Amplify Science

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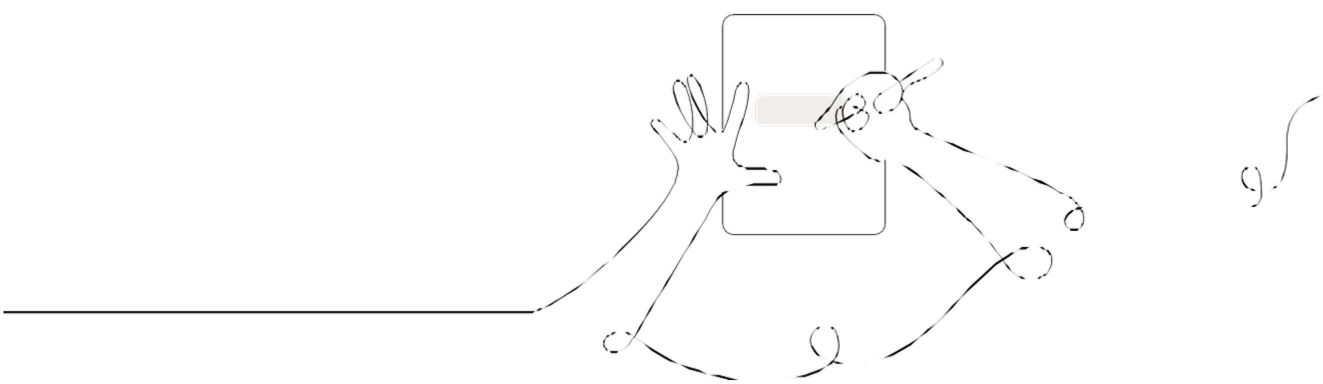
Participant Notebook

Assessment System

Grade K



Assessment System
Agenda

Introduction

- Framing

Assessment System

- Overview

Progress Build

- Analysis
- Group Work Time

Assessment**s**

- Pre-Unit Assessments
- Formative Assessments
- End of Unit Assessment

Model Lesson

Planning

Closing

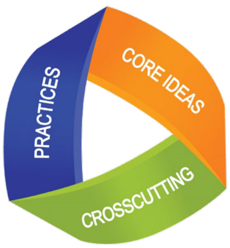
Demo account for your workshop:

URL: **learning.amplify.com** (Log in with Google)

Temporary username: ____________________ **@pd.tryamplify.net**

Password: ____________________

Three dimensional learning reference



3-D learning engages students in using scientific and engineering practices and applying crosscutting concepts as tools to develop understanding of and solve challenging problems related to disciplinary core ideas.

Science and Engineering Practices

1. Asking Questions and Defining Problems
2. Developing and Using Models
3. Planning and Carrying Out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking
6. Constructing Explanations and Designing Solutions
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas

Earth and Space Sciences:
- Earth's Place in the Universe
- Earth's Systems
- Earth and Human Activity

Life Sciences:
- From Molecules to Organisms
- Ecosystems
- Heredity
- Biological Evolution

Physical Sciences:
- Matter and its Interactions
- Motion and Stability
- Energy and their Applications

Engineering, Technology and the Applications of Science:
- Engineering Design
- Links among Engineering Technology, Science and Society

Crosscutting Concepts

1. Patterns
2. Cause and Effect
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter
6. Structure and Function
7. Stability and Change

Reflection

Use the provided spaces as a place for reflection throughout the session.

