Amplify Desmos Math
NEW YORK

Assessment Guide Sampler

Grade 7

Inside you'll find:

- Unit Assessments
- Exit Tickets

For Review Only.
Not Final Format.

Amplify Desmos Math
NEW YORK

Grade 7

Assessment Sampler

About Amplify

Amplify is dedicated to collaborating with educators to create learning experiences that are rigorous and riveting for all students. Amplify creates K–12 core and supplemental curriculum, assessment, and intervention programs for today's students.

A pioneer in K–12 education since 2000, Amplify is leading the way in next-generation curriculum and assessment. All of our programs provide teachers with powerful tools that help them understand and respond to the needs of every student.

Cover illustration by Caroline Hadilaksono.

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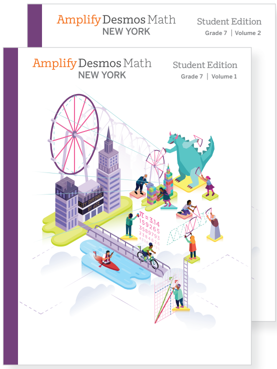
Assessment Overview

Unit Assessments | Including Pre-Unit Checks, Sub-Unit Quizzes, and End-of-Unit Assessments.

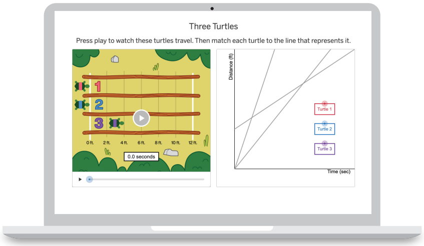
Exit Tickets | Including Exit Tickets from all lessons in every unit.

Amplify Desmos Math New York program resources

Student bundle includes:



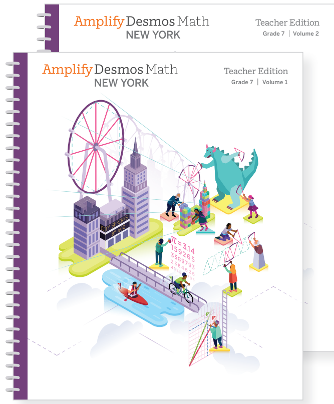
NY Student Edition,
multivolume, consumable



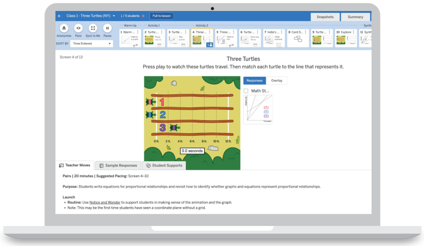
NY Digital Experience (English and Spanish), featuring:

- Interactive Student Activity Screens
- Enriched feedback
- Collaboration tools

Teacher bundle includes:



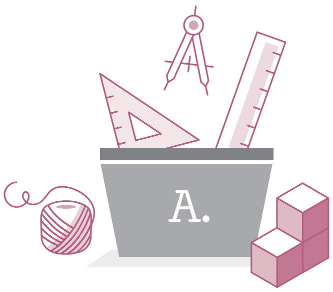
NY Teacher Edition,
multivolume, spiral-bound



NY Digital Experience (English and Spanish), featuring:

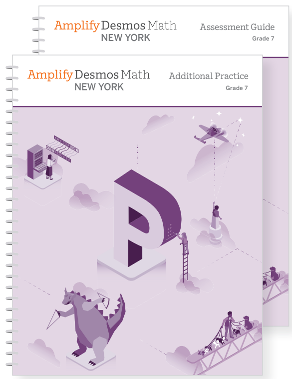
- Facilitation and progress monitoring tools
- Presentation Screens
- Instructional supports
- Assessment

Optional:



Middle School Manipulative Kit (Grades 6–8)

Extra Practice and Assessment Blackline Masters



Additional components and features may roll out over time.

Program architecture

Course

I mCLASS beginning-of-year diagnostic screener

I Interim Assesments

UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5	UNIT 6	UNIT 7	UNIT 8
18 days	19 days	16 days	20 days	20 days	24 days	19 days	22 days

Unit

A Pre-Unit Check

A Sub-Unit Quiz

End-of-Unit Assessment A

Sub-Unit 1	Sub-Unit 2 Practice Day	Sub-Unit 3 Practice Day
1 2 3 4 5 6 7	8 9 10 11 12 PD	13 14 15 16 17 18 19 20 PD

Note: The number of sub-units and lessons vary from unit to unit; this depiction shows the general structure of a unit.

Lesson

Warm-up	Activity 1	Activity 2	Synthesis	Exit Ticket	Practice
5 min	15 min	15 min	5 min	5 min	timing varies

Note: The number of activities and timing vary from lesson to lesson; this depiction shows the general structure of a lesson.

Key:

Independent

Small Groups

Pairs

Whole Class

Our robust assessments drive learning and inform instruction.

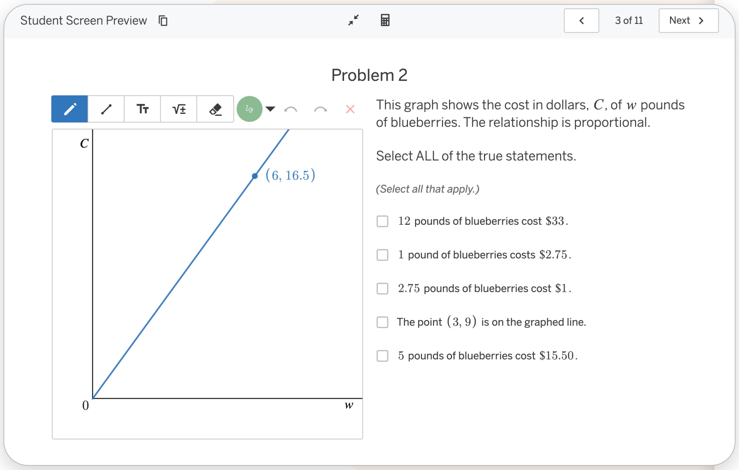
A variety of performance data in Amplify Desmos Math New York provides evidence of student learning, while helping students bolster their skills and understanding.

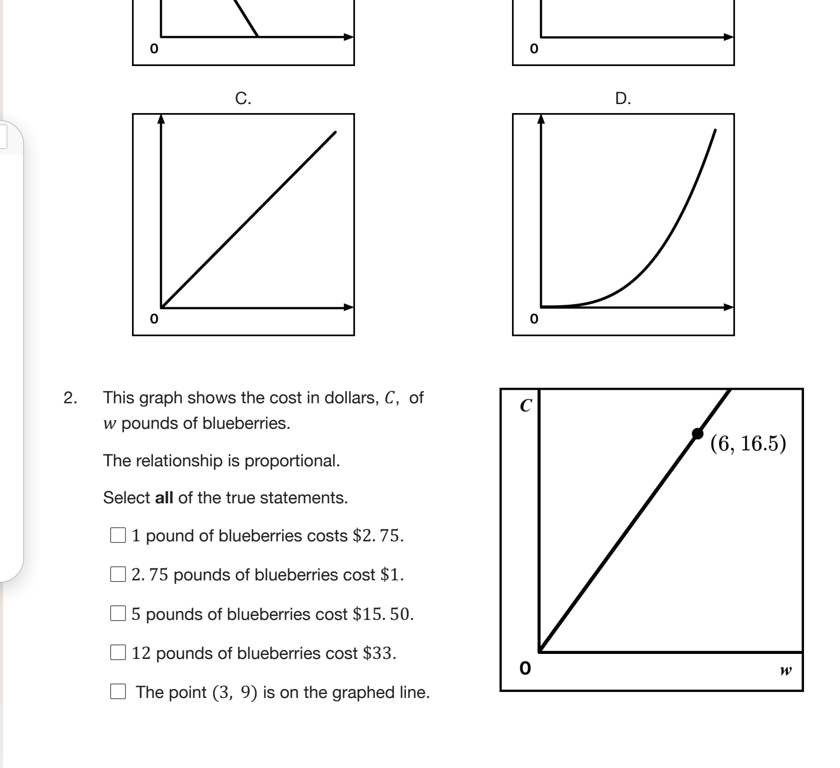
Throughout lessons, units, and the entire program, you'll find summative and formative assessments meant to provide insights into students' conceptual understandings. Student learning is never a surprise at the end of a unit—with Amplify Desmos Math New York, understanding is made continually visible.

Course-level assessments

Our beginning-of-year digital diagnostic tool measures what students know and how they think, providing teachers with targeted, actionable insights and instructional guidance. These assessments identify areas to target for students who need additional support and opportunities to extend for students who would benefit from more challenge.

- **mCLASS beginning-of-year diagnostic screener:** This tool measures the critical skills and concepts aligned to standards that are predictive of future math success. Innovative problem types reveal the processes required for math reasoning and the problem-solving strategies that go beyond the conceptual and procedural knowledge of grade-level math. They also help teachers identify students at risk for math difficulty (including difficulties related to dyscalculia) and provide detailed information about what students know and in which areas they need support. This diagnostic is in the process of being fully validated through third-party research studies conducted by WestEd.
- **Ongoing interim assessments:** These pre-generated and assignment-ready practice sets review critical moments in instruction. Teachers can create their own assessments and practice sets through the online item bank.





Digital and print assessment examples

Unit-level assessments

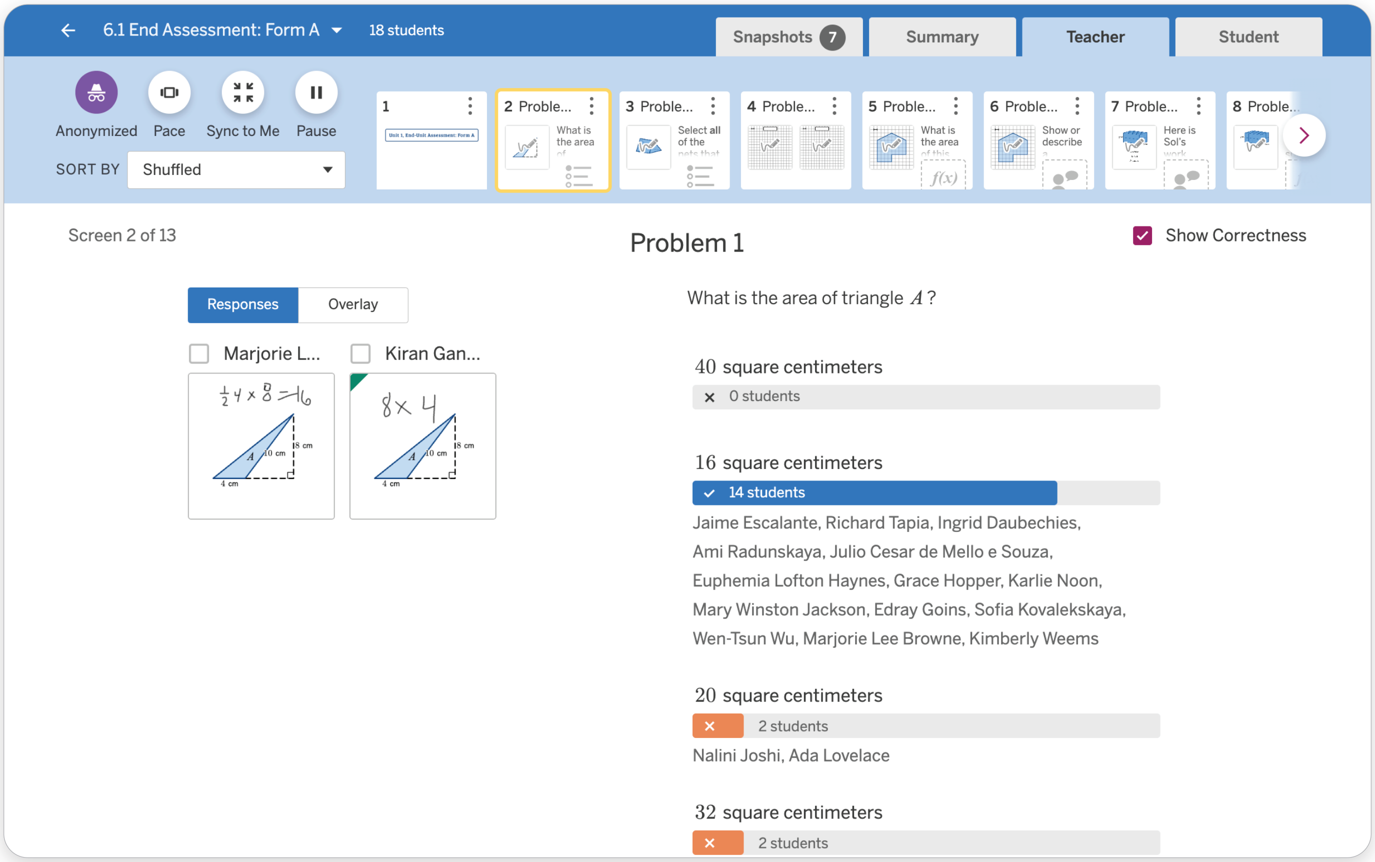
Our embedded unit assessments offer key insights into students' conceptual understanding of math. These assessments provide regular, actionable information about how students are thinking about and processing math, with both auto-scoring and in-depth rubrics that help teachers anticipate and respond to students' learning needs.

- **Pre-unit check:** Each unit begins with a check to determine student proficiency with prerequisite skills needed for success in the upcoming unit. This check is agnostic to the standards covered in the following unit and serves not as a deficit-based acknowledgement of what students do not know, but rather as an affirmation of the knowledge and skills with which they come in.
- **Sub-unit quizzes:** Student understanding never comes as an end-of-unit surprise with regular sub-unit quizzes. In these checks, students are assessed on a subset of conceptual understandings from the unit, with rubrics that help illuminate where students are and insight into what supports they need to get where they need to go.
- **End-of-Unit Assessment:** Students engage with rigorous grade-level mathematics through a variety of formats and tasks in the End-of-Unit Assessment. A combination of auto-scored and rubric-scored items provide deep conceptual insight.

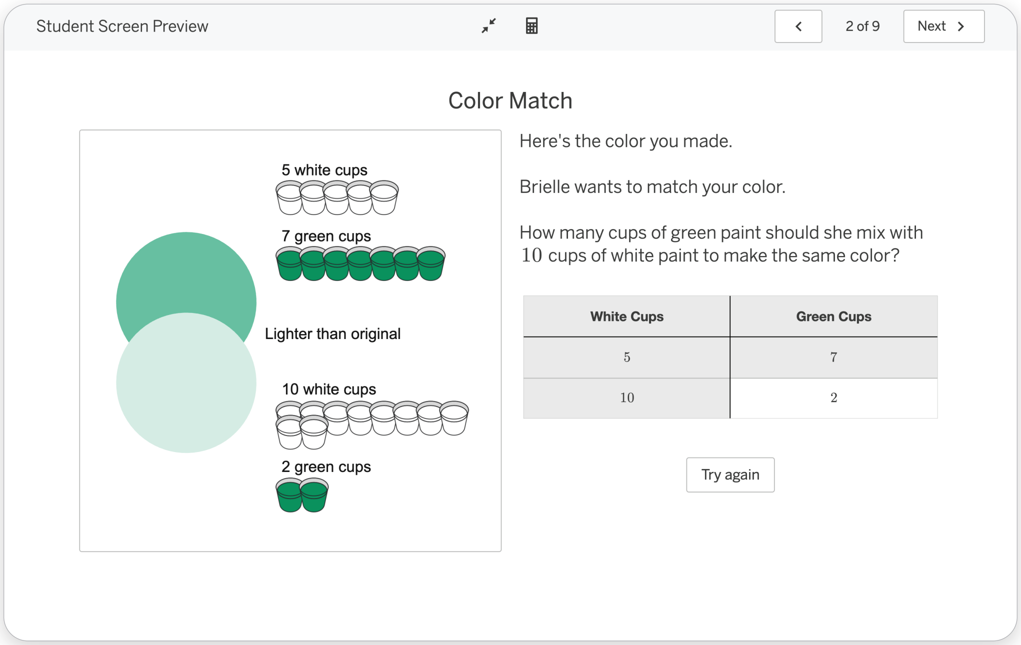
Lesson-level assessments

Amplify Desmos Math New York lessons are centered around sense-making and in-the-moment feedback. Daily moments of assessment provide valuable evidence of learning for both the teacher and student.

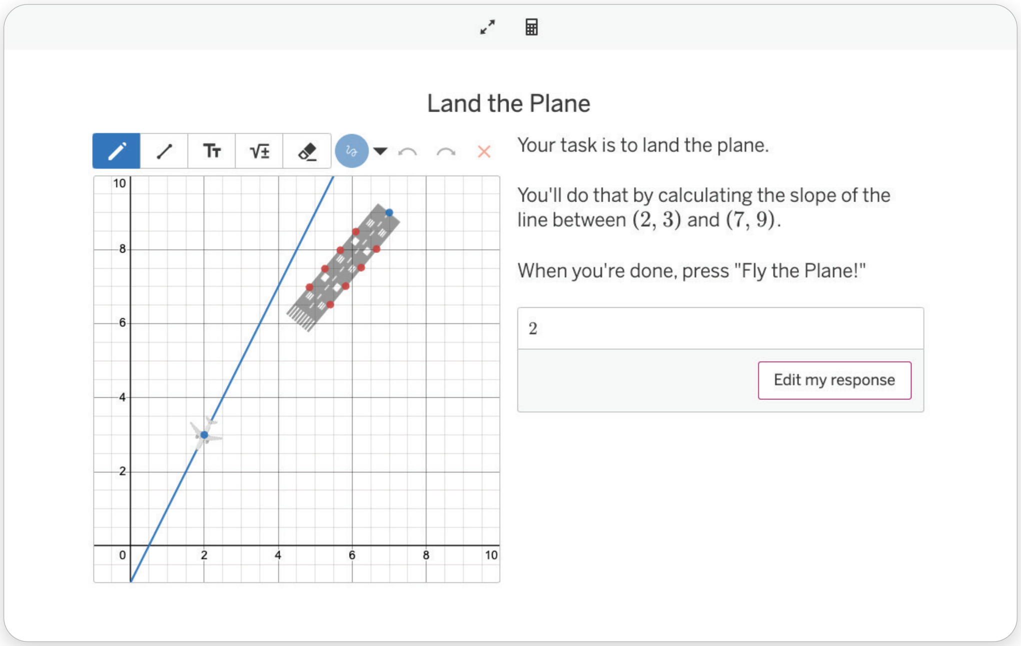
- **Exit Tickets:** Each lesson has an Exit Ticket focused on one of the key concepts in the lesson. Exit Tickets are carefully designed to minimize the time they take to complete while maximizing the insight the teacher receives on a daily basis in order to attend to student needs during the following class.
- **Enriched feedback:** We harness the power of digital math and graphing tools to show students the meaning of their thinking in context.



Enriched feedback motivates students and engages them in the learning process.



Rather than telling a student if their paint ratio is right or wrong, we mix the colors for them.



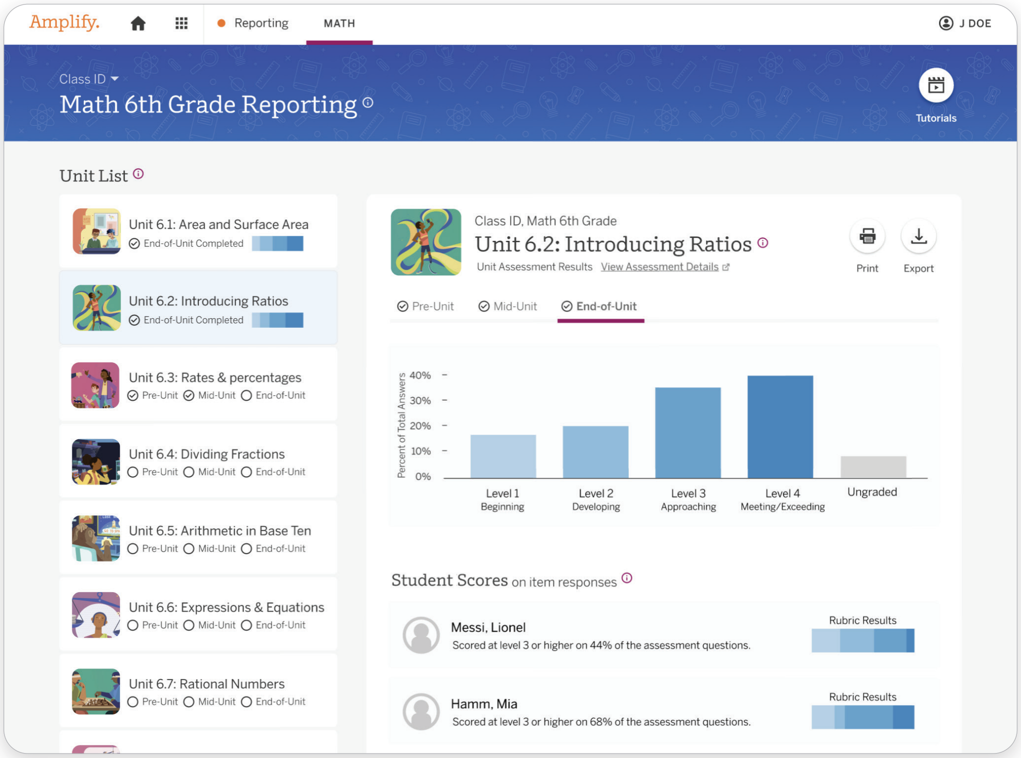
Rather than telling a student if their slope is correct, we use it to land a plane.

Reporting tools monitor progress and provide insight into learning.

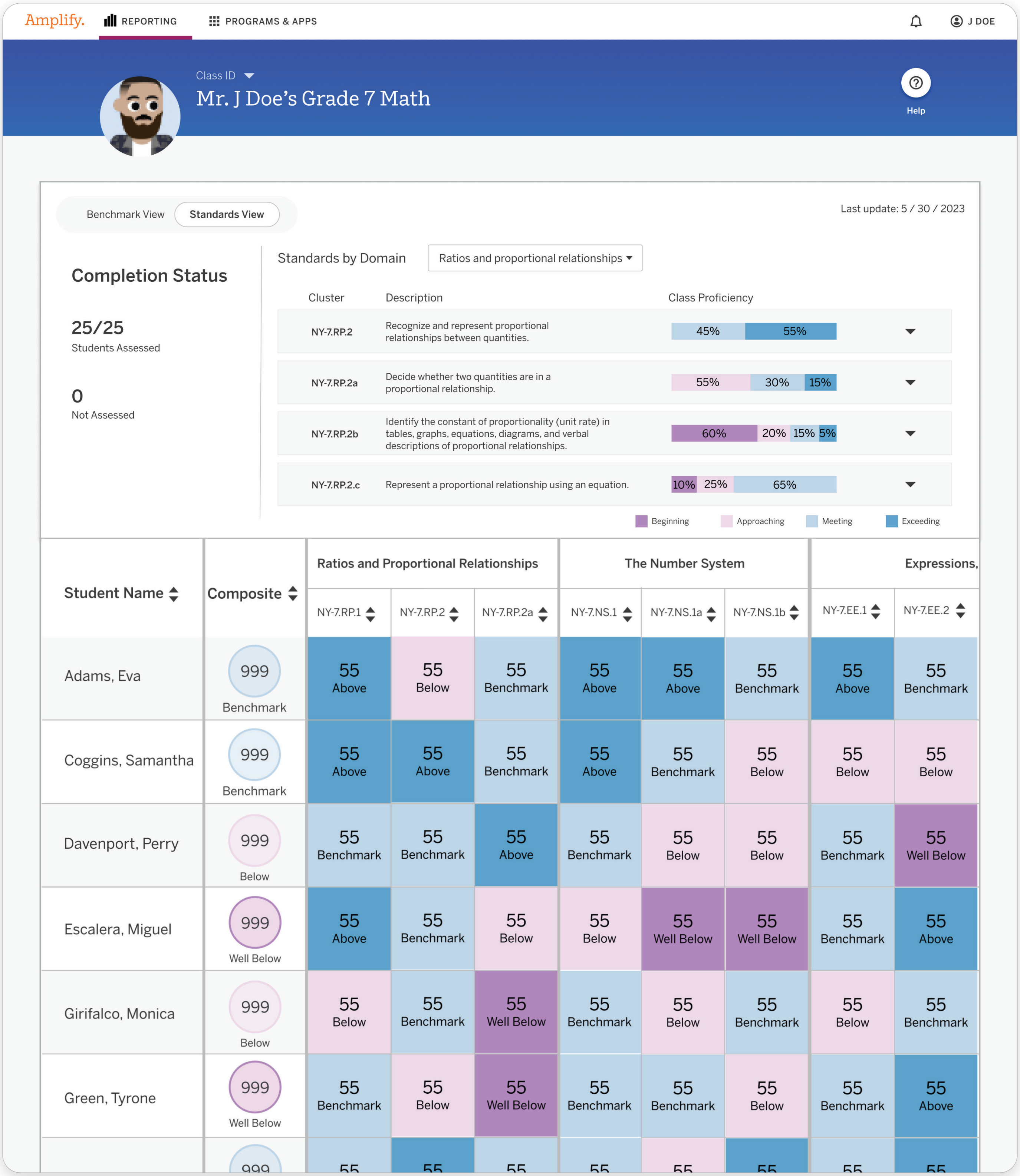
Amplify Desmos Math New York provides teachers and administrators with unified reporting and insights so that educators have visibility into what students know about grade-level math—and can plan instruction accordingly for the whole class, small groups, and individual students.

Our reports show proficiency and growth by domain, cluster, standard, and priority concept using performance data from unit assessments, then highlight areas of potential student need to allow teachers to modify their instruction and target differentiated support.

The program also includes reports on student usage, performance on benchmark assessments, school and district data, and information for caregivers. Our team will partner with you to meet the specific data and reporting needs of New York City Public Schools.



At-a-glance views of unit-level assessment results inform instructional planning, and you can also drill down to item-level analysis.



Our standards report allows you to monitor proficiency at the class and individual student levels.

GRADE 7

Amplify Desmos Math
NEW YORK

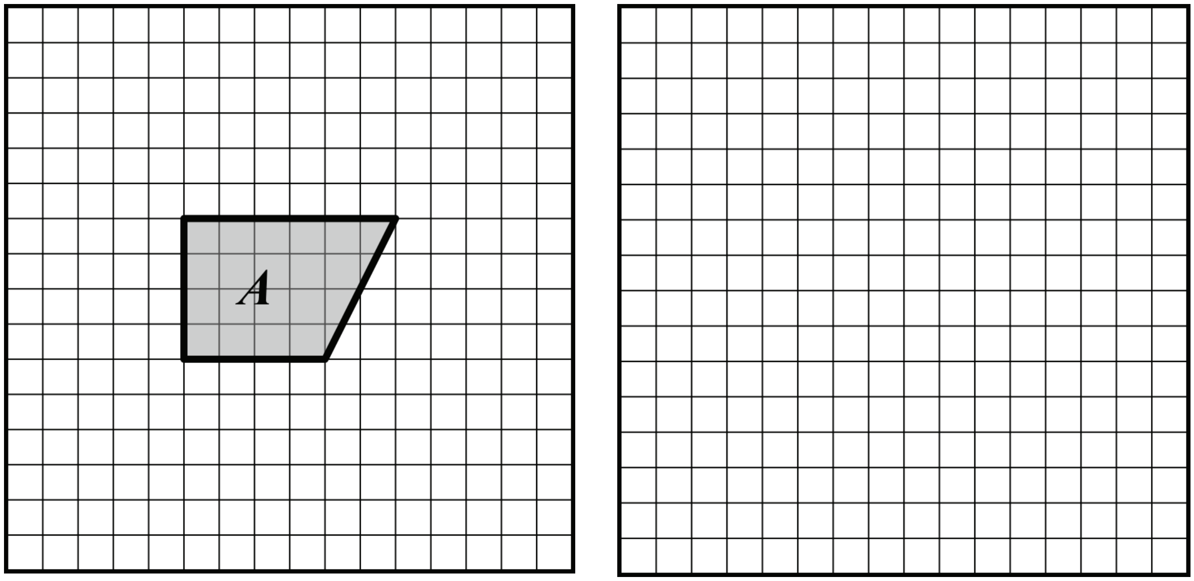
Assessment Sampler

This section includes all unit-level assessments from Amplify Desmos Math New York for Units 1–8.

- **Pre-unit Readiness Checks** are designed to help teachers see which concepts and skills from previous units and grades need to be bolstered in order for students to be successful.
- **Sub-unit Quizzes** are formal measures of what students know and can do for the lessons that immediately precede the quiz.
- **End-of-Unit Assessments** are formal measures of what students know and can do for all the lessons in the unit, with an emphasis on the critical concepts and skills of the unit.

Unit 7.1, Readiness Check Name ________________________________

1. On the grid to the right, draw a bigger or smaller version of figure A.



2. A recipe for one loaf of bread uses 2 cups of flour, 12 tablespoons of water, and 1 teaspoon of salt. Complete the table to show the quantities needed to make multiple loaves of bread.

Number of Loaves	Flour (cups)	Water (tbsp.)	Salt (tsp.)
1	2	12	1
2	4		
...	...	...	...
4		48	

3. Farah drank 3 liters of water yesterday. Rebecca drank $\frac{3}{4}$ as much water as Farah. Valeria drank twice as much water as Rebecca.

Order the amount of water drunk by each person from least to greatest. Then explain your thinking.

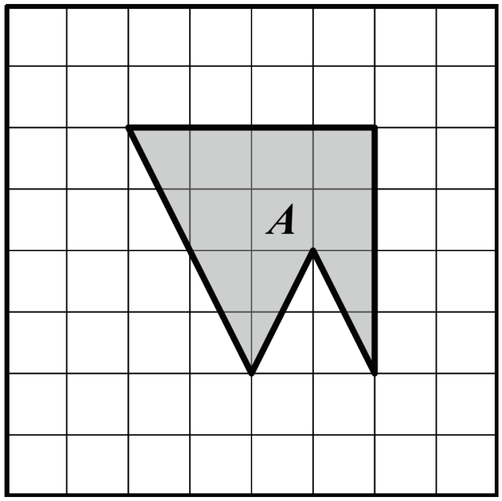
Order	Name
1 (least)	
2	
3 (greatest)	

Unit 7.1, Readiness Check Name ________________________________

4. Find the area of figure A.

   Each small square represents 1 square unit.

   Explain or show your thinking.



5. What do you know about different units?

   Order these from smallest distance (1) to largest distance (5).

   1 kilometer: _______

   1 centimeter: _______

   1 inch: _______

   1 meter: _______

   1 foot: _______

6. Did you know that marine biologists use Wiffle balls in photos to measure corals and other objects?

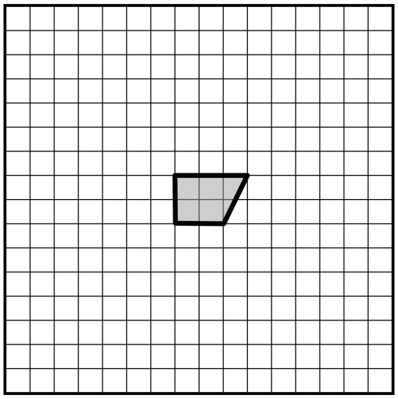
   This measurement is called a Wiffle.

   Complete the table of inches and Wiffles.

Distance in Wiffles	Distance in Inches
2	7
	21
3	

Answer Key

1. *The position and size may vary, but the shape must match*.



2.

Number of Loaves	Flour (cups)	Water (tbsp.)	Salt (tsp.)
1	2	12	1
2	4	24	2
...	...	...	...
4	8	48	4

3.

Order	Name
1 (least)	**Rebecca**
2	**Farah**
3 (greatest)	**Valeria**

Explanations vary. $\frac{3}{4}$ is less than 1 whole, so Rebecca drank less than Farah. $\frac{3}{4} \cdot 2 = 1.5$, which is more than 1 whole, so Valeria drank more than Farah.

4. 10 square units

Explanations vary. Figure A can be surrounded by a 4-unit-by-4-unit square with two triangles removed. Those triangles have areas of 4 square units and 2 square units. The area of figure A is 10 square units since $16 - 4 - 2 = 10$.

5. 1 kilometer: **5**

1 centimeter: **1**

1 inch: **2**

1 meter: **4**

1 foot: **3**

6.

Distance in Wiffles	Distance in Inches
2	7
6	21
3	10.5

Unit 7.1, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:
- Problems 1 and 2 before Lesson 3
- Problem 3 before Lesson 4
- Problem 4 before Lesson 5
- Problem 5 before Lesson 6
- Problem 6 before Lesson 7

Problem 1

(Standards: **7.G.A.1, MP7**)

This question is intended to surface what students already know about how distances and angles change when scaling a shape. Students are asked to draw a scaled copy of a figure by making use of the structure of the grid. This content first appears in Lesson 3, where students draw scaled copies of figures.

Suggested Next Steps: If students struggle . . .
- Consider inviting students to share out loud what they know about scaled drawings before Screen 3 of Lesson 3.

Problem 2

(Standard: **6.RP.A.3.A**)

This question is intended to surface what students already know about scaling using a table. This content first appears in Lesson 2, where students analyze proportional relationship tables.

Suggested Next Steps: If students struggle . . .
- Consider paying special attention to students' understanding as they engage in Lesson 2. If students are struggling with proportional relationships at the end of Lesson 2, consider reviewing tables like this one briefly before continuing with Lesson 3.

Problem 3

(Standards: **5.NF.B.5.B, MP3**)

This question is intended to surface what students already know from Grade 5 about the impact of multiplying a quantity by a value less than or greater than 1. Students construct a viable argument as they justify their ranked order choice. This content first appears in Lesson 4, where students consider the impact of scale factors greater than, equal to, or less than 1 on a figure.

Suggested Next Steps: If students struggle . . .
- Pay special attention to the Lesson 4 Warm-Up. Consider connecting language such as "twice as big" and "half the size" to scale factors in Lesson 4.

Problem 4

(Standards: **6.G.A.1, MP3, MP7**)

This question is intended to surface different strategies students use to calculate the area of figures on a grid. Students were exposed to this content in Math 6. They use the structure of the grid to calculate the area of the figure, and construct a viable argument to explain their area calculations. This content first appears in Lesson 5, where students explore the impact of scaling figures on their areas.

Suggested Next Steps: If students struggle . . .

- Consider revisiting this Problem as a class before beginning Lesson 5. Use the snapshots tool to highlight students' strategies, such as decomposing and rearranging.

Problem 5

(Standard: **4.MD.A.1**)

This question is intended to surface what students already know from Grade 4 about the relationships between different units. This content first appears in Lesson 6, where students first encounter the idea of scale.

Suggested Next Steps: If students struggle . . .

- Plan to create an anchor chart early in the unit and include this problem for students to use as they think about appropriate scales to use throughout this unit.

Problem 6

(Standard: **5.MD.A.1**)

This question is intended to surface what students already know from Grade 5 about converting between different units. This content first appears in Lesson 7, where students use a scale to calculate actual and scaled distances.

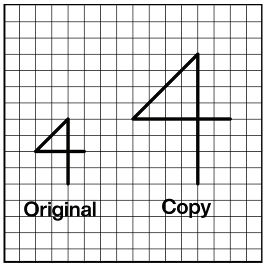
Suggested Next Steps: If students struggle . . .

- Plan to review this problem before students engage in Activity 1 of Lesson 7.

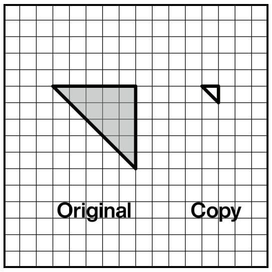
Unit 7.1, Quiz: Lessons 1–5 Name ______________________________

1. Here are pairs of figures, each with an original and a copy. Circle the pair of figures that show a copy that has a scale factor of less than 1.

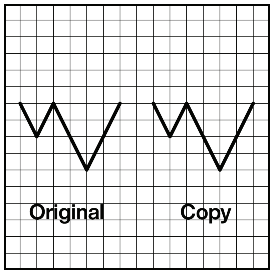
A.



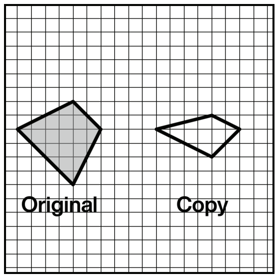
B.



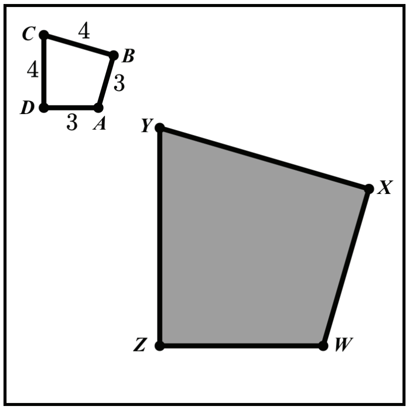
C.



D.



2. Polygon $WXYZ$ is a scaled copy of $ABCD$. The scale factor from $ABCD$ to $WXYZ$ is 3.

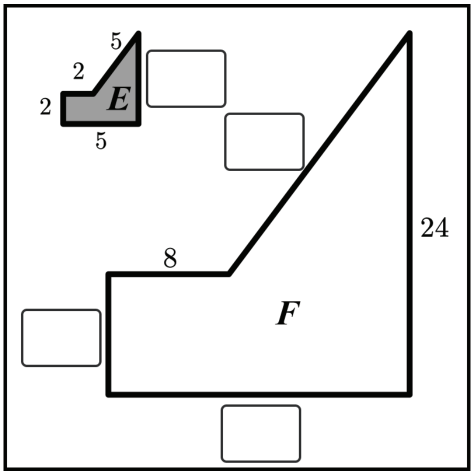


All lengths are measured in grid units.

Select **all** of the true statements about $WXYZ$.

- ☐ Segment YZ is 7 units long.
- ☐ The scale factor from $WXYZ$ to $ABCD$ is $\frac{1}{3}$.
- ☐ If the area of $ABCD$ is 12 square units, then the area of $WXYZ$ is 36 square units.
- ☐ The distance between W and Y is three times the distance between A and C.
- ☐ The ratio of $\frac{BC}{BA}$ is equivalent to the ratio of $\frac{XY}{XW}$.

Figure F is a scaled copy of figure E.



All lengths are measured in grid units.

3.1 Label each missing length so the side lengths of figure F are proportional to the side lengths of figure E.

3.2 In order to scale figure E to figure F, what scale factor should you use? ______

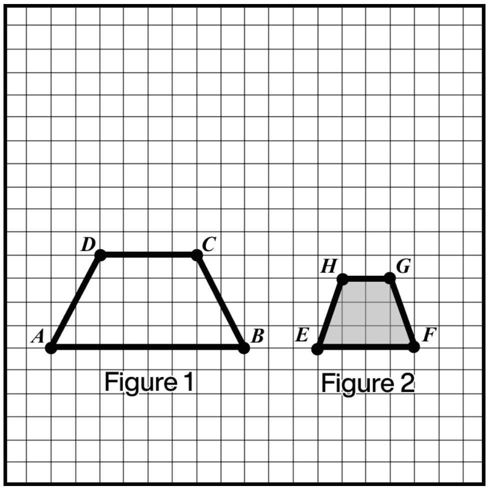
3.3 In order to scale figure F back to figure E, what scale factor should you use? ______

Explain how you know.

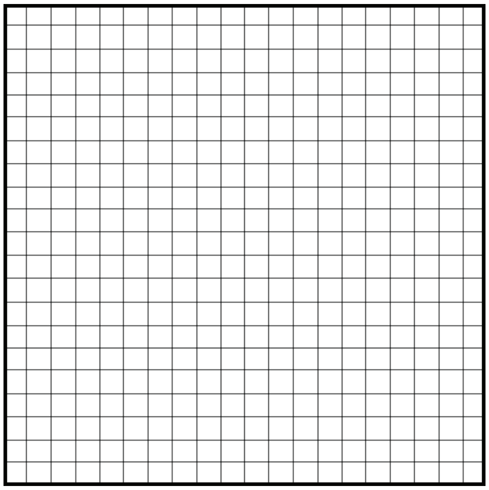
 Name ____

4.1 Are the side lengths in figure 1 proportional to the side lengths in figure 2? ________

Explain how you know.



4.2 Draw a scaled copy of figure 1 using a scale factor of $\frac{3}{2}$.

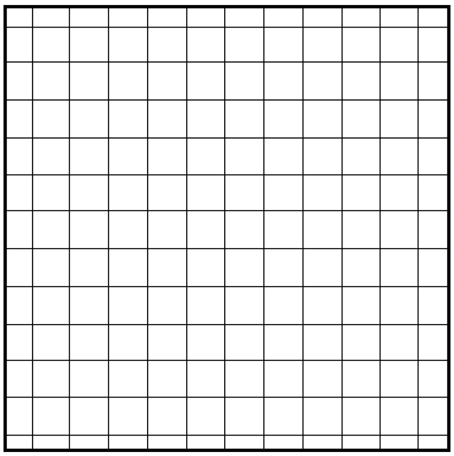


Rectangle S is 3 units by 5 units.

5.1 Draw a scaled copy of rectangle S with an **area** of 60 square units. Label each side length of the copy.

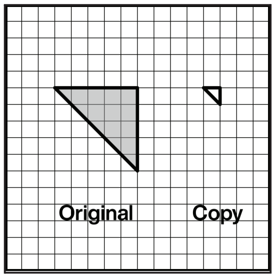
5.2 What is the scale factor between rectangle S and your copy? ______

Explain how you know.



Answer Key

1. B.

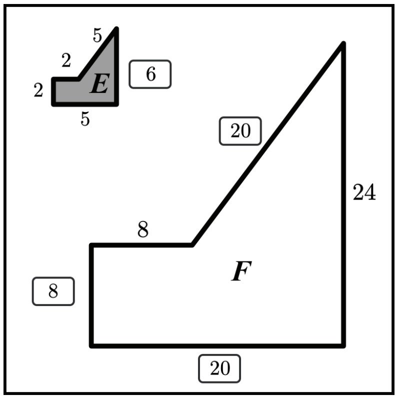


2. ✓ The scale factor from $WXYZ$ to $ABCD$ is $\frac{1}{3}$.

   ✓ The distance between W and Y is three times the distance between A and C.

   ✓ The ratio of $\frac{BC}{BA}$ is equivalent to the ratio of $\frac{XY}{XW}$.

3.1



All lengths are measured in grid units.

3.2 Scale factor: 4

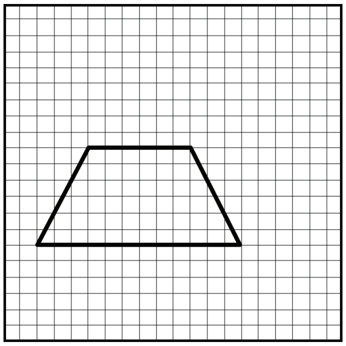
3.3 Scale factor: $\frac{1}{4}$. *Explanations vary.*

- The scale factor is $\frac{1}{4}$ because if you multiply each side of figure F by $\frac{1}{4}$, you get the side lengths of figure E.
- The ratio of any side length in figure E to the same side length in figure F is $\frac{1}{4}$. This is the scale factor you use to scale figure F back to figure E.

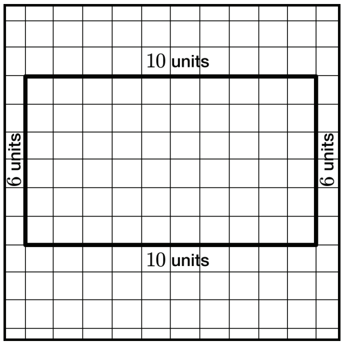
4.1 No, *Explanations vary.*

- Even though the width of Figure 2 is half the width of Figure 1, its height is not half. Therefore, the side lengths of the figures are not proportional.
- The side lengths of the figures are not proportional because they do not have equivalent ratios. For example, the widths form a ratio of $\frac{8}{4} = 2$, but the heights form a ratio of $\frac{4}{3}$, which is not equal to 2.

4.2



5.1



5.2 Scale factor: 2

Explanations vary. All of the lengths of the scaled copy are twice the lengths of the original figure. For example, the height of the original figure is 3 units, while the height of the scaled copy is $3 \cdot 2 = 6$ units.

Unit 7.1, Quiz: Summary and Rubric

Content Standards Summary

Standard	7.G.A.1	7.G.B.6	7.RP.A	7.RP.A.2	7.RP.A.2.A
Problems	1, 2, 3, 4, 5	2, 5	3.1	3.2, 3.3	2, 4.1

Problem 1
(Standards: **7.G.A.1, MP7**)

In this problem, students determine how scale factors less than 1 affect distances in scaled copies. Students make use of the structure of the grid to determine which set of figures are scaled copies with a scale factor less than 1. This problem corresponds most directly to the work students did in Lesson 4: Scale Factor Challenges.

