Percentages
Student Guide

Math 6 Unit 6 Accelerated
Part 1

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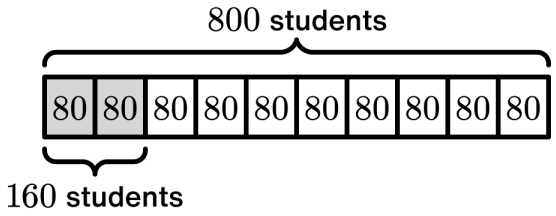
Unit 6.3, Student Goals and Glossary

Glossary

Term	Definition
at the same rate	*At the same rate* means that something continues in the same way. Example: • If Michael walks 3 meters in 2 seconds, how many seconds will it take him to walk 30 meters at the same rate? Here, *at the same rate* means Michael will not slow down or speed up. He will continue walking 3 meters every 2 seconds.
percent	*Percent* means *for every* 100. It is represented by the percent symbol: $\%$. We use percents to represent ratios and fractions. 25% means $25:100$. 25% of something means $\frac{25}{100}$ or $\frac{1}{4}$ of it. Example: • There are 800 students in a school. If 20% of them are on a field trip, then that is 160 students because 20 are on the trip for every 100 students total. 
percentage	*Percentage* is part of every 100. It is similar to percent. Examples: • Only a small percentage of students went on the trip. • If a goalie saves 96 out of 100 shots, his percentage of saves is 96%.

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Unit 6.3, Family Resource

Unit 3 Summary

Prior Learning	Math 6, Unit 3	Future Learning
Grades 2–5 • Measuring length, volume, mass, or weight • Multiplication as scaling • Multiplication of fractions and decimals Math 6, Unit 2 • Introduction to ratios	• Units and measurement • Unit rates • Percentages	Math 6, Unit 5 • Operations with decimals Math 7, Unit 4 • Proportional relationships • Percent increase and decrease

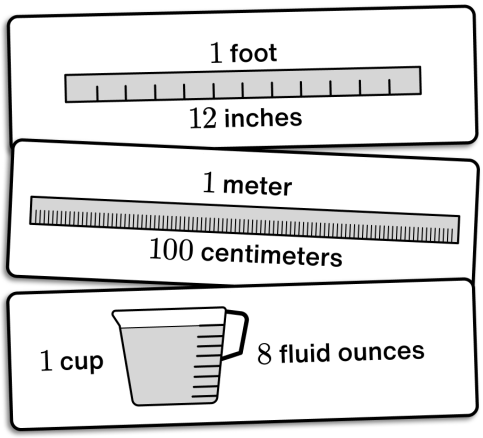
Units and Measurement

Sometimes, measurements are given in one unit and they would be more helpful in a different unit.

When converting, it can be helpful to think about which unit is larger. For example, one foot is larger than one inch, so you would need more inches to measure the same length.

Since there are 12 inches in a foot, you can convert from feet to inches by multiplying by 12.

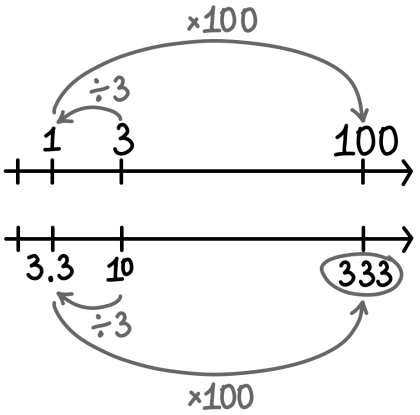
You can convert from inches to feet by multiplying by $\frac{1}{12}$.



Sometimes the conversions aren't as neat.

If you want to know how many feet a 100-meter race is, you can use the relationship 3 meters $\approx$ 10 feet.

You can use the ratio strategies from the previous unit, like making a double number line diagram or a table, to convert 100 meters to feet.



100 meters $\approx$ 333 feet

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Unit 6.3, Family Resource

Unit Rates

A *unit rate* is a ratio expressed as something "per 1." Every ratio has two unit rates.

For example, a parking meter says the price is $3 for 60 minutes.