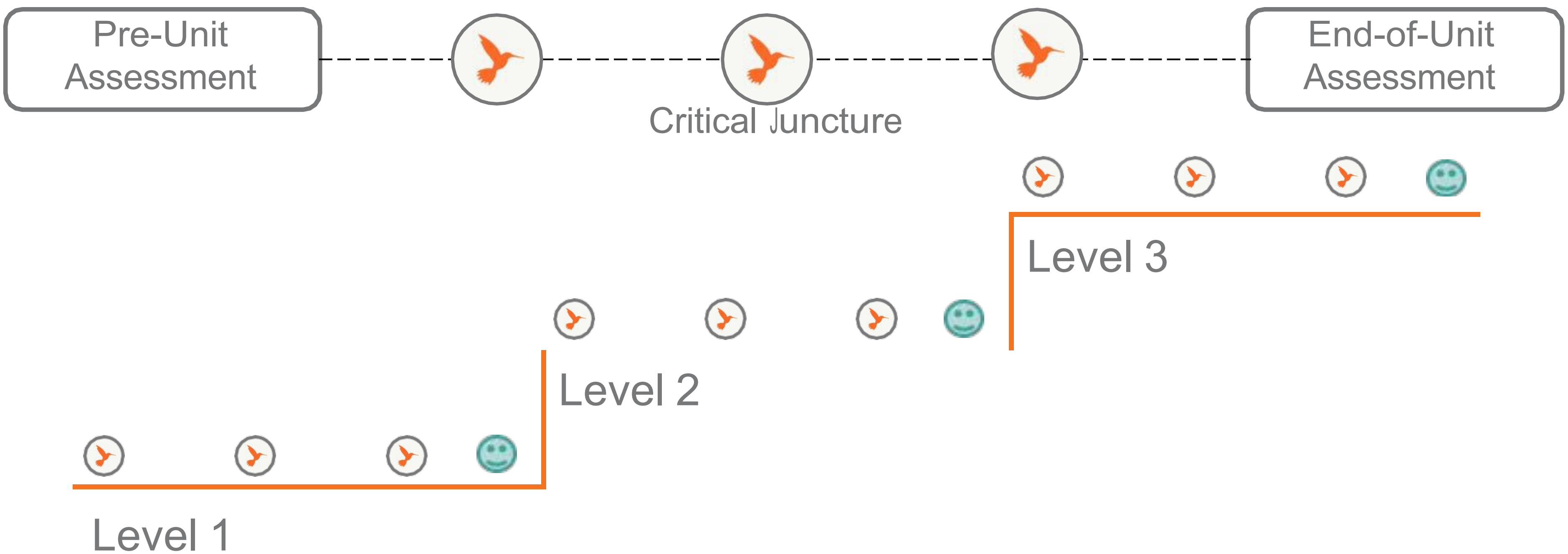
Session goals and student outcomes

What Connect the workshop goal(s) to an outcome you envision for your students.	**Why** Reflect on why you want this outcome for your students.	**How** How will your students achieve the outcome? Reflect on what you learned during the workshop that will impact student outcomes.

Triangle – Circle – Square reflection

△	
○	
□	

K-5 Assessment System



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Assessment System reference (grades K-1)

Assessment type	Description	Student experience	Teacher resources
Pre-Unit Assessment	Formative, 3-D performance assessment meant to gauge students' initial understanding and pre-conceptions about core ideas in the unit	• Full-class teacher-led discussion, supported by visual cues	• Assessment Guide (available in Digital Resources)
End-of-Unit Assessment	Summative, 3-D performance assessment to evaluate students' understanding of core ideas in the Progress Build	• Full-class teacher-led discussion, supported by visual cues	• Rubric and Possible Responses in Assessment Guide (available in Digital Resources)
Critical Juncture Assessments	Embedded formative assessments for assessing students' progress along the Progress Build	• Activities are embedded into existing instructional activities leveraged for assessment opportunities – often student-to-student discussions, investigations, or modeling activities	• Full text of assessment includes "Assess Understanding" section and "Tailor Instruction" suggestions accessible in Instructional Guide by clicking the hummingbird icon • All Critical Juncture Assessments are included in Reference: Embedded Formative Assessments (available in the Unit Guide) • Clipboard Assessment Tool includes tailored sets of questions and the specifc activities that present an opportunity to ask those questions. Also included is space to write notes about students' ideas. • Augmenting Instruction notes (accessible in Teacher Support tab) provide additional suggestions for supplemental instruction at the class, group, and student level
On-the-Fly Assessments	Embedded formative assessments for noting students' progress with one or more of the following: science disciplinary core ideas, science and engineering practices, crosscutting concepts, sense-making strategies, and collaborative science work	• Activities are embedded into existing instructional activities, leveraged for assessment opportunities. Artifacts can include full-class or student-to-student discussion, kinesthetic activities, notebook pages, etc.	• Full text of assessment includes what to "Look for" and "Now What?" instructional suggestions accessible in Instructional Guide by clicking the hummingbird icon • All On-the-Fly Assessments are included in Reference: Embedded Formative Assessments (available in the Unit Guide) • Clipboard Assessment Tool includes tailored sets of questions and the specifc activities that present an opportunity to ask those questions. Also included is space to write notes about students' ideas.

Assessment System reference (grades K-1) cont.