Suggested Next Steps: If students struggle . . .
- Consider asking students to describe the effect on a scaled copy when the scale factor is less than 1.
- Consider revisiting Lesson 4, Activity 1, Screen 4.

Problem 2
(Standards: **7.G.A.1, 7.G.B.6, 7.RP.A.2.A**)

In this problem, students compare lengths and areas in an original figure and a scaled copy. This problem corresponds most directly to the work students did in Lesson 2: Scaling Robots and Lesson 3: Make It Scale.

Suggested Next Steps: If students struggle . . .
- Consider asking students how to determine the lengths of the sides of polygon $WXYZ$. Consider asking them how scaling impacts the area of a scaled copy.
- Consider revisiting Practice Day 1: Practice Problems, choosing one or two problems to look at based on assessment results.

Unit 7.1, Quiz: Summary and Rubric

Problem 3

(Standards: **7.G.A.1, 7.RP.A, 7.RP.A.2, MP6**)

In this problem, students calculate missing lengths in a scaled copy and determine the scale factor between an original figure and a scaled copy. Students are asked to explain their thinking, thus attending to precision as they use precise mathematical language to defend their calculations for the scale factor of two figures. This problem corresponds most directly to the work students did in Lesson 2: Scaling Robots and Lesson 4: Scale Factor Challenges.

Suggested Next Steps: If students struggle . . .

- Consider asking students which side measurements should be used to determine a scale factor for the two figures. Consider asking them how the scale factor between figure E and figure F relates to the scale factor between figure F and figure E.
- Consider revisiting Lesson 4, Activity 1, Screens 3 and 4.

Problem 4

(Standards: **7.G.A.1, 7.RP.A.2.A, MP6**)

In this problem, students determine if the side lengths in two figures are proportional, and they draw scaled copies. Students attend to precision as they use precise mathematical language to justify why the side lengths in two figures are not proportional. This problem corresponds most directly to the work students did in Lesson 1: Scaling Machines and Lesson 3: Make It Scale.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why Figure 2 is not a scaled copy of Figure 1.
- Consider revisiting Lesson 3, Activity 2, Screen 7.

Problem 5

(Standards: **7.G.A.1, 7.G.B.6, MP3**)

In this problem, students connect scaled copies and areas. They construct a viable argument to explain the scale factor they determined. This problem corresponds most directly to the work students did in Lesson 5: Tiles.

Suggested Next Steps: If students struggle . . .

- Consider asking students to calculate the area of rectangle S. Consider asking them how comparing the area of rectangle S and area of the scaled copy of rectangle S can help to determine the scale factor between the two figures.
- Consider revisiting Lesson 5, Activity 2, Screen 5.

Unit 7.1, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.G.A.1 MP7	Correct choice.			Incorrect choice. *Students who select the choice with two congruent figures may have answered the question "Which scaled copy has a scale factor equal to 1?"*	Did not attempt.
2	7.G.A.1 7.G.B.6 7.RP.A.2.A	**All correct** choices and **no incorrect** choices. • The scale factor from $WXYZ$ to $ABCD$ is $\frac{1}{3}$ • The distance between W and Y is three times the distance between A and C. • The ratio of $\frac{BC}{BA}$ is equivalent to the ratio of $\frac{XY}{XW}$.	**Two correct** choices and **no incorrect** choices. **Three correct** choices and **one incorrect** choice.	**Two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.	Did not attempt.

Unit 7.1, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3.1	7.G.A.1 7.RP.A	Work is complete and correct.	Work shows **conceptual understanding**, with some errors. *E.g., Student correctly calculates 3 of the 4 lengths.*	Work shows **incomplete understanding**, with significant errors. *E.g., Student correctly calculates 2 of the 4 lengths.*	Work shows **limited understanding** of scaled copies.	Did not attempt.
3.2	7.G.A.1 7.RP.A.2	Work is complete and correct. • Scale factor: 4	Work shows **conceptual understanding**, with some errors. *E.g., Students who wrote $\frac{1}{4}$ (or equivalent) may have answered the question “In order to scale figure F to figure E, what scale factor should you use?”*	Work shows **incomplete understanding** with significant errors. *E.g., Students who write 6 may have subtracted the corresponding side lengths instead of dividing them.*	Work shows **limited understanding** of calculating a scale factor.	Did not attempt.

Unit 7.1, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3.3	7.G.A.1 7.RP.A.2 MP6	Correct answer with correct explanation. • Scale factor: $\frac{1}{4}$ *E.g.,The ratio of any side length in figure E to the same side length in figure F is $\frac{1}{4}$. This is the scale factor you use to scale figure F back to figure E.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who write 4 may have answered the question "In order to scale figure E to figure F, what scale factor should you use?"*	Work shows **incomplete understanding** with significant errors. *E.g., Students who write 6 or -6 may have subtracted the corresponding side lengths instead of dividing them.*	Work shows **limited understanding** of calculating a scale factor.	Did not attempt.

Unit 7.1, Quiz: Summary and Rubric

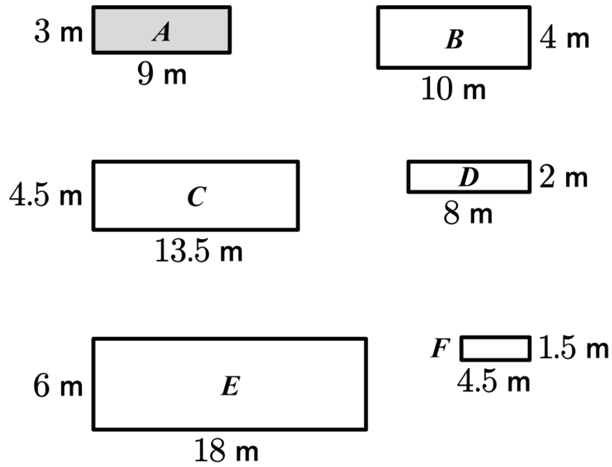
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
4.1	7.G.A.1 7.RP.A.2.A MP6	Correct choice with correct explanation. • No *E.g., Even though the width of Figure 2 is half the width of Figure 1, its height is not half. Therefore, the side lengths of the figures are not proportional.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who write "No, they are different shapes" may recognize that scaled copies have dimensions that have a constant ratio with each other.*	Work shows **incomplete understanding** with significant errors. *E.g., Students who write "Yes, they look the same" may recognize that scaled copies have the same shape.*	Work shows **limited understanding** identifying proportional side lengths.	Did not attempt.
4.2	7.G.A.1	Correct drawing.	Work shows **conceptual understanding**, with some errors. *E.g., Students who draw a scaled copy with a scale factor other than* $\frac{3}{2}$ *may understand the meaning of a scaled copy.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of drawing scaled copies**.**	Did not attempt.

Unit 7.1, Quiz: Summary and Rubric

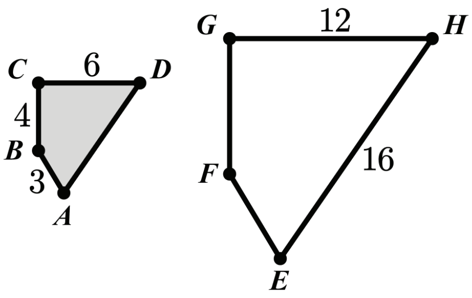
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
5.1	7.G.A.1 7.G.B.6	Correct drawing.	Work shows **conceptual understanding**, with some errors. *E.g., Students who draw a rectangle with side lengths 12 units by 20 units may have noticed the area of rectangle S multiplied by 4.*	Work shows **incomplete understanding** with significant errors. *E.g., Students who draw a rectangle with side lengths 3 units by 5 units may need support understanding the question.*	Work shows **limited understanding** of the connection between scaled copies and areas.	Did not attempt.
5.2	7.G.A.1 7.G.B.6 MP3	Correct answer with correct explanation. *E.g., 2. All of the lengths of the scaled copy are twice the lengths of the original figure. For example, the height of the original figure is 3 units, while the height of the scaled copy is $3 \cdot 2 = 6$ units.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who write 4 units may have noticed the area of rectangle S multiplied by 4.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of drawing scaled copies.	Did not attempt.

Unit 7.1, End-Unit Assessment: Form A Name ______________________________

1. Circle **all** the scaled copies of rectangle A.



2. Polygon $EFGH$ is a scaled copy of polygon $ABCD$.



Select **all** of the true statements.

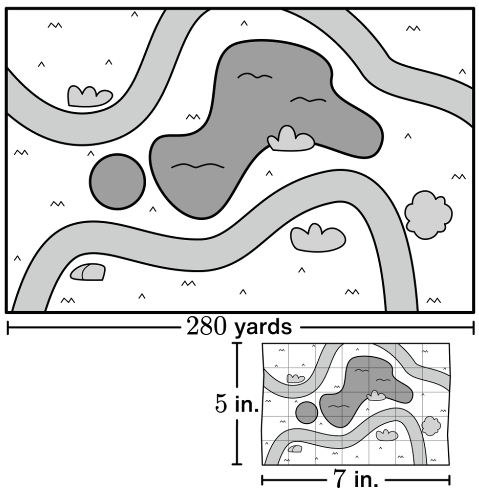
- ☐ Segment EF is twice as long as segment AB.
- ☐ Segment FG is twice as long as segment CD.
- ☐ The scale factor from $EFGH$ to $ABCD$ is 2.
- ☐ The length of segment AD is 8 units.
- ☐ The area of $EFGH$ is twice the area of $ABCD$.

3. A scale drawing of a rectangular park is 5 inches wide and 7 inches long.

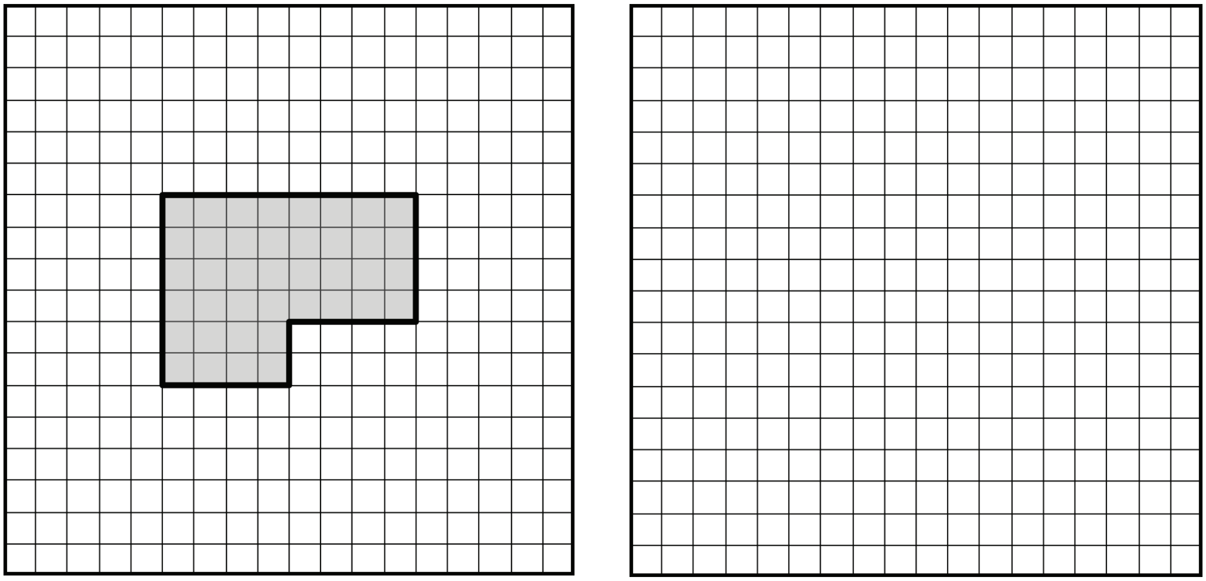
The actual park is 280 yards long.

What is its area?

A. 35 square yards
B. 200 square yards
C. 1 400 square yards
D. 56 000 square yards



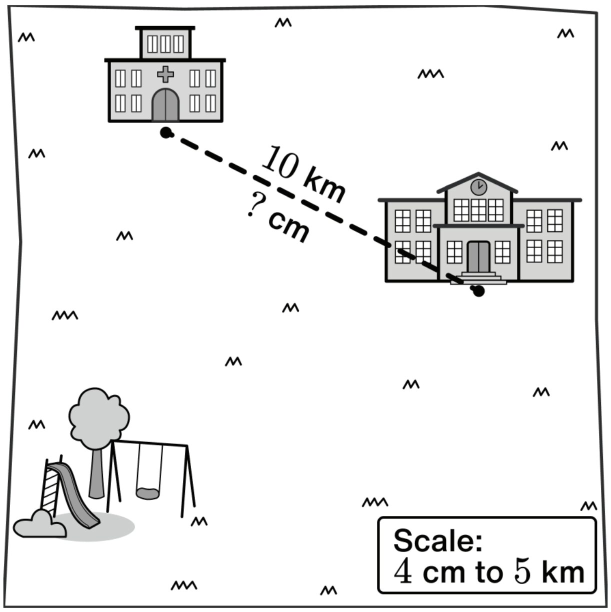
4. Draw a scaled copy of the polygon using a scale factor of $\frac{1}{2}$.



Roberto is drawing a map of his town.

5.1 He wants to include a school and a hospital, which are 10 kilometers apart.

What should the distance between the school and the hospital be on the map?



5.2 On the map, the school and the playground are 12 centimeters apart.

What is the actual distance between the school and the playground?

Unit 7.1, End-Unit Assessment: Form A Name ______________________________

A trail runner gets a new map of her favorite mountain.

- Her old map has a scale of 1 cm to 100 m.
- Her new map has a scale of 1 cm to 500 m.

6.1 If the maps represent the same area, are the distances on the new map longer, shorter, or the same size as the old map?

A. Longer
B. Shorter
C. The same size

Explain your thinking.

6.2 She ran a trail that was 40 cm long on her old map.

How long is this trail on her new map?

Explain your thinking.

Unit 7.1, End-Unit Assessment: Form A Name ______________________________

Reflection: Select a question to answer.

☐ What is something you are proud of from this unit?

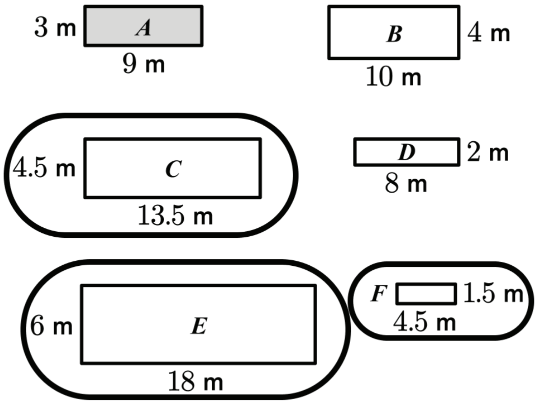
☐ Write what you know about a topic from this unit that you weren't asked about today.

☐ Describe or show one strategy you found helpful in this unit.
Name any students who helped you with this strategy.

☐ What else would you like your teacher to know?

Answer Key

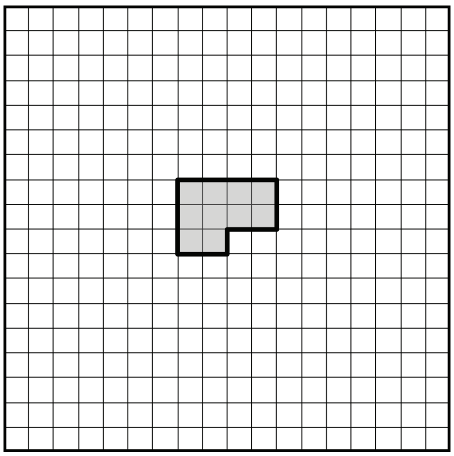
1.



2. ✓ Segment EF is twice as long as segment AB.
   ✓ The length of segment AD is 8 units.

3. D. $56\,000$ square yards

4. *The position of the scaled copy may vary, but size and shape must match.*



5.1 8 centimeters

5.2 15 kilometers (or equivalent)

6.1 B. Shorter

Explanations vary. If each centimeter on the new map represents five times the distance on the old map, the new map is much smaller. Each distance on the new map would be $\frac{1}{5}$ of the distance on the old map.

6.2 8 centimeters

Explanations vary. Using the scales of both maps, a trail that is 40 centimeters long on her old map would be equivalent to an actual distance of $4\,000$ meters or 4 kilometers, since $40 \cdot 100 = 4\,000$. On her new map, this same distance would be 8 centimeters because $\frac{4\,000}{500} = 8$.

Unit 7.1, End Assessment Summary and Rubric: Form A

Content Standards Summary

Standard	7.G.A.1	7.G.B.6
Problems	1, 2, 3, 4, 5, 6	3

Problem 1

(Standard: **7.G.A.1**)

In this problem, students demonstrate an understanding of the relationship between lengths in a figure and corresponding lengths in a scaled copy. This problem corresponds most directly to the work students did in Lesson 2: Scaling Robots. The work in this problem helps students build toward developing proportional reasoning in the next unit.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why rectangles B and D are not scaled copies of rectangle A.
- Consider revisiting Lesson 2, Activity 1.

Problem 2

(Standard: **7.G.A.1**)

In this problem, students demonstrate an understanding of how scaling impacts the area of a scaled copy and how scale factor affects distances in scaled copies. This problem corresponds most directly to the work students did in Lessons 2–5.

Suggested Next Steps: If students struggle . . .

- Consider asking students to determine the length of segments AD and EF and then discuss how they compare to the corresponding sides in polygons $ABCD$ and $EFGH$. Consider asking them how scaling impacts the area of a scaled copy.
- Consider revisiting Lesson 2, Activity 2 or Lesson 5, Activity 2, Screen 5.

Problem 3

(Standards: **7.G.A.1, 7.G.B.6**)

In this problem, students calculate the area of a scale drawing when given two images. This problem corresponds most directly to the work students did in Lesson 5: Tiles.

Suggested Next Steps: If students struggle . . .

- Consider asking students to determine the scale factor from the actual park to the map and the area of the given map. Consider asking them how scaling impacts the area of a scaled copy.
- Consider revisiting Lesson 5, Synthesis, Screen 10.

Problem 4

(Standards: **7.G.A.1, MP7**)

In this problem, students draw a scaled copy of a figure on a grid, using the structure of the grid to draw an accurate polygon. This problem corresponds most directly to the work students did in Lesson 3: Make It Scale.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe the effect on a scaled copy when the scale factor is less than 1. Consider asking them how the structure of the grid can be used to help create the sketch of the scaled copy.
- Consider revisiting Lesson 3, Activity 2, Screen 7.

Unit 7.1, End Assessment Summary and Rubric: Form A

Problem 5

(Standards: **7.G.A.1, MP2**)

In this problem, students use scales and scale drawings to calculate actual and scaled distances. Students contextualize by using a scaled drawing of a map of town to determine various distances between locations on the map. This problem corresponds most directly to the work students did in Lesson 7: Will It Fit?

Suggested Next Steps: If students struggle . . .

- Consider asking students how the map scale can be used to determine the desired distances.
- Consider revisiting Lesson 7, Activity 1, choosing one or two dimensions of the court to review.

Problem 6

(Standards: **7.G.A.1, MP6**)

In this problem, students calculate distances on a scale drawing when given a drawing with a different scale. Students are asked to explain their thinking, thus attending to precision as they defend their responses using mathematical precision. This problem corresponds most directly to the work students did in Lesson 8: Scaling States and Lesson 9: Scaling Buildings.

Suggested Next Steps: If students struggle . . .

- Consider asking students how the given scales compare in size. Consider asking them how the scales can be used to determine the desired distance.
- Consider revisiting Lesson 8, Activity 3, Problem 1.

Unit 7.1, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.G.A.1	Student selects all of the correct choices and does not select any incorrect choices. • C • E • F	Student selects one or two of the correct choices and does not select any incorrect choices.	Student selects one or two of the correct choices but also includes an incorrect choice. Student selects all of the correct choices and one incorrect choice.	Student selects only incorrect choices. Student selects two or more incorrect choices with some correct choices.	Did not attempt.
2	7.G.A.1	Student selects all of the correct choices and does not select any incorrect choices. • Segment EF is twice as long as segment AB. • The length of segment AD is 8 units.	Student selects one of the correct choices and does not select any incorrect choices. Student selects both of the correct choices, and one incorrect choice.	Student selects one of the correct choices and one incorrect choice.	Student only selects incorrect choices. Student selects two or more incorrect choices with the correct choices.	Did not attempt.

Unit 7.1, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3	7.G.A.1, 7.G.B.6	• 56 000 square yards			• 200 square yards Student may have found the correct width of the park instead of the area. • 1 400 square yards Student may have multiplied the area of the drawing by the scale factor, 40. • 35 square yards Student may have calculated the area of the scale drawing rather than that of the park.	Did not attempt.
4	7.G.A.1, MP7	Student successfully draws a scaled copy of the polygon with a scale factor of $\frac{1}{2}$.	Student has minor errors in determining the dimensions of the figure, such as a pair of segments 1 unit longer than they should be.	Student demonstrates basic understanding of reproducing a scale drawing with a different scale. Student draws a scaled copy with any other scale factor. Student may not recognize that a scale factor between 0 and 1 is a reduction.	Significant errors show lack of conceptual understanding or mastery. Student adds or subtracts $\frac{1}{2}$ to the length of each side. Drawing shows lack of use of any scale factor. Multiple errors in determining dimensions.	Did not attempt.

Unit 7.1, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.1	7.G.A.1, MP2	• 8 centimeters	• 12.5 centimeters Student incorrectly interpreted or applied the scale factor instead using a scale of 5 cm to 4 km.	• 0.8 centimeters • 1.25 centimeters Student may have correctly determined a unit rate but did not apply it to 10 km.	Weak evidence of understanding how to use scales and scale drawings.	Did not attempt.
5.2	7.G.A.1, MP2	• 15 kilometers	• 9.6 kilometers Student incorrectly interpreted or applied the scale factor instead using a scale of 5 cm to 4 km.	• 0.8 kilometers • 1.25 kilometers Student may have correctly determined a unit rate but did not apply it to the 12 cm distance.	Weak evidence of understanding how to use scales and scale drawings.	Did not attempt.
6.1	7.G.A.1, MP6	Student successfully answers the question and includes a logical and complete explanation.	Correct choice with minor flaws in explanation. Incorrect choice with logical and complete explanation. Student may not have understood the question but communicates conceptual understanding of the relationship between map scales.	Correct choice with incomplete explanation. Incorrect choice with explanation that communicates partial understanding of the relationship between the map scales.	Incorrect choice with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.1, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
6.2	7.G.A.1, MP6	Work is complete and correct. • 8 centimeters. A trail that is 40 centimeters long on her old map would mean the actual distance is $4\ 000$ meters. On her new map, this same distance would be 8 centimeters because $\frac{4\ 000}{500} = 8$.	Work shows conceptual understanding and mastery, with some errors. Student may have arithmetic errors in otherwise correct work. Work involves correctly finding the actual distance of $4\ 000$ meters, but goes wrong after that. Student may have inverted a scale factor (or multiplied when division is called for).	Work shows a developing but incomplete conceptual understanding, with significant errors. Student answers 8 centimeters without explanation. Student may have made multiple mistakes that involve inversion of scale factors.	Weak evidence of understanding proportional reasoning. Student does not show any use of proportional thinking. Incorrect answer without explanation.	Did not attempt.

Unit 7.2, Readiness Check Name ______________________________

1. An airplane flew across the Pacific Ocean at a constant speed. The table shows the amount of time and the distance traveled.

   Complete the table with the missing values.

Time (hours)	Distance Traveled (miles)
2	
3	1 650
6	

2. Blueberries cost $\$4.00$ per pound.

   2.1 How many pounds of blueberries can you buy for $\$1.00$?

   2.2 How many pounds of blueberries can you buy for $\$13.00$?

   Explain or show your thinking.

3. Antwon makes hot chocolate by mixing 2 cups of milk with 5 tablespoons of cocoa.

   3.1 How many tablespoons of cocoa would that be for 1 cup of milk?

   3.2 How many cups of milk would that be for 1 tablespoon of cocoa?

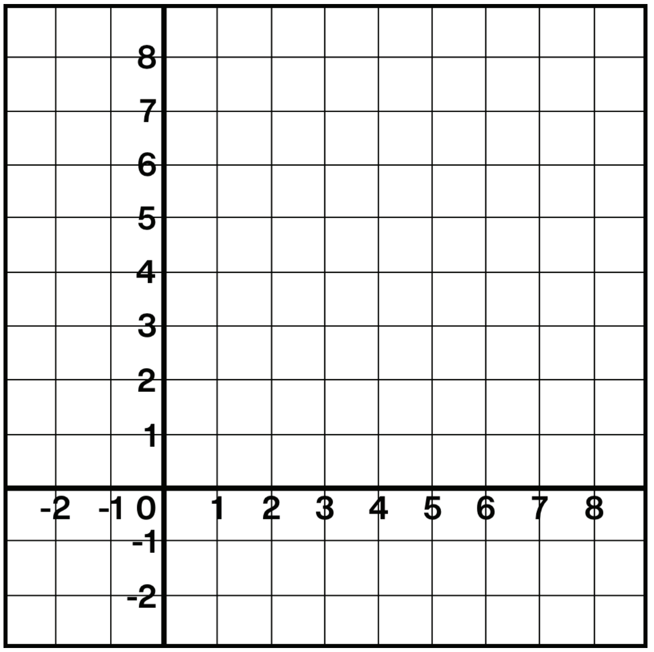
4. A length of 4 yards is equal to 12 feet. 10 yards is equal to how many feet?

5. The ratio of number of hippos to number of crocodiles at a watering hole is $4 : 3$. How many crocodiles would there be if there were 24 hippos?

6. The table shows some coordinate pairs.

   Plot these points in the coordinate plane.

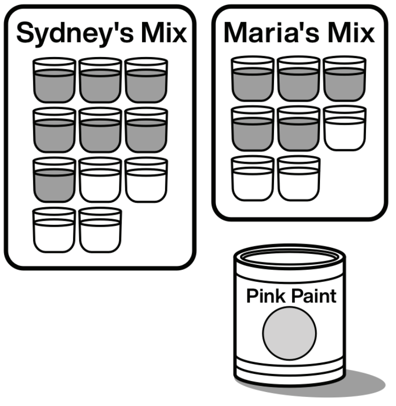
x	y
4	3
2	6
5	0



7. If you mix red and white paint in different ratios, you will get different shades of pink paint. If the ratios are equivalent, you will get the same shade of pink.

   Sydney and Maria each mix their own batch of pink paint.

   Are their batches the same shade of pink?



   Explain your thinking.

1.

Time (hours)	Distance Traveled (miles)
2	1 100
3	1 650
6	3 300

2.1 0.25 pounds (or equivalent)

2.2 3.25 pounds (or equivalent)
Explanations vary. For every $\$1$, you can buy 0.25 pounds of blueberries. So for $\$13$, you can buy 3.25 pounds of blueberries (since $13 \cdot 0.25 = 3.25$).

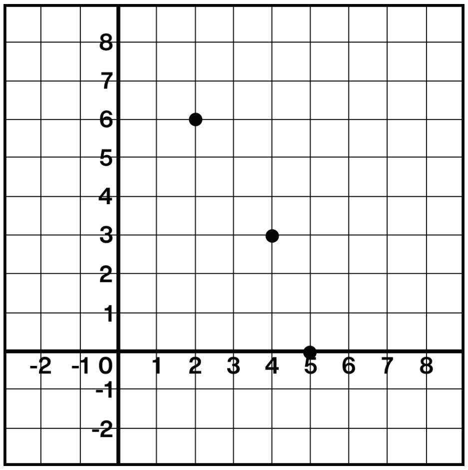
3.1 2.5 tablespoons of cocoa (or equivalent)

3.2 0.4 cups of milk (or equivalent)

4. 30 feet

5. 18 crocodiles

6.



7. No.

Explanations vary. They are different shades of pink. Sydney's paint is redder than Maria's paint. A unit rate of red paint per cup of white paint can be found for each.

For Maria's mixture, there are 5 cups of red paint for every 3 cups of white paint, which means that there are $\frac{5}{3}$ cups of red paint for every cup of white paint.

For Sydney's mixture, there are 7 cups of red paint for every 4 cups of white paint, or $\frac{7}{4}$ cups of red paint for every cup of white paint. Since the two unit rates are different, the two shades of pink are different.

Unit 7.2, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:

- Problems 5 and 7 before Lesson 1
- Problems 1 and 2 before Lesson 2
- Problem 4 before Lesson 3
- Problem 3 before Lesson 6
- Problem 6 before Lesson 8

Problem 1

(Standards: **6.RP.A.1, 6.RP.A.3.A**)

This question is intended to surface what students already know from Math 6 about using tables to solve problems involving scaling or calculating a unit rate. This content first appears in Lesson 2: Balloon Float.

Suggested Next Steps: If students struggle . . .

- Consider pausing for a longer discussion of the Warm-Up in Lesson 2. As time allows, invite students to use the sketch tool to add a pair of values to the table. During Lessons 1 and 2, monitor for students who need more practice writing equivalent ratios and discuss scaling proportional relationships in the example on Screen 4 of Lesson 2, if needed.

Problem 2

(Standards: **6.RP.A.2, 6.RP.A.3.B, MP6**)

This question is intended to surface what students already know from Math 6 about calculating and using unit rates. Students are asked to explain their thinking, thus attending to precision as they use precise mathematical language to defend their calculations. For both questions, students may use a double number line diagram or a table to help them with their thinking. This foundational knowledge may support students in the unit. This content first appears in Lesson 2: Balloon Float.

Suggested Next Steps: If students struggle . . .

- Consider revisiting techniques for finding both unit rates in the proportional relationship at the beginning of Lesson 6: Two and Two.
- Consider using representations like double number lines or tables of equivalent ratios to visualize these strategies.

Problem 3

(Standards: **6.RP.A.2, 6.RP.A.3.B**)

This question is intended to surface what students already know from Math 6 about unit rates, particularly calculating two different unit rates for one relationship. Students might use discrete diagrams, double number line diagrams, or tables to help them with their thinking. This content first appears in Lesson 1: Paint.

Suggested Next Steps: If students struggle . . .

- Plan to ask students about the meaning of both unit rates in a proportional relationship during the lesson synthesis in Lesson 6: Two and Two.
- Consider using representations like double number lines or tables of equivalent ratios to visualize these strategies.

Problem 4

(Standards: **6.RP.A.1, 6.RP.A.3**)

This question is intended to surface what students already know about determining equivalent ratios. Because the context is familiar, students may already know that there are 3 feet in a yard and multiply 10 by the unit rate 3 to find out how many feet there are in 10 yards. This content first appears in Lesson 1: Paint.

Suggested Next Steps: If students struggle . . .

- Plan to spend time reviewing how to use representations such as double number lines and tables of equivalent ratios when opportunities arise throughout the unit. The discussion on Screen 3 of Lesson 1 is the first opportunity to highlight students' strategies for finding equivalent ratios.

Problem 5

(Standards: **6.RP.A.1, 6.RP.A.3**)

This question is intended to surface what students already know about equivalent ratios and ratio notation (e.g., "$a : b$"). This content first appears in Lesson 1: Paint.

Suggested Next Steps:

- If most students do well with this item, it may be possible to abbreviate the discussion on Screen 3 of Lesson 1 since students already have an understanding of equivalent ratios.
- If most students struggle with this item, consider revisiting this question after Lesson 2. Working with these proportional relationships should support students in applying equivalent ratios to this context.

Problem 6

(Standard: **6.RP.A.3.A**)

This question is intended to surface what students already know about graphing points in the coordinate plane. This content first appears in Lesson 8: DinoPops.

Suggested Next Steps: If students struggle . . .

- Consider taking extra time during Screens 3 and 4 of Lesson 8 to discuss the meaning of the movable point's coordinates in the coordinate plane. Another opportunity to connect points in a coordinate plane with their coordinates appears in Lesson 9. Monitor student work on Screen 3 for students who need more practice working with graphing coordinates.

Problem 7

(Standards: **6.RP.A.2, 6.RP.A.3, MP3**)

This question is intended to surface student strategies for explaining whether or not two ratios are equivalent. Students are asked to communicate their reasoning concerning why or why not the shades of paint are the same. This content first appears in Lesson 1: Paint.

Suggested Next Steps:

- Success with this type of problem may be a good indication that students are ready for the Math 7 material on ratios and proportional relationships.
- If most students struggle with this item, plan to spend time reviewing representations of sets of equivalent ratios as opportunities arise, particularly in Lesson 1.

Unit 7.2, Quiz: Lessons 1–7 Name ______________________

1. Which table represents a proportional relationship?

A.

x	y
2	3
4	5
10	11

B.

x	y
2	4
4	5
10	6

C.

x	y
2	4
4	16
10	100

D.

x	y
2	3
4	6
10	15

2. Select **all** of the proportional relationships.

- ☐ $y = 2.5x$
- ☐ A turtle walks for 5 minutes, then stops for a minute.
- ☐ A turtle starts at the starting line and walks at a constant rate.
- ☐ $y = \frac{2.5}{x}$
- ☐ $y = \frac{5}{2}x$

3. Jordan is mixing water and flour to make tortillas. The number of cups of water, w, that are needed for f cups of flour is described by the equation $w = 0.75f$.

3.1 What does 0.75 tell us in this situation?	3.2 How many cups of water are needed to mix with 4 cups of flour?	3.3 How many cups of flour are needed to mix with 1 cup of water?

4. When you mix two colors of paint in equivalent ratios, the result is always the same color.

4.1 Complete the table so that there is a proportional relationship between cups of blue paint and cups of red paint.

Blue Paint (cups)	Red Paint (cups)
1	
2	3
	7
10	

4.2 What is the constant of proportionality?

What does it represent in this situation?

4.3 Write an equation for the relationship between the number of cups of blue paint, b, and the number of cups of red paint, r.

5. Titus took 30 minutes to walk 2 miles at a constant rate. Let d represent the distance Titus walks in miles after t minutes.

5.1 What are two different constants of proportionality for the relationship between distance, in miles, and time, in minutes?

1.	
2.	

5.2 What is the relationship between these constants of proportionality?

5.3 Write two different equations to represent the relationship between d and t.

1.	
2.	

5.4 If Titus walked 7.5 miles at this same rate, how many minutes would it take?

Explain your thinking.

1. D

x	y
2	3
4	6
10	15

2. ✓ $y = 2.5x$
✓ A turtle starts at the starting line and walks at a constant rate.
✓ $y = \frac{5}{2}x$

3.1 In this situation, 0.75 means that 0.75 cups of water must be mixed with each cup of flour.

3.2 3 cups of water (or equivalent)

3.3 $\frac{4}{3}$ cups of flour (or equivalent)

4.1

Blue Paint (cups)	Red Paint (cups)
1	$\frac{3}{2}$
2	3
$\frac{14}{3}$	7
10	15

4.2 Constant of proportionality: $\frac{3}{2}$ or $\frac{2}{3}$

Explanations vary.

The constant of proportionality represents the number of cups of red paint needed for each cup of blue paint.

or

The constant of proportionality represents the number of cups of blue paint needed for each cup of red paint.

4.3 $r = \frac{3}{2}b$ or $b = \frac{2}{3}r$

5.1

1.	15
2.	$\frac{1}{15}$

5.2 *Responses vary.* The constants of proportionality are reciprocals.

5.3

1.	$t = 15d$
2.	$d = \frac{1}{15}t$

5.4 112.5 minutes

Explanations vary. I multiplied 7.5 miles by the constant of proportionality, 15, to get $7.5 \times 15 = 112.5$ minutes.

Unit 7.2, Quiz: Summary and Rubric

Content Standards Summary

Standard	7.RP.A.2.A	7.RP.A.2.B	7.RP.A.2.C
Problems	1, 2	4.1, 4.2, 5.1, 5.2	3, 4.3, 5.3, 5.4

Problem 1

(Standards: **7.RP.A.2.A, MP7**)

This problem assesses students' ability to determine whether two quantities are in a proportional relationship from a table. Students make use of the structure of tables to identify proportional relationships. This problem corresponds most directly to the work students did in Lesson 2: Balloon Float.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why the incorrect tables do not represent proportional relationships.
- Consider revisiting Lesson 2, Activity 2.

Problem 2

(Standard: **7.RP.A.2.A**)

This problem assesses students' ability to determine whether two quantities are in a proportional relationship from an equation or situation. This problem corresponds most directly to the work students did in Lesson 7: All Kinds of Equations.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why the second choice does not represent a proportional relationship.
- Consider revisiting Lesson 7, Activity 2, Screen 4.

Unit 7.2, Quiz: Summary and Rubric

Problem 3

(Standards: **7.RP.A.2.C, MP2**)

This problem assesses students' ability to represent and solve problems using equations of proportional relationships. As students explain the meaning of the constant of proportionality within context, they reason abstractly and quantitatively. This problem corresponds most directly to the work students did in Lesson 5: Snapshots.

Suggested Next Steps: If students struggle . . .

- Consider asking students how they could use the equation to determine the cups of water needed to mix with 4 cups of flour.
- Consider revisiting Lesson 5, Activity 2, Screen 5.

Problem 4

(Standards: **7.RP.A.2.B, 7.RP.A.2.C, MP4**)

This problem assesses students' ability to model with mathematics, writing equations to represent proportional relationships. This problem corresponds most directly to the work students did in Lesson 3: Sugary Drinks and Lesson 6: Two and Two.

Suggested Next Steps: If students struggle . . .

- Consider asking students how the table values can be used to determine the constant of proportionality in the relationship.
- Consider revisiting Lesson 6, Activity 1.

Problem 5

(Standards: **7.RP.A.2.B, 7.RP.A.2.C, MP4**)

This problem assesses students' ability to model with mathematics, writing two equations that represent the same proportional relationship. The problem corresponds most directly to the work students did in Lesson 6: Two and Two.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe the relationship between the two constants of proportionality in proportional relationships.
- Consider revisiting Lesson 6, Activity 1.

Unit 7.2, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
1	7.RP.A.2.A	Correct choice. • D			Incorrect choice. *Students who select C may have noticed that x is multiplied by itself to get y for each row.*	Did not attempt.
2	7.RP.A.2.A	**All correct** choices and **no incorrect** choices. • $y = 2.5x$ • A turtle starts at the starting line and walks at a constant rate. • $y = \frac{5}{2}x$	**One or two correct** choices and **no incorrect** choices. **All correct** choices and **one incorrect** choice. *Students who do not select "A turtle starts at the starting line and walks at a constant rate" may not understand the connection between proportional relationships and situations.*	**One or two correct** choices and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.	Did not attempt.
3.1	7.RP.A.2.C, MP2	Correct explanation. *E.g., In this situation,* 0.75 *means that* 0.75 *cups of water must be mixed with each cup of flour.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who write "* 0.75 *means that* 0.75 *cups of flour must be mixed with each cup of water" may have reversed the variables in context.*	Work shows **incomplete understanding**, with significant errors. *E.g., Student does not reference both cups of flour and cups of water.*	Work shows **limited understanding** of proportional relationships.	Did not attempt.

Unit 7.2, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3.2	7.RP.A.2.C	Correct answer. • 3 cups of water (or equivalent)	Work shows **conceptual understanding**, with some errors. *E.g., Students who write* 5.33 *cups may have solved for cups of flour instead of cups of water.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of solving proportional relationships.	Did not attempt.
3.3	7.RP.A.2.C	Correct answer. • $\frac{4}{3}$ cups of flour (or equivalent)	Work shows **conceptual understanding**, with some errors. *E.g., Students who write* 0.75 *cups may have solved for cups of water instead of cups of flour.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of solving proportional relationships.	Did not attempt.
4.1	7.RP.A.2.B	**All correct** answers. • $\frac{3}{2}$ (or equivalent) • $\frac{14}{3}$ (or equivalent) • 15 (or equivalent)	**Two correct** answers and **one incorrect** answer.	**One correct** answer and **two incorrect** answers.	**Only incorrect** answers.	Did not attempt.

Unit 7.2, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
4.2	7.RP.A.2.B	Correct choice with correct explanation. • $\frac{3}{2}$ (or equivalent) *E.g., The constant of proportionality represents the number of cups of red paint needed for each cup of blue paint.* • $\frac{2}{3}$ (or equivalent) *E.g., The constant of proportionality represents the number of cups of blue paint needed for each cup of red paint.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who incorrectly name the constant of proportionality but have an accurate explanation.* *E.g., Students who correctly name the constant of proportionality but have an inaccurate explanation.*	Work shows **incomplete understanding** with significant errors. *E.g., Students who have both inaccurate constants and explanations but reference a constant relationship between cups of blue paint and red paint.*	Work shows **limited understanding** of representing proportional relationships.	Did not attempt.
4.3	7.RP.A.2.C, MP4	Correct answer • $r = \frac{3}{2}b$, or $b = \frac{2}{3}r$ (or equivalent)	Work shows **conceptual understanding**, with some errors. *E.g., Students who write* $r = \frac{2}{3}b$, or $b = \frac{3}{2}r$ *may have reversed the variables in the context.*	Work shows **incomplete understanding** with significant errors. *E.g., Students who write* $r = b + 1$ *may have noticed that* 2 *cups of blue paint and* 3 *cups of red paint makes this equation true.*	Work shows **limited understanding** of representing proportional relationships.	Did not attempt.

Unit 7.2, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
5.1	7.RP.A.2.B	Correct answers. • 15 (or equivalent) • $\frac{1}{15}$ (or equivalent)	Work shows **conceptual understanding**, with some errors. *E.g., Answers are reciprocals of each other.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of calculating proportional relationships. *E.g., Students who write* 30 *and* 2 *may have used the values from the description.*	Did not attempt.
5.2	7.RP.A.2.B	Correct explanation. *E.g., The constants of proportionality are reciprocals.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who say that miles per minute and minute per miles are proportional, and include other incorrect explanations.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of representing proportional relationships. *E.g., Students who say minutes and miles are proportional.*	Did not attempt.
5.3	7.RP.A.2.C, MP4	Correct answers with correct explanation. • $t = 15d$ (or equivalent) • $d = \frac{1}{15}t$ (or equivalent)	Work shows **conceptual understanding**, with some errors. *E.g., Students who write* $d = 15t$ and $t = \frac{1}{15}d$ *may have reversed the variables in the context.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of writing equations for proportional relationships.	Did not attempt.

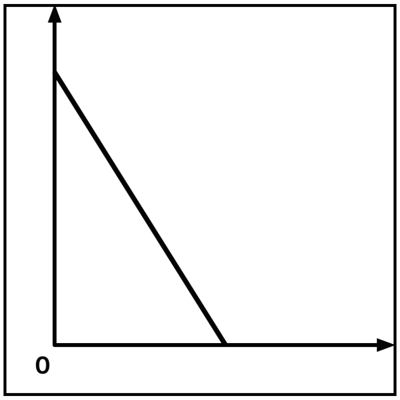
Unit 7.2, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.4	7.RP.A.2.C	Correct answer with correct explanation. • 112.5 minutes *E.g.,* I multiplied 7.5 miles by the constant of proportionality, 15, to get $7.5 \times 15 = 112.5$ minutes.	Work shows **conceptual understanding**, with some errors. *E.g., Students who incorrectly calculate the minutes (due to calculator error) but have an accurate explanation.* *E.g., Students who used their previous incorrect equation correctly in this situation.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of writing equations for proportional relationships.	Did not attempt.

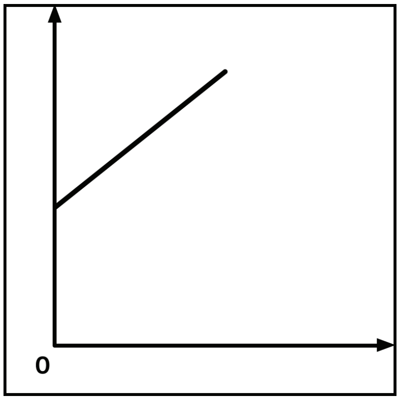
Unit 7.2, End-Unit Assessment: Form A Name ______________________________

1. Which graph represents a proportional relationship?

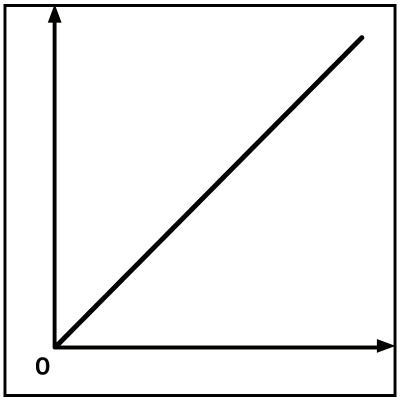
A.



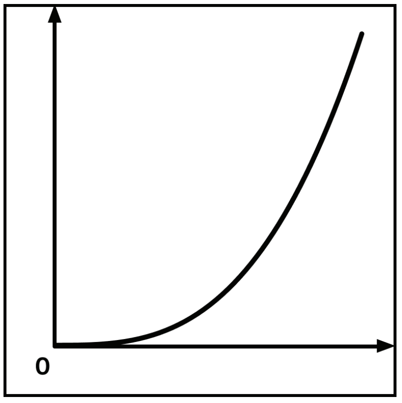
B.