You can use a double number line or table to determine two unit rates for this situation:

20 minutes per dollar and $0.05 per minute

Dollars	Time (min.)
3	60
1	20

(÷3 between Dollars; ÷3 between Time)

Dollars	Time (min.)
3	60
0.05	1

(÷60 between Dollars; ÷60 between Time)

Different unit rates are useful depending on the problem you're solving.

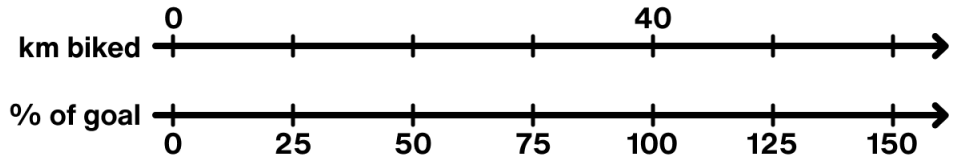
- If you have $1.35 in your pocket, you can get $1.35 \cdot 20 = 27$ minutes of parking.
- If you need 45 minutes of parking, you should pay the meter $45 \cdot 0.05 = \$2.25$.

Percentages

Unit rates are "rates per 1." *Percentages* are "rates per 100." For example, 5% means 5 per 100.

You can use ratio strategies like tape diagrams, double number lines, and tables to reason about percentages.

For example, if Binta's goal is to ride 40 kilometers, you can create a double number line where 40 kilometers lines up with 100%. Then, 50% of the ride is 20 kilometers, 75% is 30 kilometers, etc.



For more complicated percentages, expressions can help. To calculate 83% of 40 kilometers, you can first calculate 1% of 40 ($\frac{40}{100}$) and then multiply by 83. In all, $\frac{40}{100} \cdot 83 = 33.2$ kilometers.

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Try This at Home

Units and Measurement

10 kilograms weighs about the same as 22 pounds.

1.1 Which is heavier: 1 pound or 1 kilogram?

1.2 A canoe weighs 88 pounds. About how many kilograms does it weigh?

1.3 A watermelon weighs 13 kilograms. About how many pounds does it weigh?

Unit Rates

A store sells a 12-ounce bag of pistachios for $15.

2.1 What is the cost **per ounce**?

2.2 How many ounces of pistachios do you get **per dollar**?

2.3 Customers may choose to buy pistachios in other amounts at the same rate. How much would 17 ounces of pistachios cost?

2.4 How many ounces of pistachios can you buy for $7?

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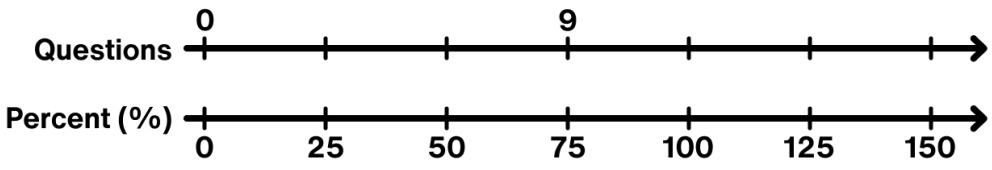
Unit 6.3, Family Resource

Percentages

3. Arturo gets a burger and fries for $\$12$. He wants to give a 20% tip. How much is the tip?

4. Sadia got 75% of the questions right in a trivia game. If she got 9 questions right, how many questions are in the game? Use the double number line if it helps with your thinking.



5. Chloe set a goal to run 8 miles. She ended up running 12 miles. What percent of her goal did she run? Make a double number line if it helps with your thinking.