Assessment type	Description	Student experience	Teacher resources
Student Self-Assessments	Opportunity for students to reflect on whether they understand or don't yet understand the core concepts from the unit	• Reflection prompts through teacher-led discussion and partner talk • Provided at or near the end of each chapter	• Information about Student Self-Assessments in Reference: Assessment System (in Unit Overview) • Teacher Support Notes accessible in Instructional Guide by clicking the Teacher Support tab • Discussion prompts in the Instructional Guide
Investigation Assessments	Summative, 3-D performance assessment to evaluate students' performance of the science and engineering practices of Planning and Carrying Out Investigations and Analyzing and Interpreting Data, as well as their application of disciplinary core ideas and crosscutting concepts	• Prompts for planning investigation and recording results in the Investigation Notebook or a copymaster (available in Digital Resources). Additional support and spoken teacher prompts in K-1. • Physical materials for conducting investigation	• Rubrics and Possible Responses in Assessment Guide (available in Digital Resources) • Possible Responses also accessible in Instructional Guide by clicking the Possible Responses tab
Portfolio Assessments	Opportunity for students to compile and reflect on key work products collected at the end of each unit. Final portfolio compilation occurs at the end of the school year and allows students to select and reflect on work products which they feel best demonstrate their growth in understanding throughout the year	• Compilation of work products that show growth over the course of the year • Reflection on chosen work products • Rubrics for evaluating work products (available in Program Guide → *Assessments → Additional Assessment Resources*)	• Assessment Rubrics (available in Program Guide → *Assessments → Additional Assessment Resources*) • Guidance for communicating to parents about student progress (available in Program Guide → *Assessments → Additional Assessment Resources*)

Progress Build

Overview: Progress Build

A Progress Build describes the way in which students' explanations of the central phenomenon should develop and deepen over the course of a unit. It is an important tool in understanding the design of the unit and in supporting students' learning. A Progress Build organizes the sequence of instruction, defines the focus of the assessments, and grounds inferences about students' understanding of the content, specifically at each of the Critical Juncture Assessments found throughout the unit. A Critical Juncture Assessment provides information to help guide decisions related to the instruction designed to address specific gaps in students' understanding. This document will serve as an overview of the *Pushes and Pulls: Designing a Pinball Machine* Progress Build. Since the Progress Build is an increasingly complex yet integrated explanation, we represent it below by including the new ideas for each level in bold. Depending on the standards for a given grade level, a unit may include additional supporting content; however, the Progress Build serves as the conceptual core of the unit.

In the *Pushes and Pulls* unit, students will learn to construct scientific explanations that describe the different ways that an object moves as caused by different forces exerted on the object. In particular, students will focus on investigating and explaining the different distances and directions that a pinball can be made to move in a pinball machine.

Prior knowledge (preconceptions): There is no significant prior knowledge assumed. Students will certainly have experience with observing moving objects, including rolling balls, as well as making objects move in different ways. Students will have experience moving objects by pushing or pulling, but they likely have not thought carefully about how those objects do so. Students will have opportunities to explore these kinds of actions more carefully over the course of the unit.

Progress Build Level 1: An object starts moving when a force is exerted on it.

When an unmoving object starts to move, it is because another object exerted a force on it.

Progress Build Level 2: Stronger force causes an object to move a longer distance.

When an unmoving object starts to move, it is because another object exerted a force on it. A strong force will cause the object to move a long distance, while a gentle force will cause the object to move a short distance.

Progress Build Level 3: An object starts to move in the direction of the force exerted on it.

When an unmoving object starts to move, it is because another object exerted a force on it. A strong force will cause the object to move a long distance, while a gentle force will cause the object to move a short distance. The object starts moving in the same direction as the force that was exerted on it.

Progress Build Level 4: Moving objects can change direction because of a force from a moving or still object.

When an unmoving object starts to move, it is because another object exerted a force on it. A strong force will cause the object to move a long distance, while a gentle force will cause the object to move a short distance. The object starts moving in the same direction as the force that was exerted on it. If the object changes the direction it is moving, it is because a moving or still object exerted a force on it.

Progress Build Analysis

Directions:

1. Open the Progress Build document in the Planning for the Unit section of the Unit Guide.
2. **START WITH THE BOX AT THE BOTTOM OF THIS PAGE,** and summarize each Progress Build level. Feel free to draw if that's more helpful.
3. In between the provided boxes, reflect on how the ideas build from one level to the next by answering the two questions given.

Level 3

What new ideas are added in level 3?

How do those new ideas build on and connect to level 2?

Level 2

What new ideas are added in level 2?

How do those new ideas build on and connect to level 1?