C.



D.

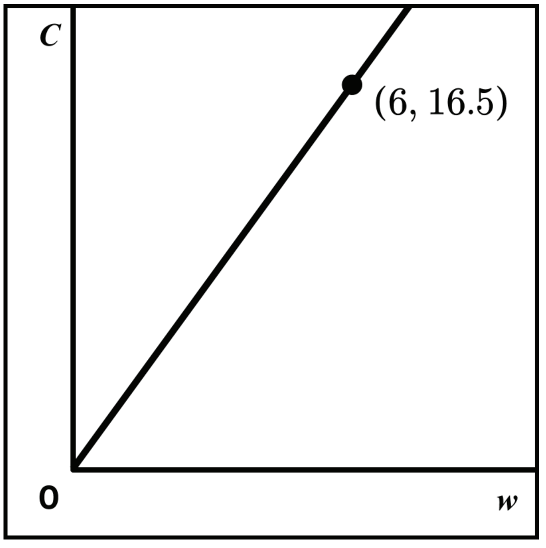


2. This graph shows the cost in dollars, C, of w pounds of blueberries.

   The relationship is proportional.

   Select **all** of the true statements.

   - ☐ 1 pound of blueberries costs $\$2.75$.
   - ☐ 2.75 pounds of blueberries cost $\$1$.
   - ☐ 5 pounds of blueberries cost $\$15.50$.
   - ☐ 12 pounds of blueberries cost $\$33$.
   - ☐ The point $(3,\ 9)$ is on the graphed line.



3. Kadeem rode his bike at a constant speed. He rode 1 mile in 5 minutes.

   Which equation represents the amount of time in minutes, t, that it took for him to ride a distance of d miles?

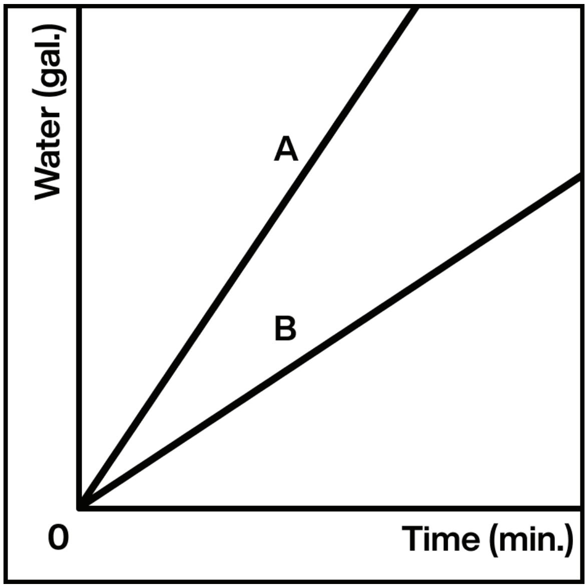
   A. $t = 5d$

   B. $t = \frac{1}{5}d$

   C. $t = d + 4$

   D. $t = d - 4$

4. The two lines represent the amount of water filling over time in two tanks of the same size.



   Which tank is filling more quickly?

   A. Tank A

   B. Tank B

   Explain or show your thinking.

5. The table shows the weight of 100 raspberries at a market.

   Complete the table so that there is a proportional relationship between the number of raspberries and their weight.

Number of Raspberries	**Weight (kg)**
40	
100	0.40
300	

6. The equation $F = \frac{9}{5}C + 32$ relates temperature in degrees Celsius, C, to degrees Fahrenheit, F.

   Is there a proportional relationship between C and F?

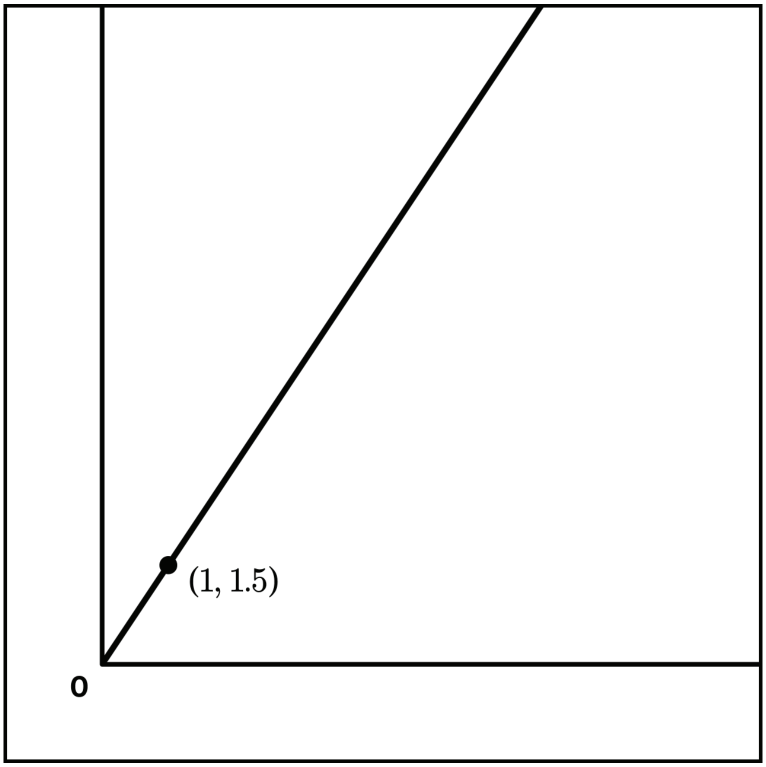
   Explain or show your thinking.

Unit 7.2, End-Unit Assessment: Form A Name ________________________________

A recipe for chocolate chip cookies uses 3 tablespoons of cookie batter for every 2 tablespoons of chocolate chips.

The line represents the relationship between the amount of cookie batter and the amount of chocolate chips needed to make a batch of cookies according to the recipe. The point $(1,\ 1.5)$ is on the line.

7.1 Label the axes appropriately.



7.2 Write an equation that represents the graphed line.

Use b for the number of tablespoons of cookie batter and c for the number of tablespoons of chocolate chips.

7.3 Explain what the point $(1,\ 1.5)$ means in terms of this situation.

Unit 7.2, End-Unit Assessment: Form A Name ______________________________

Reflection: Select a question and answer it below.

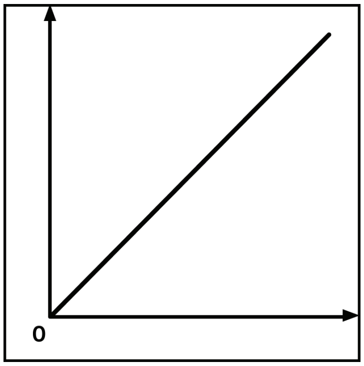
☐ What is something you are proud of from this unit?

☐ Write what you know about a topic from this unit that you weren't asked about today.

☐ Describe or show one strategy you found helpful in this unit.
Name any students who helped you with this strategy.

☐ What else would you like your teacher to know?

1. C.



2. ✓ 1 pound of blueberries costs $\$2.75$.
   ✓ 12 pounds of blueberries cost $\$33$.

3. A. $t = 5d$

4. A. Tank A

   Explanations vary. The tank that is filling more quickly is represented by the steeper graph (i.e., Tank A is filling more quickly than Tank B). Alternatively, choose a time and see how much water is in the two tanks at that time.

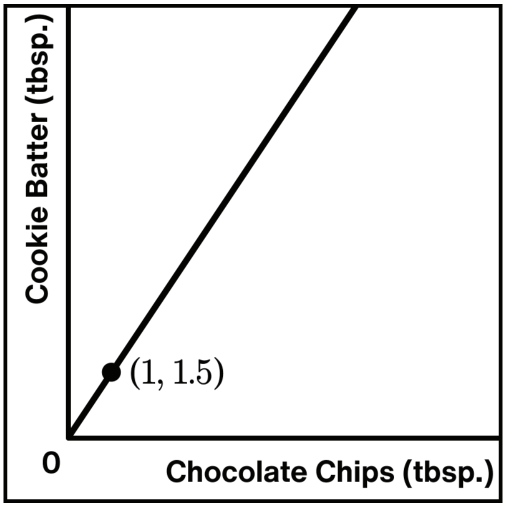
5.

Number of Raspberries	Weight (kg)
40	0.16
100	0.40
300	1.2

6. No, the relationship is not proportional.

   Explanations vary. At $C = 0$, $F = 32$. For a relationship to be proportional, when one variable is 0, the other also needs to be 0.

7.1



7.2 $b = 1.5c$ (or equivalent)

7.3 *Explanations vary.* The point $(1,\ 1.5)$ indicates that the recipe works with 1 tablespoon of chocolate chips for every 1.5 tablespoons of cookie batter. This point gives a unit rate.

Unit 7.2, End Assessment Summary and Rubric: Form A

Content Standards Summary

Standard	7.RP.A.2.A	7.RP.A.2.B	7.RP.A.2.C	7.RP.A.2.D
Problems	1, 6	4, 5	3, 7.2	2, 7.1, 7.3

Problem 1

(Standard: **7.RP.A.2.A**)

This problem assesses students' understanding of what a proportional relationship looks like when represented in a graph.
This problem corresponds most directly to the work students did in Lesson 8: DinoPops.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which graphs are not proportional and why.
- Consider revisiting Lesson 8, Activity 2.

Problem 2

(Standards: **7.RP.A.2.D, MP2**)

This problem assesses students' understanding of how to determine a constant of proportionality from a graph and how to use that rate to answer other questions about a situation. As students explain the meaning of the given point within context, they reason abstractly and quantitatively. This problem corresponds most directly to the work students did in Lesson 9: Gallon Challenge.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which statements are false and why.
- Consider revisiting Lesson 9, Activity 2.

Unit 7.2, End Assessment Summary and Rubric: Form A

Problem 3

(Standards: **7.RP.A.2.C, MP4**)

This problem assesses students' ability to model with mathematics, creating an equation for a proportional relationship from a situation. This problem corresponds most directly to the work students did in Lesson 10: Three Turtles.

Suggested Next Steps: If students struggle . . .

- Consider asking students how many minutes would it take Kadeem to ride 2 miles. Consider asking them how they can use this information to help determine which equation describes this proportional relationship.
- Consider revisiting Lesson 10, Activity 2.

Problem 4

(Standards: **7.RP.A.2.B, MP3**)

This problem assesses students' ability to interpret the graph of a proportional relationship without numerical values. Students construct a viable argument using the graph to support their answer choice. This problem corresponds most directly to the work students did in Lesson 10: Three Turtles.

Suggested Next Steps: If students struggle . . .

- Consider asking students how the steepness of the two lines compare and how this information can help them determine which tank is filling more quickly.
- Consider revisiting Lesson 10, Activity 2.

Problem 5

(Standard: **7.RP.A.2.B**)

This problem assesses students’ ability to work with a proportional relationship defined by a table. The problem corresponds most directly to the work students did in Lesson 3: Sugary Drinks.

Suggested Next Steps: If students struggle . . .

- Consider asking students to determine the constant of proportionality in the proportional relationship.
- Consider revisiting Lesson 3, Activity 2.

Problem 6

(Standards: **7.RP.A.2.A, MP6**)

This problem assesses students' ability to identify whether or not an equation represents a proportional relationship. Students attend to precision as they use clear mathematical language to communicate their reasoning concerning why or why not the given equation represents a proportional relationship. This problem most directly corresponds to the work students did in Lesson 7: All Kinds of Equations.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe the general form of equations that represent proportional relationships.
- Consider revisiting Lesson 7, Activity 2.

Problem 7

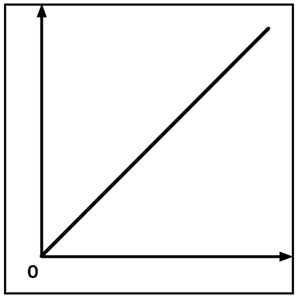
(Standards: **7.RP.A.2.D, 7.RP.A.2.C, MP2**)

The problem assesses students' understanding of the relationship between the constant of proportionality and the graph of the corresponding proportional relationship. As students explain the meaning of the given point within context, they reason abstractly and quantitatively. This item is more challenging than the other items. The axes are not labeled, and the coordinates of the point tell the amount of one quantity given one unit of the other quantity, rather than the values stated in the prompt. This problem corresponds most directly to the work students did in Lesson 10: Three Turtles.

Suggested Next Steps: If students struggle . . .

- Consider asking students to explain how they know whether or not the relationship described is a proportional relationship.
- Consider revisiting Lesson 10, Activity 2, Screen 8. Choose one of the relationships to discuss as a class.

Unit 7.2, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.RP.A.2.A	• **C.** 			Students who select incorrect linear choices may know the graph of a proportional relationship is linear, but may not recall that the line must contain $(0, 0)$. Students who select the nonlinear choice may know the graph contains $(0, 0)$, but may not know that the graph must be linear.	Did not attempt.
2	7.RP.A.2.D, MP2	Student selects all of the correct choices and does not select any incorrect choices. • 1 pound of blueberries costs $\$2.75$. • 12 pounds of blueberries cost $\$33$.	Student selects one of the correct choices and does not select any incorrect choices. Student selects both of the correct choices, and one incorrect choice.	Student selects one of the correct choices and one incorrect choice.	Student only selects incorrect choices. Student selects two or more incorrect choices with the correct choices.	Did not attempt.

Unit 7.2, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3	7.RP.A.2.C, MP4	• $t = 5d$			• $t = \frac{1}{5}d$ Student may have reversed the variables in the context. They may have misread the description as 5 miles in 1 minute, or may think that division is a typical operation in rate contexts. • $t = d + 4$ Student may have noticed that 1 mile in 5 minutes makes this equation true, but it is not a generally correct equation. • $t = d - 4$ Student may have made the error above, along with reversing the variables' meanings.	Did not attempt.
4	7.RP.A.2.B	Student successfully answers the question and includes a logical and complete explanation. • Tank A The tank that is filling more quickly is represented by the steeper graph.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation. Incorrect or imprecise use of the rates.	Correct answer with incomplete explanation. Incorrect answer with explanation showing partial understanding of proportional relationships represented with a graph.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.2, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
5	7.RP.A.2.B	Work is complete and correct. • 40 **raspberries:** 0.16 kilograms (or equivalent) • 300 **raspberries:** 1.2 kilograms (or equivalent)	Student correctly determines the weight for either 40 or 300 raspberries but not both, most likely the result of a calculation error.		Student shows weak understanding of proportional relationships in a table. *Students who write that 300 raspberries weigh 2.40 kilograms may have used addition instead of multiplication.	Did not attempt.
6	7.RP.A.2.A, MP6	Student successfully answers the question and includes a logical and complete explanation. • Not proportional. At $C = 0, F = 32$. For a relationship to be proportional, when one variable is 0, the other also needs to be 0.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation.* *Students who say the equation is proportional may have read the equation as $F = \frac{9}{5}C \cdot 32$, or noticed the fraction $\frac{9}{5}$ multiplied by a variable and assumed that it is enough to prove the relationship is proportional.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of equations of proportional relationships.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.2, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
7.1	7.RP.A.2.D	Work is complete and correct, with or without units on the axes. The vertical axis should be labeled "Cookie Batter (tbsp.)," and the horizontal axis should be labeled "Chocolate Chips (tbsp.)."		Students who label "tablespoons of cookie batter" on the horizontal axis may have either misinterpreted the meaning of the situation or were not sure how to connect the situation with the point $(1,\ 1.5)$ on the graph.	Students who label the axes as quantities other than "tablespoons of chocolate chips" and "tablespoons of cookie batter" may have misunderstood what the variables were in the situation.	Did not attempt.
7.2	7.RP.A.2.C	• $b = 1.5c$ (or equivalent) • $c = \frac{2}{3}b$ (or equivalent)	• $c = 1.5b$ • $b = \frac{2}{3}c$ Student may have reversed the variables in the context.		• $b = c + 1.5$ Student may have noticed that 1 tablespoon of chocolate chips and 1.5 tablespoons of cookie batter makes this equation true, but it is not a generally correct equation. • $b = c - 0.5$ Student may have made the error above, along with reversing the variables' meanings.	Did not attempt.

Unit 7.2, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
7.3	7.RP.A.2.D, MP2	Explanation is complete and correct. • The point $(1, 1.5)$ indicates that the recipe uses 1 tablespoon of chocolate chips for every 1.5 tablespoons of cookie batter. This point gives a unit rate.	Explanation shows general conceptual understanding and mastery, with some errors. Student accurately describes the meaning of the point in context but lacks details such as units in the explanation.	Explanation shows a developing but incomplete conceptual understanding, with significant errors. Response mentions the point in relation to cookie batter and chocolate chips, but is not clear.	Weak evidence of understanding how the point on the graph relates to the context.	Did not attempt.

Unit 7.3, Readiness Check Name ______________________

A ticket at a movie theater costs $\$9.25$.

1.1 What is the total cost for 20 tickets?

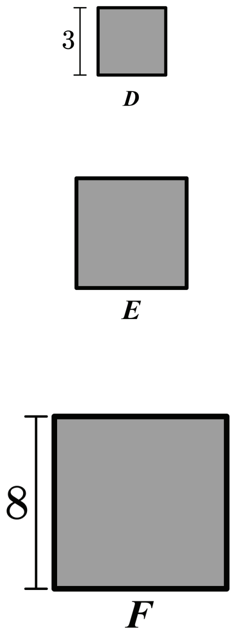
1.2 Write an equation to represent the relationship between the number of tickets purchased, n, and the total cost of the tickets, c.

1.3 How many tickets were purchased if the total cost of tickets was $\$240.50$? Explain your thinking.

Here are three squares.

2.1 Complete the table with information about each square.

Square	Side Length (in.)	Perimeter (in.)	Area (sq. in.)
D	3	12	9
E		20	
F	8		

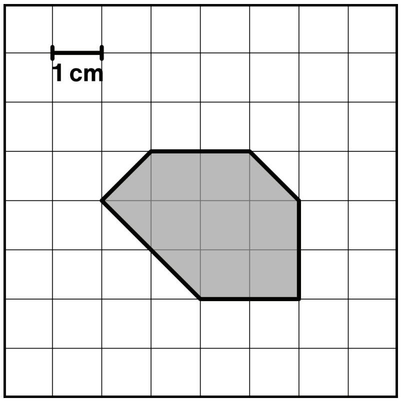


2.2 Write an equation for the relationship between the perimeter of the square, P, and its side length, s.

2.3 Write an equation for the relationship between the area of the square, A, and its side length, s.

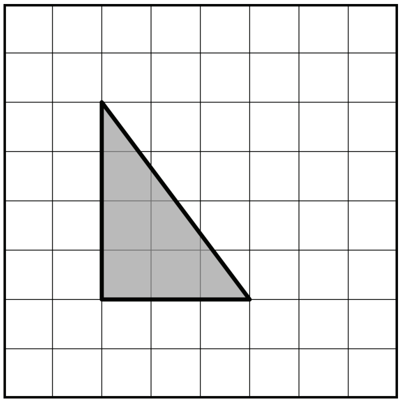
3. Use any strategy to determine the area of this figure. Draw on the figure if it helps you with your thinking.

   Explain your thinking.



4. One formula for the area of a triangle is $A = \frac{1}{2} \cdot b \cdot h$.

   The variable b represents the base of the triangle and h represents its height. What is the area of a triangle with a base of 3 units and a height of 4 units?

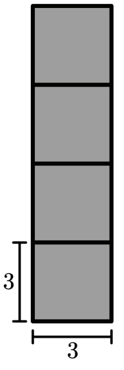


5. The area of this shape is $A = 4 \cdot 3^2$ square units.

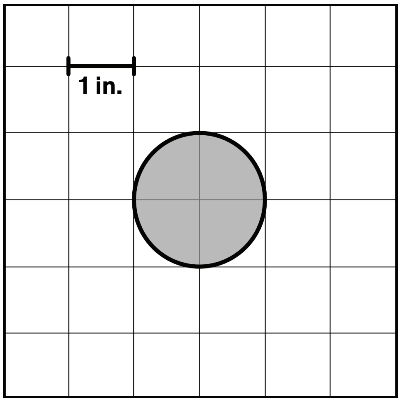
   What is another way to write the shape's area?

   - ☐ 36 square units
   - ☐ 144 square units
   - ☐ Neither

   Explain your thinking.



6. Estimate the area of this circle. Draw on the circle if it helps you with your thinking.



Unit 7.3, Readiness Check

Answer Key

1.1 $\$185$

1.2 $c = 9.25n$ (or equivalent)

1.3 26 tickets. *Explanations vary.*

- I wrote the equation $240.5 = 9.25n$ because the total cost was $\$240.50$. Then, I solved to figure out the value of n.
- Because we multiplied the number of tickets by 9.25 to figure out the total cost, I divided 240.5 by 9.25 to go backwards and figure out how many tickets were bought.

2.1

Square	Side Length (in.)	Perimeter (in.)	Area (sq. in.)
D	3	12	9
E	5	20	25
F	8	32	64

2.2 $P = 4s$ (or equivalent)

2.3 $A = s \cdot s$ (or equivalent)

3. 9 square centimeters. *Explanations vary.*

- I counted each of the whole number tiles and combined each of the half tiles to form wholes.
- I found the area of the large 3-by-4 rectangle and then subtracted the parts that weren't shaded in.

4. 6 square units

5. 36 square units. *Explanations vary.* This is another way of saying 4 copies of a 3-by-3 square. The area of each square is 9 square units, so the total area is $4 \cdot 9 = 36$ square units.

6. *Responses and explanations vary.*

- The area is less than 4 square units because the circle does not take up the entire 2-by-2 square.
- The area is more than 2 square units because each quarter of the circle takes up more than half of the unit square.

Unit 7.3, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:

- Problems 1 and 2 before Lesson 3
- Problem 3 before Lesson 5
- Problems 5 and 6 before Lesson 6
- Problem 4 before Lesson 7

Problem 1

(Standards: **6.EE.A.2.C, 7.RP.A.2.C, MP4**)

These questions are intended to surface what students already know about writing and using equations of proportional relationships. Students model with mathematics when writing an equation to represent a situation. This content first appears in Lesson 3, where students generate and use the formula for the circumference of a circle.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question before Lesson 3 and highlighting several different strategies for Problem 1.3, including one in which a student describes using the equation to find the number of tickets. If no student used that strategy, consider asking: *How could you use the equation to help determine the number of tickets?*

Problem 2

(Standards: **3.MD.C.5, 3.MD.D.8, 6.EE.C.9, MP4**)

These questions are intended to surface what students already know about the concepts of area and perimeter. Students model with mathematics as they represent the relationships between the side length of a square and its perimeter and area using equations. The concept of perimeter first appears in Lesson 1. Area first appears in Lesson 5, where students estimate the areas of polygons.

Suggested Next Steps: If students struggle . . .

- Consider revisiting Problems 2.1 and 2.2 at the beginning of Lesson 3, and Problem 2.3 at the beginning of Lesson 5. Ask students to interpret each number and variable in the correct equations and justify their reasoning.

Problem 3
(Standards: **6.G.A.1, MP6**)

This question is intended to surface what students already know about strategies for calculating the area of complex polygons. Students should be able to determine the area by counting whole and half tiles, decomposing and finding the area of each piece, or by surrounding the polygon with a larger rectangle and removing the area that is not shaded. Students attend to precision by being careful about specifying appropriate units of measure when explaining their thinking. This concept first appears in Lesson 5, where students estimate the areas of polygons.

Suggested Next Steps: If students struggle . . .
- Consider revisiting this problem at the beginning of Lesson 5 and highlighting several different successful strategies for determining the area.

Problem 4
(Standard: **6.EE.A.2.C**)

This question is intended to surface what students already know about evaluating expressions with letters that stand for numbers and about calculating the area of a triangle. This concept first appears in Lesson 3, where students use the formula for the circumference of a circle and again in Lesson 7, where students use the formula for the area of a triangle to approximate the area of a circle.

Suggested Next Steps: If students struggle . . .
- Consider revisiting this problem at the beginning of Lesson 7 by presenting incorrect solutions and asking students what the person might have been thinking and to justify why their solution was incorrect.

Problem 5
(Standard: **6.EE.A.2.C**)

This question is intended to surface what students already know about evaluating equations and order of operations, particularly with exponents. This concept first appears in Lesson 6, where students use the formula for the area of a circle.

Suggested Next Steps: If students struggle . . .
- Consider revisiting this problem at the beginning of Lesson 6, presenting incorrect solutions and asking students what the person might have been thinking and to justify why their solution was incorrect.

Problem 6

(Standard: **3.MD.C.6**)

This question is intended to surface what students already know about estimating areas. This concept first appears in Lesson 5, where students estimate the area of shapes with curved edges. This concept will be explored in detail in Lesson 6.

Suggested Next Steps: If students struggle . . .

- Consider revisiting this problem at the beginning of Lesson 6 and highlighting several different successful strategies for estimating area of a circle.

Unit 7.3, Quiz: Lessons 1–4 Name ______________________________

1. Order these expressions from least to greatest value.

- 4π
- 12.5
- 6
- $4 + 2\pi$

Least ________ ________ ________ ________ **Greatest**

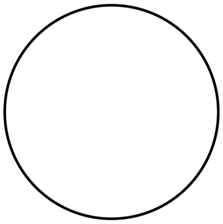
2. This circle has a **circumference** of 40 centimeters. Which of these is its diameter?

A. 40π centimeters

B. $\frac{20}{\pi}$ centimeters

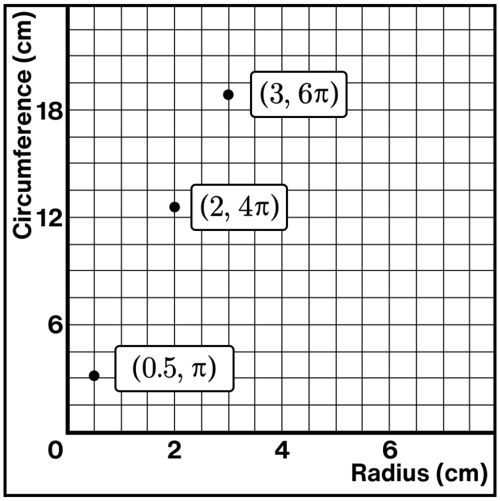
C. $\frac{40}{\pi}$ centimeters

D. 20 centimeters



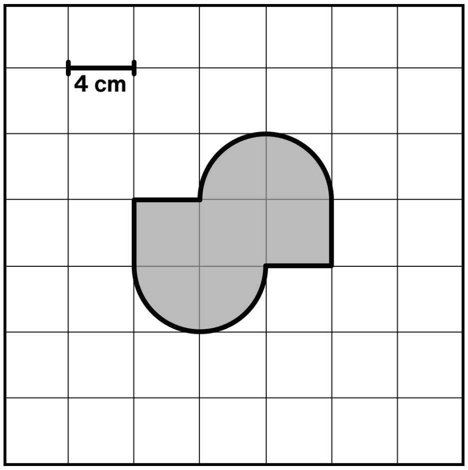
3. Here is a graph of the radius and circumference of several circles.

What is a constant of proportionality in this relationship?



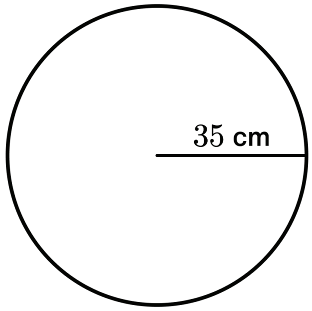
4. What is the total perimeter of this figure?

Show or explain your thinking.



Unit 7.3, Quiz: Lessons 1–4 Name ______________________________

5.1 A wheel has a **radius** of 35 centimeters.
Determine its circumference.



5.2 Complete the table showing how far this wheel travels for each number of rotations.

Number of Rotations	Distance (cm)
1	
5	
30	

5.3 What is a constant of proportionality for this relationship?

5.4 About how many rotations does the wheel make when it travels $100\ 000$ cm?

Unit 7.3, Quiz: Lessons 1–4

Answer Key

Note: On this quiz, calculations made using approximations for π between 3.14 and $\frac{22}{7}$ should be marked correct.

1. Least to greatest value:
   - 6
   - $4 + 2\pi$
   - 12.5
   - 4π

2. $\frac{40}{\pi}$ centimeters

3. 2π (or equivalent)

4. $16 + 8\pi$ centimeters (or equivalent)

   Explanations vary. The total perimeter is the same as the circumference of 1 circle plus the perimeter of 1 square. The perimeter of the square is 16 centimeters. The circumference of the circle is 8π centimeters, so the total perimeter is $16 + 8\pi$ centimeters.

5.1
- 220 centimeters
- 70π centimeters (or equivalent)

5.2

Number of Rotations	Distance (cm)
1	220 (or equivalent)
5	$1\,100$ (or equivalent)
30	$6\,600$ (or equivalent)

5.3
- 220
- 70π (or equivalent)

5.4 *Responses vary.* Responses between 454 and 455 rotations should be marked correct.

Unit 7.3, Quiz: Summary and Rubric

Content Standards Summary

Standard	7.RP.A.2	7.RP.A.2.B	7.RP.A.3	7.G.B.4
Problems	5.2	3, 5.3	5.4	1, 2, 3, 4, 5.1, 5.2, 5.4

Problem 1
(Standard: **7.G.B.4**)

This problem assesses students' ability to reason about the value of an expression containing π. This problem corresponds most directly to the work students did in Lesson 3: Measuring Around.

Suggested Next Steps: If students struggle . . .

- Consider asking to students to compare 4π with 12.5 and $4 + 2\pi$ with 6. Consider asking them how these comparisons can help with ordering the values from least to greatest.
- Consider revisiting Lesson 3, Activity 2.

Problem 2
(Standard: **7.G.B.4**)

This problem assesses students' ability to calculate the radius, diameter, or circumference of a circle given one of those measurements. This problem corresponds most directly to the work students did in Lesson 3: Measuring Around.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe the relationship between a circle's circumference and radius and the relationship between a circle's circumference and diameter.
- Consider revisiting Lesson 3, Activity 1.

Unit 7.3, Quiz: Summary and Rubric

Problem 3

(Standards: **7.RP.A.2.B, 7.G.B.4**)

This problem assesses students' ability to make connections between proportional relationships and measurements around a circle. This problem corresponds most directly to the work students did in Lesson 3: Measuring Around.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe how to calculate a constant of proportionality for a given proportional relationship.
- Consider revisiting Lesson 3, Activity 2, Screen 4.

Problem 4

(Standards: **7.G.B.4, MP6, MP7**)

This problem assesses students' ability to calculate the perimeter of a complex shape composed of squares and parts of circles. Students make use of the structure of the grid and attend to precision as they defend their calculations for the perimeter of the given figure and specify appropriate units of measure. This problem corresponds most directly to the work students did in Lesson 4: Perimeter Challenges.

Suggested Next Steps: If students struggle . . .

- Consider asking students how many semicircles and how many sides of a square make up the figure.
- Consider revisiting Lesson 4, Activity 1, Screen 5.

Problem 5

(Standards: **7.G.B.4, 7.RP.A.2, 7.RP.A.2.B, 7.RP.A.3**)

This problem assesses students' ability to solve problems using the circumference of a circle. This problem corresponds most directly to the work students did in Lesson 3: Measuring Around.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe the relationship between the circumference of a wheel and the distance that it travels.
- Consider revisiting the last question in Practice Day 1.

Unit 7.3, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
1	7.G.B.4	All expressions are in the correct order. Least to greatest value: • 6 • $4 + 2\pi$ • 12.5 • 4π	Work shows **conceptual understanding**, with some errors. All expressions are ordered from greatest to least. Students may have confused the directions.	Work shows **incomplete understanding**, with significant errors. Students correctly identify the least or most accurate answer.	Work shows **limited understanding**.	Did not attempt.
2	7.G.B.4	Correct choice. • $\frac{40}{\pi}$ centimeters			Incorrect choice. *Students who select* 40π *cm may have calculated the circumference for a circle whose diameter is* 40 cm. *Students who select* $\frac{20}{\pi}$*cm may have calculated the radius of the circle.* *Students who select* 20 *cm may have calculated the radius for a circle with a diameter of* 40 cm.	Did not attempt.

Unit 7.3, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3	7.RP.A.2.B, 7.G.B.4	Correct answer. • 2π (or equivalent)	Work shows **conceptual understanding**, with some errors.	Work shows **incomplete understanding**, with significant errors.	Work shows **limited understanding**.	Did not attempt.
4	7.G.B.4, MP6 MP7	Correct answer with correct explanation. • $16 + 8\pi$ (or equivalent) *E.g., The total perimeter is the same as the circumference of 1 circle plus the perimeter of 1 square. The perimeter of the square is 16 cm. The circumference of the circle is 8π cm, so the total perimeter is $16 + 8\pi$ cm.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who write $16 + 8\pi$ cm with an incomplete explanation.* *Students who write $20 + 8\pi$ or $24 + 8\pi$ may have added additional sides of squares.*	Work shows **incomplete understanding** with significant errors. *E.g., Students who write 24 cm may have added $16 + 8$.* *E.g., Students who write 32 cm may have noticed that the perimeter of the figure includes 8 unit squares and calculated $8 \cdot 4$.*	Work shows **limited understanding**.	Did not attempt.
5.1	7.G.B.4	Correct answer. • 220 centimeters or • 70π centimeters	Work shows **conceptual understanding**, with some errors. *E.g., Students who write 35π may have calculated the circumference of a circle with a diameter of* 35 cm.	Work shows **incomplete understanding**, with significant errors. *E.g., Students who write 70 may have calculated the diameter of a circle with a radius of* 35 cm.	Work shows **limited understanding**.	Did not attempt.

Unit 7.3, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
5.2	7.G.B.4 7.RP.A.2	Correct answers. • 220 or 70π • $1\,100$ or 350π • $6\,600$ or $2\,100\pi$	Work shows **conceptual understanding**, with some errors. *E.g., Two out of three answers correct.*	Work shows **incomplete understanding**, with significant errors. *E.g., One out of three answers correct.*	Work shows **limited understanding**.	Did not attempt.
5.3	7.RP.A.2.B	Correct answer. • 220 or 70π (or equivalent)	Work shows **conceptual understanding**, with some errors. *E.g., Students who write* 35π *may have calculated the circumference of a circle with a diameter of* 35 cm.	Work shows **incomplete understanding**, with significant errors. *E.g., Students who write* 70 *may have calculated the diameter of a circle with a radius of* 35 cm.	Work shows **limited understanding**.	Did not attempt.
5.4	7.G.B.4 7.RP.A.3	Correct answer. • Responses between 454 and 455 rotations should be marked correct.	Work shows **conceptual understanding**, with some errors. *E.g., Students who write* $1\,429$ *rotations may have calculated* $100\,000 \div 70$.	Work shows **incomplete understanding**, with significant errors. *E.g., Students who write* $2\,857$ *rotations may have calculated* $100\,000 \div 35$.	Work shows **limited understanding**.	Did not attempt.

Unit 7.3, End-Unit Assessment: Form A Name ______________________________

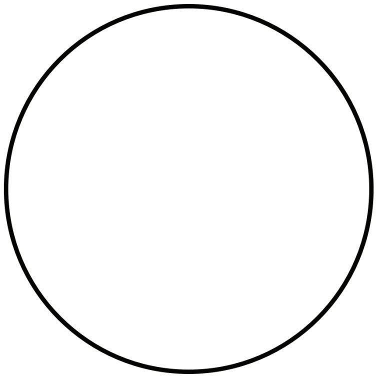
1. A circle has a radius of 50 centimeters. Which of these is closest to its area?

   A. 157 square centimeters

   B. 314 square centimeters

   C. $7\,854$ square centimeters

   D. $15\,708$ square centimeters

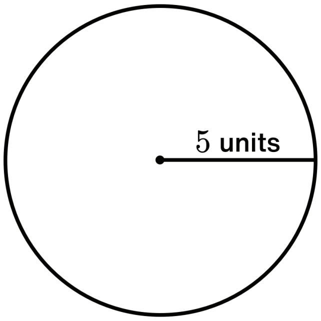


2. This circle has a radius of 5 units. Three students tried to calculate the circumference.

   Order their answers from least to most accurate.

   - 31.4 units
   - 31.4π units
   - 10π units

   Least accurate ________ ________ ________ **Most accurate**



3. Diego measured the distance that a wheel traveled in different numbers of rotations.

   Select **all** of the true statements.

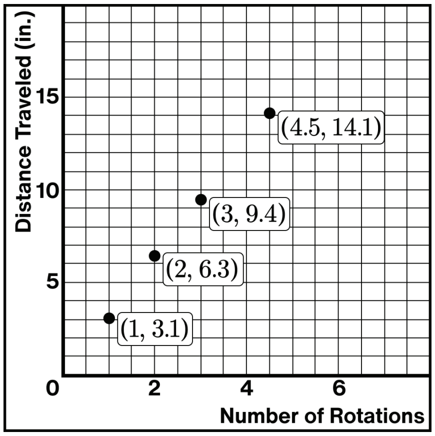
   ☐ The relationship in the graph appears to be proportional.

   ☐ The radius of the wheel is about 1 inch.

   ☐ The diameter of the wheel is about 1 inch.

   ☐ The diameter of the wheel is about 3.1 inches.

   ☐ The circumference of the wheel is about 3.1 inches.



Unit 7.3, End-Unit Assessment: Form A Name ______________________________

Decide whether each quantity describes a circle's circumference or area.

4.1	The amount of paint needed to cover a circular canvas.	**Circumference**	**Area**
4.2	How long it takes to run around a circular track.	**Circumference**	**Area**
4.3	The amount of ribbon needed to wrap around a circular present.	**Circumference**	**Area**
4.4	The amount of grass inside of a circular track.	**Circumference**	**Area**

5. Which measurement is always proportional to the radius of a circle?

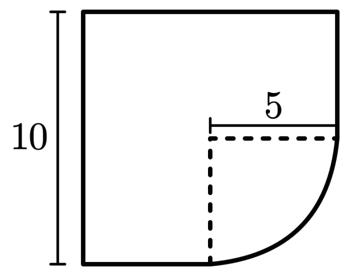
   A. Circumference B. Area C. Both D. Neither

   Explain your thinking.

6. This figure is made of part of a circle and part of a square.

   What is the perimeter of the figure?

   What is the area of the figure?



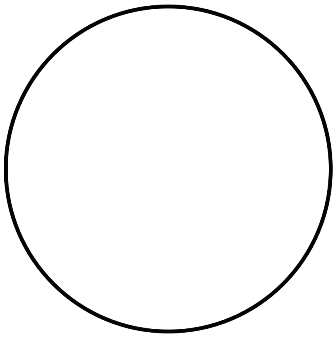
All measurements are in units.

Unit 7.3, End-Unit Assessment: Form A Name ______________________________

DeShawn needs grass seed to cover Field A. One bag of grass seed covers 5 000 square feet.

7.1 Field A is a circular field with a 100-foot radius.

What is the fewest number of bags DeShawn must buy to cover Field A?



7.2 Field B is a circular field with a 50-foot radius.

DeShawn says he will need half the amount of grass seed to cover Field B. Is this correct?

A. Yes B. No C. Not enough information

Explain your thinking.

Reflection: Select a question to answer.

- ☐ What is something you are proud of from this unit?
- ☐ Write what you know about a topic from this unit that you weren't asked about today.
- ☐ Describe or show one strategy you found helpful in this unit. Name any students who helped you with this strategy.
- ☐ What else would you like your teacher to know?

Answer Key

Note: On this assessment, calculations made using approximations for π between 3.14 and $\frac{22}{7}$ should be marked correct.

1. C. $7\,854$ square centimeters

2. Least accurate to most accurate:
   - 31.4π units
   - 31.4 units
   - 10π units

3. ✓ The relationship in the graph appears to be proportional.
   ✓ The diameter of the wheel is about 1 inch.
   ✓ The circumference of the wheel is about 3.1 inches.

4.1 Area 4.2 Circumference 4.3 Circumference 4.4 Area

5. Circumference
   Explanations vary.
   - The equation for the circumference of a circle is $C = 2\pi r$, which is in a proportional relationship with 2π as the constant of proportionality.
   - The equation for the area of a circle is $A = \pi r^2$, which is not proportional.

6. **Perimeter:** $2.5\pi + 30$ units (or equivalent)
   Area: $6.25\pi + 75$ square units (or equivalent)

7.1 7 bags

Explanations vary. The area of Field A is $\pi \cdot 100^2 \approx 31\,415.93$ square feet. Dividing by the area covered by each bag, $\frac{31\,415.93}{5\,000} \approx 6.28$ bags. Since you can only buy whole bags, DeShawn must buy 7 bags.

7.2 No.

Explanations vary.
- The area is not proportional to the radius; it is proportional to the square of the radius. A circle with half of the radius will have an area that is $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$ of the area of Field A.
- The area of Field A is $\pi \cdot 100^2 \approx 31\,415.93$ square feet. The area of Field B is $\pi \cdot 50^2 \approx 7\,853.98$ square feet, which is not half of the area of Field A.

Content Standards Summary

Standard	7.G.B.4	7.G.B.6	7.RP.A.2	7.RP.A.2.A	7.RP.A.3
Problems	1, 2, 3, 5, 6, 7	4, 7	5	3	7

Problem 1
(Standard: **7.G.B.4**)

This problem assesses students' ability to calculate the area of a circle. This problem corresponds most directly to the work students did in Lesson 6: Radius Squares.

Suggested Next Steps: If students struggle . . .
- Consider asking students to describe the relationship between a circle's area and radius.
- Consider revisiting Lesson 6, Activity 1.

Problem 2
(Standards: **7.G.B.4, MP6**)

This problem assesses students' ability to make sense of values written in terms of π. Students attend to precision when determining which answers are least and most accurate. This problem corresponds most directly to the work students did in Lesson 3: Measuring Around.

Suggested Next Steps: If students struggle . . .
- Consider asking students to determine the diameter of the circle. Consider asking them to describe the relationship between a circle's circumference and radius.
- Consider revisiting Lesson 3: Practice Problems, Problem 1.

Unit 7.3, End Assessment Summary and Rubric: Form A

Problem 3
(Standards: **7.G.B.4, 7.RP.A.2.A**)

This problem assesses students' ability to connect the distance a wheel travels with the circumference of a circle. It also checks their understanding of the relationship between the diameter and circumference of a circle. This problem corresponds most directly to the work students did in Lesson 3: Measuring Around.

Suggested Next Steps: If students struggle . . .
- Consider asking students which circle measurement would correspond to the distance a wheel travels. Consider asking them to describe the relationship between a circle's circumference and diameter.
- Consider revisiting Lesson 3, Activity 2, Screen 4.

Problem 4
(Standard: **7.G.B.6**)

This problem assesses students' ability to distinguish area from circumference in various real-world contexts. This problem corresponds most directly to the work students did in Practice Day 2.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why Problem 4.1 does not describe circumference and why Problem 4.2 does not describe area.
- Consider revisiting Practice Day 2, Problem 1.

Problem 5
(Standards: **7.G.B.4, 7.RP.A.2**)

This problem assesses students' ability to recognize proportional relationships and the formulas for area and circumference of a circle. This problem corresponds most directly to the work students did in Lesson 3: Measuring Around and Lesson 6: Radius Squares.

Suggested Next Steps: If students struggle . . .
- Consider asking students how they can identify proportional relationships from an equation. Invite students to revisit Screen 4 of Unit 2, Lesson 7 to discuss examples and non-examples of proportional relationships.
- Consider revisiting Lesson 3, Activity 1, Screen 3 and Lesson 6, Activity 3.

Problem 6
(Standards: **7.G.B.4, MP7**)

This problem assesses students' ability to calculate the perimeter and area of a complex shape that is made up of fractions of circles. Students make use of structure as they determine the perimeter and area of the given figure. This problem corresponds most directly to the work students did in Lesson 4: Perimeter Challenges and Lesson 8: Area Challenges.

Suggested Next Steps: If students struggle . . .
- Consider asking students to describe the structure of the shape (e.g., 1 quarter circle and 4 squares). Consider asking them how they can use the structure to help them determine the total perimeter and area of the shape.
- Consider revisiting Lesson 4, Activity 1 or Lesson 8, Activity 1.

Problem 7
(Standards: **7.G.B.4, 7.G.B.6, 7.RP.A.3, MP1**)

This problem assesses students' ability to apply proportional relationships in the context of area. Students are asked to make sense of the situation and persevere in answering multi-step questions as they determine whether half the area is a result of halving of the radius. This problem corresponds most directly to the work students did in Lesson 9: Circle vs. Square.

Suggested Next Steps: If students struggle . . .
- Consider asking students which measurement affects the number of bags of grass seed needed. Consider asking students to describe the relationship between the radius and the area of a circle.
  Consider revisiting Lesson 9, Activity 2.