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Unit 6.3, Family Resource

Solutions:

1.1 1 kilogram

1.2 About 40 kilograms

1.3 About 28.6 pounds

2.1 $1.25 per ounce

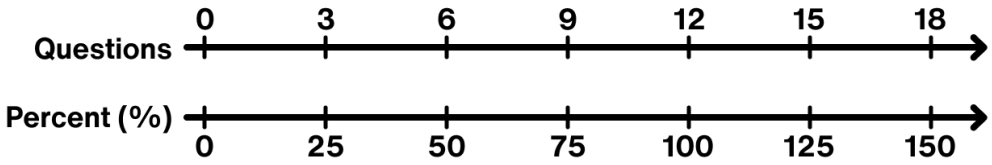
2.2 0.8 ounces per dollar

2.3 $21.25

2.4 5.6 ounces

3. $2.40

4. 12 questions



5. 150%

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Unit 6.3, Lesson 8: Notes Name _____

My Notes

1. In your own words, explain what 25% of a number means.

Esteban bought a bag of candies that come in different colors. They like the orange candies the least.

2. How many orange candies are in each bag?

3. There are 60 candies in Bag B. 75% of them are red. How many red candies are in Bag B? Explain your thinking.

Summary

- ☐ I can use the word *percent* and the symbol $\%$ to mean for every 100.
- ☐ I can calculate 10%, 25%, 50%, or 75% of a number.

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Unit 6.3, Lesson 8: Notes Name _____

My Notes

1. In your own words, explain what 25% of a number means.

   Responses vary. **25% means 25 out of every 100, or $\frac{1}{4}$ of something. If you have 80 duckies and 25% of them have stars, then $80 \cdot \frac{1}{4} = 20$ of them have stars.**

Esteban bought a bag of candies that come in different colors. They like the orange candies the least.

2. How many orange candies are in each bag?

Bag A: 25% of Bag A is 10 candies.

10	10	10	10

Bag B: 10% of Bag B is 6 candies.

6	6	6	6	6	6	6	6	6	6

3. There are 60 candies in Bag B. 75% of them are red. How many red candies are in Bag B? Explain your thinking.

   45 candies are red. *Explanations vary.*

   75% means 75 out of every 100, or $\frac{3}{4}$ of the candies.

   $\frac{1}{4}$ of 60 is 15, so $\frac{3}{4}$ of 60 is $3 \cdot 15 = 45$.

Summary

- ☐ I can use the word *percent* and the symbol $\%$ to mean for every 100.
- ☐ I can calculate 10%, 25%, 50%, or 75% of a number.

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Unit 6.3, Lesson 9: Notes Name _____

My Notes

Faaria's goal was to ride her bike 30 kilometers.

1.1 Complete the table.

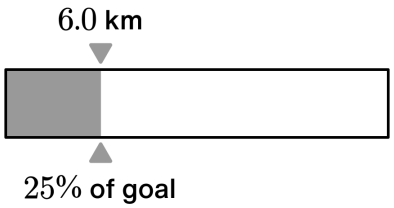
1.2 She rode 40% of her goal.

How far did she ride?

Km Biked	%of Goal
30	100
	10
	40

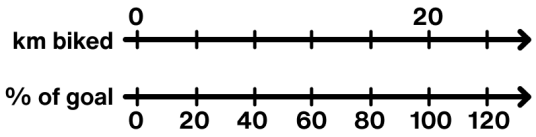
Juliana rode 6 kilometers, which is 25% of her goal.

2. What was her goal distance?



Emmanuel's goal was to ride 20 km. He rode 120% of his goal.

3. How far did he ride?



Summary

- ☐ I can make connections between percentages and ratios.
- ☐ I can use a double number line, tape diagram, or table to determine unknown parts or wholes.

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Unit 6.3, Lesson 9: Notes Name _____

My Notes

Faaria's goal was to ride her bike 30 kilometers.

1.1 Complete the table.

1.2 She rode 40% of her goal.

How far did she ride?

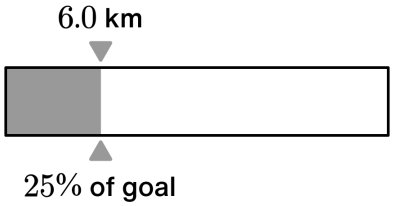
12 **kilometers**

Km Biked	%of Goal
30	100
3	10
12	40

Juliana rode 6 kilometers, which is 25% of her goal.