Level 1

Level 0 **(preconceptions/prior knowledge)**

Amplify Science sample assessment data collection tool

Grade:
Lesson

Look for 1:

Look for 2:

Student Name	Look for 1	Look for 2	Notes

Lesson 1.2, Activity 2

On-the-Fly Assessment 1: Students' Initial Use of Visualizing Scientific Phenomena

Look for: The focal comprehension strategy in this unit is visualizing by using information read or seen in books. As students are talking about the movements they visualize based on the projected images, listen for and make note of individual students or partners who are attending to particular elements in an image and using talk or gestures to describe how they imagine the elements moving. For example, a student might say something such as *I think the cow is pulling the wagon and making the wagon move on the road. The cow's legs look like the cow is taking a step. The cow is hooked to the wagon, so it pulls the wagon, and the wheels are turning round and round.*

Now what? As you reflect on the activity with the class, repeat one or two accurate examples of visualizing that you noticed in students' talk. Highlight the way that students took what could be seen in the images and then went beyond it in describing movement. For example, you might say something such as *I noticed Rosa's example of visualizing with this picture. She noticed how the cow's legs were forward and imagined the cow taking a step. She saw that the cow is hitched to the wagon, so she imagined the wagon rolling forward on its wheels as the cow walked. Good visualizing takes what is in a picture or words and uses those things to imagine something more.* If students generally had difficulty visualizing, pick another image and model visualizing particular movement based on specific elements in the image.

End-of-Unit Assessment Questions

Science Content: Forces and Motion

Prompt the student to explain the forces that were exerted.

- *We have learned a lot about how different kinds of forces make things, like the pinball, move in different ways. I am going to make the pinball move in our Class Pinball Machine. Talk to me about the different forces that made the pinball move like it did.*

Ask follow-up questions to probe for aspects of motion that students did not explain. If students do not mention ideas that were the focus of the unit, they may still have some understanding of those ideas, even if they did not independently use them in their explanations. You can ask the following questions to probe for ideas that students did not include.

If the student does not mention the force from the bumper:

- *Were there any forces exerted on the ball after I launched it the second time? Why do you think so?*

If the student does not mention the direction of forces:

- *Why did the ball move in this direction when I pulled the launcher and in that direction after the ball hit the bumper?*

If the student does not mention the strength of forces:

- *Why did the ball move only a short distance the first time but a long distance the second time?*

Crosscutting Concept: Cause and Effect

Prompt the student to give an example of cause and effect in the pinball's motion. Remind the student that cause and effect means something happens because another thing caused it.

- *Think about how the ball moved in the pinball machine. Can you describe an example of cause and effect?*

If the student has difficulty giving an example:

- *Can you use the word* because *to explain what made the ball move the way it did?*

If the student still has difficulty giving an example, launch the pinball one more time and provide the following scaffolding:

- *What caused the ball to move?*
- *What happened to the ball when the launcher hit it?*
- *How can we use the word* because *to explain what happened?*

End-of-Unit Assessment Questions (continued)

Science and Engineering Practice: Supporting an Answer with Evidence

Prompt the student to provide evidence of the strength of a force. Launch the pinball two more times—the first time very gently so the ball moves only a short distance; the second time with a stronger force so the ball moves a longer distance.

- *I launched the ball two times. Which time do you think the force was stronger—the first time or the second time?*
- *What is your evidence that that force was stronger?*

  If the student is not sure how to respond:
  - *What did you see that made you think the force was stronger?*

Rubric 1: Assessing Students' Understanding of Science Concepts in the Unit

Rubric 1 focuses on students' explanations of how different forces are responsible for different movements in the Class Pinball Machine and how their explanations reflect an understanding of the disciplinary core ideas in the unit. Rubric 1 is designed to guide the teacher in making inferences when assessing students' understanding and may be used summatively to gauge students' levels of understanding of science concepts from the unit.

If you would like to score students' explanations for grading purposes, we recommend using a 5-point scale (0–4). An explanation that provides an accurate and suffcient response to each question listed in the rubric should score a 4. An explanation that does not provide an accurate response to any questions should score a 0. For explanations that provide accurate responses to some, but not all questions, assign scores from 1 to 3 at your discretion. For guidance on what could be considered an accurate explanation for each question, see the Possible Accurate Student Responses table at the end of this document.

Rubric 1: Assessing Students' Understanding of Science Concepts in the Unit
• Did the student explain that the ball moved because the launcher exerted a force on it? • In the first launch, did the student explain that the ball moved a short distance because the launcher exerted a gentle force on it? • In the second launch, did the student explain that the ball moved a long distance because the launcher exerted a strong force on it? • Did the student explain that the ball moved in a given direction because the launcher exerted a force on it in that direction? • Did the student explain that the ball changed direction because the still object (the bumper) exerted a force on it?