Unit 7.3, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.G.B.4	• C 7 854 square centimeters			Students who select 157 square centimeters may have multiplied the radius by π instead of squaring the radius first. Students who select 314 square centimeters may have calculated the circumference of the circle instead of its area. Students who select 15 708 square centimeters may have combined the circumference and area formulas, calculating $2\pi r^2$.	Did not attempt.
2	7.G.B.4, MP6	Student correctly orders the three responses. • 31.4π units • 31.4 units • 10π units		Student correctly identifies the least or most accurate answer. • 31.4π units • 10π units • 31.4 units or • 31.4 units • 31.4π units • 10π units	Student says 31.4π units is the most accurate or 10π units is the least accurate.	Did not attempt.

Unit 7.3, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3	7.G.B.4, 7.RP.A.2.A	Student selects all of the correct choices and does not select any incorrect choices. • The relationship in the graph appears to be proportional. • The diameter of the wheel is about 1 inch. • The circumference of the wheel is about 3.1 inches.	Student selects one or two of the correct choices and does not select any incorrect choices.	Student selects one or two of the correct choices but also includes an incorrect choice. Student selects all of the correct choices and one incorrect choice.	Student selects only incorrect choices. Student selects two or more incorrect choices with some correct choices.	Did not attempt.
4	7.G.B.6	Student correctly identifies which category is described by each statement.	Student correctly identifies which category is described by **three** of the four statements.	Student correctly identifies which category is described by **two** of the four statements.	Student correctly identifies which category is described by **one** of the four statements.	Did not attempt.
5	7.G.B.4, 7.RP.A.2	Correct choice with correct explanation. • Circumference The equation for the circumference of a circle is $C = 2\pi r$, which is in a proportional relationship with 2π as the constant of proportionality.	Correct choice with minor flaws in explanation. Incorrect choice with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect choice with explanation that communicates partial understanding.	Incorrect choice with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.3, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
6	7.G.B.4, MP7	Work is complete and correct. • **Perimeter:** $2.5\pi + 30$ units (or equivalent) • **Area:** $6.25\pi + 75$ square units (or equivalent)	Student correctly determines the perimeter or the area but not both (most likely the result of a calculation error).		Student shows limited understanding of perimeter and area of complex shapes made up of fractions of circles.	Did not attempt.
7.1	7.G.B.4, 7.G.B.6, 7.RP.A.3, MP1	Student successfully answers the question and includes a logical and complete explanation. • 7 bags The area of Field A is $\pi \cdot 100^2 \approx 31\,415.93$ square feet. Dividing by the area covered by each bag, $\frac{31\,415.93}{5\,000} \approx 6.28$ bags. Since you can only buy whole bags, DeShawn must buy 7 bags.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.3, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
7.2	7.G.B.4, 7.G.B.6, 7.RP.A.3, MP1	Correct choice with correct explanation. • No. *Explanations vary.* The area is not proportional to the radius; it is proportional to the square of the radius. A circle with half of the radius will have an area that is $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$ of the area of Field A.	Correct choice with minor flaws in explanation. Incorrect choice with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect choice with explanation that communicates partial understanding	Incorrect choice with incorrect explanation or without an explanation.	Did not attempt.

 Name ______________________________

1. Last year, Thiago hosted a spaghetti dinner for his soccer team. He made 6 boxes of spaghetti to feed 20 people. This year, 50 people are coming!

   How many boxes of spaghetti should Thiago make to feed all of his guests?

2. Annika finished $\frac{1}{4}$ of her run in $\frac{1}{2}$ of an hour. How long will her whole run take?

   ☐ Less than 1 hour ☐ More than 1 hour ☐ Exactly 1 hour

   Explain your thinking.

Match each fraction expression to an equivalent percent expression.

3.1	$\frac{3}{4}$ of x	_____	A. 25% of x
3.2	$\frac{1}{4}$ of x	_____	B. 40% of x
3.3	$\frac{2}{5}$ of x	_____	C. 4% of x
3.4	$\frac{1}{25}$ of x	_____	D. 75% of x

4. Select **all** of the expressions that are equivalent to 5% of 60.

   ☐ $\frac{1}{20}(60)$ ☐ $\frac{1}{5} \cdot 60$ ☐ $0.05 \cdot 60$ ☐ $0.5(60)$ ☐ $\frac{5}{100} \cdot 60$

Unit 7.4, Readiness Check Name ________________________________

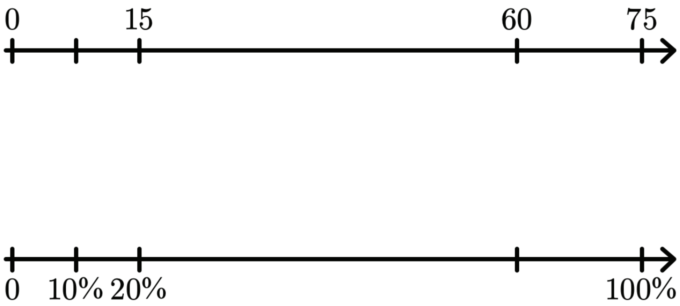
5. What is 13% of 200? Explain your thinking.

6. A new soft drink has 20% less sugar than before. The drink had 50 grams of sugar originally. How much less sugar does it have now?

7. Select **all** of the expressions that are equivalent to $0.4x$.

- ☐ $(1 - 0.6)x$
- ☐ $1 - 0.6x$
- ☐ $x - 0.6$
- ☐ $x - 0.6x$
- ☐ $\frac{40}{100}x$

8. Gabriel created a double number line. Fill in the value at each unlabeled tick mark.



Unit 7.4, Readiness Check

Answer Key

1. 15 boxes

2. More than 1 hour. *Explanations vary.* If Annika finished $\frac{1}{4}$ of her run in $\frac{1}{2}$ of an hour, then she needs 4 times as long to finish her whole run. $4 \cdot \frac{1}{2} = 2$ hours.

3.1 D

3.2 A

3.3 B

3.4 C

4. ✓ $\frac{1}{20}(60)$

   ✓ $0.05 \cdot 60$

   ✓ $\frac{5}{100} \cdot 60$

5. 26. *Explanations vary.* 13% of 100 is 13, so 13% of 200 should be double that, and $2 \cdot 13 = 26$.

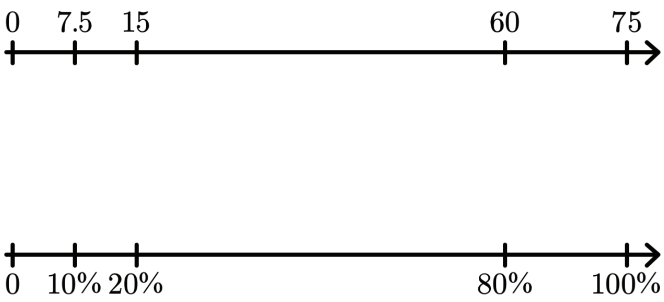
6. 10 grams

7. ✓ $(1 - 0.6)x$

   ✓ $x - 0.6x$

   ✓ $\frac{40}{100}x$

8.



Unit 7.4, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:

- Problems 3 and 4 before Lesson 1
- Problems 1 and 2 before Lesson 2
- Problems 5 and 6 before Lesson 4
- Problem 7 before Lesson 5
- Problem 8 before Lesson 6

Problem 1

(Standards: **6.RP.A.2, 6.RP.A.3, MP1**)

This question is intended to surface what students already know about using unit rates. Students must analyze the information given and plan a solution strategy. This content first appears in Lesson 2: Peach Cobbler.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 2 and highlighting several different strategies students used to determine the number of boxes, including strategies that involve calculating a unit rate.

Problem 2

(Standards: **6.RP.A.2, 6.RP.A.3, MP3**)

This question is intended to surface what students already know about rates and ratios that involve fractions. Students are asked to explain their thinking, thus constructing a viable argument as they defend their answer selection. This content first appears in Lesson 2: Peach Cobbler.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 2 and highlighting several different strategies students used to determine how long Annika's whole run is, including strategies that involve calculating a unit rate.
- Consider creating a display of student strategies for Problems 1 and 2 for students to refer back to as they engage in this unit.

Problem 3

(Standard: **6.RP.A.3.C**)

This question is intended to surface what students already know about the relationship between fractions and percentages. This content first appears in Lesson 1: Mosaics.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 1 and creating an anchor chart of common benchmark percents (e.g., 5%, 10%, 20%, 25%) and their equivalent fractions.

Problem 4

(Standards: **6.RP.A.3.C, MP7**)

This question is intended to surface what students already know about the relationship between decimals and percentages. Students make sure of structure as they determine correspondences between multiple equations by selecting equations with similar solutions. This content first appears in Lesson 1: Mosaics.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 1 and creating an anchor chart of percents and equivalent decimals (e.g., $5\% = 0.05$, $50\% = 0.5$).

Problem 5

(Standards: **6.RP.A.3.C, MP3**)

This question is intended to surface what students already know about calculating the percentage of a number. Students attend to precision by efficiently and accurately calculating 13% of 200. Students are asked to explain their thinking, thus also constructing a viable argument as they discuss their rationale. This content first appears in Lesson 4: More and Less.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 4 and asking a question like: *How would you calculate 14% of 200? What about 13% of 80?*

Unit 7.4, Readiness Check Summary

Problem 6

(Standard: **6.RP.A.3.C**)

This question is intended to surface what students already know about reasoning about the percent increase or decrease of an original amount. This content first appears in Lesson 4: More and Less.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 4 and asking a question like: *How much total sugar does it have now?*

Problem 7

(Standard: **6.EE.A.3**)

This question is intended to surface what students already know about equivalent expressions. This content first appears in Lesson 5: All the Equations.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 5 and creating an anchor chart of this question as an example of which expressions are and are not equivalent.

Problem 8

(Standard: **6.RP.A.3**)

This question is intended to surface what students already know about double number lines. This content first appears in Lesson 6: 100%.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this question as a class before Lesson 6 and creating an anchor chart that includes an example of a double number line.

Unit 7.4, Quiz: Lessons 1–7 Name ________________________________

1. The value of a car decreases over time. This year, Faaria's car is worth $\$22\ 000$.
   If the value of Faaria's car decreases by 8%, what will her car be worth next year?

   A. $\$1\ 760$

   B. $\$4400$

   C. $\$17\ 600$

   D. $\$20\ 240$

   E. $\$23\ 760$

2. Mayra bought x grams of rice.

   Anika bought $\frac{1}{3}$ more than Mayra bought.

   Select **all** of the equations that represent the relationship between the amount of rice that Mayra bought, x, and the amount of rice that Anika bought, y.

   ☐ $y = \frac{2}{3}x$

   ☐ $y = \frac{1}{3}x$

   ☐ $y = x + \frac{1}{3}x$

   ☐ $y = x - \frac{1}{3}x$

   ☐ $y = \frac{4}{3}x$

3. To make a certain color of paint, Anya mixed $\frac{2}{3}$ cups of white paint with $2\frac{2}{3}$ cups of blue paint. How many cups of blue paint should she mix with $\frac{3}{4}$ cups of white paint to make the same shade?

   Explain or show your thinking.

 Name ________________________________

4. Describe a situation that could be represented by the equation $y = x - 0.3x$. Be sure to explain what x and y mean in your situation.

A storekeeper increased the price of hats by 5%.

5.1 A hat was originally priced at $\$15.00$. What is the new cost of the hat?

5.2 Write an equation to calculate the new total cost, c, when the original price of a hat is p dollars.

5.3 If the price of a hat (after the increase) is $\$33.60$, what is the original price?

Explain or show your thinking.

Answer Key

1. D. $\$20\,240$

2. ✓ $y = x + \frac{1}{3}x$

   ✓ $y = \frac{4}{3}x$

3. 3 cups of blue paint.

   Explanations vary. There are 4 groups of $\frac{2}{3}$ in $2\frac{2}{3}$, so the constant of proportionality is 4.

   To figure out the amount of blue paint she needs, you can multiply $\frac{3}{4} \cdot 4 = 3$ cups.

4. *Responses vary.*

   A bear's body weight can decrease by 30% during hibernation.

   In this situation, y is the bear's weight after hibernation and x is the bear's weight before hibernation.

5.1 $\$15.75$

5.2 $c = 1.05p$

5.3 $\$32.00$

Explanations vary. I used the equation $c = 1.05p$ and substituted $\$33.60$ in place of c. Then, I divided both sides by 1.05 to get p, the original price of the hat.

Unit 7.4, Quiz: Summary and Rubric

Content Standards Summary

Standard	7.RP.A.1	7.RP.A.3	7.EE.A.2
Problems	3	1, 5.1	2, 4, 5.2, 5.3

Problem 1
(Standard: **7.RP.A.3**)

This problem assesses students' ability to solve problems involving percent increases and decreases. This problem corresponds most directly to the work students did in Lesson 4: More and Less and Lesson 6: 100%.

Suggested Next Steps: If students struggle . . .
- Consider asking students to explain how to determine 8% of Faaria's car value this year.
- Consider revisiting Lesson 4, Activity 1, Screen 4.

Problem 2
(Standards: **7.EE.A.2, MP4**)

This problem assesses students' ability to use equations to represent a situation involving adding or subtracting a fraction of the initial value. Students model with mathematics as they determine which equations represent the given relationship. This problem corresponds most directly to the work students did in Lesson 5: All the Equations.

Suggested Next Steps: If students struggle . . .
- Consider asking students to determine the number of grams of rice Anika bought if Mayra bought 3 grams of rice. Consider asking how using this information can help to determine which equation represents this relationship.
- Consider revisiting Lesson 5, Activity 1.

Unit 7.4, Quiz: Summary and Rubric

Problem 3

(Standards: **7.RP.A.1, MP6**)

This problem assesses students' ability to use a constant of proportionality to solve problems involving fractional quantities. Students are asked to explain their thinking, thus attending to precision as they defend their calculations for the number of cups of blue paint needed. This problem corresponds most directly to the work students did in Lesson 3: Sticker Sizes.

Suggested Next Steps: If students struggle . . .

- Consider asking students how to determine the constant of proportionality in this relationship.
- Consider revisiting Lesson 3, Activity 2.

Problem 4

(Standards: **7.EE.A.2, MP2**)

This problem assesses students' ability to make sense of an equation that represents a percent decrease. As students describe a situation that could be represented by the given equation, they reason abstractly and quantitatively. This problem corresponds most directly to the work students did in Lesson 5: All the Equations.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe how they could use the structure of the equation to determine whether the question could be used to solve a percent increase or a percent decrease problem.
- Consider revisiting Lesson 5, Activity 2, Screen 7.

Problem 5

(Standards: **7.EE.A.2, 7.RP.A.3**)

This problem assesses students' ability to write equations to represent situations involving a percent increase and use them to solve problems. This problem corresponds most directly to the work students did in Lesson 5: All the Equations and Lesson 7: Percent Machines.

Suggested Next Steps: If students struggle . . .

- Consider asking students to explain how to determine 5% of the hat's original price.
- Consider revisiting Lesson 5, Activity 1 or Lesson 7, Activity 1.

Unit 7.4, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.RP.A.3	Correct choice. • $20 240			Work shows **limited understanding**. *Students who select* $1 760 *may have calculated* 8% *of* 22 000. *Students who select* $4 400 *may have correctly calculated the value after an* 80% *decrease.* *Students who select* $23 760 *may have added* 8% *to the initial value.* *Students who select* $17 600 *may have calculated* 80% *of* $22 000.	Did not attempt.
2	7.EE.A.2, MP4	**All correct** choices and **no incorrect** choices. • $y = x + \frac{1}{3}x$ • $y = \frac{4}{3}x$	**One correct** choice and **no incorrect** choices. **Both correct** choices and **one incorrect** choice.	**One correct** choice and **one incorrect** choice.	**Only incorrect** choices. **Two or more incorrect** choices with some correct choices.	Did not attempt.

Unit 7.4, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3	7.RP.A.1, MP6	Correct answer and explanation. *E.g., 3 cups of blue paint. There are 4 groups of $\frac{2}{3}$ in $2\frac{2}{3}$, so the constant of proportionality is 4. To figure out the amount of blue paint she needs, multiply $\frac{3}{4} \cdot 4 = 3$ cups.*	Work shows **conceptual understanding**, with some errors. *E.g., Student writes 3 cups with incomplete explanation.*	Work shows **incomplete understanding**, with significant errors.	Work shows **limited understanding**. *Students who write $2\frac{3}{4}$ cups may have noticed that Anya added 2 more cups of blue paint than white in the original mixture.*	Did not attempt.
4	7.EE.A.2, MP2	Correct explanation. *E.g., A bear's body weight can decrease by 30% during hibernation. In this situation, y is the bear's weight after hibernation and x is the bear's weight before hibernation.*	Work shows **conceptual understanding**, with some errors. *E.g., Students who discuss a decrease of 30%, but do not explain the meaning of x and y.* *E.g., Students who discuss a decrease of $\frac{1}{3}$.*	Work shows **incomplete understanding** with significant errors. *E.g., Students who mention a decrease of 3 or 0.3.*	Work shows **limited understanding**.	Did not attempt.

Unit 7.4, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.1	7.RP.A.3	Correct answer. • $\$15.75$	Work shows **conceptual understanding**, with some errors. *Students who write* $\$22.50$ *may have calculated the price after a* 50% *increase.* *Students who write* $\$14.25$ *may have calculated a* 5% *decrease.*	Work shows **incomplete understanding** with significant errors. *Students who write* $\$0.75$ *may have calculated* 5% *of* $\$15$.	Work shows **limited understanding**.	Did not attempt.
5.2	7.EE.A.2, 7.RP.A.3	Correct equation. • $c = 1.05p$	Work shows **conceptual understanding**, with some errors. *Students who write* $p = 1.05c$ *may have reversed the variables in the context.*	Work shows **incomplete understanding** with significant errors. *Students who write* $c = 1.5p$ *may have written* 5% *as* 0.5 .	Work shows **limited understanding**. *E.g.,* $c = p + 0.05$ *E.g.,* $c = 5p$	Did not attempt.
5.3	7.EE.A.2, 7.RP.A.3	Correct answer with correct explanation. *E.g.,* $\$32.00$. I used $c = 1.05p$ and substituted $\$33.60$ in place of c. Then I divided both sides by 1.05 to get p, the original price of the hat.	Work shows **conceptual understanding**, with some errors. *Students who write* $\$32$ *with incomplete explanation.* *Students who write* $\$31.92$ *may have calculated a* 5% *decrease from* $\$33.60$. *Students who used their previous incorrect equation correctly for this situation.*	Work shows **incomplete understanding** with significant errors. *E.g., Students who write* $\$35.28$ *may have substituted the incorrect variable.*	Work shows **limited understanding**.	Did not attempt.

Unit 7.4, End-Unit Assessment: Form A Name ______________________

1. A car is 160 inches long.
   A truck is 7% longer than the car.

   How long is the truck?

   A. 272 inches B. 171.2 inches C. 11.2 inches D. 167 inches

2. Dalia is painting her room. After painting $\frac{1}{10}$ of her room, Dalia has used $\frac{1}{2}$ of a can of paint.

   Select **all** of the true statements.

   - ☐ Each can of paint will cover $\frac{1}{20}$ of Dalia's room.
   - ☐ 3 cans of paint will cover 60% of Dalia's room.
   - ☐ Dalia's entire room requires 5 cans of paint.
   - ☐ Dalia's entire room requires 20 cans of paint.
   - ☐ Painting $\frac{1}{2}$ of Dalia's room requires 10 cans of paint.

3. Oliver tries to cut a piece of metal 30 centimeters long. The piece of metal ends up being 29.4 centimeters long.

   What is the percent error in this situation?

   A. 1.02%
   B. 0.6%
   C. 2%
   D. 20%

4. A lamp originally costs $\$30$. Krishna has a 5% off coupon for the lamp. After the coupon, a 5% sales tax is applied. He will pay:

   A. More than $\$30$.
   B. Less than $\$30$.
   C. Exactly $\$30$.

   Explain your thinking.

5. The population of Renton, WA, is about $101\,920$ people.
   10 years ago, the population was about $91\,000$ people.

   By what percent did the population increase between 10 years ago and now?

Unit 7.4, End-Unit Assessment: Form A Name ______________________________

A store is offering a 20% discount on all items.

6.1 Is there a proportional relationship between the original price of an item and its price after the discount?

Explain your thinking.

6.2 Write an equation for the relationship between the discount price of an item, d, and its original price, p.

6.3 The price of a hat after the discount is $\$18$. What was the original price?

The cost of every college is expected to increase 3.5% next year.

7.1 The cost to attend Westish College is currently $\$18\ 000$.

What is the expected cost to attend Westish College next year?

7.2 Write an equation that will help calculate the cost of other colleges next year.

Use t to represent this year's cost and n to represent next year's cost.

7.3 The cost to attend Faber College is currently $\$24\ 000$.

If the percent increase stays constant, what will the cost be in **two** years?

Explain your thinking.

Unit 7.4, End-Unit Assessment: Form A Name ______________________________

Reflection: Select a question to answer.

- ☐ What is something you are proud of from this unit?

- ☐ Write what you know about a topic from this unit that you weren't asked about today.

- ☐ Describe or show one strategy you found helpful in this unit.
  Name any students who helped you with this strategy.

- ☐ What else would you like your teacher to know?

Unit 7.4, End-Unit Assessment: Form A

Answer Key

1. B

2. ✓ 3 cans of paint will cover 60% of Dalia's room.
   ✓ Dalia's entire room requires 5 cans of paint.

3. C

4. B
   Explanations vary. After a 5% discount, the lamp costs $\$28.50$. After a 5% tax, the lamp costs $\$29.93$.

5. 12%

6.1 Yes. *Explanations vary*. Every item's price after the discount is 0.8 times its original price.

6.2 *Responses vary*.

- $d = 0.8p$
- $d = p - 0.2p$
- $d = (1 - 0.2)p$
- $d = \frac{4}{5}p$

6.3 $\$22.50$

7.1 $\$18\,630$

7.2 *Responses vary*.

- $n = 1.035t$
- $n = t + 0.035t$
- $n = (1 + 0.035)t$

7.3 $\$25\,709.40$
Explanations vary. After a 3.5% increase, the cost is $\$24\,840$. After another 3.5% increase, the cost is $\$25\,709.40$.

Unit 7.4, End Assessment Summary and Rubric: Form A

Content Standards Summary

Standard	7.RP.A.1	7.RP.A.2.A	7.RP.A.2.C	7.RP.A.3
Problems	2	6.1	6.2, 7.2	1, 3, 4, 5, 6.3, 7.1, 7.3

Problem 1
(Standard: **7.RP.A.3**)

This problem assesses students' ability to calculate the result of a percent increase. This problem corresponds most directly to the work students did in Lesson 4: More and Less.

Suggested Next Steps: If students struggle . . .
- Consider asking students to explain how to determine 7% of a car's length and how this value will help them to determine the length of the truck.
- Consider revisiting Lesson 4, Activity 1, Screen 3.

Problem 2
(Standard: **7.RP.A.1**)

This problem assesses students' ability to compute unit rates associated with ratios of fractions. This problem corresponds most directly to the work students did in Lesson 2: Peach Cobbler and Lesson 3: Sticker Sizes.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which statements are false and why.
- Consider revisiting Lesson 3, Activity 2.

Unit 7.4, End Assessment Summary and Rubric: Form A

Problem 3

(Standard: **7.RP.A.3**)

This problem assesses students' ability to determine the percent error given a desired measurement and an actual measurement. This problem corresponds most directly to the work students did in Lesson 11: Bookcase Builder.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe the length error in centimeters made by Oliver when cutting the piece of metal. Consider asking them how the length error relates to the percent error.
- Consider revisiting Lesson 11, Activity 1.

Problem 4

(Standard: **7.RP.A.3**)

This problem assesses students' ability to reason about a multistep percent problem. This problem corresponds most directly to the work students did in Lesson 7: Percent Machines.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why Krishna would not pay more than $30.
- Consider revisiting Lesson 7, Activity 1.

Problem 5

(Standard: **7.RP.A.3**)

This problem assesses students' ability to determine a percent change given the original value and the new value. This problem corresponds most directly to the work students did in Lesson 6: 100%.

Suggested Next Steps: If students struggle . . .

- Consider asking students to determine by how many people the population increased in 10 years. Consider asking students how this increase can be represented as a percentage.
- Consider revisiting Lesson 6, Activity 1, Problem 4.

Problem 6

(Standards: **7.RP.A.2.A**, **7.RP.A.2.C**, **7.RP.A.3, MP4, MP6**)

This problem assesses students' ability to identify whether or not a situation represents a proportional relationship, to write an equation for that situation, and to calculate the original value given a new value and a percent change. Students model with mathematics when writing an equation. They attend to precision when using precise mathematical language to defend their conclusion concerning whether or not a situation represents a proportional relationship. This problem most directly corresponds to the work students did in Lesson 5: All the Equations and Lesson 6: 100%.

Suggested Next Steps: If students struggle . . .

- Consider suggesting that students begin by completing Problem 6.3 and working backward, using their answers to help answer the other problems.
- Consider revisiting Lesson 6, Activity 2.

Problem 7

(Standards: **7.RP.A.3, 7.EE.B.3, 7.RP.A.2.C, MP4, MP6**)

The problem assesses students' ability to solve multistep percent problems that involve a fractional percentage. Students model with mathematics as they represent the relationships between the current year's tuition cost and the next year's tuition cost using an equation and attend to precision when determining and explaining future tuition costs. This problem corresponds most directly to the work students did in Lesson 10: Cost of College.

Suggested Next Steps: If students struggle . . .

- Consider asking students how the equation written in Problem 7.2 can be used to answer Problem 7.3.
- Consider revisiting Lesson 10, Activity 2.

Unit 7.4, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.RP.A.3	• B 171.2 inches			Students who select 272 inches may have figured out a 70% increase instead of a 7% increase. Students who select 11.2 inches may have calculated 7% of the car's length instead of a 7% increase. Students who select 167 inches may have added $160 + 7$.	Did not attempt.
2	7.RP.A.1	Student selects all of the correct choices and does not select any incorrect choices. • 3 cans of paint will cover 60% of Dalia's room. • Dalia's entire room requires 5 cans of paint.	Student selects one of the correct choices and does not select any incorrect choices. Student selects both of the correct choices, and one incorrect choice.	Student selects one of the correct choices and one incorrect choice.	Student only selects incorrect choices. Student selects two or more incorrect choices with the correct choices.	Did not attempt.

Unit 7.4, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3	7.RP.A.3	• C 2%			Students who select 0.6% may be calculating the actual error in centimeters and not the percent error. Students who select 20% may have correctly calculated $\frac{0.6}{30}$, but did not correctly convert this to a percentage. Students who select 1.02% may be calculating what percentage 30 is of 29.4.	Did not attempt.
4	7.RP.A.3	Student successfully answers the question and includes a logical and complete explanation. • Less than $\$30$ After a 5% discount, the lamp costs $\$28.50$. After a 5% tax, the lamp costs $\$29.93$.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect answer with explanation showing partial understanding of multistep percentage problems.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.4, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5	7.RP.A.3	• 12%	Work shows conceptual understanding and mastery, with some errors. Students who write 10.7% may have divided the change in population by the current population instead of the original population.	Work shows a developing but incomplete conceptual understanding, with significant errors. Students who write 89%, 89.3%, 1.12%, or 112% may be calculating what percentage $91\ 000$ is of $101\ 920$, or vice-versa.	Weak evidence of understanding how to calculate percent change.	Did not attempt.
6.1	7.RP.A.2.A, MP6	Student successfully answers the question and includes a logical and complete explanation. • Yes. Every item's price after the discount is 0.8 times its original price.	Correct choice with minor flaws in explanation. Incorrect choice with logical and complete explanation.	Correct choice with incomplete explanation. Incorrect choice with explanation that communicates partial understanding of proportional relationships.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.
6.2	7.RP.A.2.C, MP4	Student writes a correct equation for the relationship. • $d = 0.8p$ • $d = p - 0.2p$ • $d = (1 - 0.2)p$ • $d = \frac{4}{5}p$	Work shows conceptual understanding and mastery, with some errors. Students who write $d = 0.2p$ are finding 20% of the original price rather than a 20% decrease. Students who write $p = 0.8d$ may have mixed up the variables.	Work shows a developing but incomplete conceptual understanding, with significant errors.	Weak evidence of understanding equations involving percent decrease.	Did not attempt.

Unit 7.4, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
6.3	7.RP.A.3	Response is complete and correct. • $\$22.50$	Work shows conceptual understanding and mastery, with some errors. Students who respond with $\$14.40$ may have solved the problem "What is the price after a 20% discount on $\$18$?"	Work shows a developing but incomplete conceptual understanding, with significant errors. Students who respond with $\$3.60$ may have calculated 20% of $\$18$.	Weak evidence of understanding how to calculate the original price given a percent decrease.	Did not attempt.
7.1	7.RP.A.3	Response is complete and correct. • $\$18\,630$	Work shows conceptual understanding and mastery, with some errors. Students who respond with $\$24\,300$ may have calculated the cost after a 35% increase. Students who respond with $\$630$ may have calculated the increase in price, but did not add that to determine the total cost next year.	Work shows a developing but incomplete conceptual understanding, with significant errors. Students who respond with $\$6\,300$ may have calculated 35% of $\$18\,000$.	Weak evidence of understanding how to calculate the original price given a percent decrease.	Did not attempt.

Unit 7.4, End Assessment Summary and Rubric: Form A

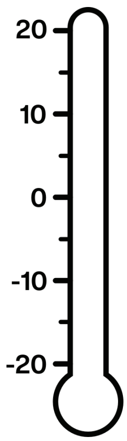
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
7.2	7.RP.A.2.C, MP4	Student writes a correct equation for the relationship. • $n = 1.035t$ • $n = t + 0.035t$ • $n = (1 + 0.035)t$	Work shows conceptual understanding and mastery, with some errors. Students who write $n = 0.035t$ wrote an equation that finds 3.5% of the original cost rather than the cost after a 3.5% increase. Students who write $t = 1.035n$ may have mixed up the variables.	Work shows a developing but incomplete conceptual understanding, with significant errors.	Weak evidence of understanding equations involving percent decrease.	Did not attempt.
7.3	7.RP.A.3, MP6	Student successfully answers the question and includes a logical and complete explanation. • $\$25\,709.40$ After a 3.5% increase, the cost is $\$24\,840$. After another 3.5% increase, the cost is $\$25\,709.40$.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of multiple percent increases.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.5, Readiness Check Name ______________________

On Monday in Minneapolis, Minnesota, it was 0 °F outside.

1.1 On Tuesday, it was 15 degrees colder.

What was the temperature on Tuesday?



1.2 Wednesday was 5 degrees warmer than Tuesday.

What was the temperature on Wednesday?

2. Select **all** of the true statements.

- ☐ $-2 < -5$
- ☐ -5 is less than -2.
- ☐ -2 is closer to 0 than 5 is.
- ☐ $-5 > -2$
- ☐ $2 < 5$

3. Order the numbers by value from least to greatest.

$\frac{5}{2}$ $-\frac{2}{5}$ -2 5.2 -5

Least ______ ______ ______ ______ ______ **Greatest**

4. Determine the value of each expression.

Expression	**Value**
$\frac{11}{4} + \frac{9}{4}$	
$3.2 - 2.6$	
$\frac{5}{8} + \frac{3}{2}$	
$12 - 3.6$	

5.1 Select **all** of the equations where a has the same value as $2 + a = 5$.

- ☐ $5 - a = 2$
- ☐ $2 - a = 5$
- ☐ $5 - 2 = a$
- ☐ $a + 2 = 5$
- ☐ $2 - 5 = a$

5.2 Select **all** of the equations where b has the same value as $\frac{8}{2} = b$.

- ☐ $2 \cdot b = 8$
- ☐ $\frac{8}{b} = 2$
- ☐ $2 \cdot 8 = b$
- ☐ $\frac{1}{2} \cdot b = 8$
- ☐ $8 \cdot \frac{1}{2} = b$

Determine the value of the variable that makes each equation true.

6.1 $x - 2.6 = 5$

6.2 $2.6 \cdot 5 = y$

6.3 $\frac{1}{4} z = 8$

1.1 -15 °F

1.2 -10 °F

2. ✓ -5 is less than -2.
   ✓ -2 is closer to 0 than 5 is.
   ✓ $2 < 5$

3. **Least** $-5, -2, -\frac{2}{5}, \frac{5}{2}, 5.2$ **Greatest**

4.

Expression	Value
$\frac{11}{4} + \frac{9}{4}$	5 (or equivalent)
$3.2 - 2.6$	0.6 (or equivalent)
$\frac{5}{8} + \frac{3}{2}$	$\frac{17}{8}$ (or equivalent)
$12 - 3.6$	8.4 (or equivalent)

5.1 ✓ $5 - a = 2$
    ✓ $5 - 2 = a$
    ✓ $a + 2 = 5$

5.2 ✓ $2 \cdot b = 8$
    ✓ $\frac{8}{b} = 2$
    ✓ $8 \cdot \frac{1}{2} = b$

6.1 7.6

6.2 13

6.3 32

Unit 7.5, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:

- Problems 1 and 2 before Lesson 1
- Problems 3, 4, 5, and 6 before Lesson 3

Problem 1

(Standards: **6.NS.C.5, MP2**)

These questions are intended to surface what students already know about reasoning with negative numbers. Students reason abstractly and quantitatively by connecting increase and decrease in temperature to numerical values. This content first appears in Lesson 1: Floats and Anchors, where students reason about the position of a submarine as anchors and floats are added.

Suggested Next Steps: If students struggle . . .

- Consider paying special attention to how students reason about negative numbers during Lesson 1, or revisit this question as a class before beginning Lesson 2.

Problem 2

(Standards: **6.NS.C.7.A, 6.NS.C.7.D**)

This question is intended to surface what students already know about comparing signed numbers. This content first appears in Lesson 1: Floats and Anchors.

Suggested Next Steps: If students struggle . . .

- Consider spending extra time comparing values of negative numbers during Lesson 1, particularly on Screen 5, using the vertical number line to aid in the discussion.

Problem 3

(Standard: **6.NS.C.7**)

This question is intended to surface what students already know about ordering and comparing signed numbers, including fractions and decimals. This content first appears in Lesson 3: Bumpers.

Suggested Next Steps: If students struggle . . .

- Plan to revisit this problem before Lesson 3, or use this item as the Warm-Up. Ask students to consider where each value would be located on a vertical or horizontal number line to help them order the numbers by value.

Problem 4

(Standard: **5.NF.A.1**)

This question is intended to surface what students already know about adding and subtracting fractions and decimals. This content first appears in Lesson 3: Bumpers.

Suggested Next Steps: If students struggle . . .

- Consider including review of operations with fractions and decimals throughout the beginning of the unit leading up to Lesson 3.
- Consider spending extra time discussing students' strategies for the questions in Lesson 3 that involve fractions.

Problem 5

(Standards: **6.EE.A.4, MP7**)

These questions are intended to surface what students already know about equivalent relationships, particularly rewriting subtraction as addition and division as multiplication. Students make use of structure to determine correspondences between various representations by selecting equivalent expressions. This content first appears in Lesson 3: Bumpers and Lesson 8: Speeding Turtles.

Suggested Next Steps: If students struggle . . .

- Consider reviewing Problem 5.1 before beginning Lesson 3 and Problem 5.2 before beginning Lesson 8.

Problem 6

(Standard: **6.EE.B.7**)

This question is intended to surface what students already know about solving one-step equations. This content first appears in Lesson 3: Bumpers and Lesson 8: Speeding Turtles.

Suggested Next Steps: If students struggle . . .

- Consider reviewing Problem 6.1 after students have surfaced strategies for using number lines to solve addition and subtraction problems in Lesson 3.
- Consider spending extra time on Activity 2 of Lesson 3 surfacing different strategies students use to solve equations, then revisiting those strategies before beginning Lesson 8.

Unit 7.5, Quiz 1: Lessons 1–5 Name ______________________________

1. Which expression has the least value?

   A. $-9-(-9)$

   B. $-2-(6)$

   C. $15+(-7)$

   D. $-15+(-3)$

2. Select **all** of the expressions that are equivalent to $3.5-(4.7)$.

   ☐ $4.7-(3.5)$

   ☐ $-4.7+3.5$

   ☐ $3.5+4.7$

   ☐ $3.5-(-4.7)$

   ☐ $3.5+(-4.7)$

Determine the value of the variable that makes each equation true.

3.1 $15-a=17$

3.2 $b+(-8.3)=0$

3.3 $\frac{13}{4}+c=-\frac{3}{4}$

Unit 7.5, Quiz 1: Lessons 1–5 Name ____________________

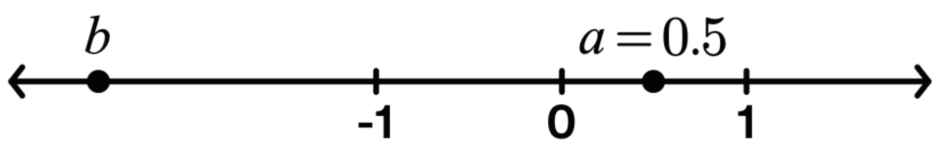
This table shows temperatures in an Arctic city during one winter week.

4.1 Complete the table.

Day	Temperature at Midnight (°F)	Temperature Change From Midnight to Noon (°F)	Temperature at Noon (°F)
Monday	-32	20	-12
Tuesday	-17.5	-11	
Wednesday		15.5	10.5
Thursday	-12.2		-24
Friday	-21.8	17.3	

4.2 On Saturday, the temperature at midnight was -17°F. At noon, the temperature was 10°F. How many degrees did the temperature change from midnight to noon? Explain your reasoning.

Use the positions of a and b on the number line to answer the question below.



5. Is $a + b$ positive, negative, or zero? Explain how you know.

Unit 7.5, Quiz 1: Lessons 1–5 **Answer Key**

1. D. $-15 + (-3)$

2. ✓ $-4.7 + 3.5$

   ✓ $3.5 + (-4.7)$

3.1 -2

3.2 8.3

3.3 $-\frac{16}{4}$ (or equivalent)

4.1

Day	Temperature at Midnight (°F)	Temperature Change From Midnight to Noon (°F)	Temperature at Noon (°F)
Monday	-32	20	-12
Tuesday	-17.5	-11	-28.5
Wednesday	-5	15.5	10.5
Thursday	-12.2	-11.8	-24
Friday	-21.8	17.3	-4.5

4.2 *Responses vary*. The change in temperature from midnight to noon was 27 degrees since $-17 + 27 = 10$.

5. Negative

   Explanations vary. To find $a + b$ on the number line, I start at a and then travel b units to the left (since b is negative). Since b is further from 0 than a, $a + b$ is negative.

Unit 7.5, Quiz 1: Summary and Rubric

Content Standards Summary

Standard	7.NS.A.1	7.NS.A.1.A	7.NS.A.1.B	7.NS.A.1.C	7.NS.A.3
Problems	1, 2, 3, 5	3	1, 3, 5	2, 3	4

Problem 1
(Standards: **7.NS.A.1, 7.NS.A.1.B**)

This problem assesses students' ability to add and subtract positive and negative integers.
This problem corresponds most directly to the work students did in Lesson 2: More Floats and Anchors.

Suggested Next Steps: If students struggle . . .
- Consider asking students to describe the meaning of each problem in terms of adding or removing anchors.
- Consider revisiting Lesson 2, Activity 1.

Problem 2
(Standards: **7.NS.A.1, 7.NS.A.1.C**)

This problem assesses students' ability to compare and contrast expressions that include the same signed numbers in different orders. This problem corresponds most directly to the work students did in Lesson 4: Draw Your Own.

Suggested Next Steps: If students struggle . . .
- Consider asking students to draw a number line diagram to represent each expression and use it to determine the value.
- Consider revisiting Lesson 4, Activity 1.

Unit 7.5, Quiz 1: Summary and Rubric

Problem 3

(Standards: **7.NS.A.1, 7.NS.A.1.A, 7.NS.A.1.B, 7.NS.A.1.C**)

This problem assesses students' ability to determine the value of a variable that makes an equation involving addition or subtraction of signed numbers true. This problem corresponds most directly to the work students did in Lesson 3: Bumpers.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe how they could use a number line to determine the value of x in each equation.
- Consider revisiting Lesson 3.

Problem 4

(Standards: **7.NS.A.3, MP7**)

This problem assesses students' ability to add and subtract signed numbers in context. Students make use of the structure of the table to complete the missing information. This problem corresponds most directly to the work students did in Lesson 3: Bumpers.

Suggested Next Steps: If students struggle . . .

- Consider asking students to use Monday's temperature information to describe a relationship between the temperature at midnight, temperature change from noon to midnight, and the temperature at noon using an equation.
- Consider revisiting Lesson 3, Activity 1.

Problem 5

(Standards: **7.NS.A.1, 7.NS.A.1.B, MP7**)

This problem assesses students' ability to reason about variable expressions involving addition and subtraction. Students make use of the structure of the number line to approximate the values of a, b, and $a + b$. This problem corresponds most directly to the work students did in Lesson 4: Draw Your Own.

Suggested Next Steps: If students struggle . . .

- Consider asking students to determine the direction the arrow would point when illustrating the change between a and b on the number line diagram.
- Consider revisiting Lesson 4, Activity 1.

Unit 7.5, Quiz 1: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.NS.A.1, 7.NS.A.1.B	Correct choice. • $-15 + (-3)$			Incorrect choice. *Students who selected* $-2 - (6)$ *may have confused the phrase "least value" with an expression that had relatively small numbers in the expression.*	Did not attempt.
2	7.NS.A.1, 7.NS.A.1.C	**All correct** choices and **no incorrect** choices. • $-4.7 + 3.5$ • $3.5 + (-4.7)$	**One correct** choice or **one correct choice with one incorrect** choice. **Two correct choices and one incorrect** choice.	**One correct** choice but also includes **two incorrect** choices.	**Only incorrect** choices**.** **Two incorrect** choices with some correct choices.	Did not attempt.

Unit 7.5, Quiz 1: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3.1	7.NS.A.1, 7.NS.A.1.A, 7.NS.A.1.B, 7.NS.A.1.C	Correct answer. • -2	Work shows **conceptual understanding** with some errors. *Students who wrote* 2 *may have determined that* $-a = 2$ *, but did not solve for just* a*.*	Work shows **incomplete understanding** with significant errors. *Students who wrote* 32 *or* -32 *may have incorrectly added* 15 *to both sides to balance the equation.*	Work shows **limited understanding** of determining the value of a variable that makes an equation involving addition or subtraction of signed numbers true.	Did not attempt.
3.2	7.NS.A.1, 7.NS.A.1.A, 7.NS.A.1.B, 7.NS.A.1.C	Correct answer. • 8.3	Work shows **conceptual understanding** with some errors.	Work shows **incomplete understanding** with significant errors. *Students who wrote* -8.3 *may have incorrectly subtracted* 8.3 *from both sides to balance the equation.*	Work shows **limited understanding** of determining the value of a variable that makes an equation involving addition or subtraction of signed numbers true.	Did not attempt.

Unit 7.5, Quiz 1: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3.3	7.NS.A.1, 7.NS.A.1.A, 7.NS.A.1.B, 7.NS.A.1.C	Correct answer. • $-\frac{16}{4}$ (or equivalent)	Work shows **conceptual understanding** with some errors.	Work shows **incomplete understanding** with significant errors. *Students who wrote $\frac{10}{4}$ may have incorrectly added $\frac{13}{4}$ to both sides to balance the equation.*	Work shows **limited understanding** of determining the value of a variable that makes an equation involving addition or subtraction of signed numbers true.	Did not attempt.
4.1	7.NS.A.3	Correct answers. • **Tuesday:** -28.5 °F **Wednesday:** -5 °F **Thursday:** -11.8 °F **Friday:** -4.5 °F	Three temperatures are correct.	Two temperatures are correct.	**One** or **none** of the temperatures are correct.	Did not attempt.
4.2	7.NS.A.3	**Correct answer** with **correct explanation.** • 27 degrees *E.g., The change in temperature from midnight to noon was 27 degrees since $-17 + 27 = 10$.*	**Correct answer** with **minor flaws in explanation.** **Incorrect answer** with **logical and complete explanation.** *E.g., To go from 10 to −17 degrees, the temperature must change by −27 degrees since $10 - 27 = -17$.*	**Correct answer** with **incomplete explanation.** **Incorrect answer** with **explanation that shows partial understanding.**	**Incorrect answer** with **no explanation or incorrect explanation.**	Did not attempt.

Unit 7.5, Quiz 1: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
5	7.NS.A.1, 7.NS.A.1.B	**Correct answer** with **correct explanation.** • Negative *E.g., To find $a + b$ on the number line, I start at a and then travel b units to the left (since b is negative). Since b is farther from 0 than a, $a + b$ is negative.*	**Correct answer** with **minor flaws in explanation.** *E.g., Negative because a is larger than b.* **Incorrect answer** with **logical and complete explanation.** *E.g., Positive because the distance from b to 0 is about 2, and the distance from 0 to a is 0.5, so the total distance $a + b$ is about positive 2.5.*	**Correct answer** with **incomplete explanation.** **Incorrect answer** with **explanation that shows partial understanding.**	**Incorrect answer** with **no explanation or incorrect explanation.**	Did not attempt.