2. What was her goal distance?

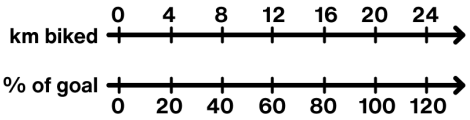
$6 \cdot 4 = 24$ **kilometers**



Emmanuel's goal was to ride 20 km. He rode 120% of his goal.

3. How far did he ride?

20% **is** 4 **km, so he rode** $20 + 4 = 24$ **km.**



Summary

- ☐ I can make connections between percentages and ratios.
- ☐ I can use a double number line, tape diagram, or table to determine unknown parts or wholes.

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Unit 6.3, Lesson 10: Notes Name _____

My Notes

For each question, use a tape diagram, double number line, or table to figure out the solution.

1. Axel has read 60 pages of a book. He is 40% finished. How many pages are in the book?

Representation	Solution

2. There are 300 pages in a book. Tay is 80% finished. How many pages have they read?

Representation	Solution

3. Pilar has read 160 out of 200 pages in a book. What percent of the book has she read?

Representation	Solution

Summary

☐ I can create tape diagrams, double number line diagrams, or tables to determine unknown parts, percentages, or wholes.

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Unit 6.3, Lesson 10: Notes Name _____

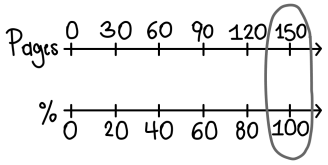
My Notes

For each question, use a tape diagram, double number line, or table to figure out the solution.

1. Axel has read 60 pages of a book. He is 40% finished. How many pages are in the book?

Representation

Representations vary.



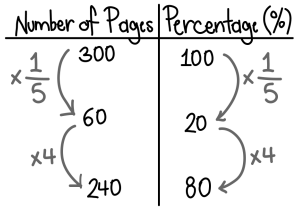
Solution

150 **pages**

2. There are 300 pages in a book. Tay is 80% finished. How many pages have they read?

Representation

Representations vary.



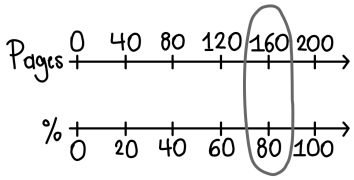
Solution

240 **pages**

3. Pilar has read 160 out of 200 pages in a book. What percent of the book has she read?

Representation

Representations vary.



Solution

80%

Summary

☐ I can create tape diagrams, double number line diagrams, or tables to determine unknown parts, percentages, or wholes.

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Unit 6.3, Lesson 11: Notes Name _____

My Notes

Here is the work Anand did to calculate 21% of $\$52$.

1. Explain Anand's strategy.

Percentage (%)	Cost (dollars)
100	52
1	$\frac{52}{100}$
21	$\frac{52}{100} \cdot 21$

2. Select **all** of the expressions that could be used to calculate 54% of $\$22$.

- ☐ $\frac{22}{100} \cdot 54$
- ☐ $\frac{22}{100}$
- ☐ $\frac{100}{22} \cdot 54$
- ☐ $\frac{54}{100} \cdot 22$
- ☐ $\frac{22}{54} \cdot 100$

A pair of shoes cost $\$60$. The store's profit is 22% of the cost.

3. How much is the store's profit on a pair of shoes?

Summary

- ☐ I can calculate any percentage of a number.
- ☐ I can explain two different expressions you can use to calculate a percentage of a number.

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Unit 6.3, Lesson 11: Notes Name _____

My Notes

Here is the work Anand did to calculate 21% of $\$52$.

1. Explain Anand's strategy.

Percentage (%)	Cost (dollars)
100	52
1	$\frac{52}{100}$
21	$\frac{52}{100} \cdot 21$

***Explanations vary*. First Anand divided by 100 to find out the cost for 1%. Then he multiplied by 21 to get the cost for 21%.**

2. Select **all** of the expressions that could be used to calculate 54% of $\$22$.

- ✓ $\frac{22}{100} \cdot 54$
- ☐ $\frac{22}{100}$
- ☐ $\frac{100}{22} \cdot 54$
- ✓ $\frac{54}{100} \cdot 22$
- ☐ $\frac{22}{54} \cdot 100$

A pair of shoes cost $\$60$. The store's profit is 22% of the cost.