Unit 7.5, Quiz 2: Lessons 6–10 Name ______________________

1. Select **all** of the equations that are equivalent to $\frac{27}{-3} = k$.

- ☐ $\frac{-27}{3} = k$
- ☐ $-3k = -27$
- ☐ $-3 \cdot (27) = k$
- ☐ $\frac{1}{3}k = -27$
- ☐ $\frac{-27}{k} = 3$

2. Which expression has a negative value?

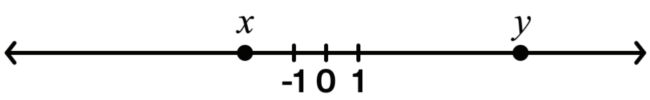
Use the positions of x and y on the number line to answer the question.

A. xy

B. $-\frac{x}{y}$

C. $y - x$

D. $2y$



When Dylan checks their school lunch account, the balance is $\$56$. After buying 8 lunches, the balance is $\$40$.

3.1 How much does the balance change with each lunch bought?
Show whether the change is positive or negative.

3.2 How many more lunches can Dylan buy before they run out of money?

3.3 At Dylan's school, every student starts with a balance of $\$80$ for school lunches.
How many lunches had Dylan bought when they first checked their balance?

Unit 7.5, Quiz 2: Lessons 6–10 Name ______________________________

Determine the value of the variable that makes each equation true.

4.1 $5a = -1$

4.2 $\frac{b}{-3} = -15$

4.3 $-14 + c = -12.5$

Here are the times and positions of cars passing a camera on a highway. Cars east of the camera have positive positions and cars west of the camera have negative positions.

5.1 Complete the table for one car traveling at a constant speed.

What does the number you wrote tell you about the car?

Time (sec.)	Position (ft.)
-3	
-2	120
-1	60
0	0
1	-60
2	-120

5.2 Which question would $a = (-5)(-60)$ help to answer?

A. The car was traveling at a rate of -60 feet per second. What was the position of the car 5 seconds **after** it passed the camera?

B. The car was at -60 feet one second after it passed the camera. When was the car 5 feet to the **west** of the camera?

C. The car was traveling at a rate of -60 feet per second. What was the position of the car 5 seconds **before** it passed the camera?

5.3 Answer the question you selected in 5.2.

Unit 7.5, Quiz 2: Lessons 6–10

Answer Key

1. ✓ $\frac{-27}{3} = k$

   ✓ $\frac{-27}{k} = 3$

2. A. xy

3.1 -2 dollars

3.2 20 lunches

3.3 12 lunches

4.1 $-\frac{1}{5}$

4.2 45

4.3 1.5

5.1

Time (sec.)	-3	-2	-1	0	1	2
Position (ft.)	180	120	60	0	-60	-120

Responses vary. The car was 180 feet east of the camera 3 seconds before it passed the camera.

5.2 C

5.3 *Responses vary*. 5 seconds before the car passed the camera, its position was $(-5)(-60) = 300$ feet.

Unit 7.5, Quiz 2: Summary and Rubric

Content Standards Summary

Standard	7.NS.A.1	7.NS.A.2	7.NS.A.2.A	7.NS.A.2.B	7.NS.A.2.C	7.NS.A.3	7.EE.B.3
Problems	4	1	4	1	4	2, 3, 5	3

Problem 1
(Standards: **7.NS.A.2, 7.NS.A.2.B, MP7**)

This problem assesses students' ability to identify different multiplication and division expressions that have the same value. Students make use of the structure of each expression to identify equivalent expressions. This problem corresponds most directly to the work students did in Lesson 8: Speeding Turtles.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which equations are not equivalent to the given equation and why.
- Consider revisiting Lesson 8, Activity 1.

Problem 2
(Standards: **7.NS.A.3, MP7**)

This problem assesses students' ability to reason about variable expressions involving adding, subtracting, multiplying, and dividing signed numbers. Students use the structure of the number line to support their thinking. This problem corresponds most directly to the work students did in Lesson 9: Expressions.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which expressions do not have a negative value and why.
- Consider revisiting Lesson 9, Activity 1.

Unit 7.5, Quiz 2: Summary and Rubric

Problem 3

(Standards: **7.NS.A.3, 7.EE.B.3, MP2**)

This problem assesses students' ability to multiply and divide positive and negative numbers in context. Students reason abstractly and quantitatively when they extrapolate from given information to answer questions in context. This problem corresponds most directly to the work students did in Lesson 8: Speeding Turtles.

Suggested Next Steps: If students struggle . . .

- Consider asking students to determine the total cost of the 8 lunches Dylan purchased. Consider asking them to determine how much of the $\$80$ initial balance Dylan had already spent when he first checked his balance.
- Consider revisiting Lesson 8, Activity 1.

Problem 4

(Standards: **7.NS.A.1, 7.NS.A.2.A, 7.NS.A.2.C**)

This problem assesses students' ability to determine the value of a variable that makes an equation involving multiplication or division of signed numbers true. This problem corresponds most directly to the work students did in Lesson 10: Integer Puzzles.

Suggested Next Steps: If students struggle . . .

- Consider asking students to determine whether the value of the variable in each equation would be positive or negative.
- Consider revisiting Lesson 10, Activity 1.

Problem 5

(Standards: **7.NS.A.3, MP2**)

This problem assesses students' ability to interpret the meaning of multiplication of signed numbers in context. Students reason abstractly and quantitatively when they describe the meaning for the value computed in question 5.1 and determine which problem could be solved using the given equation in problem 5.2. This problem corresponds most directly to the work students did in Lesson 7: Back in Time.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe what negative time measurements mean within the context of the problem.
- Consider revisiting Lesson 7, Activity 1.

Unit 7.5, Quiz 2: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.NS.A.2, 7.NS.A.2.B	**All correct** choices and **no incorrect** choices. • $\frac{-27}{3} = k$ • $\frac{-27}{k} = 3$	**One correct** choice or **one correct choice with one incorrect** choice. **Two correct choices and one incorrect** choice.	**One correct** choice but also includes **two incorrect** choices.	**Only incorrect** choices**.** **Two incorrect** choices with some correct choices.	Did not attempt.
2	7.NS.A.3	Correct choice. • xy			Incorrect choice. *Students who selected $-\frac{x}{y}$ may have understood the expression as $\frac{-x}{-y}$.*	Did not attempt.

Unit 7.5, Quiz 2: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3.1	7.NS.A.3, 7.EE.B.3	Correct answer. • -2 dollars	Work shows **conceptual understanding** with some errors. *Students who wrote* 2 *dollars may have known that each lunch costs* \$2 *but did not know if that affected the balance in a positive or negative way.*	Work shows **incomplete understanding** with significant errors. *Students who wrote* -5 *dollars may have known that each lunch would decrease the balance but may have interpreted that it took* \$40 *to buy* 8 *lunches.*	Work shows **limited understanding** of multiplying and dividing positive and negative numbers in context. *Students who wrote* \$16 *may have calculated the cost of all* 8 *lunches but did not recognize that further division was required.*	Did not attempt.
3.2	7.NS.A.3, 7.EE.B.3	Correct answer. • 20 lunches	Work shows **conceptual understanding**, with minor errors. *E.g., Student divides* 40 *by the value they wrote in 3.1.*	Work shows a developing but **incomplete understanding**, with significant errors. *Students who wrote* 28 *lunches may have determined the total number of lunches that could be bought with a balance of* \$56.	Work shows **limited understanding** of multiplying and dividing positive and negative numbers in context. *Students who wrote* 2 *lunches may have calculated* $\frac{16}{8}$ *thinking the value of each lunch is* \$8.	Did not attempt.

Unit 7.5, Quiz 2: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3.3	7.NS.A.3, 7.EE.B.3	Correct answer. • 12 lunches	Work shows **conceptual understanding** with some errors. *E.g., Student divides 24 by the value they wrote in 3.1.*	Work shows **incomplete understanding** with significant errors. *Students who wrote 40 lunches may have determined the total number of lunches that could be bought with the original balance of $80.*	Work shows **limited understanding** of multiplying and dividing positive and negative numbers in context. *Students who wrote 3 lunches may have calculated* $\frac{24}{8}$ *thinking the value of each lunch is $8.*	Did not attempt.
4.1	7.NS.A.1, 7.NS.A.2.A, 7.NS.A.2.C	Correct answer. • $-\frac{1}{5}$	Work shows **conceptual understanding**, with minor errors. *E.g., Student makes a sign error, such as writing* $\frac{1}{5}$.	Work shows a developing but **incomplete understanding**, with significant errors.	Work shows **limited understanding** of determining the value of a variable that makes an equation involving multiplication or division of signed numbers true.	Did not attempt.

Unit 7.5, Quiz 2: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
4.2	7.NS.A.1, 7.NS.A.2.A, 7.NS.A.2.C	Correct answer. • 45	Work shows **conceptual understanding** with some errors. *E.g., Student makes a sign error, such as writing* -45.	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of determining the value of a variable that makes an equation involving multiplication or division of signed numbers true.	Did not attempt.
4.3	7.NS.A.1, 7.NS.A.2.A, 7.NS.A.2.C	Correct answer. • 1.5	Work shows **conceptual understanding** with some errors. *E.g., Student makes a sign error, such as writing* -1.5.	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of determining the value of a variable that makes an equation involving multiplication or division of signed numbers true.	Did not attempt.

Unit 7.5, Quiz 2: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.1	7.NS.A.3	**Correct answer** and **explanation**. • 180 *E.g., The car was* 180 *feet east of the camera* 3 *seconds before it passed the camera.*	**Correct answer** with **minor flaws in explanation**. *E.g., The car was* 180 *feet east.* **Incorrect answer** with **logical and complete explanation**.	**Correct answer** with **incomplete explanation**. **Incorrect answer** with **explanation that shows partial understanding**. *E.g., The car was* 160 *feet east of the camera* 3 *seconds before it passed the camera.*	**Incorrect answer** with **no explanation or incorrect explanation**.	Did not attempt.
5.2 **5.3**	7.NS.A.3	**Correct answer** and **explanation**. • The car was traveling at a rate of -60 feet per second. What was the position of the car 5 seconds before it passed the camera? *E.g.,* 5 *seconds before the car passed the camera, its position was* $(-5)(-60) = 300$ *feet.*	**Correct answer** with **incomplete explanation**. *E.g., The car was* 300 *feet east.*	**Correct answer** with **incomplete explanation**. **Incorrect answer** with **correct explanation**. *E.g., Student chooses incorrect question but correctly interprets the equation.*	**Incorrect answer** with **no explanation or incorrect explanation**.	Did not attempt.

Unit 7.5, End-Unit Assessment: Form A Name ________________________________

1. What is the value of $2.6 + (-3)$?

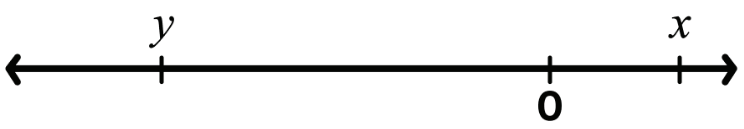
   A. -0.4 B. 5.6 C. -5.6 D. 0.4

2. Select **all** of the expressions that are equivalent to $-4.5 - 5.2$.

   - ☐ $-4.5 + 5.2$
   - ☐ $-4.5 + (-5.2)$
   - ☐ $5.2 - (-4.5)$
   - ☐ $-5.2 - 4.5$
   - ☐ $4.5 - 5.2$

Use the positions of x and y on the number line to answer the question.

3. Which expression has a positive value?



   A. $x + y$ B. $x - y$ C. $x \cdot y$ D. $\frac{x}{y}$

4. Determine the value of each expression.

Expression	Value
$-\frac{12}{3}$	
$-12 + 3$	
$12 - (-3)$	
$(-12)(-3)$	
$\frac{-12}{-3}$	

5. Which question would the equation $b = -\frac{12}{3}$ help to answer?

   A. The temperature dropped 12 degrees each hour for 3 hours. How much did the temperature change in total?

   B. The temperature dropped 12 degrees over 3 hours. How much did it change each hour?

   C. The temperature was 12°F and dropped to -3°F. How much did the temperature change?

   Explain your thinking.

Determine the value of the variable that makes the equation true.

6.1 $\frac{1}{3}a = -5$

6.2 $12 - b = 12.5$

6.3 $1 = -10c$

Unit 7.5, End-Unit Assessment: Form A Name ________________________________

In 2020, Kathryn Sullivan and Vanessa O'Brien became the first women to reach the deepest-known point in the ocean. They started out at 0 feet and traveled at a constant rate toward the ocean floor.

Use the table showing their elevation at different times to help you answer the questions.

7.1 How much did their elevation change each minute?

Show whether the change is positive or negative.

Time (min.)	Elevation (ft.)
0	0
20	$-3\ 000$

7.2 What was Kathryn and Vanessa's elevation 75 minutes after they started their journey to the bottom of the ocean?

7.3 How many minutes did it take them to reach $-36\ 000$ feet after they started their journey?

Explain your thinking.

Unit 7.5, End-Unit Assessment: Form A Name ______________________

Reflection: Select a question to answer.

☐ What is something you are proud of from this unit?

☐ Write what you know about a topic from this unit that you weren't asked about today.

☐ Describe or show one strategy you found helpful in this unit.
Name any students who helped you with this strategy.

☐ What else would you like your teacher to know?

Unit 7.5, End-Unit Assessment: Form A **Answer Key**

1. A. -0.4

2. ✓ $-4.5 + (-5.2)$
   ✓ $-5.2 - 4.5$

3. B. $x - y$

4.

Expression	Value
$-\frac{12}{3}$	-4
$-12 + 3$	-9
$12 - (-3)$	15
$(-12)(-3)$	36
$\frac{-12}{-3}$	4

5. B
   Explanations vary. If the temperature dropped 12 degrees over 3 hours, then it changed
   $-\frac{12}{3} = -4$ degrees each hour.

6.1 -15

6.2 -0.5

6.3 $-\frac{1}{10}$

7.1 -150 feet per minute

7.2 $-11\,250$ feet

7.3 240 minutes
Explanations vary. Kathryn and Vanessa travel at a rate of -150 feet per minute. They need to descend $-36\,000$ feet. That's a total of $\frac{-36\,000}{-150} = 240$ minutes to reach the ocean floor.

Unit 7.5, End Assessment Summary and Rubric: Form A

Content Standards Summary

Standard	7.NS.A.1	7.NS.A.1.B	7.NS.A.1.C	7.NS.A.1.D	7.NS.A.2	7.NS.A.2.B	7.NS.A.3	7.EE.B.3
Problems	1, 4	3	2	6.2	6.1, 6.3	4	5	7

Problem 1
(Standard: **7.NS.A.1**)

This problem assesses students' ability to add positive and negative numbers. This problem corresponds most directly to the work students did in Lesson 3: Bumpers.

Suggested Next Steps: If students struggle . . .
- Consider asking students to draw a number line diagram to represent the expression and use it to determine the value.
- Consider revisiting Lesson 3, Activity 1.

Problem 2
(Standard: **7.NS.A.1.C**)

This problem assesses students' ability to identify different addition and subtraction expressions that have the same value. This problem corresponds most directly to the work students did in Lesson 3: Bumpers and Lesson 4: Draw Your Own.

Suggested Next Steps: If students struggle . . .
- Consider asking students to draw a number line diagram to represent each expression and use it to determine the value of each expression.
- Consider revisiting Lesson 3, Activity 1 or Lesson 4, Activity 1.

Unit 7.5, End Assessment Summary and Rubric: Form A

Problem 3

(Standards: **7.NS.A.1.B, MP7**)

This problem assesses students' ability to reason about variable expressions involving adding, subtracting, multiplying, and dividing signed numbers. Students make use of the structure of the number line to determine which of four given expressions is positive. This problem corresponds most directly to the work students did in Lesson 4: Draw Your Own and Lesson 9: Expressions.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which expressions do not have a negative value and why.
- Consider revisiting Lesson 9, Activity 1.

Problem 4

(Standards: **7.NS.A.1, 7.NS.A.2.B**)

This problem assesses students' ability to add, subtract, multiply, and divide signed integers. This problem corresponds most directly to the work students did in Lesson 10: Integer Puzzles.

Suggested Next Steps: If students struggle . . .

- Consider asking students to first determine whether the value of each expression would be positive or negative.
- Consider revisiting Lesson 10.

Unit 7.5, End Assessment Summary and Rubric: Form A

Problem 5

(Standards: **7.NS.A.3, MP2**)

This problem assesses students' ability to connect expressions to real-world situations. Students reason abstractly and quantitatively as they determine which question the given equation could be used to solve. This problem corresponds most directly to the work students did in Lesson 8: Speeding Turtles.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which questions the equation would not help answer and why.
- Consider revisiting Lesson 8, Activity 1.

Problem 6

(Standards: **7.NS.A.2, 7.NS.A.1.D**)

This problem assesses students' ability to determine the value of a variable that makes an equation with positive and negative numbers true. This problem corresponds most directly to the work students did in Lesson 8: Speeding Turtles and Lesson 10: Integer Puzzles.

Suggested Next Steps: If students struggle . . .

- Consider asking students to first determine whether the value of the variable in each equation would be positive or negative.
- Consider revisiting Lesson 8, Activity 1 or Lesson 10, Activity 1.

Problem 7

(Standard: **7.EE.B.3, MP2**)

This problem assesses students' ability to solve problems involving positive and negative rates. Students reason abstractly and quantitatively as they extrapolate given information to answer further questions in the given context. This problem corresponds most directly to the work students did in Lesson 7: Back in Time and Lesson 12: Arctic Sea Ice.

Suggested Next Steps: If students struggle . . .

- Consider asking students how the data in the table can be used to determine the rate of change of the elevation. Consider asking them to describe how the rate can be used to make predictions about future elevations.
- Consider revisiting Lesson 12, Activity 1.

Unit 7.5, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.NS.A.1	• A -0.4			Students who select 0.4 may recognize that the values have the opposite sign but do not know that -3 is further from 0 than 2.6. Students who select -5.6 may have added $2.6 + 3$ and knew that the total was negative. Students who select 5.6 may have determined the value of $2.6 - (-3)$.	Did not attempt.
2	7.NS.A.1.C	Student selects all of the correct choices and does not select any incorrect choices. • $-4.5 + (-5.2)$ • $-5.2 - 4.5$	Student selects one of the correct choices and does not select any incorrect choices. Student selects both of the correct choices and one incorrect choice.	Student selects one of the correct choices and one incorrect choice.	Student only selects incorrect choices. Student selects two or more incorrect choices with the correct choices.	Did not attempt.
3	7.NS.A.1.B, MP7	• B $x - y$			Students who select $x + y$ may be paying attention to the + sign. Students who select $x \cdot y$ or $\frac{x}{y}$ may have remembered that when you multiply or divide two negative numbers, the result is positive.	Did not attempt.

Unit 7.5, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
4	7.NS.A.1, 7.NS.A.2.B	Work is complete and correct. • $-\frac{12}{3} = -4$ • $-12 + 3 = -9$ • $12 - (-3) = 15$ • $(-12)(-3) = 36$ • $\frac{-12}{-3} = 4$	Work shows conceptual understanding and mastery, with minor errors. Students who write that: • $-\frac{12}{3} = 4$ may have divided -12 by -3. • $-12 + 3 = -15$ may have calculated $-(12 + 3)$. • $12 - (-3) = 9$ may have subtracted $12 - 3$. • $(-12)(-3) = -15$ may have subtracted $-12 - 3$ • $\frac{-12}{-3} = -4$ may have assumed the result is negative.	Work shows a developing but incomplete conceptual understanding with significant errors.	Weak evidence of understanding.	Did not attempt.

Unit 7.5, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5	7.NS.A.3, MP2	Student successfully answers the question and includes a logical and complete explanation. • B. The temperature dropped 12 degrees over 3 hours. How much did it change each hour? *Explanations vary*. If the temperature dropped 12 degrees over 3 hours, then it changed $-\frac{12}{3} = -4$ degrees each hour.	Correct choice with minor flaws in explanation. Incorrect choice with logical and complete explanation.	Correct choice with incomplete explanation. Incorrect choice with explanation that communicates partial understanding of connecting expressions to real-world situations.	Incorrect choice with incorrect explanation or without an explanation.	Did not attempt.
6.1	7.NS.A.2	Work is complete and correct. • -15	Work shows conceptual understanding and mastery, with minor errors.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write $\frac{-5}{3}$ may have divided by 3.	Weak evidence of understanding.	Did not attempt.

Unit 7.5, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
6.2	7.NS.A.1.D	Work is complete and correct. • -0.5	Work shows conceptual understanding and mastery, with minor errors.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write 0.5 may have calculated $12.5 - 12$.	Weak evidence of understanding.	Did not attempt.
6.3	7.NS.A.2	Work is complete and correct. • $-\frac{1}{10}$	Work shows conceptual understanding and mastery, with minor errors. • Students who write 0.1 may not have considered the sign of the expression.	Work shows a developing but incomplete conceptual understanding, with significant errors.	Weak evidence of understanding.	Did not attempt.
7.1	7.EE.B.3, MP2	Work is complete and correct. • -150 feet per minute	Work shows conceptual understanding and mastery, with minor errors. • Students who write 150 may not have considered the sign of the change.	Work shows a developing but incomplete conceptual understanding, with significant errors.	Weak evidence of understanding.	Did not attempt.

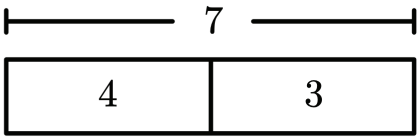
Unit 7.5, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
7.2	7.EE.B.3, MP2	Work is complete and correct. • $-11\ 250$ feet	Work shows conceptual understanding and mastery, with minor errors. • Students who write $-3\ 055$ may have used the difference from the given time to the new time to determine the new elevation.	Work shows a developing but incomplete conceptual understanding, with significant errors.	Weak evidence of understanding.	Did not attempt.
7.3	7.EE.B.3, MP2	Student successfully answers the question and includes a logical and complete explanation. • 240 minutes Kathryn and Vanessa travel at -150 feet per minute and need to descend $-36\ 000$ feet. That's $\frac{-36\ 000}{-150} = 240$ minutes to reach the ocean floor.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation. • Students who write $33\ 020$ or $-32\ 080$ as the time to reach the bottom may have noticed that the elevation changed by $33\ 000$ feet and then used the same reasoning to determine the change in time.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of multiple percent increases.	Incorrect choice with incorrect explanation or without an explanation.	Did not attempt.

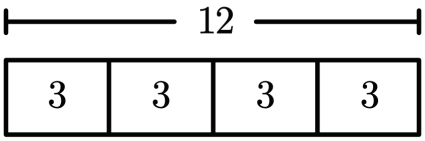
Unit 7.6, Readiness Check Name ______________________________

Determine whether each equation matches Diagram A, Diagram B, or neither diagram. Circle your answer.

A



B



1.1 $7 = 3 + 4$ matches **Diagram A / Diagram B / neither diagram**.

1.2 $4 - 3 = 7$ matches **Diagram A / Diagram B / neither diagram**.

1.3 $4 \cdot 3 = 7$ matches **Diagram A / Diagram B / neither diagram**.

1.4 $3 + 3 + 3 + 3 = 12$ **matches Diagram A / Diagram B / neither diagram**.

1.5 $12 = 4 \cdot 3$ matches **Diagram A / Diagram B / neither diagram**.

Vihaan collects stickers. He has x stickers. After getting 15 more stickers, he has 60 stickers total.

2.1 How many stickers did Vihaan start with?

2.2 Select **all** of the equations that could be used to determine how many stickers Vihaan started with.

- ☐ $x + 15 = 60$
- ☐ $x = 60 - 15$
- ☐ $x = 60 + 15$
- ☐ $15x = 60$
- ☐ $x = 60 \cdot 15$

3. Select **all** of the equations that are true when x is -4.

☐ $-8 = 2x$ ☐ $-12 = x \cdot -3$ ☐ $-12 = x + x + x$ ☐ $\frac{x}{4} = -1$ ☐ $x + 4 = -8$

Unit 7.6, Readiness Check Name ________________________________

Solve each equation.

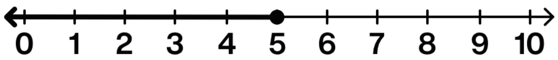
4.1 $p + 12 = 7$	4.2 $90 = -20r$	4.3 $\frac{1}{3}s = 7$

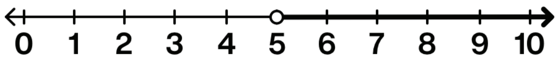
5. Which expression is equivalent to $4(x + 2)$?

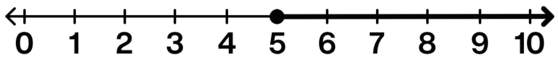
A. $12x$ B. $4x + 2$ C. $6x$ D. $4x + 8$

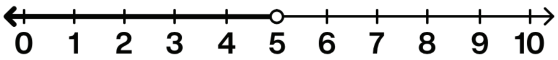
Explain your thinking.

6.1 Cameron is selling boxes of cookies. His goal is to sell more than 5 boxes. Which graph shows how many boxes Cameron must sell in order to reach his goal?

A.


B.


C.


D.


Explain your thinking.

6.2 Arnav is also selling boxes of cookies. He sells each box for $\$3.75$. His goal is to make more than $\$30$. How many boxes of cookies could he sell to reach his goal?

Explain your thinking.

Answer Key

1.1 A

1.2 Neither

1.3 Neither

1.4 B

1.5 B

2.1 45 stickers

2.2 ✓ $x + 15 = 60$
✓ $x = 60 - 15$

3. ✓ $-8 = 2x$
✓ $-12 = x + x + x$
✓ $\frac{x}{4} = -1$

4.1 $p = -5$

4.2 $r = -4.5$ (or equivalent)

4.3 $s = 21$

5. D

Explanations vary. This is like 4 groups of $x + 2$, which is like $4 \cdot x + 4 \cdot 2$ or $4x + 8$.

6.1 B

Explanations vary. Cameron wants to sell more than 5 boxes, so that's like shading to the right of 5. We don't shade the 5 though because if he sells 5 boxes, he didn't reach his goal.

6.2 9 or more boxes

Explanations vary. To make exactly $\$30$, Arnav needs to sell $30 \div 3.75 = 8$ boxes of cookies. But he wants to make more than $\$30$, so he needs to sell 9 or more boxes.

Unit 7.6, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:

- Problem 1 before Lesson 2
- Problem 2 before Lesson 3
- Problems 3, 4, and 5 before Lesson 6
- Problem 7 before Lesson 13

Problem 1

(Standards: **2.OA.A, 3.OA.A, MP7**)

This question is intended to surface what students already know about tape diagrams. Students make use of diagram structure to choose equations that are representative of the diagrams. This content first appears in Lesson 2: Smudged Receipts, where students interpret tape diagrams and use them to determine unknown values in context.

Suggested Next Steps: If students struggle . . .

- Consider revisiting this question as a class before beginning Lesson 2 or spending extra time during the Warm-Up of Lesson 2 discussing the structure of the tape diagram.

Problem 2

(Standards: **6.EE.B.6, 6.EE.B.7, MP2**)

These questions are intended to surface what students already know about writing and solving equations to represent real-world situations. Students reason quantitatively to answer the first problem in context, then reason abstractly to model the situation as an equation. This unit builds on the work students did with equations in Math 6. This content first appears in Lesson 3: Equations.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this problem before beginning Lesson 3, or spending extra time discussing the relationship between the scenarios in Activity 1 of Lesson 3 and the equations that represent them.

Problem 3

(Standards: **6.EE.B.5, 7.NS.A.1**)

This question is intended to surface what students already know about how to decide whether a given number makes an equation true. This content first appears in Lesson 7: Keeping It True.

Suggested Next Steps: If students struggle . . .

- Consider checking all of the solutions in Activity 1 of Lesson 7 together as a class.

Unit 7.6, Readiness Check Summary

Problem 4

(Standards: **6.EE.B.7, 7.EE.B.4**)

These questions are intended to surface what students already know about solving equations of the forms $x + p = q$ and $px = q$, where p, q, and x are positive or negative numbers. This content first appears in Lesson 6: Balancing Equations, where students first use balancing moves to determine solutions to equations.

Suggested Next Steps: If students struggle . . .

- Consider spending extra time reviewing this problem to surface strategies for solving equations before beginning Lesson 6.

Problem 5

(Standards: **6.EE.A.3, 6.EE.A.4, MP7**)

This question is intended to surface what students already know about how to identify when two expressions are equivalent. Students make use of the structure of the expressions to select an equivalent expression. This content first appears in Lesson 8: Factoring and Expanding.

Suggested Next Steps: If students struggle . . .

- Consider spending extra time reviewing the Warm-Up in Lesson 8, helping students see the connection between the various representations.

Problem 6

(Standards: **6.EE.B.8, 6.RP.A.1, 7.NS.A.3, MP2**)

These questions are intended to surface what students already know about representing solutions to inequalities on number line diagrams and answering questions about inequalities in context. Students reason abstractly and quantitatively to represent and solve the problems as inequalities in context. This content first appears in Lesson 13: I Saw the Signs.

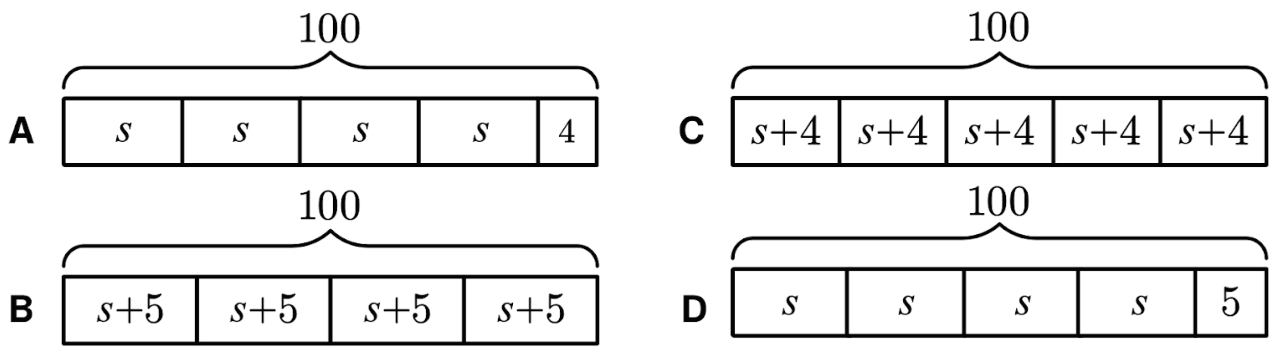
Suggested Next Steps: If students struggle . . .

- Consider reviewing both problems before beginning Lesson 13. Ask students to test whether or not 8 boxes of cookies will help Arnav reach his goal, and help students make connections between the number line diagrams and the word problem.

Unit 7.6, Quiz: Lessons 1–12 Name ______________________________

1. Sothy is baking 5 batches of muffins. Each batch uses 4 teaspoons of sugar for the topping and more sugar for the batter. Sothy uses 100 teaspoons of sugar in total.

   Which tape diagram matches this situation?



2. Select **all** of the expressions that are equivalent to $3(8 - 4x)$.

   - ☐ $24 - 4x$
   - ☐ $-12x + 24$
   - ☐ $2(12 - 6x)$
   - ☐ $12x - 24$
   - ☐ $24 - 12x$

Solve each equation.

3.1 $3x + 7 = 40$

3.2 $-2(x + 5) = 10$

Unit 7.6, Quiz: Lessons 1–12 Name ________________________________

Here is Kwame's work writing the expression $4 - 2(x + 5)$ using fewer terms.

Kwame's Work

$4 - 2(x+5)$

$2(x+5)$

$2x+10$

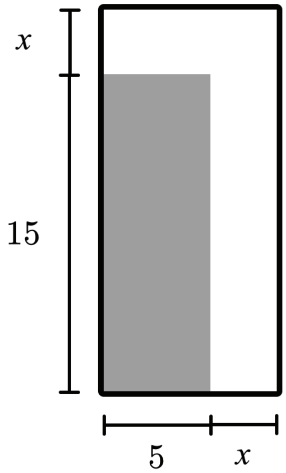
4.1 Describe the mistake that Kwame made.

4.2 Write an expression equivalent to $4 - 2(x + 5)$ that has two terms.

Isaiah's vegetable garden is 15 feet long by 5 feet wide. He plans to increase the width and length of his garden and put a fence around it.

He writes this expression for the total amount of fencing: $(x + 15) + (x + 5) + (x + 15) + (x + 5)$.

5.1 Describe what x represents in this situation.



5.2 Write an equivalent expression that uses fewer terms.

5.3 How much will the length of Isaiah's garden increase by if he uses 50 feet of fencing in total?

Answer Key

1.

C $\overbrace{\boxed{s+4}\boxed{s+4}\boxed{s+4}\boxed{s+4}\boxed{s+4}}^{100}$

2. ✓ $-12x + 24$
   ✓ $2(12 - 6x)$
   ✓ $24 - 12x$

3.1 11

3.2 -10

4.1 *Responses vary.* Kwame subtracted $4 - 2$ first, but the -2 is actually multiplied by $x + 5$, so that needs to happen before you combine like terms.

4.2 $-2x - 6$ (or equivalent)

5.1 *Responses vary.* x is how much longer and wider Isaiah's new garden is than his old garden.

5.2 $4x + 40$ (or equivalent)

5.3 2.5 feet

Unit 7.6, Quiz: Summary and Rubric

Content Standards Summary

Standard	7.EE.A.1	7.EE.B.3	7.EE.B.4	7.EE.B.4.A
Problems	2, 4	5	1	3

Problem 1
(Standards: **7.EE.B.4, MP2**)

This problem assesses students' ability to connect tape diagrams, equations, and verbal descriptions in context. Students reason abstractly and quantitatively as they determine which tape diagram matches the given situation. This problem corresponds most directly to the work students did in Lesson 3: Equations.

Suggested Next Steps: If students struggle . . .
- Consider asking students to describe the meaning of the variable s in the given situation. Consider asking them how many teaspoons of sugar are needed for each of the 5 muffins.
- Consider revisiting Lesson 3.

Problem 2
(Standards: **7.EE.A.1, MP7**)

This problem assesses students' ability to determine whether or not factored, expanded, or reordered expressions are equivalent. Students make use of the structure of the expressions to select an equivalent expression. This problem corresponds most directly to the work students did in Lesson 9: Always-Equal Machines.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which expressions are not equivalent and why.
- Consider revisiting Lesson 9, Activity 1.

Unit 7.6, Quiz: Summary and Rubric

Problem 3
(Standard: **7.EE.B.4.A**)

This problem assesses students' ability to solve equations of the form $px + q = r$ and $p(x + q) = r$ that involve positive and negative numbers. This problem corresponds most directly to the work students did in Lesson 7: Keeping It True.

Suggested Next Steps: If students struggle . . .
- Consider asking students to draw a hanger diagram to help them with their thinking. Consider asking students to describe the first step they can take to solve each equation.
- Consider revisiting Lesson 7, Activity 1.

Problem 4
(Standard: **7.EE.A.1, MP3**)

This problem assesses students' ability to write equivalent expressions with fewer terms by expanding and adding terms. Students critique the reasoning of another student and construct a viable argument to determine the correct final expression. This problem corresponds most directly to the work students did in Lesson 10: Collect the Squares.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate the mistake that Kwame made and how the mistake could be corrected.
- Consider revisiting Lesson 10.

Problem 5
(Standards: **7.EE.B.3, MP2**)

This problem assesses students' ability to connect visual representations, equations, and verbal descriptions of the same situation and solve equations to represent situations in context. Students reason abstractly and quantitatively as they explain and apply the meaning of the variable x in context. This problem corresponds most directly to the work students did in Lesson 12: Community Day.

Suggested Next Steps: If students struggle . . .
- Consider asking students how the given expression representing the total amount of fencing can be used to answer Problem 5.3.
- Consider revisiting Lesson 12, Activity 1.

Unit 7.6, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
1	7.EE.B.4	Correct answer. **C** $\overbrace{\boxed{s+4}\boxed{s+4}\boxed{s+4}\boxed{s+4}\boxed{s+4}}^{100}$			Incorrect choice. *Students who selected* $\overbrace{\boxed{s}\boxed{s}\boxed{s}\boxed{s}\boxed{4}}^{100}$ *may have known there should be 5 batches, but understood the 4 teaspoons of sugar for the topping as a separate addition instead of included in each batch.*	Did not attempt.
2	7.EE.A.1	**All correct** choices and **no incorrect** choices. • $-12x + 24$ • $2(12 - 6x)$ • $24 - 12x$	**One or two correct** choices and **no incorrect** choice. **All correct** choices and **one incorrect** choice.	**One or two correct** choices but also includes **two incorrect** choices.	**Only incorrect** choices. **Two incorrect** choices with some correct choices.	Did not attempt.

Unit 7.6, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3.1	7.EE.B.4.A	Correct answer. • 11	Work shows **conceptual understanding** with some errors. *E.g., Student makes a sign error, such as writing* -11.	Work shows **incomplete understanding** with significant errors. *E.g., Student incorrectly adds* 7 *to balance both sides of the equation, then divides by* 3 *to get* $x = \frac{47}{3}$.	Work shows **limited understanding** of solving equations of the form $px + q = 4$ and $p(x + q) = r$ that involve positive and negative numbers.	Did not attempt.
3.2	7.EE.B.4.A	Correct answer. • -10	Work shows **conceptual understanding**, with minor errors. *E.g., Student makes a sign error, such as writing* 10.	Work shows a developing but **incomplete understanding**, with significant errors. *E.g., Student incorrectly adds* 2 *to balance both sides of the equation then subtracts by* 5 *to get* $x = 7$.	Work shows **limited understanding** of solving equations of the form $px + q = 4$ and $p(x + q) = r$ that involve positive and negative numbers.	Did not attempt.

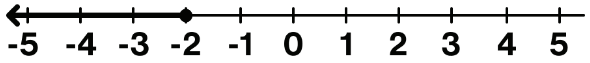
Unit 7.6, Quiz: Summary and Rubric

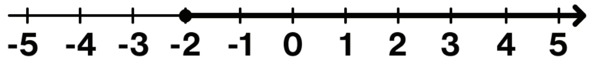
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
4.1 4.2	7.EE.A.1	**Correct description** and **correct equivalent expression**. *E.g., Kwame subtracted $4 - 2$ first, but the -2 was actually multiplied by $x + 5$, so that needs to happen first before you combine like terms.* **Expression:** $-2x - 6$ (or equivalent)	**Correct equivalent expression** with **minor flaws in description**. *E.g., Kwame should have distributed.* **Incorrect equivalent expression** with **logical and complete description**.	**Correct equivalent expression** with **incomplete description**. **Incorrect equivalent expression** with **description that shows partial understanding**.	**Incorrect equivalent expression** with **no or incorrect description**.	Did not attempt.
5.1	7.EE.B.3	Correct description. *E.g.,* x is how much longer and wider Isaiah's new garden is than his old garden.	Description references an increase in feet of the width and length of the fence. *E.g.,* x is part of the width and length of the fence.	Description references either units or the fence. *E.g.,* x is part of the fence measured in feet.	Incorrect description.	Did not attempt.

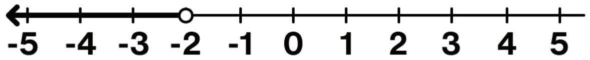
Unit 7.6, Quiz: Summary and Rubric

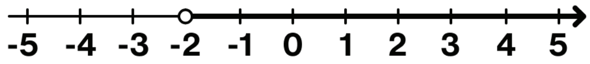
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.2	7.EE.B.3	Correct answer. • $4x + 40$ (or equivalent)	Work shows **conceptual understanding** with some errors. *Students who wrote $2(x + 5) + (x + 15)$ may have attempted to distribute the 2 to both the length and width but were confused about parentheses placement.*	Work shows **incomplete understanding** with significant errors. *E.g., Student includes either $4x$ or 40.*	Work shows **limited understanding** of connecting visual representations, equations, and verbal descriptions of the same situation in context. *E.g., Student does not include either $4x$ or 40.*	Did not attempt.
5.3	7.EE.B.3	Correct answer. • 2.5 feet	Work shows **conceptual understanding** with some errors. *E.g., Student sets the equation they wrote in 5.2 equal to 50 and then solves it correctly.* *Student writes $4x + 40 = 50$ but solves for x incorrectly.*	Work shows **incomplete understanding** with significant errors. *E.g., Student relates length and side quantities to a value other than 50.*	Work shows **limited understanding** of connecting visual representations, equations, and verbal descriptions of the same situation and solving equations to represent situations in context. *Students who wrote 15 or 30 may have only considered only one side of the length and width.*	Did not attempt.

1. Which number line shows all of the values of x that make the inequality $3x - 1 \leq -7$ true?

A. 

B. 

C. 

D. 

2. Parv has a $\$50$ gift card. He uses the gift card to buy a pack of games for $\$9.99$.

   He also wants to buy n movies. Each movie costs $\$3.99$.

   Which inequality describes how many movies Parv can buy?

   A. $9.99 + 3.99n \geq 50$

   B. $9.99 + 3.99n \leq 50$

   C. $9.99 - 3.99n \geq 50$

   D. $9.99 - 3.99n \leq 50$

3.1 Write an equivalent expression in expanded form.

$$-\frac{1}{4}(-8x + 12)$$

3.2 Write an equivalent expression in factored form.

$$36a - 16$$

Solve each equation.

4.1 $4(x + 2) = 40$

4.2 $-2x - 10 = -6$

Here is Diya's work writing the expression $6 - 2x + 5 + 4x$ with fewer terms.

Diya's Work

$6 - 2x + 5 + 4x$

$4x + 9x$

$13x$

5.1 Describe the mistake that Diya made.

5.2 Write an expression equivalent to $6 - 2x + 5 + 4x$ that has two terms.

Joel's family car has a 14-gallon gas tank. The car uses about 0.5 gallons of gas each day. A warning light comes on when the fuel left in the tank is 1.5 gallons or less.

6.1 If Joel's family starts with a full tank, can they drive the car for 15 days without the warning light coming on?

Explain or show how you know.

6.2 Which expression describes the gallons of gas in the tank after d days?

A. $14 - 0.5d$ **B.** $14d - 0.5$ **C.** $0.5 - 14d$ **D.** $0.5d - 14$

Write an inequality that represents the number of days Joel's family can drive **without** the warning light coming on.

6.3 Solve the inequality you wrote.

Explain what the solutions mean in this situation.

Unit 7.6, End-Unit Assessment: Form A Name ________________________

Reflection: Select a question to answer.

- ☐ What is something you are proud of from this unit?

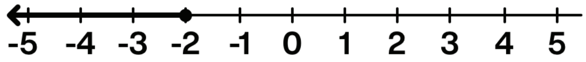
- ☐ Write what you know about a topic from this unit that you weren't asked about today.

- ☐ Describe or show one strategy you found helpful in this unit.
  Name any students who helped you with this strategy.

- ☐ What else would you like your teacher to know?

Unit 7.6, End-Unit Assessment: Form A

Answer Key

1. A. 

2. B. $9.99 + 3.99n \leq 50$

3.1 $2x - 3$ (or equivalent)

3.2 $2(18a - 8)$ or $4(9a - 4)$ (or equivalent)

4.1 $x = 8$

4.2 $x = -2$

5.1 *Responses vary.* Diya added all of the terms together instead of adding $6 + 5$ and $-2x + 4x$.

5.2 $11 + 2x$ (or equivalent)

6.1 Yes.
Explanations vary. Joel's family would use 7.5 gallons of gas in 15 days, so there would still be $14 - 7.5 = 6.5$ gallons of gas left in the tank.

6.2 A
$14 - 0.5d > 1.5$ (or equivalent)

6.3 $d < 25$
Explanations vary. The solutions to this inequality represent the number of days that Joel's family can drive without the warning light coming on.

Unit 7.6, End Assessment Summary and Rubric: Form A

Content Standards Summary

Standard	7.EE.A.1	7.EE.B.3	7.EE.B.4	7.EE.B.4.A	7.EE.B.4.B
Problems	3, 5	6.1, 6.3	6.2, 6.3	4	1, 2

Problem 1
(Standard: **7.EE.B.4.B**)

This problem assesses students' ability to represent solutions to inequalities with graphs, including less-than-or-equal-to and greater-than-or-equal-to. This problem corresponds most directly to the work students did in Lesson 14: Unbalanced Hangers.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which number lines make the inequality false and why.
- Consider revisiting Lesson 14, Activity 2.

Problem 2
(Standards: **7.EE.B.4.B, MP2**)

This problem assesses students' ability to write an inequality to represent a context. Students reason abstractly and quantitatively as they decide which inequality describes the given situation. This problem corresponds most directly to the work students did in Lesson 15: Budgeting.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which inequalities do not describe the scenario and why.
- Consider revisiting Lesson 15.

Unit 7.6, End Assessment Summary and Rubric: Form A

Problem 3

(Standard: **7.EE.A.1**)

This problem assesses students' ability to write equivalent expressions using expanding and factoring. This problem corresponds most directly to the work students did in Lesson 8: Factoring and Expanding and Lesson 9: Always-Equal Machines.

Suggested Next Steps: If students struggle . .

- Consider asking students to create and complete a factoring puzzle to help them with their thinking and to help them complete each problem.
- Consider revisiting Lesson 9.

Problem 4

(Standard: **7.EE.B.4.A**)

This problem assesses students' ability to solve equations of the forms $px + q = r$ and $p(x + q) = r$. This problem corresponds most directly to the work students did in Lesson 6: Balancing Equations.

Suggested Next Steps: If students struggle . . .

- Consider asking students to draw a hanger diagram to help them with their thinking. Consider asking students to describe the first step they can take to solve each equation.
- Consider revisiting Lesson 6, Activity 2.

Unit 7.6, End Assessment Summary and Rubric: Form A

Problem 5

(Standards: **7.EE.A.1, MP3**)

This problem assesses students' ability to write an expression using fewer terms. Students critique the reasoning of others as they describe Diya's mistake. This problem corresponds most directly to the work students did in Lesson 10: Collect the Squares.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate the mistake that Diya made and how the mistake could be corrected.
- Consider revisiting Lesson 10.

Problem 6

(Standards: **7.EE.B.3, 7.EE.B.4, MP2**)

This problem assesses students' ability to write, solve, and interpret the meanings of solutions to inequalities in context. Students reason abstractly and quantitatively as they describe the gallons of gas in the tank using an expression and an inequality. This problem corresponds most directly to the work students did in Lesson 15: Budgeting and Lesson 17: Write Them and Solve Them.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which expressions do not describe the situation and why.
  Consider revisiting Lesson 17.

Unit 7.6, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.EE.B.4.B	• A			Students who select the graph with the arrow pointing to the left and the open circle may have recognized the less-than symbol. Students who select the graph with the arrow pointing to the right and the closed circle may have understood that the inequality needed to be closed.	Did not attempt.
2	7.EE.B.4.B, MP2	• B $9.99 + 3.99n \le 50$			Students who select $9.99 + 3.99n \ge 50$ may not understand the meaning of the inequality symbols $\ge$ and $\le$. Students who select $9.99 - 3.99n \ge 50$ or $9.99 - 3.99n \le 50$ may think that, because each movie costs $\$3.99$, the amount should be subtracted.	Did not attempt.

Unit 7.6, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3.1	7.EE.A.1	Work is complete and correct. • $2x - 3$	Work shows conceptual understanding and mastery, with minor errors. • Students who write $2x + 3$ may have multiplied 12 by $\frac{1}{4}$.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write $2x + 12$ may have only multiplied $-\frac{1}{4}$ by $-8x$.	Weak evidence of understanding.	Did not attempt.
3.2	7.EE.A.1	Work is complete and correct. • $2(18a - 8)$ • $4(9a - 4)$	Work shows conceptual understanding and mastery, with minor errors. • Students who write $2(18a + 8)$ may have factored the terms correctly, but forgot the subtraction operation.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write expressions like $10(26a - 6)$ may have subtracted 10 from each term. • Students who write $36(a - 16)$ may have recognized that $36 \cdot a = 36a$.	Weak evidence of understanding.	Did not attempt.

Unit 7.6, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
4.1	7.EE.B.4.A	Work is complete and correct. • $x = 8$	Work shows conceptual understanding and mastery, with minor errors. • Students who write 12 may have divided both sides by 4 and then added 2 to each side instead of subtracting.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write $\frac{38}{4}$ may have subtracted 2 from each side as their first step or multiplied 4 only to the first term. • Students who write 34 may have subtracted 4 from both sides as their first step.	Weak evidence of understanding.	Did not attempt.
4.2	7.EE.B.4.A	Work is complete and correct. • $x = -2$	Work shows conceptual understanding and mastery, with minor errors. • Students who write 2 may not have included the negative when writing their solution.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write $\frac{1}{2}$ may have written $-12x = -6$ as their first step. • Students who write 8 may have subtracted 10 from both sides as their first step.	Weak evidence of understanding.	Did not attempt.

Unit 7.6, End Assessment Summary and Rubric: Form A

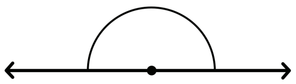
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5	7.EE.A.1, MP3	Student includes a logical and complete description of the mistake and successfully writes an equivalent expression. • Diya added all of the terms together instead of adding $6 + 5$ and $-2x + 4x$. • $11 + 2x$ (or equivalent)	Correct answer with minor flaws in description. Incorrect answer with logical and complete description. • Students who write $6x - 1$ may have added $-6 + 5$ and $2x + 4x$.	Correct answer with incomplete description. Incorrect answer with explanation that communicates partial understanding of writing an expression using fewer terms. • Students who write $8x + 5$ may have subtracted $6 - 2x = 4x$.	Incorrect answer with incorrect description or without a description.	Did not attempt.
6.1	7.EE.B.3, MP2	Student successfully answers the question and includes a logical and complete explanation. • Yes. Joel's family would use 7.5 gallons of gas in 15 days, so there would still be $14 - 7.5 = 6.5$ gallons of gas left in the tank.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation. • Students who respond "No" may have answered whether or not Joel's family has used all of their gas or if the warning light is on.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of the situation.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

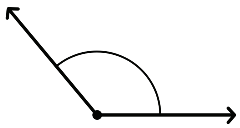
Unit 7.6, End Assessment Summary and Rubric: Form A

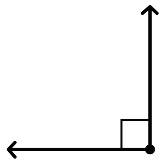
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
6.2	7.EE.B.4, MP2	Work is complete and correct. • A • $14 - 0.5d > 1.5$	Work shows conceptual understanding and mastery, with minor errors. • Students who write $14 - 0.5d \geq 1.5$ may have recognized that the light will go on starting at 1.5 gallons of gas.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who select B, C, or D and set that expression greater than 1.5 may have recognized the significance of 1.5 gallons. • Students who write $14 - 0.5d < 1.5$ have related the amount of gas left to 1.5 gallons.	Weak evidence of understanding. • Students who write inequalities containing subtraction may recognize that the gas used each day and the total amount of gas should be subtracted.	Did not attempt.
6.3	7.EE.B.3, 7.EE.B.4, MP2	Student correctly solves the inequality that they wrote in 6.2. Student writes a logical and complete explanation. • $d < 25$ The solutions to this inequality represent the number of days that Joel's family can drive without the warning light coming on.	Logical and complete explanation with minor flaws. • The solutions to this inequality represent the days that Joel's family can drive.	Solution shows a developing but incomplete conceptual understanding, with significant errors. Incomplete explanation or one that shows partial understanding. • Students who write $d > 25$ may have correctly solved the related equation, but did not check the direction of the inequality.	Weak evidence of understanding. Incorrect explanation.	Did not attempt.

Unit 7.7, Readiness Check Name ______________________________

1. Match each diagram with a phrase that describes it. You will have one description left over.



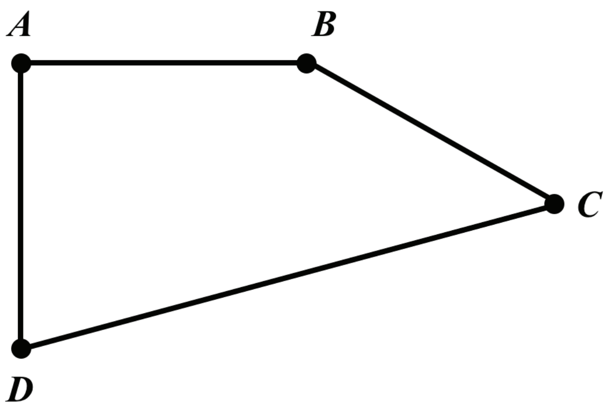




Description
Right angle
Straight angle
Obtuse angle
Acute angle

Quadrilateral $ABCD$ has four angle measures: $45°$, $75°$, $90°$, and $150°$.

2.1 Write each angle measure in the appropriate location on the diagram.

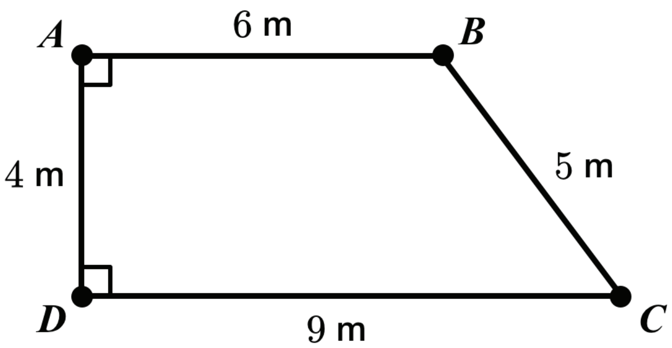


2.2 Select **all** of the acute angles.

- ☐ $\angle A$
- ☐ $\angle B$
- ☐ $\angle C$
- ☐ $\angle D$

3. What is the area of this figure?

Explain or show your strategy.



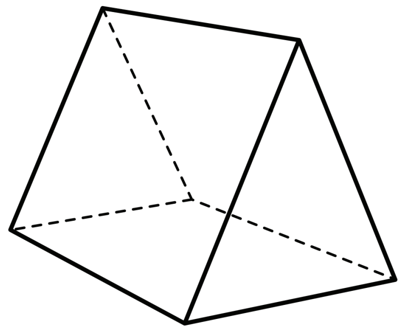
Unit 7.7, Readiness Check Name ______________________________

4.1 What are some things you know about volume and surface area?

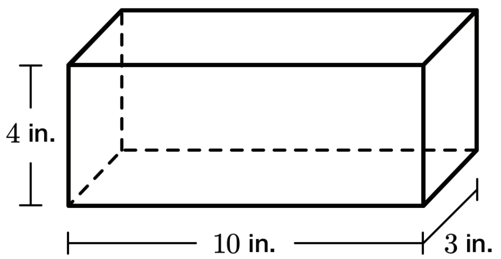
4.2 What are some things you still wonder about volume and surface area?

5.1 How many faces does this triangular prism have?

5.2 Describe or draw the shape of each face.



6.1 How many 1-by-1-by-1-inch cubes fit inside of this rectangular prism?

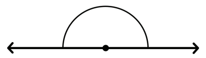


6.2 How many square inches of paper would you need to cover the entire prism?

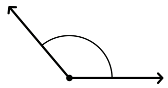
Show or explain your thinking.

Unit 7.7, Readiness Check **Answer Key**

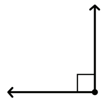
1.1



Straight Angle



Obtuse Angle



Right Angle

2.1 $A = 90°,\ B = 150°,\ C = 45°,\ D = 75°$

2.2 ✓ $\angle C$
✓ $\angle D$

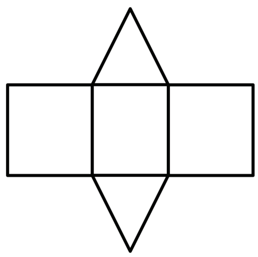
3. 30 square meters.

Explanations vary. I split the shape into a rectangle and a triangle. The area of the rectangle is $6 \cdot 4 = 24$ square meters, and the area of the triangle is $0.5 \cdot 3 \cdot 4 = 6$ square meters, so the total is 30 square meters.

4.1 *Responses vary.*
- Surface area is the amount it takes to cover the outside of an object, and volume is the amount it takes to fill up an object.
- The volume of a cube is the side length cubed.

4.2 *Responses vary.*
- Is the volume of every object length times width times height?
- Why is surface area measured in units squared?
- How do you remember the difference between volume and surface area?

5.1 5 faces



5.2 *Responses vary.* There are three rectangles and two triangles. The triangles are the same size and shape.

6.1 120 cubes

6.2 164 square inches

Explanations vary. There are two faces whose areas are $4 \cdot 3 = 12$ sq. inches, two faces whose areas are $4 \cdot 10 = 40$ sq. inches, and two faces whose areas are $3 \cdot 10 = 30$ sq. inches. So the total surface area is $12 + 12 + 40 + 40 + 30 + 30 = 164$ square inches.

Unit 7.7, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:

- Problems 1 and 2 before Lesson 1
- Problems 3, 4, and 6 before Lesson 10
- Problem 5 before Lesson 12

Problem 1

(Standards: **4.G.A.1, 4.MD.C.5, 4.MD.C.5.A, 4.MD.C.5.B**)

This question is intended to surface what students already know about describing angle measures. This content first appears in Lesson 1: Pinwheels where students determine unknown angle measures around a circle.

Suggested Next Steps: If students struggle . . .

- Consider revisiting this problem as a class before beginning Lesson 1 or spending extra time during the Warm-Up of Lesson 1 discussing whether the angles on Screen 2 are acute, obtuse, right, or straight.

Problem 2

(Standards: **4.G.A.1, 4.MD.C.5, 4.MD.C.6**)

These questions are intended to surface what students already know about estimating angle measures. This content first appears in Lesson 1: Pinwheels.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this problem as a class after Lesson 1's Warm-Up, where students will get to practice and receive feedback on estimating angle measures.

Problem 3

(Standards: **6.G.A.1, MP1**)

This question is intended to surface what students already know about calculating the area of non-rectangular quadrilaterals. Students can make sense of the problem to determine the area in multiple different ways. This content first appears in Lesson 11: More Complicated Prisms.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this problem as a class before beginning Lesson 11. Highlight several different strategies students used to calculate the total area, including surrounding and subtracting, decomposing, or using a trapezoid area formula.

Problem 4

(Standards: **6.G.A.2, 6.G.A.4**)

These questions are intended to surface what students already know about volume and surface area of objects. This content first appears in Lesson 10: Simple Prisms where students calculate the volumes of rectangular and triangular prisms.

Suggested Next Steps: If students struggle . . .

- Consider taking time before beginning Lesson 10 to share what students already know about volume and surface area.
- Consider recording what they wonder publicly to refer to throughout Lessons 10–13.

Problem 5

(Standard: **6.G.A.4**)

This question is intended to surface what students already know about triangular prisms and their surface areas. This content first appears in Lesson 12: Surface Area Strategies where students calculate the surface area of various prisms.

Suggested Next Steps: If students struggle . . .

- Consider spending extra time reviewing the Warm-Up in Lesson 12 or using a physical representation of a triangular prism to make sense of the number and shapes of its faces.

Problem 6

(Standards: **6.G.A.2, 6.G.A.4, MP3**)

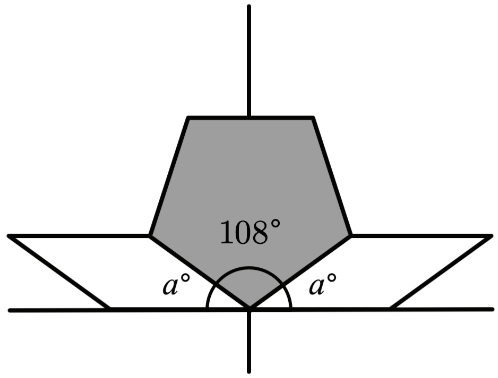
These questions are intended to surface what students already know about calculating the surface area and volume of rectangular prisms. Students construct a viable argument for their calculations when they explain their thinking. This content first appears in Lesson 10: Simple Prisms.

Suggested Next Steps: If students struggle . . .

- Consider reviewing Problem 6.1 before beginning Lesson 10 and Problem 6.2 before Lesson 12. Ask students to describe their strategies.
- Consider using a physical representation of a rectangular prism to support students' understanding.

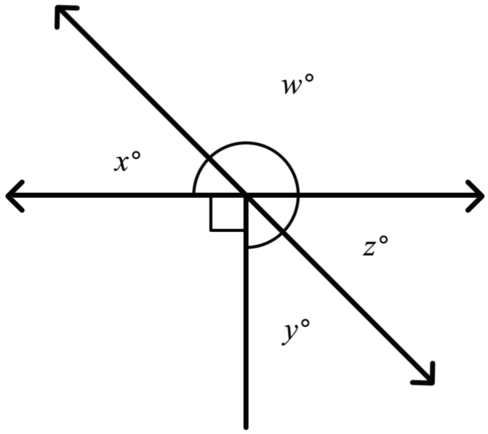
1. What is the value of a?

   A. $18°$
   B. $36°$
   C. $45°$
   D. $72°$
   E. $108°$



2. Here are three line segments that intersect at a point. Select **all** of the true statements.

   ☐ The angles marked $x°$ and $z°$ are complementary.
   ☐ The angles marked $w°$ and $z°$ are supplementary.
   ☐ $x = y$
   ☐ $y + z = 90$
   ☐ $x + y + z = 180$



3. How many nonidentical triangles can be made using these side lengths?

$$4 \text{ cm},\ 8 \text{ cm},\ 14 \text{ cm}$$

   A. Zero triangles
   B. One triangle
   C. More than one triangle

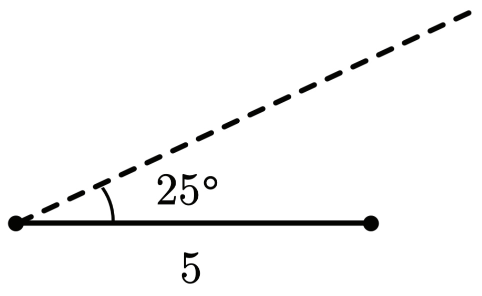
   Explain your reasoning.

4. A triangle has one side that is 5 units long, one $25°$ angle, and one $90°$ angle.

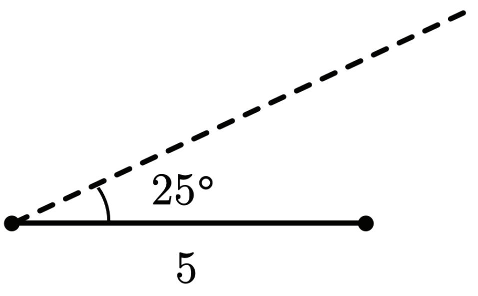
   Complete the two diagrams to create two different triangles with these measurements.

   Label the $90°$ angle in each diagram.

Triangle #1



Triangle #2

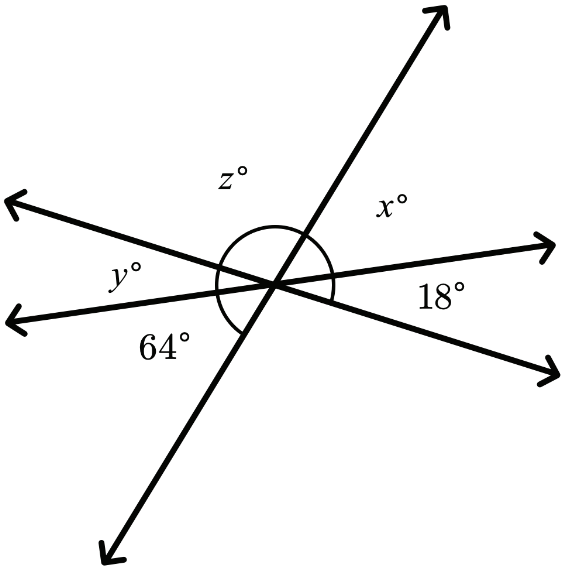


Here are three lines that intersect at one point.

5.1 Write a true equation based on this diagram.

5.2 Determine the values of x, y, and z.

5.3 Laila wrote the equation $x + 18 = 90$.
Describe the error that Laila might have made.



Answer Key

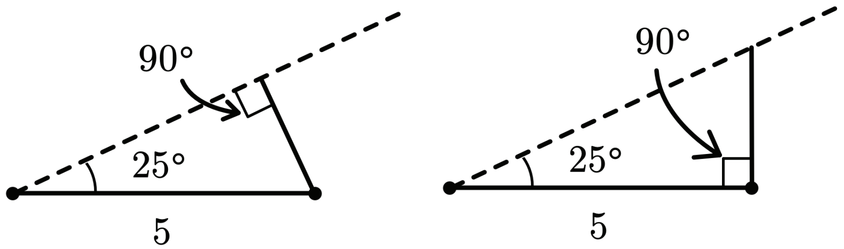
1. $36°$

2. ✓ The angles marked w° and z° are supplementary.
   ✓ $y + z = 90$

3. Zero triangles

   Explanations vary. 4 centimeters and 8 centimeters are not long enough to make a triangle if one side is 14 centimeters. The two sides will not connect to make a triangle.

4.



5.1 *Responses vary.* Some possible equations are:

- $x + y + z = 180$
- $z + x + 18 = 180$
- $x = 64$
- $2y = 36$

5.2 $x = 64°$, $y = 18°$, $z = 98°$

5.3 *Responses vary.* Laila may have assumed that the angle marked $z°$ was a right angle, so $90°$ was left for $x°$ and $18°$.

Unit 7.7, Quiz: Summary and Rubric

Content Standards Summary

Standard	7.EE.B.4	7.G.A.2	7.G.B.5
Problems	2	3, 4	1, 2, 5

Problem 1
(Standards: **7.G.B.5, MP7**)

This problem assesses students' ability to determine unknown angle measures by reasoning about complementary and supplementary angles. Students make use of the structure of the diagram to determine an unknown angle measure. This problem corresponds most directly to the work students did in Lesson 4: Missing Measures.

Suggested Next Steps: If students struggle . . .
- Consider asking students to classify the three angles labeled in the diagram as either complementary, supplementary, or neither. Consider asking students how identifying the angle relationship can help them determine the value of a.
- Consider revisiting Lesson 4: Activity 1.

Problem 2
(Standards: **7.G.B.5, 7.EE.B.4, MP7**)

This problem assesses students' ability to describe angle diagrams with words and equations. Students make use of the structure of the diagram to determine true and false statements about the diagram. This problem corresponds most directly to the work students did in Lesson 3: Angle Diagrams.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which statements are false and why.
- Consider revisiting Lesson 3, Activity 2.

Unit 7.7, Quiz: Summary and Rubric

Problem 3
(Standards: **7.G.A.2, MP3**)

This problem assesses students' ability to determine how many triangles are possible given three specific side lengths. Students construct a viable argument to support their conclusion about the number of triangles that can be constructed with the given side lengths. This problem corresponds most directly to the work students did in Lesson 5: Can You Build It?

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why it is impossible to draw one or more triangles with the given length.
- Consider revisiting Lesson 5, Activity 1.

Problem 4
(Standards: **7.G.A.2, MP1**)

This problem assesses students' ability to draw triangles given three measurements. Students must make sense of the problem to determine two different ways to meet the given constraints.
This problem corresponds most directly to the work students did in Lesson 8: Can You Draw It?

Suggested Next Steps: If students struggle . . .
- Consider asking students to describe what they could do to create two different triangles with the given measurements.
- Consider revisiting Lesson 8, Activity 1, Description 3.

Problem 5
(Standards: **7.G.B.5, MP7**)

This problem assesses students' ability to write and use equations to determine unknown angle measures. Students make use of the structure of the diagram to determine the value of the variables x, y, and z. This problem corresponds most directly to the work students did in Lesson 3: Angle Diagrams.

Suggested Next Steps: If students struggle . . .
- Consider asking students which pair of angles are vertical. Consider asking them which angles are complementary and which are supplementary.
- Consider revisiting Lesson 3, Activity 2.

Unit 7.7, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
1	7.G.B.5	Correct choice. • $36°$			Incorrect choice. *Students who selected* $72°$ *may have solved for* $2a$ *instead of* a *by calculating* $180 - 108$*.*	Did not attempt.
2	7.G.B.5, 7.EE.B.4	**All correct** choices and **no incorrect** choices. • The angles marked $w°$ and $z°$ are supplementary. • $y + z = 90$	**One correct** choice or **one correct choice with one incorrect** choice. **Two correct choices and one incorrect** choice.	**One correct** choice but also includes **two incorrect** choices.	**Only incorrect** choices**.** **Two incorrect** choices with some correct choices.	Did not attempt.

Unit 7.7, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3	7.G.A.2	**Correct answer** with **correct explanation**. • Zero triangles *E.g., 4 centimeters and 8 centimeters are not long enough to make a triangle if one side is 14 centimeters. The two sides will not connect to make a triangle.*	**Correct answer** with **minor flaws in explanation**. **Incorrect answer** with **logical and complete explanation**. *E.g., Student's explanation includes an attempt to add up two sides and compare the third side such as* $4 + 14 > 8$ *and* $8 + 14 > 4$.	**Correct answer** with **incomplete explanation**. **Incorrect answer** with **explanation that shows partial understanding**.	**Incorrect answer** with **no explanation or incorrect explanation**.	Did not attempt.
4	7.G.A.2	Work is **complete and correct**. Both diagrams are correct.	Work shows **conceptual understanding** with some errors. *One diagram is correct.*	Work shows **incomplete understanding** with significant errors. *Both diagrams have an angle that looks like $90°$, but they are not labeled as such.*	Work shows **limited understanding** of drawing triangles given three measurements.	Did not attempt.

Unit 7.7, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.1	7.G.B.5	Correct answer. E.g., Some possible equations. • $x + y + z = 180$ • $z + x + 18 = 180$ • $x = 64$ • $2y = 36$	Work shows **conceptual understanding** with some errors. *Students who wrote $y + 64 = 90$ may have thought those two angles were complementary.*	Work shows **incomplete understanding** with significant errors.	Work shows **limited understanding** of writing equations to determine unknown angle measures.	
5.2	7.G.B.5	Correct answers. • $x = 64°, y = 18°, z = 98°$	Work shows **conceptual understanding** with some errors. *Two values are correct.*	Work shows **incomplete understanding** with significant errors. *One value is correct.*	Work shows **limited understanding** of using equations to determine unknown angle measures.	
5.3	7.G.B.5	Correct explanation. *E.g., Laila may have assumed that the angle marked $z°$ was a right angle, so $90°$ was left for $x°$ and $18°$.*	Work shows **conceptual understanding** with some errors. *E.g., Student correctly explains that the angles $x°$ and $18°$ are not complementary angles but doesn't explain how they know they are not.*	Work shows **incomplete understanding** with significant errors. *E.g., Student partially explains the error but also includes incorrect thinking such as writing, "It should have been $y + 64 = 90$."*	Work shows **limited understanding** to writing and using equations to determine unknown angle measures.	

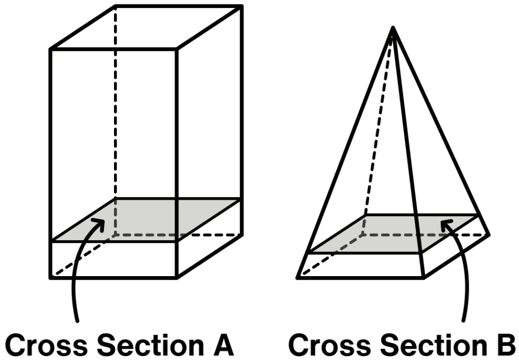
Unit 7.7, End-Unit Assessment: Form A Name ________________________________

1. How many nonidentical triangles can be made using these side lengths?

$$5 \text{ cm}, 7 \text{ cm}, \text{and } 10 \text{ cm}$$

   A. Zero triangles
   B. One triangle
   C. More than one triangle

2. Here is a prism and a pyramid with identical square bases.
   Each figure is sliced parallel to the base.



Select **all** of the true statements.

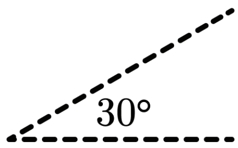
- ☐ Cross Section A is a square.
- ☐ Cross Section B is a square.
- ☐ Cross Section A has the same area as the base of the prism.
- ☐ Cross Section B has the same area as the base of the pyramid.
- ☐ Cross Section A and Cross Section B have the same area.

3. Draw one or more diagrams that show each of the angle relationships in the word bank.
   Label each relationship in your diagram(s).

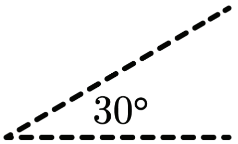
Word Bank
complementary angles
supplementary angles
vertical angles

 Name ______________________________

4.1 Draw a triangle with one $30°$ angle, one 4 cm side, and one 6 cm side.



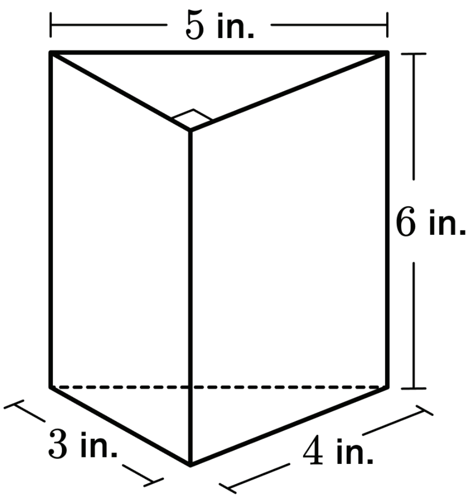
4.2 Is it possible to draw more than one unique triangle with the same three measurements? Explain or show your thinking.



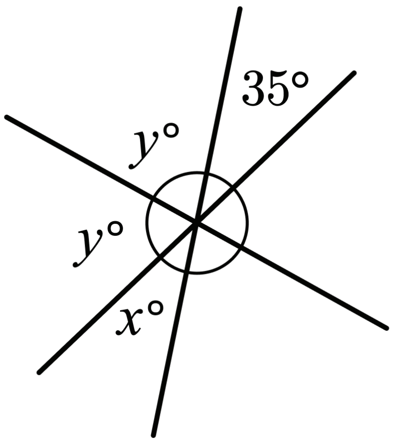
Here is a right triangular prism.

5.1 What is the volume of the prism?

5.2 What is the surface area of the prism?



6.1 Determine the values of x and y.

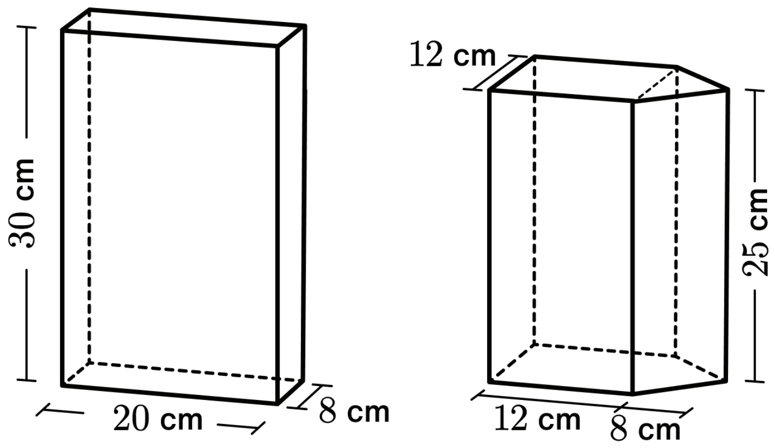


6.2 Titus wrote the equation $x + y + y + 35 = 180$.

Change Titus's equation to make it true.

7. Afia bought a brand new box of sugar. He wants to transfer it to a new container.

Will there be sugar left over after filling the new container? Explain how you know.



Unit 7.7, End-Unit Assessment: Form A Name ________________________________

Reflection: Select a question to answer.

☐ What is something you are proud of from this unit?

☐ Write what you know about a topic from this unit that you weren't asked about today.

☐ Describe or show one strategy you found helpful in this unit.
Name any students who helped you with this strategy.

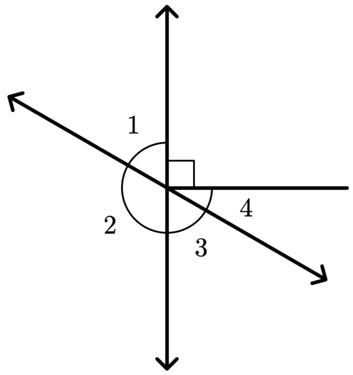
☐ What else would you like your teacher to know?

Unit 7.7, End-Unit Assessment: Form A **Answer Key**

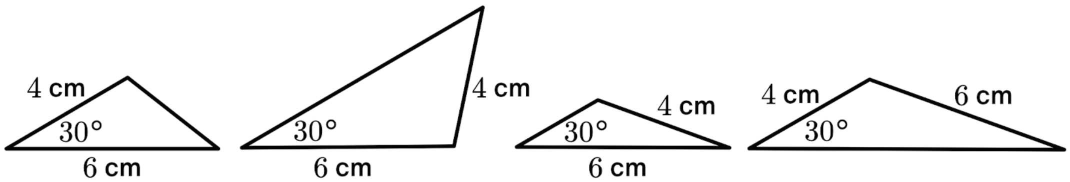
1. One triangle

2. ✓ Cross Section A is a square.
   ✓ Cross Section B is a square.
   ✓ Cross Section A has the same area as the base of the prism.

3. *Drawings vary.* Angles 1 and 3 are vertical angles. Angles 1 and 2 are supplementary angles. Angles 3 and 4 are complementary angles.



4.1 *Drawings vary.*



4.2 Yes. *Explanations vary.* If the angle is between the two given sides, it creates a different triangle than if the angle is between the 6 centimeter side and the unknown third side.

5.1 36 cubic inches

5.2 84 square inches

6.1 $x = 35$
$x = 72.5$

6.2 *Responses vary.* $x + y + y = 180$, $2y + 35 = 180$, $x + y + y + 35 = 215$

7. No. *Explanations vary.* The volume of each container is equal, which means they can each hold the same amount of sugar. The original container's volume is $8 \cdot 20 \cdot 30 = 4800$ cubic centimeters. The new container's volume is
$25 \cdot (12 \cdot 12 + 0.5 \cdot 12 \cdot 8) = 25 \cdot (144 + 48) = 25 \cdot 192 = 4800$ cubic centimeters.

Unit 7.7, End Assessment Summary and Rubric: Form A

Content Standards Summary

Standard	7.EE.B.4	7.G.A.2	7.G.A.3	7.G.B.5	7.G.B.6
Problems	6.2	1, 4	2	3, 6	5, 7

Problem 1

(Standard: **7.G.A.2**)

This problem assesses students' ability to determine how many triangles are possible given three side lengths. This problem corresponds most directly to the work students did in Lesson 5: Can You Build It? and Lesson 6: Is It Enough?

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate why it is impossible to draw more than one triangle with the given length.
- Consider revisiting Lesson 6, Activity 2.

Problem 2

(Standards: **7.G.A.3, MP7**)

This problem assesses students' ability to describe cross sections that result from slicing three-dimensional figures. In particular, this assesses students' ability to compare and contrast cross sections of prisms and pyramids. Students make use of the structure of the figures to determine which statements must be true. This problem corresponds most directly to the work students did in Lesson 9: Slicing Solids.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which statements are false and why.
- Consider revisiting Lesson 9, Activity 2.

Unit 7.7, End Assessment Summary and Rubric: Form A

Problem 3

(Standards: **7.G.B.5, MP6**)

This problem assesses students' ability to understand the key terms of the unit: complementary, adjacent, and vertical angles. Students attend to precision when they create diagrams to exemplify mathematical vocabulary. This problem corresponds most directly to the work students did in Lesson 2: Friendly Angles and Lesson 3: Angle Diagrams.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe what the terms *complementary angles*, *supplementary angles*, and *vertical angles* mean.
- Consider revisiting Lesson 2, Activity 2 or Lesson 3, Activity 1.

Problem 4

(Standards: **7.G.A.2, MP1**)

This problem assesses students' ability to draw shapes with given conditions and explain when the conditions determine multiple non-identical triangles. Students are prompted to approach the problem from multiple entry points, thus making sense of the problem in various ways. This problem corresponds most directly to the work students did in Lesson 7: More Than One? and Lesson 8: Can You Draw It?

Suggested Next Steps: If students struggle . . .

- Consider asking students to create an acute triangle and an obtuse triangle with the given measurements.
- Consider revisiting Lesson 8, Activity 1, Description 2.

Problem 5

(Standard: **7.G.B.6**)

This problem assesses students' ability to calculate the volume and surface area of a right prism. This problem corresponds most directly to the work students did in Lesson 10: Simple Prisms and Lesson 12: Surface Area Strategies.

Suggested Next Steps: If students struggle . . .

- Consider asking students to identify the base of the given prism. Then ask students to describe what information is needed to calculate the volume and surface area of the prism.

- Consider revisiting Lesson 10, Activity 2 or Lesson 12, Activity 2.

Problem 6
(Standards: **7.EE.B.4, 7.G.B.5, MP7**)

This problem assesses students' ability to use facts about supplementary, vertical, and adjacent angles to determine unknown angles in a figure. Students are asked to determine the values of the variables x and y by making use of the structure of the given diagram. This problem corresponds most directly to the work students did in Lesson 4: Missing Measures.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate the mistake that Titus made and how the mistake could be corrected.
- Consider revisiting Lesson 4, Activity 1.

Problem 7
(Standard: **7.G.B.6, MP2**)

This problem assesses students' ability to solve real-world problems involving the volume of three-dimensional prisms. Students reason abstractly and quantitatively to determine that the questions can be answered by comparing the volumes of each container. This problem corresponds most directly to the work students did in Lesson 13: Popcorn Possibilities.

Suggested Next Steps: If students struggle . . .
- Consider asking students whether the surface area or the volume of the prisms should be used to solve the given problem.
- Consider revisiting Lesson 13, Activity 1.

Unit 7.7, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.G.A.2	• One triangle			Students who select “Zero triangles” may have remembered that some sets of three sides do not form a right triangle. Students who select “More than one triangle” may have remembered that given three angles, there are an infinite number of triangles possible.	Did not attempt.
2	7.G.A.3, MP7	Student selects all of the correct choices and does not select any incorrect choices. • Cross Section A is a square. • Cross Section B is a square. • Cross Section A has the same area as the base of the prism.	Student selects one or two of the correct choices and does not select any incorrect choices. Student selects all of the correct choices and one incorrect choice.	Student selects one or two of the correct choices but also includes an incorrect choice.	Student selects only incorrect choices. Student selects two or more incorrect choices with some correct choices.	Did not attempt.

Unit 7.7, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
3	7.G.B.5, MP6	Work is complete and correct. • Drawing correctly shows each of the angle relationships.	Work shows conceptual understanding and mastery, with minor errors. • Students who draw all three angle relationships but confuse the angle relationship names may need more practice with the words complementary, supplementary, and vertical. • Students who indicate that complementary angles sum to $180°$ may be confusing the term with supplementary angles.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who draw only some angle relationships may still be learning about what the words complementary, supplementary, and vertical mean.	Weak evidence of understanding.	Did not attempt.
4.1	7.G.A.2, MP1	Work is complete and correct. • Construction correctly shows a triangle with one $30°$ angle, one 4 cm side, and one 6 cm side.	Work shows conceptual understanding and mastery, with minor errors.	Work shows a developing but incomplete conceptual understanding, with significant errors.	Weak evidence of understanding.	Did not attempt.

Unit 7.7, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
4.2	7.G.A.2, MP1	Student successfully answers the question and includes a logical and complete explanation. • Yes If the angle is between the two given sides, it creates a different triangle than if the angle is between the 6-centimeter side and the unknown third side.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of the situation. • Students who write that it is not possible may remember that you can only draw one nonidentical triangle given three sides. • Students who write that it is not possible may have swapped the locations of the 4 cm side and the 6 cm side and noticed that the two triangles are identical.	Incorrect answer with or without incorrect explanation.	Did not attempt.
5.1	7.G.B.6	Work is complete and correct. • 36 cubic inches	Work shows conceptual understanding and mastery, with minor errors. • Students who write 72 cubic inches may not have divided by 2 when calculating the area of the base of the prism.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write 360 cubic inches may have multiplied each given measurement together.	Weak evidence of understanding.	Did not attempt.

Unit 7.7, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.2	7.G.B.6	Work is complete and correct. • 84 square inches	Work shows conceptual understanding and mastery, with minor errors.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write 48 square inches may have calculated the areas of the visible surfaces.	Weak evidence of understanding.	Did not attempt.
6.1	7.G.B.5, MP7	Work is complete and correct. • $x = 35$ $y = 72.5$	Work shows conceptual understanding and mastery, with minor errors. • Students who write $x = 72.5$ and $y = 35$ may have correctly solved for the variables but mixed up the values for x and y.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write $y = 55$ may have used the equation $x + 2y + 35 = 180$.	Weak evidence of understanding.	Did not attempt.
6.2	7.G.B.5, 7.EE.B.4, MP7	Work is complete and correct. • The equation accurately reflects the angle relationships shown in the diagram.	Work shows conceptual understanding and mastery, with minor errors.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write $x + y + y = 360$ may have remembered that there is a specific relationship for supplementary angles but forgotten the correct angle sum.	Weak evidence of understanding.	Did not attempt.

Unit 7.7, End Assessment Summary and Rubric: Form A

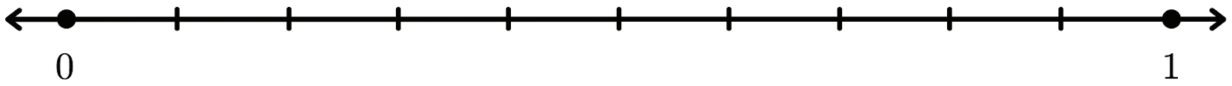
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
7	7.G.B.6, MP2	Student successfully answers the question and includes a logical and complete explanation. • No The volume of each container is equal, which means they can each hold the same amount of sugar. The original container's volume is $8 \cdot 20 \cdot 30 = 4800$ cubic centimeters. The new container's volume is $25(12 \cdot 12 + \frac{1}{2} \cdot 12 \cdot 8) =$ $25(144 + 48) = 4800$ cubic centimeters.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation. • Students who write "Yes" may have correctly calculated one of the volumes and made a minor error in calculating the second volume.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of the situation. • Students who write "Yes" may have noticed that the new container is shorter than the sugar container.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.8, Readiness Check Name ______________________________

1. You look at the weather forecast and it says 10% chance of rain today.

   Would you take an umbrella? Explain your thinking.

2. Plot and label each number on the number line: $0.75, \frac{1}{4}, 0.2, 0.5, \frac{8}{10}$.



3. Complete the table so that each column has the same value.

Fraction	$\frac{7}{10}$		$\frac{3}{5}$	$\frac{3}{8}$
Decimal	0.7	0.75		
Percent		75%		37.5%

Nihkil surveyed 20 students at his middle school and 13 of them had at least one sibling.

4.1 What percent of the students surveyed have at least one sibling?

4.2 There are 300 students at Nikhil's middle school. If the rest of the school is consistent with these results, about how many students would have at least one sibling?

Explain your thinking.

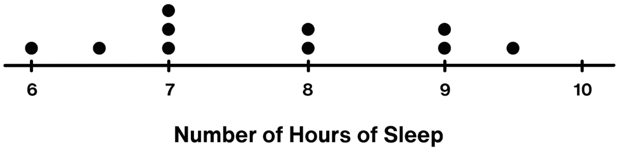
5.1 What are some things you know about mean and median?

5.2 What are some things you know about IQR (interquartile range) and MAD (mean absolute deviation)?

5.3 What are some things you still wonder about mean, median, IQR, or MAD?

Eva is curious how much students at her school sleep.

She asked 10 students how many hours they slept last night and recorded their answers in a dot plot.



6.1 How many students slept for 8 or more hours last night?

6.2 Calculate the mean number of hours that all 10 students slept.

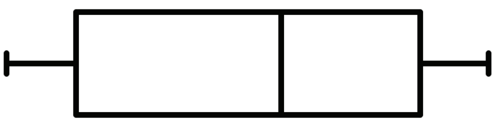
6.3 Do you think the mean you calculated is similar to the mean of all the students in Eva's school? Explain your reasoning.

There are 11 dancers in a performance. Their ages (in years) are:

$$5.5,\ 6,\ 6,\ 6.5,\ 7,\ 7.5,\ 8,\ 8,\ 8.5,\ 9,\ 9$$

7.1 What is the median age of these dancers? _______

7.2 Determine the first quartile, median, and third quartile of the dancers' ages.
Label them on the box plot below.

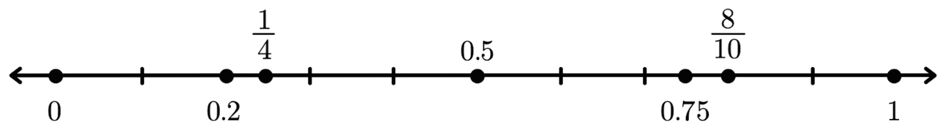


7.3 What is the interquartile range (IQR) of the dancers' ages?

Answer Key

1. *Responses and explanations vary.*
   - Even though there is some chance of rain, it isn't that high, so I wouldn't bring an umbrella.
   - I would bring an umbrella because it might rain, even if the chance is low.

2.



3.

Fraction	$\frac{7}{10}$	$\frac{3}{4}$ (or equivalent)	$\frac{3}{5}$	$\frac{3}{8}$
Decimal	0.7	0.75	0.6	0.375
Percent	70%	75%	60%	37.5%

4.1 65%

4.2 Anywhere between 180 and 210 students.

Explanations vary. If the percentage of all students in the school who have siblings is also 65%, then 65% of 300 is 195. It might not be exactly 195, but close.