3. How much is the store's profit on a pair of shoes?

$\$13.20$

Summary

- ☐ I can calculate any percentage of a number.
- ☐ I can explain two different expressions you can use to calculate a percentage of a number.

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Unit 6.3, Lesson 12: Notes Name _____

My Notes

On Thursday, Alejandro rode 21 km. His goal was 25 km.
Here is how he calculated the percentage of his goal that he rode.

Distance (km)	Percent of Goal
25	100
1	$\frac{100}{25}$
21	$\frac{100}{25} \cdot 21$

1. 1 kilometer is what percent of Alejandro's goal?

2. What percent of his goal did he ride?

3. Use Alejandro's strategy to calculate 17 out of 25 as a percentage.

4. Write an expression that can be used to calculate 46 out of 40 as a percentage.

Summary

- ☐ I can calculate an unknown percentage.
- ☐ I can explain different expressions for calculating an unknown percentage.

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Unit 6.3, Lesson 12: Notes Name _____

My Notes

On Thursday, Alejandro rode 21 km. His goal was 25 km.
Here is how he calculated the percentage of his goal that he rode.

Distance (km)	Percent of Goal
25	100
1	$\frac{100}{25}$
21	$\frac{100}{25} \cdot 21$

1. 1 kilometer is what percent of Alejandro's goal?

   $\frac{100}{25} = 4\%$

2. What percent of his goal did he ride?

   $\frac{100}{25} \cdot 21 = 84\%$

3. Use Alejandro's strategy to calculate 17 out of 25 as a percentage.

   $\frac{100}{25} \cdot 17 = 68\%$

4. Write an expression that can be used to calculate 46 out of 40 as a percentage.

   $\frac{100}{40} \cdot 46$ or $\frac{46}{40} \cdot 100$

Summary

- ☐ I can calculate an unknown percentage.
- ☐ I can explain different expressions for calculating an unknown percentage.

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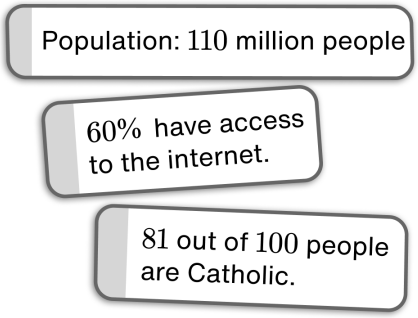
Unit 6.3, Lesson 13: Notes Name _____

My Notes

Here are some facts about the Philippines.

1. How many people in the Philippines have access to the internet?



2. How many people practice Catholicism?

Imagine the Philippines were a village with just 100 people. How many people would have each of these characteristics?

3.1 Have access to the internet?

3.2 Practice Catholicism?

4. What are some things that are important to remember when working with percentages?

Summary

☐ I can use rates and percentages to analyze characteristics of a country's population.

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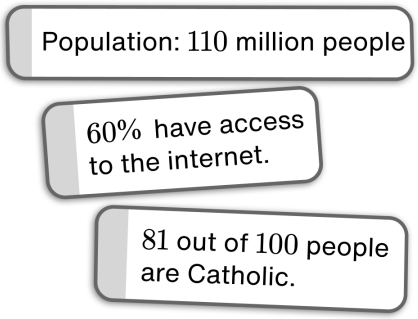
Unit 6.3, Lesson 13: Notes Name _____

My Notes

Here are some facts about the Philippines.

1. How many people in the Philippines have access to the internet?



66 **million**

2. How many people practice Catholicism?

89.1 **million**

Imagine the Philippines were a village with just 100 people. How many people would have each of these characteristics?

3.3 Have access to the internet?

60 **people**

3.4 Practice Catholicism?

81 **people**

4. What are some things that are important to remember when working with percentages?

***Responses vary*. It is important to know which of your numbers represents a part, a whole, or a percentage. The whole always corresponds to 100%. I can use a double number line or table to compare parts, wholes, and percentages.**

Summary

☐ I can use rates and percentages to analyze characteristics of a country's population.