5.1 *Responses vary.*
- To find the mean, add up all the numbers and divide by how many numbers you have.
- Median is the middle number.
- When figuring out the median, you need to put all the numbers in order.

5.2 *Responses vary.*
- You can figure out IQR using a box plot.
- MAD is a lot of calculations and has to do with the mean.
- IQR is related to the median.

5.3 *Responses vary.*
- What is IQR?
- How do you calculate the MAD?

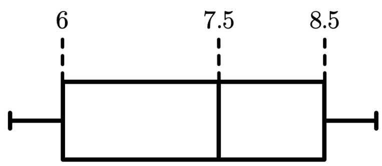
6.1 5 students

6.2 7.7 hours

6.3 *Responses and explanations vary.*
- I think so because the small group probably covers all different types of students: students who sleep a lot and students who don't sleep a lot.
- I don't think so because we don't know all the students in the school and how many hours they sleep for.

7.1 7.5 years

7.2



7.3 2.5 years

Unit 7.8, Readiness Check Summary

For teachers who choose to spread out the questions, consider assigning the following:

- Problem 1 before Lesson 1
- Problems 2, 3, and 4 before Lesson 2
- Problems 5 and 6 before Lesson 9
- Problem 7 before Lesson 13

Problem 1

(Standards: **6.RP.A.3, MP3**)

This question is intended to surface what students already know about concepts of chance. Students construct a viable argument concerning why they would or would not bring an umbrella given a 10% chance of rain. This content first appears in Lesson 1: Chance Experiments, where students conduct their own experiments using phrases like "likely" and "equally likely as not" to describe the likelihood of events.

Suggested Next Steps:

- Consider surfacing students' arguments before beginning Lesson 1 in order to come to a shared understanding of what *chance* and *likelihood* mean.

Problem 2

(Standards: **6.NS.C.6, MP7**)

This question is intended to surface what students already know about benchmark fractions and decimals between 0 and 1, which are useful in probability. Students use the structure of the number line to place fractions and decimals relative to each other. This content first appears in Lesson 2: Prob-bear-bilities, where students use the sample space to determine the probability of an event as a number between 0 and 1.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this problem as a class before beginning Lesson 2 and asking questions like: *Which value is closest to 1? 0? How do you know?*

Problem 3

(Standards: **6.RPA.3.C, MP1**)

This question is intended to surface what students already know about equivalent fractions, decimals, and percentages. Students can complete the missing information in the table by making sense of the problem from multiple entry points. In this unit, students will express probabilities in all three forms. This content first appears in Lesson 2: Prob-bear-bilities, where students compare the probability of events expressed as fractions, decimals, and percentages.

Suggested Next Steps: If students struggle . . .

- Consider spending extra time on Screens 2 and 3 of Lesson 2.
- Consider asking questions like: *What would the probability look like written as a decimal? As a fraction? As a percentage? What form would be most helpful for comparing these probabilities?*

Problem 4

(Standards: **6.RP.A.3, 7.RP.A.3**)

This question is intended to surface what students already know about proportional relationships and percentages from earlier in Math 7. This content first appears in Lesson 3: Mystery Bag, where students use proportional relationships to predict the sample space of a mystery bag.

Suggested Next Steps: If students struggle . . .

- Consider reviewing this problem as a class before Lesson 3 or spending extra time during Lesson 3's Warm-Up discussing several different examples of bags that would lead to a 40% chance of picking a green block. If students struggle with Problem 4.2, consider spending extra time discussing students' strategies on Screen 7 of Lesson 3.

Problem 5

(Standards: **6.SP.A.2, 6.SP.A.3**)

This question is intended to surface what students already know about measures of center and variability: mean, median, mean absolute deviation (MAD), and interquartile range (IQR). This content first appears in Lesson 9: Car, Bike, or Train?, where students calculate the mean and mean absolute deviation (MAD) for a data set, and use those measures to interpret data.

Suggested Next Steps:

- Consider taking time before beginning Lesson 9 to share what students already know about these measures and record their wonderings publicly to return to throughout Lessons 9–15.

Problem 6

(Standards: **6.SP.B.4, 6.SP.B.5, 6.SP.B.5.C, MP7**)

This question is intended to surface what students already know about dot plots and means. Students make use of the structure of the dot plot to calculate the mean number of hours slept by the sample of students. This content first appears in Lesson 9: Car, Bike, or Train?, where students calculate the mean and mean absolute deviation (MAD) for a data set and use those measures to interpret data.

Suggested Next Steps: If students struggle . . .

- Consider spending extra time before Lesson 9 reviewing how to calculate mean, as students may not have used this concept for some time.

Problem 7

(Standards: **6.SP.A.3, 6.SP.B.4, 6.SP.B.5, 6.SP.B.5.C, MP7**)

This question is intended to surface what students already know about box plots, medians, and IQRs. Students make use of the structure of box plots to support their thinking. This content first appears in Lesson 13: Plots and Samples, where students estimate the measure of center of a population based on one or more samples sometimes expressed as a box plot.

Suggested Next Steps: If students struggle . . .

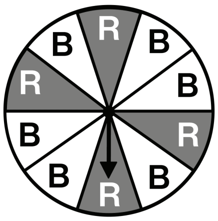
- Consider spending extra time before beginning Lesson 13 reviewing what median and IQR represent about data and how to calculate them.
- Consider using a routine like Notice and Wonder when students first encounter a box plot in Lesson 13.

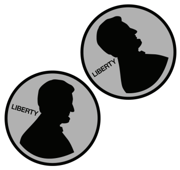
1. Which event is possible, but unlikely?

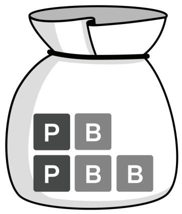
   A. Flipping one fair coin that lands with heads facing up.
   B. Opening a 300-page book to exactly page 143.
   C. Rolling a seven on a standard number cube.
   D. Getting wet if you stand in the rain without an umbrella.

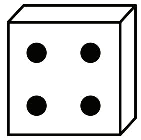
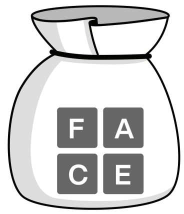
2. Select **all** of the ways you could accurately simulate a 40% chance of rain tomorrow.

- ☐ Land on red in one spin.
- ☐ Both coins land on heads.
- ☐ Select a cube labeled “P”.
- ☐ Roll a 4 in one roll.
- ☐ Select an “E” at random.







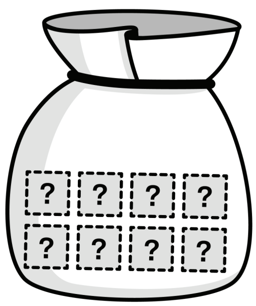



Esi does an experiment where she picks a block out of a bag without looking 50 times, putting it back each time. She picks a green block 32 times.

3.1 Out of 200 picks, how many times do you predict Esi will pick a green block?

3.2 If the bag has 8 blocks, how many do you think are green?

Explain your reasoning.



Unit 7.8, Quiz: Lessons 1–8 Name ______________________

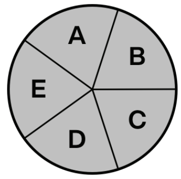
The Spin N' Dine Restaurant has a special deal. For $\$20$, you can spin two spinners to select one appetizer and one entree at random.

4.1 How many different possible combinations of appetizer and entree could you spin?

4.2 What is the probability you will spin at least one item with cheese in the name?

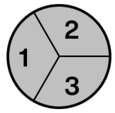
Appetizers

A. Chicken wings
B. Onion dip
C. Cheese sticks
D. Crab cakes
E. Fried pickles



Entrees

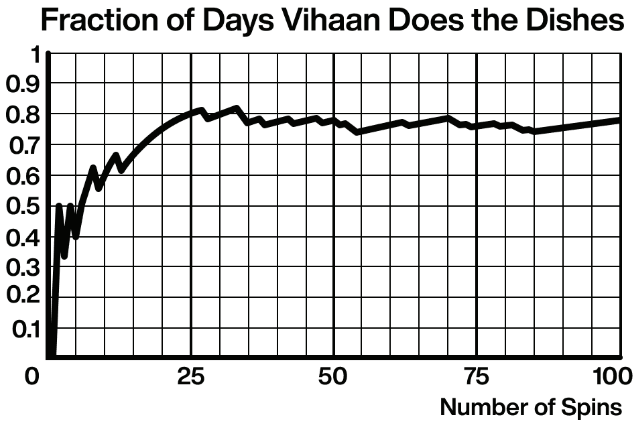
1. Cheese pizza
2. Barbecue ribs
3. Meatloaf



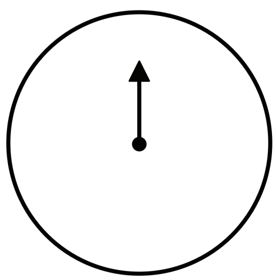
Vihaan and Neena use a spinner to decide who has to do the dishes each night. They make a graph of the fraction of days that Vihaan has to do the dishes.

5.1 Is this spinner fair?

Use at least one piece of evidence to support your claim.



5.2 Describe or sketch what you think their spinner could look like.



Answer Key

1. B. Opening a 300-page book to exactly page 143.

2. ✓ Land on red in one spin.
   ✓ Select a cube labeled "P".

3.1 128 times

3.2 5 green blocks

Explanations vary. 32 green blocks out of 50 is 64% of the blocks. 64% of 8 blocks is 5.12, which is closest to 5 green blocks.

4.1 15 different combinations

4.2 $\frac{7}{15}$ (or equivalent)

5.1 No.

Explanations vary. If the spinner were fair, then the probability should get close to 0.5 as you spin it more and more times. Looking at the graph, the probability gets closer to 0.75 or 0.8.

5.2 *Responses vary.*

- The spinner would have 4 sections with 3 of them labeled for Vihaan, so the probability of him doing the dishes would be $\frac{3}{4}$.
- The spinner would have 10 sections with 8 of them labeled for Vihaan, so the probability of him doing the dishes would be 0.8.

Unit 7.8, Quiz: Summary and Rubric

Content Standards Summary

Standard	7.SP.C.5	7.SP.C.6	7.SP.C.7	7.SP.C.7.B	7.SP.C.8	7.SP.C.8.A	7.SP.C.8.B	7.SP.C.8.C
Problems	1	3, 5	5	3, 5	4	4	4	2

Problem 1

(Standard: **7.SP.C.5**)

This problem assesses students' ability to describe the likelihood of events. This problem corresponds most directly to the work students did in Lesson 1: Chance Experiments.

Suggested Next Steps: If students struggle . . .

- Consider asking students to describe what makes an event unlikely to occur. Consider asking them to identify which events are certain to occur and which events are impossible.
- Consider revisiting Lesson 1.

Problem 2

(Standards: **7.SP.C.8.C, MP2**)

This problem assesses students' ability to connect real-world situations and the probability tools that could be used to simulate those situations. Students reason abstractly and quantitatively as they select which of the given probability events could simulate a 40% chance of rain. This problem corresponds most directly to the work students did in Lesson 7: Weather or Not.

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which events would not accurately simulate a 40% chance of rain and why.
- Consider revisiting Lesson 7, Activity 2.

Unit 7.8, Quiz: Summary and Rubric

Problem 3

(Standards: **7.SP.C.6, 7.SP.C.7.B, MP2**)

This problem assesses students' ability to use the results from a repeated experiment to make predictions about the sample space and future events. Students reason abstractly and quantitatively when they use experimental data to make predictions about future events and unknown information. This problem corresponds most directly to the work students did in Lesson 3: Mystery Bag.

Suggested Next Steps: If students struggle . . .

- Consider asking students how they can use the results of Esi's experiment to make predictions if the bag contained 8 blocks or if there were 200 picks.
- Consider revisiting Lesson 3, Activity 1.

Problem 4

(Standards: **7.SP.C.8, 7.SP.C.8.A, 7.SP.C.8.B**)

This problem assesses students' ability to calculate the probability of a multistep event. This problem corresponds most directly to the work students did in Lesson 6: Fair Games.

Suggested Next Steps: If students struggle . . .

- Consider asking students to make a table or a tree diagram to represent the sample space of the event.
- Consider revisiting Lesson 6, Activity 2.

Problem 5

(Standards: **7.SP.C.6, 7.SP.C.7, 7.SP.C.7.B, MP4**)

This problem assesses students' ability to use the results of a repeated experiment to describe the probability of an event. Students model with mathematics when they design a spinner that could be responsible for the given data. This problem corresponds most directly to the work students did in Lesson 4: Spin Class.

Suggested Next Steps: If students struggle . . .

- Consider asking students how they can use the graph to determine the fraction of the days Vihaan would do the dishes according to the spinner.
- Consider revisiting Lesson 4.

Unit 7.8, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
1	7.SP.C.5	Correct choice. • Opening a 300 -page book to exactly page 143.			Incorrect choice.	Did not attempt.
2	7.SP.C.8.C	**All correct** choices and **no incorrect** choices. • Land on red in one spin. • Select a cube labeled "P".	**One correct** choice or **one correct choice with one incorrect** choice. **Two correct choices and one incorrect** choice.	**One correct** choice but also includes **two incorrect** choices.	**Only incorrect** choices**.** **Two incorrect** choices with some correct choices.	Did not attempt.
3.1	7.SP.C.6, 7.SP.C.7.B	Correct answer. • 128 times	Work shows **conceptual understanding** with some errors.	Work shows **incomplete understanding** with significant errors. *Students who write answers between 120 to 140 may have rounded 32 to 30 or 35 to make an easier or more round prediction.*	Work shows **limited understanding** of using the results from a repeated experiment to make predictions about the sample space and future events.	Did not attempt.

Unit 7.8, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3.2	7.SP.C.6, 7.SP.C.7.B	**Correct answer** with **correct explanation.** • 5 green blocks *E.g., 32 green blocks out of 50 is 64% of the blocks. 64% of 8 blocks is 5.12, which is closest to 5 green blocks.*	**Correct answer** with **minor flaws in explanation.** *E.g., 32 is a bit more than half of 50, so for 8 blocks, there might be around 6 blocks.* **Incorrect answer** with **logical and complete explanation.** *E.g., Student answers 6 with a complete explanation where they explain that they rounded up.*	**Correct answer** with **incomplete explanation.** **Incorrect answer** with **explanation that shows partial understanding.** *E.g., 6 because more than half of the blocks are green.*	**Incorrect answer** with **no explanation or incorrect explanation.**	Did not attempt.
4.1	7.SP.C.8, 7.SP.C.8.A 7.SP.C.8.B	Correct answer. • 15 combinations	Work shows **conceptual understanding** with some errors.	Work shows **incomplete understanding** with significant errors. *Students who wrote 23 may have also considered the possibility of choosing none as an option for an appetizer or entree.*	Work shows **limited understanding** of calculating the probability of a multistep event.	Did not attempt.

Unit 7.8, Quiz: Summary and Rubric

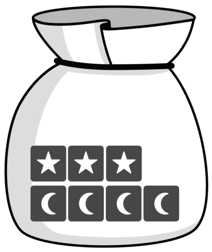
Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
4.2	7.SP.C.8, 7.SP.C.8.A 7.SP.C.8.B	Correct answer. • $\frac{7}{15}$ (or equivalent)	Work shows **conceptual understanding** with some errors.	Work shows **incomplete understanding** with significant errors. *Students who wrote* 7 *may have understood there were* 7 *possible outcomes that had cheese but were unsure how to write that as a probability.*	Work shows **limited understanding** of calculating the probability of a multistep event. *Students who wrote anything greater than* 1 *may not understand that all probabilities are between* 0 *and* 1*.*	Did not attempt.
5.1	7.SP.C.6, 7.SP.C.7, 7.SP.C.7.B	**Correct answer** with **correct explanation**. • No *E.g.,* If the spinner were fair, then the probability should get close to 0.5 as you spin it more and more times. Looking at the graph, the probability gets closer to 0.75 or 0.8.	**Correct answer** with **minor flaws in explanation**. *E.g., No, because Vihaan and Neena should be equal.* **Incorrect answer** with **logical and complete explanation**.	**Correct answer** with **incomplete explanation**. **Incorrect answer** with **explanation that shows partial understanding**.	**Incorrect answer** with **no explanation or incorrect explanation**.	Did not attempt.

Unit 7.8, Quiz: Summary and Rubric

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
5.2	7.SP.C.6, 7.SP.C.7, 7.SP.C.7.B	**Correct description** or **sketch**. *E.g., The spinner would have* 4 *sections with* 3 *of them labeled for Vihaan, so the probability of him doing the dishes would be* $\frac{3}{4}$. *The spinner would have* 10 *sections with* 8 *of them labeled for Vihaan, so the probability of him doing the dishes would be* 0.8.	Work shows **conceptual understanding** with some errors.	Work shows **incomplete understanding** with significant errors. *Students who made a spinner that gave the probability of Vihaan doing the dishes to be* 0.5 *may have attempted to represent a fair spinner.*	Work shows **limited understanding** of modeling a spinner that could be responsible for a given data.	Did not attempt.

Unit 7.8, End-Unit Assessment: Form A Name ________________________________

1. You pick a block out of this bag without looking. What is the probability of picking a star?



A. $\frac{1}{3}$ B. $\frac{3}{4}$ C. $\frac{3}{7}$ D. $\frac{4}{7}$

2. A principal wants to know if students want to change the start time of the school day. Which strategy is most likely to produce a representative sample?

   A. Ask each teacher to select one student.

   B. Select a day at random. Ask the first students who arrive at school that day.

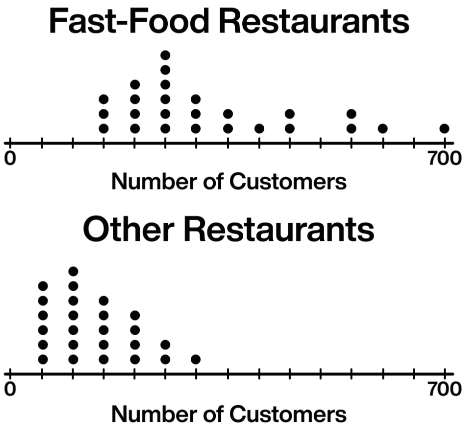
   C. Select students from a list of all students at random. Ask those students.

   D. Select tables in the library at random. Ask the students sitting at those tables.

3. Adriana is curious: do more customers go to fast-food restaurants or to other restaurants?

   She went to a random sample of 50 restaurants (25 fast-food and 25 other).

   At each restaurant, Adriana recorded the number of customers the restaurant had that day.

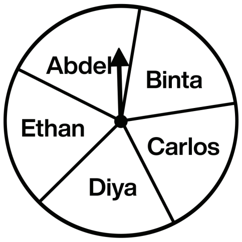


   Select **all** of the true statements:

   - ☐ Fast-food restaurants tend to get more customers than other restaurants.
   - ☐ Other restaurants tend to get more customers than fast-food restaurants.
   - ☐ Fast-food restaurants have a more consistent number of customers than other restaurants.
   - ☐ Other restaurants have a more consistent number of customers than fast-food restaurants.
   - ☐ All fast-food restaurants have more customers than other restaurants.

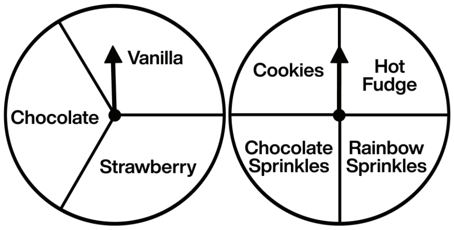
4. Abdel, Binta, Carlos, Diya, and Ethan use a spinner with 5 equal sections to decide who will mop the floor of their shared apartment each week. Diya says, "After 100 weeks, I will have mopped the floor exactly 20 times.

   Do you agree or disagree with her? Explain your thinking.



The Spin N' Dine restaurant sells ice cream for dessert. You spin two spinners to select one random flavor of ice cream and one random topping.

5.1 How many different possible combinations could you spin?



5.2 What is the probability of spinning vanilla ice cream with chocolate or rainbow sprinkles?

Rudra is wondering, "Should I start a petition for a longer lunch and longer school day at my school?" They survey a random sample of 20 students and find that 12 of them agree.

6.1 What is the population for Rudra's question?

6.2 If the school has 250 students, about how many do you predict would agree?

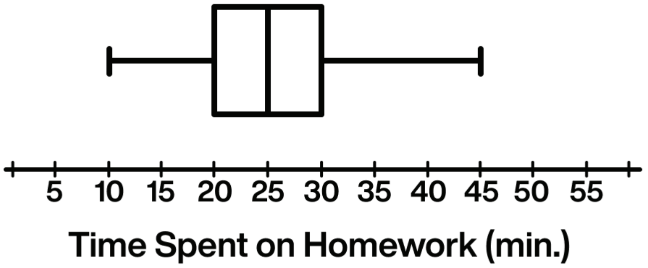
6.3 The next day, Rudra surveys another 20 random students and finds that 8 of them are in favor. Does this make you more or less confident in your prediction? Explain your thinking.

Unit 7.8, End-Unit Assessment: Form A Name ________________________________

Maneli is wondering if her class gets more homework than her twin sister Yasmine's class.

Maneli selects a random sample of 7 students from each class and asks those students how long they spent on homework last night.

Sample of Maneli's Class



Sample of Yasmine's Class

15, 30, 35, 40, 40, 40, 45

7.1 Dylan looks at the data and says that there are only 7 students in Yasmine's class.

Do you agree? Explain your thinking.

7.2 In which class do students spend more time on homework?

Use at least two different pieces of evidence to support your claim.

Unit 7.8, End-Unit Assessment: Form A Name ______________________________

Reflection: Select a question to answer.

☐ What is something you are proud of from this unit?

☐ Write what you know about a topic from this unit that you weren't asked about today.

☐ Describe or show one strategy you found helpful in this unit.
Name any students who helped you with this strategy.

☐ What else would you like your teacher to know?

Answer Key

1. $\frac{3}{7}$

2. C. Select students from a list of all students at random. Ask those students.

3. ✓ Fast-food restaurants tend to get more customers than other restaurants.
   ✓ Other restaurants have a more consistent number of customers than fast-food restaurants.

4. Disagree

   Explanations vary. Diya might have mopped the floor 20 times, but she also might have mopped the floor close to 20 times, like 19 or 22 times. You can't predict the exact results.

5.1 12 different combinations

5.2 $\frac{2}{12}$ (or equivalent)

6.1 All the students at Rudra's school.

6.2 About 150 students.

6.3 Less confident.

Explanations vary. In Rudra's first sample, over 50% of students agreed. In their second sample, less than 50% agreed. This means that the variation is large, which makes me less confident in my prediction.

7.1 No.

Explanations vary. This is only a sample of Yasmine's class, not the whole population.

7.2 Yasmine's class

Explanations vary. The median of Maneli's class is 25 minutes of homework. The median of Yasmine's class is 40 minutes. This is a 15-minute difference. The IQR for both classes is 10 minutes, so the difference is more than the IQR, which means that Yasmine's class definitely gets more homework. Also, in Maneli's class, the least amount of time a student took is 10 minutes, whereas in Yasmine's class, it was 15 minutes.

Unit 7.8, End Assessment Summary and Rubric: Form A

Content Standards Summary

Standard	7.SP.A.1	7.SP.A.2	7.SP.B.3	7.SP.B.4	7.SP.C.6	7.SP.C.7.A	7.SP.C.8.A	7.SP.C.8.B
Problems	2	6.1, 6.3	3, 7.2	3, 6.2, 7.1	4	1	5.2	5.1

Problem 1
(Standard: **7.SP.C.7.A**)

This problem assesses students' ability to determine the probability of events. This problem corresponds most directly to the work students did in Lesson 2: Prob-bear-bility.

Suggested Next Steps: If students struggle . . .
- Consider asking students to describe how they think probability is determined.
- Consider revisiting Lesson 2, Activity 2.

Problem 2
(Standard: **7.SP.A.1**)

This problem assesses students' understanding that random sampling tends to produce representative samples as well as their understanding on how to gather a random sample. This problem corresponds most directly to the work students did in Lesson 11: Headlines.

Suggested Next Steps: If students struggle . . .
- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which sampling methods would not produce a representative sample and why.
- Consider revisiting Lesson 11, Activity 2.

Unit 7.8, End Assessment Summary and Rubric: Form A

Problem 3

(Standards: **7.SP.B.3, 7.SP.B.4, MP2**)

This problem assesses students' ability to informally assess the degree of visual overlap of two numerical data sets and use measures of center and variability for numerical data from random samples to draw informal comparative inferences about two populations. Students reason abstractly and quantitatively as they compare and contrast data using shape, center, spread, and visual overlap and draw conclusions in context. This problem corresponds most directly to the work students did in Lesson 9: Car, Bike, or Train?

Suggested Next Steps: If students struggle . . .

- **Math Language Development** Consider using the mathematical language routine Critique, Correct, Clarify to help students understand and communicate which statements are false and why.
- Consider revisiting Lesson 9, Activity 3.

Problem 4

(Standards: **7.SP.C.6, MP3**)

This problem assesses students' ability to describe that the results of a repeated experiment may not exactly match the actual probability of the event. Students construct a viable argument and critique the reasoning of others as they explain if they agree or disagree with Diya's conclusion. This problem corresponds most directly to the work students did in Lesson 4: Spin Class.

Suggested Next Steps: If students struggle . . .

- Consider asking students whether it is possible for Diya to have mopped the floor fewer than 20 times or more than 20 times, and prompt them to explain their thinking.
- Consider revisiting Lesson 4, Activity 1.

Problem 5
(Standards: **7.SP.C.8.A**, **7.SP.C.8.B**)

This problem assesses students' ability to find probabilities of compound events. This problem corresponds most directly to the work students did in Lesson 6: Fair Games.

Suggested Next Steps: If students struggle . . .
- Consider asking students to make a table or a tree diagram to represent the sample space of the event.
- Consider revisiting Lesson 6.

Problem 6
(Standards: **7.SP.A.2, 7.SP.B.4, MP2**)

This problem assesses students' ability to use data from a random sample to make predictions about a population and to use multiple samples to gauge the variation in those predictions. Students reason abstractly and quantitatively when they explain how results from multiple samples affect their confidence in their predictions. This problem corresponds most directly to the work students did in Lesson 12: Flower Power.

Suggested Next Steps: If students struggle . . .
- Consider asking students how the sample can be used with proportional reasoning to estimate information about the population.
- Consider revisiting Lesson 12, Activity 1.

Problem 7
(Standards: **7.SP.B.3**, **7.SP.B.4**)

This problem assesses students' ability to compare two populations using measures of center and measure of variability for numerical data from random samples. This problem corresponds most directly to the work students did in Lesson 14: Student Newspaper.

Suggested Next Steps: If students struggle . . .
- Consider asking students to calculate the median and IQR for each sample. Consider asking them how comparing the median difference to the IQR can help determine whether a difference in the amount of homework given in the two classes exists.
- Consider revisiting Lesson 14, Activity 2.

Unit 7.8, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
1	7.SP.C.7.A	• $\frac{3}{7}$			• Students who select $\frac{1}{3}$ may have recognized that they are picking one of three stars. • Students who select $\frac{3}{4}$ may have compared the number of stars to the number of moons. • Students who select $\frac{4}{7}$ may have determined the probability of selecting a moon.	Did not attempt.
2	7.SP.A.1	• Select students from a list of all students at random. Ask those students.			• Students who select "Ask each teacher to select one student" may believe that having one student from each class is more likely to produce a representative sample. • Students who select "Select a day at random. Ask the first students who arrive at school that day" may have paid attention to the word *random* in the description. • Students who select "Select tables in the library at random. Ask the students sitting at those tables" may not have considered the bias in only selecting students in the library.	Did not attempt.

Unit 7.8, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	**3**	**2**	**1**	**0**
3	7.SP.B.3, 7.SP.B.4, MP2	Student selects all of the correct choices and does not select any incorrect choices. • Fast-food restaurants tend to get more customers than other restaurants. • Other restaurants have a more consistent number of customers than fast-food restaurants.	Student selects one of the correct choices and does not select any incorrect choices. Student selects both of the correct choices and one incorrect choice.	Student selects one of the correct choices and one incorrect choice.	Student only selects incorrect choices. Student selects two or more incorrect choices with the correct choices.	Did not attempt.
4	7.SP.C.6, MP3	Student successfully answers the question and includes a logical and complete explanation. • Disagree Diya might have mopped the floor 20 times, but she also might have mopped the floor close to 20 times, like 19 or 22 times. You can't predict the exact results.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation. • Students who agree with Diya may have recognized that $\frac{1}{5} \cdot 100 = 20$. If the results of a repeated experiment exactly matched the probability of an event, then 20 would be the expected result.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of the situation.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.8, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
5.1	7.SP.C.8.B	Work is complete and correct. • 12 different combinations.	Work shows conceptual understanding and mastery, with minor errors.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write 7 may have calculated the total number of options.	Weak evidence of understanding.	Did not attempt.
5.2	7.SP.C.8.A	Work is complete and correct. • $\frac{2}{12}$ (or equivalent)	Work shows conceptual understanding and mastery, with minor errors. • Students who write $\frac{1}{12}$ may have noticed only one of the two sprinkle options.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write $\frac{3}{12}$ may have counted the total number of options (vanilla, chocolate sprinkles, rainbow sprinkles).	Weak evidence of understanding.	Did not attempt.
6.1	7.SP.A.2	Work is complete and correct. • All the students at Rudra's school.	Work shows conceptual understanding and mastery, with minor errors. • Students who write "the school" may not fully understand who or what about the school makes up the population.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write “longer lunch and longer school day” may have written the subject of interest instead of the population.	Weak evidence of understanding.	Did not attempt.

Unit 7.8, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
6.2	7.SP.B.4	Work is complete and correct. • 150 students	Work shows conceptual understanding and mastery, with minor errors. Student makes a calculation error when applying the ratio $\frac{12}{20}$ to the population of the school.	Work shows a developing but incomplete conceptual understanding, with significant errors. • Students who write 21 may have calculated $\frac{250}{12}$.	Weak evidence of understanding.	Did not attempt.
6.3	7.SP.A.2, MP2	Student successfully answers the question and includes a logical and complete explanation. • Less confident In Rudra's first sample, over 50% of students agreed. In their second sample, less than 50% agreed. This large variation leaves me less confident in my prediction.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation. • Students who select "More confident" may have been paying attention to the number of samples drawn rather than the variability between samples.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of the situation.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

Unit 7.8, End Assessment Summary and Rubric: Form A

Problem	Standard	Meeting/Exceeding	Approaching	Developing	Beginning	
		4	3	2	1	0
7.1	7.SP.B.4	Student successfully answers the question and includes a logical and complete explanation. • No This is only a sample of Yasmine's class, not the whole population.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of the situation. • Students who say "Yes" may still be learning about what a sample means.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.
7.2	7.SP.B.3	Student successfully answers the question and includes a logical and complete explanation. • Yasmine's class The median of Maneli's class is 25 minutes of homework. The median of Yasmine's class is 40 minutes. This is a 15-minute difference. The IQR for both classes is 10 minutes, so the difference is more than the IQR, which means that Yasmine's class definitely gets more homework.	Correct answer with minor flaws in explanation. Incorrect answer with logical and complete explanation.	Correct answer with incomplete explanation. Incorrect answer with explanation that communicates partial understanding of the situation. • Students who say that Maneli's class has more homework may have noticed that the range of Maneli's sample is larger than the range of Yasmine's sample. • Students who say that the amount of homework is about the same may have noticed that the highest value in each sample is the same.	Incorrect answer with incorrect explanation or without an explanation.	Did not attempt.

GRADE 7

Exit Tickets

Exit Tickets provide an opportunity for students to show what they individually understood about the main idea of the lesson.

This section includes all Exit Tickets and Teacher Moves for Units 1–8, as well as printable PDFs for sample lessons. Please note that Exit Tickets are referenced as Cool Downs in this review.

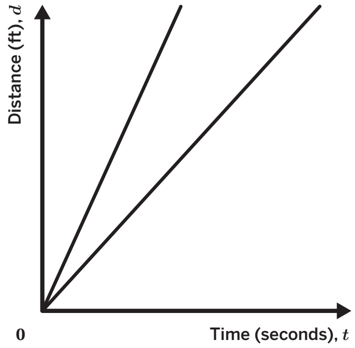
Exit Tickets are available as PDFs for download from the teacher experience in the platform, as well as digitally in the student experience. Amplify Desmos Math does not include them in the core student print materials to ensure students do not have access prior to the end of the lesson. (Teachers can control access to the Exit Ticket in the digital experience, too.)

Name: .... Date: .... Period: ....

Exit Ticket 2.10

Kayla and Daniela started walking at constant speeds. After 3 seconds:

- **Kayla walked 6 feet.**
- **Daniela walked 12 feet.**



1. Label each graph with the name of the person whose walk it represents.

2. Write an equation that represents Kayla's walk. Use d for distance and t for time.

How well did you understand the math in this lesson?

How did you feel about this lesson?

Reflect on the math from this lesson.

- I can write an equation of a proportional relationship from a point on a graph.
- I can compare related proportional relationships on the same graph.

Exit Ticket PDFs are available for all lessons. Here are samples from Amplify Desmos Math New York, fully designed.

Name: ____________ Date: ________ Period: ________

Exit Ticket

6.14

Solve the inequality $19 \geq 2x + 10$. Explain your thinking.

How well did you understand the math in this lesson?

1 2 3 4 5

How did you feel about this lesson?

1 2 3 4 5

Reflect on the math from this lesson.

- I can determine the solutions to an inequality with positive numbers.
- I can explain how to solve an inequality.

The following pages in this section include digital versions of all Exit Tickets and their Teacher Moves for Units 1–8.

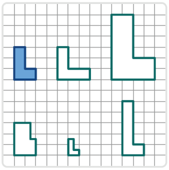
Please note that Exit Tickets are referenced as Cool Downs in the partially designed samples that follow.

7.1 Cool-Downs

Lesson Checklist

- [ ] Complete the lesson using the student preview.
- [ ] Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- [ ] Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- [ ] Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- [ ] Anticipate screens where students will struggle, then plan your response.
- [ ] Consider how to use snapshots to select and present student thinking for class discussion.
- [ ] Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: What Are Scaled Cop...



Click one shape that is **not** a scaled

Click one shape that is **not** a scaled copy of figure A.

Teacher Moves

Support for Future Learning: Students will have more opportunities to determine whether or not shapes are scaled copies, so if students struggle with this cool-down, there is no need to slow down or add additional work to the next lessons.

Sample Responses

B, D, or F

Explanations vary.

- Figure B is not a scaled copy of figure A because the side lengths are not proportional. The figures are the same height, but not the same width.
- Figure D is not a scaled copy of figure A because it's not the same shape. The two figures are the same height and width, but the area of figure D is greater.
- Figure F is not a scaled copy of figure A because the side lengths do not make equivalent ratios. The height ratio is $\frac{5}{3}$ and the width ratio is $\frac{2}{2}$.

---

2 Lesson 2: Lengths and Scaled ...

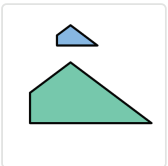


Figure B is a scaled copy of figure A .

Label the missing side lengths of

Figure B is a scaled copy of figure A .

Label the missing side lengths of figure B .

Teacher Moves

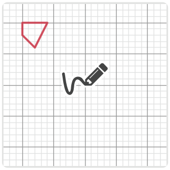
Support for Future Learning: If students struggle to determine missing measurements, consider spending extra time during the discussion on Screen 6 of Lesson 3 to reflect on the proportional relationship between the side lengths of the original and scaled copies.

Sample Responses

Left side length: 4.5 (or equivalent)

Base length: 18 (or equivalent)

3 Lesson 3: Drawing Scaled Cop...



Use the sketch tool to draw a scaled copy of the polygon using a scale factor of 3.

Use the sketch tool to draw a scaled copy of the polygon using a scale factor of 3.

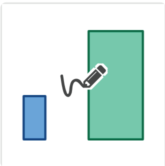
Teacher Moves

Support for Future Learning: If students struggle to draw a scaled copy, consider reviewing this cool-down as a class before Lesson 4 or offering individual support where needed during the "Draw It!" task during Practice Day 1.

Sample Responses

Image solution

4 Lesson 4: Effects of Scale Fact...



What scale factor would make figure A

What scale factor would make figure A match figure B?

What scale factor would make figure B match figure A?

Enter your answers in the table.

Teacher Moves

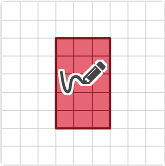
Support for Future Learning: If students struggle to determine the scale factors, consider reviewing this cool-down as a class before Practice Day 1 or offering individual support where needed during the "Reverse It!" task during Practice Day 1.

Sample Responses

A **to** B: $\frac{5}{2}$ (or equivalent)

B **to** A: $\frac{2}{5}$ (or equivalent)

5 Lesson 5: Scaling and Area



Imagine scaling this rectangle

f(x)

Imagine scaling this rectangle using a scale factor of 4.

What is the area of the scaled copy?

Teacher Moves

Support for Future Learning: If students struggle to draw a scaled copy, consider reviewing this cool-down as a class before Practice Day 1 or offering individual support where needed on Problem 2 of the Fix It! task during Practice Day 1.

Sample Responses

240 square units

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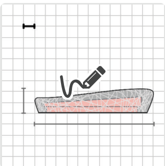
6 Lesson 6: Comparing Scale Fa...



Here is a scale drawing of National

Here is a scale drawing of National Stadium, also known as the Bird's Nest, located in Beijing, China.

Estimate the actual width and height of National Stadium.

Enter your estimates in the table.

Teacher Moves

Support for Future Learning: Students will have more opportunities to reason using scale, so if students struggle with this cool-down, there is no need to slow down or add additional work to the next lessons.

Sample Responses

Width: 332.3 meters (Answers between 330 and 340 meters are marked correct.)
Height: 68.5 meters (Answers between 60 and 80 meters are marked correct.)

7 Lesson 7: Scale Drawings

A scale drawing of a school bus has a scale of $\frac{1}{2}$ in. to 5 ft. If

f(x)

A scale drawing of a school bus has a scale of $\frac{1}{2}$ in. to 5 ft. If the length of the school bus is 4 inches on the scale drawing, what is the actual length of the bus?

Teacher Moves

Support for Future Learning: If students struggle to determine the missing length, consider spending extra time discussing strategies for determining missing lengths during Activities 1 and 3 in the next lesson.

Sample Responses

40 feet

Explanations vary.

The scale drawing is 4 inches, so there are $\frac{1}{2} \cdot 4 = 8$ half inches in the drawing. Since each half inch represents 5 feet , $8 \cdot 5 = 40$ feet.

---

8 Lesson 8: Creating Scale Draw...

You need a ruler for this cool-down.

Aaliyah is making a map

You need a ruler for this cool-down.

Aaliyah is making a map of the local park.

The park has a rectangular swimming pool that measures 50 meters in length and 25 meters in width.

Make a scale drawing of the swimming pool where 1 centimeter represents 10 meters.

Label the side lengths of your scale drawing.

Teacher Moves

Support for Future Learning: If students struggle to create a scale drawing, consider reviewing this cool-down as a class before beginning Lesson 9 or offering individual support where needed on Task 2 of Practice Day 2.

Sample Responses

Image solution

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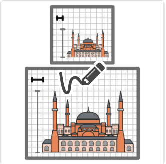
9 Lesson 9: Same Object, Differ...



Here are two scale drawings of the Hagia

f(x)

Here are two scale drawings of the Hagia Sophia in Istanbul, Turkey.

Complete the scale by entering the number of meters the black segment represents.

Teacher Moves

Support for Future Learning: If students struggle to identify the scale, consider reviewing this cool-down as a class before Practice Day 2 or offering individual support where needed on Task 4 of Practice Day 2.

Sample Responses

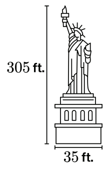
11 m

Explanations vary.

In the bottom drawing, 2 units represent 10 meters, so 1 unit represents 5 meters. In this drawing, the Hagia Sophia is 11 units tall, so the actual height is $5 \cdot 11 = 55$ meters. In the top drawing, the Hagia Sophia is 5 units tall, so each unit must represent 11 meters.

---

10 Lesson 10: Choosing Your Ow...



You want to fit the Statue of Liberty onto a

You want to fit the Statue of Liberty onto a sticker to put on your computer (12 in. by 9 in.).

What scale might you use to make the drawing?

Teacher Moves

Support for Future Learning: If students struggle to choose an appropriate scale (e.g., 1 inch to 30 feet), consider offering individual support where needed on the Are You Ready for More? of Practice Day 2. This skill will not be assessed on the End-Unit Assessment.

Sample Responses

Responses vary.

7.2 Cool-Downs

Lesson Checklist

- ☐ Complete the lesson using the student preview.
- ☐ Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- ☐ Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- ☐ Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- ☐ Anticipate screens where students will struggle, then plan your response.
- ☐ Consider how to use snapshots to select and present student thinking for class discussion.
- ☐ Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: Using Equi…

Teacher Moves

Support for Future Learning: The concept of equivalent ratios will be reinforced over the next several lessons. Consider checking in with students individually to monitor their understanding as the unit progresses.

Sample Responses

Image solution

---

2 Lesson 2: Introducing…

Complete this table so that the relationship is proportional.

Complete this table so that the relationship is proportional.

Teacher Moves

Support for Future Learning: The concept of using proportional relationships to determine unknown values will be reinforced over the next several lessons.

Sample Responses

- $x = 3$, $y = 10$
- $x = 60$, $y = 200$

---

3 Lesson 3: Constant o…

When you mix two colors of paint in

$f(x)$

When you mix two colors of paint in equivalent ratios, the resulting color is always the same. Each row of the table represents a way to make the same shade of green paint.

What is the constant of proportionality in this relationship?

Sample Responses

5 or $\frac{1}{5}$

Explanations vary. The constant of proportionality means that this particular shade of paint is made with 5 cups of yellow paint for every 1 cup of blue paint.

---

4 Lesson 4: Proportion…

It is snowing in Syracuse, New York. After 2

f(x)

It is snowing in Syracuse, New York. After 2 hours, 1 inch of snow has fallen. The snow falls at the same rate.

Complete the table.

Then write an equation for the amount of snow, s, that has fallen after h hours.

Teacher Moves

Support for Future Learning: The skills of writing an equation for a proportional relationship will be reinforced over the next several lessons.

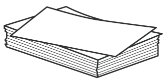
Sample Responses

Snow: 0.5, 3.5

Equation: $s = 0.5h$ (or equivalent)

---

5 Lesson 5: More Equa…



The height in inches, h, of s sheets of paper

The height in inches, h, of s sheets of paper can be described by the equation $h = 0.004s$.

What does the 0.004 mean in this situation?

Teacher Moves

Support for Future Learning: If students struggle to interpret the meaning of the constant of proportionality, consider spending extra time during the Warm-Up of the next lesson discussing the meaning of the constant of proportionality or reviewing the cool-down as a class.

Sample Responses

Responses vary. The 0.004 means that each sheet of paper is 0.004 inches tall.

---

6 Lesson 6: Two Equati…

An albatross is a large bird that can fly 400 kilometers in 8 hours at a constant speed

An albatross is a large bird that can fly 400 kilometers in 8 hours at a constant speed.

1. What are two constants of proportionality for the relationship between distance in kilometers, d , and number of hours, t ?

2. Write two equations that relate d and t in this situation.

Sample Responses

Constant of proportionality: $\frac{400}{8}$, $\frac{8}{400}$

Equation: $d = \frac{400}{8}t$, $t = \frac{8}{400}d$

---

7 Lesson 7: Equations …

Select ALL of the proportional relationships.

Select ALL of the proportional relationships.

Teacher Moves

Support for Future Learning: Using the structure of an equation to determine it represents a proportional relationship will be revisited over the next several lessons. Offer individual support during the next several lessons as needed or review the cool-down before the next lesson.

Sample Responses

- $1.08x = y$
- $y = 8x$
- $y = \frac{x}{8}$

---

8 Lesson 8: Introducing…

Select ALL of the graphs that could represent a proportional relationship.

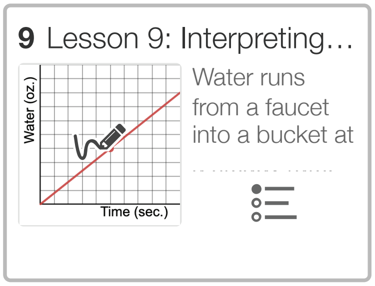
Select ALL of the graphs that could represent a proportional relationship.

Teacher Moves

Support for Future Learning: Offer individual support where needed, or lead a whole-class discussion at the beginning of the next class if enough students struggle with the cool-down.

Sample Responses

Image solution



Water runs from a faucet into a bucket at a steady rate.

The relationship between the amount of water in the bucket and time is proportional.

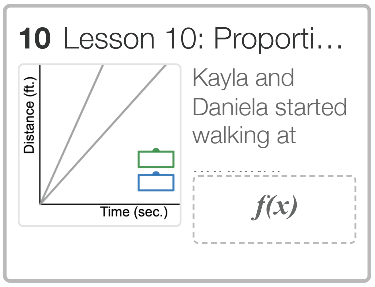
Select ALL of the true statements.

Teacher Moves

Support for Future Learning: Determining the constant of proportionality from a graph and interpreting its meaning will be reinforced in the next lesson.

Sample Responses

- After 1 second, there are 4 ounces of water in the bucket.
- The point $(1, 4)$ is on the graph of the line.
- A constant of proportionality for this relationship is 4.



Kayla and Daniela started walking at constant speeds.

After 3 seconds:
- Kayla walked 6 feet.
- Daniela walked 12 feet.

Label each graph with the name it represents.

Then write an equation for Kayla's walk. Use d for distance and t for time.

Teacher Moves

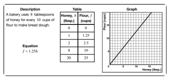
Support for Future Learning: If students struggle to write an equation, offer individual support where needed before or during the next lesson, or review the cool-down before the next lesson.

Sample Responses

Image solution

$d = 2t$

11 Lesson 11: Connect…



Here are four representations of a

Here are four representations of a proportional relationship.

Explain where you can see the constant of proportionality in each representation.

Sample Responses

Description: The constant of proportionality is the cups of flour for each tablespoon of honey, $\frac{10}{8}$.

Equation: The constant of proportionality is k in the equation $f = kh$. Here, it is 1.25 .

Table: Multiply each value in the first column by 1.25 to get the values in the second column.

Graph: The constant of proportionality is the y -coordinate that corresponds to the x -coordinate of 1 . Here, the line goes through the point $(1, 1.25)$.

12 Lesson 12: Let's Pu…

Marshall wants to buy a kitchen faucet.

Marshall wants to buy a kitchen faucet.

Which faucet uses less water?

Sample Responses

Faucet B

Explanations vary. Pick a constant amount of time for both faucets, such as 2 minutes. In 2 minutes, Faucet A would use 8 gallons of water, and Faucet B would use 6 gallons of water.

7.3 Cool-Downs

Lesson Checklist

- ☐ Complete the lesson using the student preview.
- ☐ Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- ☐ Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- ☐ Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- ☐ Anticipate screens where students will struggle, then plan your response.
- ☐ Consider how to use snapshots to select and present student thinking for class discussion.
- ☐ Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: Perimeter and Propo...

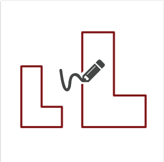


Figure B is a scaled copy of figure A.

Figure B is a scaled copy of figure A.

What is the perimeter of figure B?

Teacher Moves

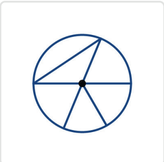
Support for Future Learning: The concept of perimeter, particularly of circles, will be revisited in Lesson 3.

Sample Responses

31.2 units

---

2 Lesson 2: Parts of a Circle



The diagram shows 4 segments and

The diagram shows 4 segments and a point. The point is located at the center of the circle.

Click on all of the segments that are diameters.

Then explain how you know a segment is a diameter.

Teacher Moves

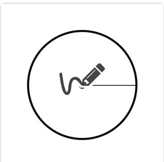
Support for Future Learning: The meanings of radius and diameter will be reinforced over the next several lessons.

Sample Responses

Image solution

---

3 Lesson 3: Estimating and Calc...



What is the approximate circumference

f(x)

What is the approximate circumference of this circle?

Teacher Moves

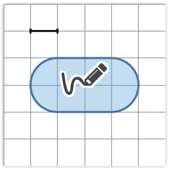
Support for Future Learning: If students struggle, offer individual support during the warm-up of Lesson 4, or practice calculating the circumference of circles as a class before beginning Lesson 4.

Sample Responses

20π inches

---

4 Lesson 4: Calculating Perimet...



What is the perimeter of this figure?

f(x)

What is the perimeter of this figure?

Teacher Moves

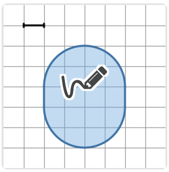
Support for Future Learning: If a few students struggle with this cool-down, offer them individual support during Practice Day 1. If a large portion of the class struggles, facilitate a whole-class discussion about this question or a similar question at the beginning of the next class.

Sample Responses

$10\pi + 20$ centimeters

---

5 Lesson 5: Estimating and Calc...



What is the approximate area of this

f(x)

What is the approximate area of this figure?

Teacher Moves

Support for Future Learning: Students will revisit estimating the area of a shape with curved edges at the beginning of the next lesson.

Sample Responses

Estimates between 15 and 18 square units are marked correct.

---

6 Lesson 6: Exploring Circle Area

Circle A has a diameter of approximately 20 inches.

Circle A has a diameter of approximately 20 inches.

Which of these could be the area of circle A?

Teacher Moves

Connection to Future Learning: This concept of circle area will be reinforced in Lessons 7 and 8.

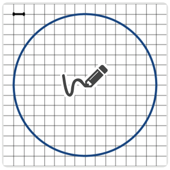
Sample Responses

About 300 square inches

Explanations vary. If the diameter of the circle is about 20 inches, then its radius is about 10 inches. The area of a circle is a little more than 3 times the area of the radius square, which would be $10^2 = 100$ square inches. This means the area of the circle is a little more than $100 \cdot 3 = 300$ square inches.

---

7 Lesson 7: Relating Area to Circ...



Calculate the area of this circle.

f(x)

Calculate the area of this circle.

Teacher Moves

Support for Future Learning: If students struggle, offer individual support during the warm-up of Lesson 8, or practice calculating the area of circles as a class before starting Lesson 8.

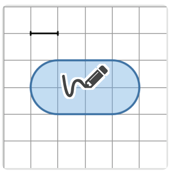
Sample Responses

49π square centimeters

Explanations vary. I figured out the radius by counting the number of units between the center of the circle and the edge. Then, I squared that number and multiplied by π to get $7^2 \cdot \pi = 49\pi$ square centimeters.

---

8 Lesson 8: Calculating Areas of...



What is the area of this figure?

f(x)

What is the area of this figure?

Teacher Moves

Support for Future Learning: If students struggle on the cool-down, consider revisiting before the End-Unit Assessment. Students will not explore complex shapes in Lesson 9 or Practice Day 2.

Sample Responses

$100 + 25\pi$

9 Lesson 9: Calculating Area Giv...

The circumference of this circle is

$f(x)$

The circumference of this circle is 60 feet.

What is the circle's area?

Teacher Moves

Support for Future Learning: If students struggle, consider revisiting this question or a similar question before students begin Practice Day 2.

Sample Responses

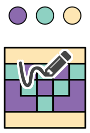
$$\left(\frac{60}{2\pi}\right)^2 \cdot \pi$$

7.4 Cool-Downs

Lesson Checklist

- [ ] Complete the lesson using the student preview.
- [ ] Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- [ ] Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- [ ] Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- [ ] Anticipate screens where students will struggle, then plan your response.
- [ ] Consider how to use snapshots to select and present student thinking for class discussion.
- [ ] Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: Working W…



What percentage of the square is

f(x)

What percentage of the square is yellow?

Teacher Moves

Support for Future Learning: If students are struggling to calculate the percentage that is shaded yellow, consider reviewing questions similar to the warm-up and the cool down as students work on Lessons 2 and 3 to prepare them to revisit percentages in Lesson 4.

Sample Responses

40%

Explanations vary. There are 5 rows in the design. Therefore, each row makes up 20%. Since two full rows are yellow, the design is 40% yellow.

2 Lesson 2: Rates and …

Aba mixes $2\frac{1}{2}$ cups of water with $\frac{1}{3}$ of a cup of lemon

Aba mixes $2\frac{1}{2}$ cups of water with $\frac{1}{3}$ of a cup of lemon juice.

Esteban mixes $1\frac{2}{3}$ cups of water with $\frac{1}{4}$ of a cup of lemon juice.

Whose lemonade mixture tastes stronger?

Teacher Moves

Support for Future Learning: If students struggle to compare two relationships with fractions, consider reviewing the cool-down as a class before students begin Lesson 3.

Sample Responses

Esteban

Explanations vary. Aba uses $7\frac{1}{2}$ cups of water per 1 cup of lemon juice because $2\frac{1}{2} \div \frac{1}{3} = 7\frac{1}{2}$. Esteban uses $6\frac{2}{3}$ cups of water per 1 cup of lemon juice because $1\frac{2}{3} \div \frac{1}{4} = 6\frac{2}{3}$. Esteban's mixture has less water for the same amount of lemon juice.

---

3 Lesson 3: Revisiting …

It costs $\$3.75$ to buy $\frac{3}{4}$ pounds of chopped walnuts.

It costs $\$3.75$ to buy $\frac{3}{4}$ pounds of chopped walnuts.

How many pounds of walnuts can you purchase with $\$11.25$?

Teacher Moves

Support for Future Learning: Students will continue to use tables to calculate unknown values in the remainder of the unit.

Sample Responses

$2\frac{1}{4}$ (or equivalent)

---

4 Lesson 4: Percent Inc…

The number of fish in a pond decreased by 10% this year compared to last year.

f(x)

The number of fish in a pond decreased by 10% this year compared to last year.

Last year, there were 60 fish in the pond.

How many fish are in the pond this year?

Teacher Moves

Support for Future Learning: This idea will be reinforced over the next several lessons.

Sample Responses

54 fish

---

5 Lesson 5: Percent Inc…

Jayla's bank account increased by 7% this year.

f(x)

Jayla's bank account increased by 7% this year.

Write an equation to represent the relationship between the amount that Jayla started with, b, and the amount she has now, c.

Teacher Moves

Support for Future Learning: If a few students struggle with this cool-down, offer them individual support during Activity 2 of Lesson 6. If a large portion of the class struggles, consider facilitating a whole-class discussion about the different equations representing a percent increase or decrease during the discussion for Problem 6 of Lesson 6, Activity 1.

Sample Responses

Responses vary.

- $1b + .07b = c$
- $1.07b = c$
- $c = (1 + 0.07)b$

---

6 Lesson 6: Percent Inc…

A company claims that their new bottle holds 40% more laundry soap.

f(x)

A company claims that their new bottle holds 40% more laundry soap.

If their original container held 53 fluid ounces of soap, how much does the new container hold?

Teacher Moves

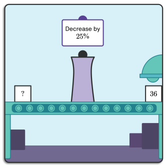
Connection to Future Learning: Double number lines will not be specifically addressed in future lessons. Students will have more opportunities to practice calculating original amounts, new amounts, and percent change using other representations in Lesson 7 and beyond.

Sample Responses

74.2 fluid ounces

---

7 Lesson 7: Calculating…



A number went into this machine and

f(x)

A number went into this machine and 36 came out.

What number went in?

Teacher Moves

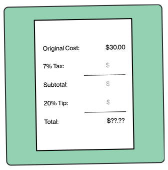
Support for Future Learning: Consider offering individual support to students who struggle with the cool-down before students take the quiz, or conduct a whole class discussion before the next class.

Sample Responses

48

---

8 Lesson 8: Multistep P…



A meal costs $\$30$ before

f(x)

A meal costs $\$30$ before tax and tip.

There is a 7% sales tax. After the tax, a 20% tip is added.

What is the total after tax and tip?

Teacher Moves

Support for Future Learning: Consider checking in with students who struggle on this cool-down when they work on stations during the

Practice Day, or review this question as a class before the end of the unit.

Sample Responses

$\$38.52$

---

9 Lesson 9: Real-World…

Tariq works as a server making $\$9$ per hour. In a typical 8-hour shift, he earns $\$65$ in tips.

Tariq works as a server making $\$9$ per hour. In a typical 8-hour shift, he earns $\$65$ in tips.

The restaurant offers Tariq a 50% raise on his hourly rate. If he takes the offer, he would stop collecting tips.

If you were Tariq, would you accept this offer?

Teacher Moves

Support for Future Learning: Students will revisit these concepts in Lesson 10: Cost of College.

Sample Responses

Responses vary.

- No. During a typical 8-hour shift, Tariq currently makes $\$137$ ($9 \cdot 8 + 65$). A 50% raise means making $\$13.5$ per hour, but in an 8-hour shift without tips, he would only make $\$108$.
- Yes. During a typical 8-hour shift, Tariq currently makes $\$137$ ($9 \cdot 8 + 65$), but it could vary depending on tips. With the raise, he would make less money on average, but at least the amount he makes would be predictable.

---

10 Lesson 10: Real-Wo…

Tyler purchased a vintage video game for $\$60$.

$f(x)$

Tyler purchased a vintage video game for $\$60$.

The value of the video game is expected to increase by 4% each year.

How much will the video game be worth after two years?

Teacher Moves

Support for Future Learning: Students will have an opportunity to practice calculating multiple percent increases during the Practice Day.

Sample Responses

$\$64.90$

---

11 Lesson 11: Percent …

To be labeled as a jumbo egg, an egg is supposed to weigh 2.5 ounces.

f(x)

To be labeled as a jumbo egg, an egg is supposed to weigh 2.5 ounces.

Rafael buys a carton of jumbo eggs and finds that one egg weighs 2.4 ounces.

What is the percent error?

Teacher Moves

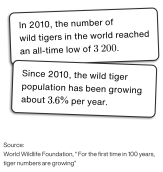
Supports for Future Learning: If students struggle, consider inviting these students to spend extra time on the section of the Practice Day that involves percent error, or reviewing this question before students begin the Practice Day.

Sample Responses

4%

---

12 Lesson 12: Analyze …



Here are two facts.

Here are two facts.

Write a question that you could figure out using this information and whose answer is not already given.

Teacher Moves

Support for Future Learning: Students will continue to work with real-world situations involving percent increase and decrease in the Practice Day.

Sample Responses

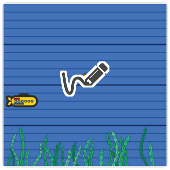
Responses vary. How many wild tigers are there in the world today?

7.5 Cool-Downs

Lesson Checklist

- ☐ Complete the lesson using the student preview.
- ☐ Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- ☐ Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- ☐ Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- ☐ Anticipate screens where students will struggle, then plan your response.
- ☐ Consider how to use snapshots to select and present student thinking for class discussion.
- ☐ Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: Representing Adding...



This submarine's starting

This submarine's starting position is -2 units.

Select the THREE actions that would make the final position 1 unit.

Teacher Moves

Support for Future Learning: Students will have more opportunities to analyze combinations of floats and anchors in Lesson 2 and 6, so if students struggle with this cool-down, there is no need to slow down or add additional work to the next lessons.

Sample Responses

- Add 3 floats
- Remove 3 anchors
- Add 1 float and remove 2 anchors

---

2 Lesson 2: Adding and Subtrac...

Teacher Moves

Support for Future Learning: If students struggle to determine the value of each expression, plan to revisit this when opportunities arise during Lessons 3 and 4. Consider spending extra time during Activity 1 of Lesson 3 connecting the bumper context to floats and anchors or spending extra time during Lesson 4's warm-up surfacing students' strategies for determining the value of each expression.

Sample Responses

- 3
- -3
- -7
- 3

3 Lesson 3: Adding and Subtrac...

Teacher Moves

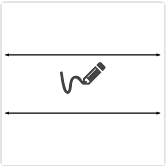
Support for Future Learning: If students struggle to determine the unknown value in each equation, consider making time to explicitly revisit these ideas before Quiz 1.

Sample Responses

- $a = 10$
- $b = -5.1$
- $c = \frac{6}{6}$ (or equivalent)

---

4 Lesson 4: Number Lines and E...



$-2.3 - (-3.5)$

$f(x)$

$$-2.3 - (-3.5)$$

Teacher Moves

Support for Future Learning: If students struggle with determining the value of each expression, plan to revisit this when opportunities arise in Lesson 5. Consider asking students to draw a number line diagram to support their thinking during Activity 1 of Lesson 5, particularly Screens 2 and 3.

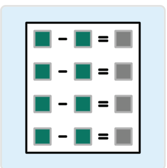
Sample Responses

- 1.2
- -5.8

Image solution

---

5 Lesson 5: Practice With Addin...



Make four true equations by flipping the cards.

(Note: You

Make four true equations by flipping the cards.

(Note: You can click on a card to flip it and switch the sign.)

Teacher Moves

Support for Future Learning: If students struggle to reason about subtracting negative and positive numbers, consider reviewing this screen as a class before Practice Day 1 or offering individual support where needed during Task 3 of Practice Day 1.

Sample Responses

- $1.5 - (-2.5) = 4$
- $(-1.5) - (-2.5) = 1$
- $1.5 - 2.5 = -1$
- $(-1.5) - 2.5 = -4$

---

6 Lesson 6: Representing Multip...

Teacher Moves

Support for Future Learning: Students will have more opportunities to multiply positive and negative integers in upcoming lessons.

Sample Responses

- -20
- -12
- 21

---

7 Lesson 7: Position, Rate, and T...

Two of these equations are true. One is false.

Two of these equations are true. One is false.

Select the false equation.

Teacher Moves

Support for Future Learning: If students struggle to select the false equation, plan to revisit this when opportunities arise during Lesson 8. For example, consider spending extra time discussing the sign of each expression in the Lesson 8 warm-up.

Sample Responses

$(-3) \cdot (-8) = -24$

Explanations vary.

The equation is false because when you multiply two negative numbers, the total is positive.

Make it true by changing -8 to 8.

8 Lesson 8: Multiplying and Divi...

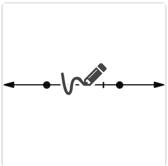
Teacher Moves

Support for Future Learning: If students struggle to determine the value of each expression, consider making time to explicitly revisit these ideas before the quiz. Consider spending extra time discussing the sign of $\frac{x}{y}$ and $\frac{y}{x}$ in Activity 1 of Lesson 9.

Sample Responses

- 80
- -5
- 5
- -5

9 Lesson 9: Variable Expressions



x and y are plotted on the number line.

x and y are plotted on the number line.

Order the expressions from least to greatest.

Use the number line if it helps you with your thinking.

Teacher Moves

Support for Future Learning: If students struggle to order the variable expressions, consider spending extra time on Task 3 of Practice Day 2 or reviewing this question before Quiz 2.

Sample Responses

Least
- $x \cdot y$
- $x + y$
- $\frac{x}{y}$
- $x - y$

Greatest

10 Lesson 10: Practice With All F...

Determine the value of each expression.

Determine the value of each expression.

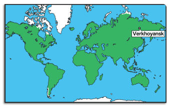
Teacher Moves

Support for Future Learning: If students struggle to determine the value of each expression, consider reviewing this screen as a class before Practice Day 2 or offering individual support where needed during the Practice Day.

Sample Responses

- -4
- 8
- 12
- -3

11 Lesson 11: Real-World Situatio...



Verkhoyansk, Russia, has one of the

Verkhoyansk, Russia, has one of the largest temperature differences between its summer and winter temperatures.

Teacher Moves

Support for Future Learning: If students struggle to calculate the difference, consider reviewing this screen as a class before Lesson 12 or offering individual support where needed during the lesson. Students need to be able to calculate differences between large positive and negative numbers throughout Lesson 12.

Sample Responses

110.5 °F

12 Lesson 12: Real-World Situati...

In 2020, the average temperature in some parts of the Arctic was about -19.3 °F.

f(x)

In 2020, the average temperature in some parts of the Arctic was about -19.3 °F.

The temperature in the Arctic increased about 0.135 degrees **per year** in the last decade.

If the Arctic continues to warm at the same rate, what will be the average temperature in 2050?

Teacher Moves

Support for Future Learning: If students struggle with using rates to make a prediction, consider making time to explicitly revisit these ideas before students take the End Assessment, where they will be asked to use a rate to make a prediction.

Sample Responses

-15.25 °F

---

13 Lesson 13: Real-World Situati...

Teacher Moves

Support for Future Learning: If students struggle to calculate the **total due**, consider making time to explicitly revisit these ideas before the End-Unit Assessment.

Sample Responses

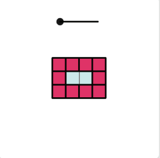
Electricity used: 900 kilowatt-hours
Electricity generated: 712 kilowatt-hours
Total due: $\$53.92$

7.6 Cool-Downs

Lesson Checklist

- [ ] Complete the lesson using the student preview.
- [ ] Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- [ ] Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- [ ] Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- [ ] Anticipate screens where students will struggle, then plan your response.
- [ ] Consider how to use snapshots to select and present student thinking for class discussion.
- [ ] Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: Non-Propo…



Here is the pattern from the

Here is the pattern from the lesson synthesis.

Teacher Moves

Support for Future Learning: Students will have more chances to develop their understanding of non-proportional relationships throughout the unit.

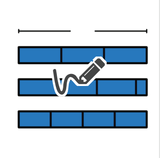
Sample Responses

No

Explanations vary. Each stage adds 6 new tiles. If I keep adding 6 tiles, later stages will have 46 and 52 tiles, but not 50.

---

2 Lesson 2: Connectin…



Neel and his sister are making

Neel and his sister are making gift bags for a party.

Neel puts 3 pencil erasers in each bag. His sister puts x stickers in each bag. After filling 4 bags, they have used a total of 36 items.

Which diagram best represents the story?

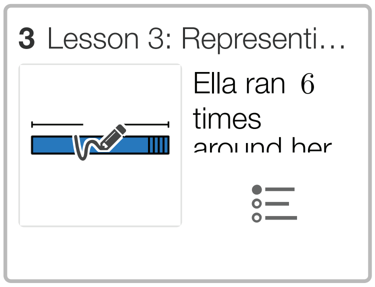
Teacher Moves

Support for Future Learning: If students struggle to connect situations and tape diagrams, plan to revisit this when opportunities arise during Lesson 3. Consider spending extra time discussing how diagrams connect to situations in Lesson 3, Activity 1.

Sample Responses

Diagram C

$x = 6$



Ella ran 6 times around her school building. Then she ran 4 miles home.

Her phone told her that she ran 7 miles total.

Select an equation that represents this situation.

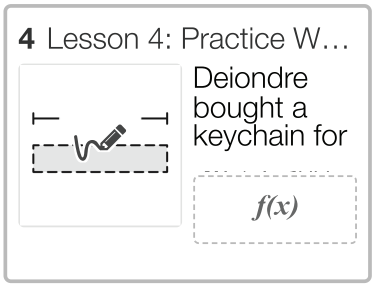
Teacher Moves

Support for Future Learning: Students will have more chances to develop their understanding of equations, situations, and solutions in the upcoming lessons, particularly Lesson 4 and Lesson 12.

Sample Responses

$6x + 4 = 7$

$x = 0.5$ (or equivalent)



Deiondre bought a keychain for $\$6.75$ and 3 shirts that cost x dollars each. Altogether, the items cost $\$31.50$.

Write an equation to represent the situation.

Teacher Moves

Support for Future Learning: If students struggle with this cool-down, they will have more opportunities to write equations from contexts, particularly in Lesson 12 and Practice Day 1.

Sample Responses

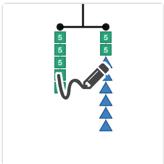
Tape Diagram: 3 sections of x and one section of 6.75. The total length is 31.50.

Equation: $6.75 + 3x = 31.50$ (or equivalent)

Solution: $x = 8.25$ (or equivalent)

Meaning: *Responses vary.* The shirts cost $\$8.25$ each.

5 Lesson 5: Introductio…



Here is a new balanced hanger.

f(x)

Here is a new balanced hanger.

What is the weight of a triangle?

Use the sketch tool if it helps you with your thinking.

Teacher Moves

Support for Future Learning: If students struggle with this cool-down, they will have more opportunities to determine unknown weights in balanced hangers, particularly in Lessons 6 and 7.

Sample Responses

2.5 pounds

---

6 Lesson 6: Solving Eq…

What is the value of x in the equation $5x+\frac{1}{4}=\frac{61}{4}$?

f(x)

What is the value of x in the equation $5x+\frac{1}{4}=\frac{61}{4}$?

Teacher Moves

Support for Future Learning: If students struggle with figuring out the value of x, plan to revisit this when opportunities arise in Lesson 7. Consider spending more time during Activity 1 of Lesson 7 connecting the moves on the hanger in Problem 1 with the equation steps in Problems 2 and 3.

Sample Responses

$x=3$

---

7 Lesson 7: Solving Eq…

Teacher Moves

Support for Future Learning: If students struggle to solve each equation, consider reviewing these problems as a class before beginning Lesson 8, or spending extra time during Lesson 8, Activity 2 discussing students' strategies and highlighting common errors.

Sample Responses

- $x=-7$

- $x = -1$

8 Lesson 8: Options for…

Solve the equation.

$f(x)$

Solve the equation.

Teacher Moves

Support for Future Learning: If students struggle to solve the equation, plan to revisit this when opportunities arise in Lesson 11 and Practice Day 1. Consider spending extra time on Problems 2 and 3 of Set 1 in Activity 1 of Lesson 11.

Sample Responses

$x = 9$

9 Lesson 9: Equivalent …

Write an equivalent expression for $-5(3-2x)$.

$f(x)$

Write an equivalent expression for $-5(3-2x)$.

Teacher Moves

Support for Future Learning: If students struggle with writing an equivalent expression, plan to revisit this when opportunities arise in Lesson 10. Consider spending extra time during Activity 1 of Lesson 10 (where expressions in factored form are introduced) discussing strategies for rewriting these in expanded form and what errors might come up.

Sample Responses

Responses vary. $-15 + 10x$

10 Lesson 10: Adding …

Write each expression with fewer terms.

$f(x)$

Write each expression with fewer terms.

$10x - 2x$

Teacher Moves

Support for Future Learning: Students will have more chances to develop their understanding of writing expressions with fewer terms in Lesson 11 and Practice Day 1.

Sample Responses

- $8x$
- $14x - 7$

---

11 Lesson 11: Solving …
Saanvi and Ichiro each started solving this equation for x:

Saanvi and Ichiro each started solving this equation for x:

$$3 + 5(x - 1) = 48$$

- The result of Saanvi's first step was $5(x - 1) = 45$.
- The result of Ichiro's first step was $3 + 5x - 1 = 48$.

One of them made an error. Who was it?

Teacher Moves

Support for Future Learning: If students struggle with identifying the error, consider checking in with individual students as they solve equations during Practice Day 1, or reviewing this problem as a class before beginning Practice Day 1.

Sample Responses

Ichiro

Responses vary. The error was that Ichiro didn't expand correctly. He only multiplied 5 to the first term in the parentheses.

---

12 Lesson 12: Using E…
Noe is hiking in a canyon.
At one point during the

$f(x)$

Noe is hiking in a canyon.

At one point during the hike, Noe is at an elevation of 453 feet. After descending at a rate of 50 feet per minute, she reaches an elevation of 146 feet.

How long does the descent take?

Teacher Moves

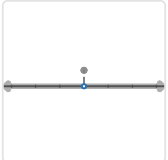
Support for Future Learning: If students struggle to answer the question in context, consider making time to explicitly revisit these ideas before the Quiz. Students will have the opportunity to answer questions like these during Practice Day 1.

Sample Responses

6.14 minutes

---

13 Lesson 13: Inequaliti…



To work at an amusement

$f(x)$

To work at an amusement park, employees must be at least 14 years old.

1. Make a graph on the number line to represent the possible ages of employees at this park.

2. Write an inequality to represent this situation.

Teacher Moves

Support for Future Learning: If students struggle with writing or graphing an inequality based on the situation, plan to emphasize this when opportunities arise over the next several lessons. For example, plan to spend extra time making connections between the inequality and the situations in Activity 1 of Lesson 15.

Sample Responses

Image solution

$x \geq 14$ or $14 \leq x$

---

14 Lesson 14: Solution…

Solve the inequality $19 \geq 2x + 10$.

$f(x)$

Solve the inequality $19 \geq 2x + 10$.

Teacher Moves

Support for Future Learning: If students struggle with solving the inequality, plan to emphasize this when opportunities arise over the next several lessons. For example, spend extra time in Lesson 15 discussing strategies for solving the inequality that represents each situation.

Sample Responses

$4.5 \geq x$

15 Lesson 15: Solving I…

It is currently $14°$ C outside and the

f(x)

It is currently $14°$ C outside and the temperature is dropping 4 degrees every hour.

Zahra will only stay outside if it is – $10°$ C or warmer.

Solve the inequality $14 - 4h \geq -10$.

Teacher Moves

Support for Future Learning: If students struggle to solve the inequality and interpret the solution, plan to emphasize this when opportunities arise during Lesson 17 and Practice Day 2. For example, consider spending extra time during Activity 1 of Lesson 17 discussing students' strategies for solving the inequality

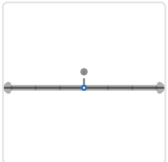
Sample Responses

$h \leq 6$

Responses vary. Zahra will stay outside only for the next 6 hours.

---

16 Lesson 16: Solving I…



Graph the solutions to $-3 > -2x +$.

Graph the solutions to $-3 > -2x + 9$.

Teacher Moves

Support for Future Learning: If students struggle to solve and graph the solutions to the inequality, consider reviewing this screen as a class before beginning Lesson 17 or offering individual support where needed during Lesson 17 and Practice Day 2.

Sample Responses

Image solution

---

17 Lesson 17: Modelin…

Describe

Describe the mistake that Wey Wey made.

Teacher Moves

Support for Future Learning: If students struggle to identify and correct the error, consider checking in with individual students as they solve inequalities during Practice Day 2 or reviewing this problem as a class before beginning Practice Day 2.

Sample Responses

Responses vary. Wey Wey should have used the less-than-or-equal-to symbol.

- $8x + 58 \leq 500$
- $x \leq 55.25$

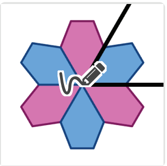
Wey Wey can download 55 movies or fewer.

7.7 Cool-Downs

Lesson Checklist

- ☐ Complete the lesson using the student preview.
- ☐ Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- ☐ Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- ☐ Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- ☐ Anticipate screens where students will struggle, then plan your response.
- ☐ Consider how to use snapshots to select and present student thinking for class discussion.
- ☐ Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: Exploring Angles



What angle was used to create this

$f(x)$

What angle was used to create this pinwheel?

Teacher Moves

Support for Future Learning: Students will have more chances to develop their understanding of angle measures of a circle in the upcoming lessons, particularly Lesson 2 where students reason about angle measures in pattern blocks.

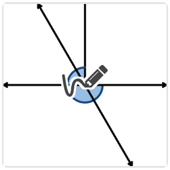
Sample Responses

$60°$

Explanations vary. There are six pieces and no gap, so I divided $360°$ by 6.

---

2 Lesson 2: Complementary an...



The measure of angle X is $60°$.

$f(x)$

The measure of angle X is $60°$.

X and Y are **complementary** angles.

What is the measure of angle Y?

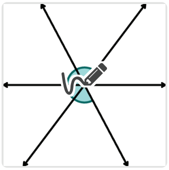
Teacher Moves

Support for Future Learning: If students struggle with measures of complementary and supplementary angles, plan to emphasize this when opportunities arise over the next several lessons. Consider spending extra time during Lesson 3's warm-up naming the angle relationships in the diagram and describing what that means about their measures.

Sample Responses

$Y = 30°$
$Z = 120°$

3 Lesson 3: Vertical Angles and ...



Determine the values of a and b.

Determine the values of a and b.

Teacher Moves

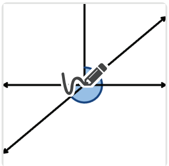
Support for Future Learning: If students struggle with determining the missing angle measures, plan to emphasize this during Lesson 4, where students will practice determining unknown angles in diagrams.

Sample Responses

$a = 53$, $b = 65$

---

4 Lesson 4: Writing Equations a...



Write at least one true equation

$f(x)$

Write at least one true equation based on this diagram.

Teacher Moves

Support for Future Learning: If students struggle with writing equations or determining the missing measures, consider reviewing this as a class before Practice Day 1 or offering individual support where needed during the practice day.

Sample Responses

1. *Equations vary.* $a + 50 = 90$, $a = b$, $a + c = 180$.
2. $a = 40$, $b = 40$, $c = 140$

---

5 Lesson 5: The Triangle Inequal...

Select **all** the groups of side lengths that will form a triangle.

Select **all** the groups of side lengths that will form a triangle.

Teacher Moves

Support for Future Learning: If students struggle to determine which groups of side lengths form triangles, consider reviewing this screen as a class before Practice Day 1 or offering individual support where needed during the practice day.

Sample Responses

- 6, 11, and 6 units

- 12, 8, and 9 units

6 Lesson 6: Building Polygons G...

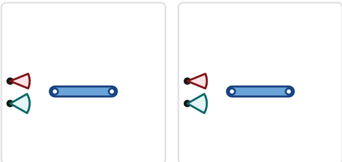
Teacher Moves

Support for Future Learning: If students struggle with determining the number of different possible triangles, plan to emphasize this when opportunities arise over the next several lessons. For example, in Lesson 8, spend extra time during the debrief of Activity 1 discussing how many triangles are possible with each description.

Sample Responses

Image solution

7 Lesson 7: Building Triangles Wi...



Teacher Moves

Support for Future Learning: If students struggle to create two different triangles, consider reviewing this screen as a class before beginning Lesson 8.

Sample Responses

Image solution

8 Lesson 8: Drawing Triangles W...

Alejandro was asked to draw a triangle with

Alejandro was asked to draw a triangle with two $45°$ angles and a side length of 8 cm.

He drew the triangle shown here.

Is it possible for Alejandro to draw a different triangle with the same measurements?

Teacher Moves

Support for Future Learning: If students struggle to describe how to create a different triangle, consider reviewing this screen as a class or offering individual support where needed during Practice Day 1.

Sample Responses

Yes

Explanations vary. Alejandro could make it so that the 8 cm segment is on one of the smaller sides rather than on the largest side. This arrangement would create a different triangle.

---

9 Lesson 9: Describing Cross Se...

Here is a triangular prism.

Here is a triangular prism.

Select **all** the cross sections that are possible with these cuts.

Teacher Moves

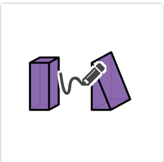
Support for Future Learning: Students will have more opportunities to develop their understanding of three-dimensional solids in the upcoming lessons.

Sample Responses

- Triangle
- Rectangle
- Trapezoid

---

10 Lesson 10: Using Base Area t...



Which prism has the greater

Which prism has the greater volume?

Use paper and pencil if that helps you with your thinking.

Teacher Moves

Support for Future Learning: If students struggle to compare the volumes, consider reviewing this screen as a class before beginning Lesson 11 or offering individual support where needed during Lesson 11's warm-up.

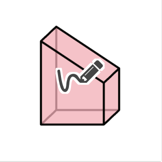
Sample Responses

Same volume

Explanations vary. Both volumes are 30 cubic units. The rectangular prism is $5 \cdot 2 \cdot 3 = 30$ cubic units and the triangular prism is $\frac{1}{2} \cdot 2 \cdot 5 \cdot 6 = 30$ cubic units.

---

11 Lesson 11: Calculating Volume...



What is the volume of this prism?

f(x)

What is the volume of this prism?

Use the sketch tool if it helps you with your thinking.

Teacher Moves

Support for Future Learning: If students struggle with calculating the volume, consider making time to explicitly revisit these ideas. A strong understanding of volume will support students in Lesson 13 and the End Assessment.

Sample Responses

63 cubic units

---

12 Lesson 12: Surface Area of Ri...

Calculate the surface area of this prism.

f(x)

Calculate the surface area of this prism.

Use the sketch tool if it helps you with your thinking.

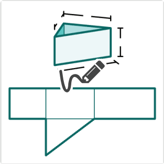
Teacher Moves

Support for Future Learning: If students struggle with calculating the surface area, consider reviewing this question as a class before Lesson 13 or offering individual support where needed during the surface area–focused parts of Lesson 13.

Sample Responses

300 square centimeters

13 Lesson 13: Applying Volume a...



Here is a new container without a top

f(x)

Here is a new container without a top lid.

How much popcorn can it hold (in cubic units)?

Teacher Moves

Support for Future Learning: If students struggle with calculating volume or surface area, consider making time to explicitly revisit these ideas. A strong understanding of each will support students in both Practice Day 2 and the End Assessment.

Sample Responses

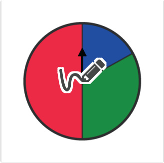
Popcorn: 120 cubic units
Cardboard: 144 square units

7.8 Cool-Downs

Lesson Checklist

- [ ] Complete the lesson using the student preview.
- [ ] Identify how this lesson extends the learning from previous lessons, and how it prepares students for future lessons.
- [ ] Think about how you will introduce each new section within the lesson to engage students in the task and maintain focus on the learning goals.
- [ ] Determine the screens where you'll use Pacing and Pause to bring the class together. What questions will you ask on those screens?
- [ ] Anticipate screens where students will struggle, then plan your response.
- [ ] Consider how to use snapshots to select and present student thinking for class discussion.
- [ ] Think about how you will use the results of previous Cool-Downs and student surveys to inform your approach to this lesson.

1 Lesson 1: Chance Experiments



Write the letter that matches the

Write the letter that matches the likelihood of spinning each color on one spin.

A. Impossible
B. Unlikely
C. Equally likely as not
D. Likely
E. Certain

Teacher Moves

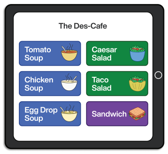
Support for Future Learning: Students will have more opportunities to develop their understanding of likelihood in the upcoming lessons, particularly in Lesson 2 and 3.

Sample Responses

- E (Certain)
- C (Equally likely as not)
- A (Impossible)
- B (Unlikely)
- B (Unlikely)

---

2 Lesson 2: Intro to Probability



Here is a menu from a restaurant.

$f(x)$

Here is a menu from a restaurant.

If one item is selected at random, what is the probability that the item is a **salad**?

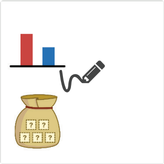
Teacher Moves

Support for Future Learning: Students will have more opportunities to develop their understanding of calculating probability in the upcoming lessons, particularly in Lessons 3 and 4.

Sample Responses

$\frac{2}{6}$ (or equivalent)

3 Lesson 3: Predicting Sample S...



A new mystery bag has 5 blocks.

f(x)

A new mystery bag has 5 blocks. Some are red and some are blue.

Based on these results, how many blocks are likely to be red?

Teacher Moves

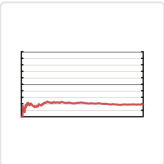
Support for Future Learning: If students struggle to determine the number of red blocks, consider reviewing this screen as a class before Practice Day 1 or offering individual support where needed during the practice day.

Sample Responses

3 blocks

---

4 Lesson 4: Repeated Experime...



The graph shows the results of 500

The graph shows the results of 500 spins.

Which spinner is most likely to have produced this graph?

Teacher Moves

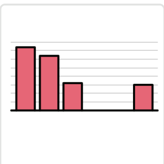
Support for Future Learning: If students struggle with connecting the results of a graph to the probability of spinners, plan to emphasize this when opportunities arise during Lesson 5. Consider spending extra time analyzing the graphs of results of repeated experiments during Activity 1.

Sample Responses

The spinner with 1 red section out of 5.

---

5 Lesson 5: Comparing Probabili...



This graph shows the results of 100

This graph shows the results of 100 rolls with a number cube.

Describe the number cube that could have generated these results.

Teacher Moves

Support for Future Learning: If students struggle to estimate the probability of rolling a two, consider reviewing this screen as a class before Practice Day 1 or offering individual support where needed during the practice day.

Sample Responses

Responses vary. Maybe the cube has 2 sides with one dot, 2 sides with two dots, 1 side with three dots, and 1 side with six dots.

$\frac{2}{6}$ (or equivalent)

---

6 Lesson 6: Multistep Events

Pablo plays a game that involves

$f(x)$

Pablo plays a game that involves rolling a standard number cube and flipping a coin.

How many possible outcomes are in the sample space?

Teacher Moves

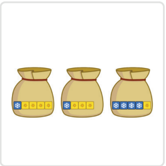
Support for Future Learning: If students struggle to determine the number of possible outcomes or the probability, consider reviewing this screen as a class before Practice Day 1 or offering individual support where needed during the practice day.

Sample Responses

- 12 outcomes
- $\frac{3}{12}$ (or equivalent)

---

7 Lesson 7: Estimating Probabili...



Lucia's school closes if it snows.

Lucia's school closes if it snows.

Lucia created these bags to simulate the forecast for the next 3 school days.

Press "Simulate" to run the experiment 100 times.

Teacher Moves

Support for Future Learning: If students struggle with interpreting the simulation, plan to emphasize this when opportunities arise in

Lesson 8. Consider spending extra time during the warm-up discussing how to interpret the results of the simulation.

Sample Responses

Students will be marked correct if they estimate the probability between 0.28 and 0.38.

---

8 Lesson 8: Designing Simulatio...

Natalia is playing in a very close basketball game.

Natalia is playing in a very close basketball game.

She is about to shoot 3 free throws and needs to make all 3 to win the game. She typically makes about 75% of her free throws.

Describe a simulation you could run to determine the probability that she wins the game.

Teacher Moves

Support for Future Learning: If students struggle to design a simulation, they will have more opportunities to practice analyzing simulations during Practice Day 1.

Sample Responses

Responses vary. Create three identical spinners to simulate each free throw. Give each spinner four sections: three sections that say "MAKE" and one that says "MISS." Spin the three spinners and write down how many free throws Natalie "makes" in the simulation. Repeat this many times, and keep track of the percentage of experiments where "MAKE" comes up all three times.

---

9 Lesson 9: Using Mean and MA...

Here is a new set of data: 4, 5, 5, 6, 8, 8.

f(x)

Here is a new set of data: 4, 5, 5, 6, 8, 8.

Calculate the mean.

Teacher Moves

Support for Future Learning: If students struggle to calculate the mean, they will have more opportunities during Lesson 10. If students struggle to calculate the MAD, they will have more opportunities during Lesson 14. Consider spending extra time reviewing each calculation before beginning these lessons.

Sample Responses

Mean: 6
MAD: 1.33

---

10 Lesson 10: Sampling From La...

Ariel wants to know the most popular chip flavor among teenagers in the United States.

Ariel wants to know the most popular chip flavor among teenagers in the United States.

1. What is the **population** for Ariel's question?

2. What is a **sample** Ariel could use to help answer this question?

Teacher Moves

Support for Future Learning: If students struggle with defining the sample and population, plan to emphasize this when opportunities arise over the next several lessons. For example, spend extra time during Lesson 11 defining the population for each question and headline.

Sample Responses

1. The population is all teenagers in the United States.
2. A sample could be the teenagers at their school.

---

11 Lesson 11: Sampling Bias

Teacher Moves

Support for Future Learning: If students struggle to connect sampling methods with possible conclusions, consider spending extra time during Lesson 12 discussing how different sampling methods might impact your understanding of how many different types of flowers are in the seed mix.

Sample Responses

Image solution

12 Lesson 12: Using Percentages...

20 random students from Median

f(x)

20 random students from Median Middle School were asked what superpower they wanted. Here are the results.

Median Middle School has 500 students. Estimate the number of students who want **teleportation**.

Teacher Moves

Support for Future Learning: If students struggle to estimate the population based on the sample, consider reviewing this screen as a class before Practice Day 2 or offering individual support where needed during the practice day.

Sample Responses

100 students

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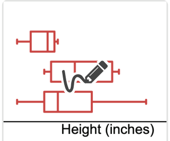
13 Lesson 13: Using Median and ...



Omari wants to know the median

f(x)

Omari wants to know the median height of all 200 students in his dance school. He sampled 20 students on three different days and recorded their heights.

1. Predict the median height for **all** students.

Teacher Moves

Support for Future Learning: If students struggle with estimating the median from a box plot, consider making time to explicitly revisit these ideas.

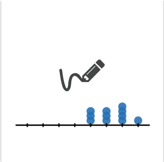
Sample Responses

Responses and explanations vary.

1. 62 inches

2. Since the medians and IQRs are all pretty close, I think my prediction is pretty accurate.

14 Lesson 14: Comparing Popula...



Caasi wonders if students

Caasi wonders if students watched more movies than teachers over the winter break.

After collecting data from a random sample of 11 students and 11 teachers, she decides that the difference between the number of movies watched isn't that big.

Do you agree with Caasi?

Teacher Moves

Support for Future Learning: If students struggle with using evidence to determine if the means of data sets are different, plan to emphasize this when opportunities arise during Lesson 15. Consider asking students if the difference between the asthma rates of the two areas students are comparing is big or not and to explain why.

Sample Responses

No

Explanations vary. I don't agree with Caasi because the difference between the means is $5.3-3=2.3$, which is more than one MAD of either data set (0.9 and 0.8). When the difference between the means is equal to one or more MADs, that means there is a big difference between the number of movies watched by each population.

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15 Lesson 15: Putting It All Toget...

Select **one** question below and record your response.

Select **one** question below and record your response.

Teacher Moves

If time allows, consider checking in with each student throughout the remainder of the year about their responses to the cool-down.

Sample Responses

Responses vary.