Rubrics 2 and 3

Rubrics 2 and 3 focus on students' explicit understanding of the crosscutting concept of Cause and Effect and their use of a science and engineering practice (supporting an answer with evidence), respectively. Given that students' understanding of crosscutting concepts and their dexterity with science practices develop through regular opportunities across multiple units, mastery is outside the scope of a single unit. Therefore, these two rubrics are intended to be used formatively to guide teacher feedback and future instruction rather than to produce a score or a grade.

Rubric 2: Assessing Students' Understanding of the Crosscutting Concept of Cause and Effect

Rubric 2 focuses on students' descriptions and identifcations of an example of cause and effect (in the context of the pinball machine), which is a unifying concept in science and engineering.

Rubric 2: Assessing Students' Understanding of the Crosscutting Concept of Cause and Effect
Did the student describe an appropriate example of cause and effect and explicitly identify both cause and effect accurately? • Did the student provide an appropriate example of cause and effect from the Class Pinball Machine? (For example, did the student indicate the effect as the observed movement of the ball and the cause as the force exerted on the ball?) • Did the student explicitly identify the cause and the effect in his/her example?

Rubric 3: Assessing Students' Understanding of the Practice of Supporting an Answer with Evidence

Rubric 3 focuses on students' descriptions of appropriate observations as evidence of the nature of the force exerted.

Rubric 3: Assessing Students' Understanding of the Practice of Supporting an Answer with Evidence
Did the student describe the movement of the pinball when asked to describe the evidence for his/her response? • Did the student describe the long distance traveled by the ball as evidence that a stronger force was exerted on it? • If the student did not know what to provide when explicitly asked for evidence, did he/she describe the long distance traveled as what he/she saw that led to his/her answer?

Possible Accurate Student Responses

Relevant to each rubric, possible student responses are provided to illustrate an accurate response to each question.

Possible Accurate Student Responses
Science Content: Forces and Motion • *We have learned a lot about how different kinds of forces make things, like the pinball, move in different ways. I am going to make the pinball move in our Class Pinball Machine. Talk to me about the different forces that made the ball move like it did.* The first time, the pinball moved a short distance toward this side of the machine because the launcher exerted a gentle force on the ball toward this side. The second time, the pinball moved a long distance toward that side of the machine because the launcher exerted a strong force in that direction. The ball changed direction because the bumper exerted a force on the ball when the ball hit the bumper. Responses to follow-up questions If the student does not mention the force from the bumper: • *Were there any forces exerted on the ball after I launched it the second time? Why do you think so?* Yes, the bumper exerted a force on the ball. I think so because the ball changed direction. If the student does not mention the direction of forces: • *Why did the ball move in this direction when I pulled the launcher and in that direction after the ball hit the bumper?* The launcher exerted a force on the ball. When the ball hit the bumper, the bumper exerted a force on the ball and made it change direction. If the student does not mention the strength of forces: • *Why did the ball move only a short distance the first time but a long distance the second time?* The first time, the launcher exerted a gentle force, so the ball only moved a short distance. The second time, the launcher exerted a strong force, so the ball moved a long distance, and then it hit the bumper.

Possible Accurate Student Responses

Crosscutting Concept: Cause and Effect

- *As we have been learning about forces, we have been talking about cause and effect. Cause and effect means that one thing caused another thing to happen. Think about how the ball moved in the pinball machine. Can you describe an example of cause and effect?*

  The ball moved a long distance because the launcher exerted a strong force on it.

If the student has diffculty giving an example:

- *Can you use the word* because *to explain what made the ball move the way it did?*

  The ball changed direction because the bumper exerted a force on it.

If the student still has diffculty giving an example, launch the pinball one more time and provide the following scaffolding:

- *What caused the ball to move?*

  The launcher.

- *What happened to the ball when the launcher hit it?*

  The ball started to move.

- *How can we use the word* because *to explain what happened?*

  The ball started to move because the launcher hit it.

Science and Engineering Practice: Supporting an Answer with Evidence

- *I launched the ball two times. Which time do you think the force was stronger—the first time or the second time?*

  The second time.

- *What is your evidence that that force was stronger?*

  The ball went a longer distance.

If the student is not sure how to respond:

- *What did you see that made you think the force was stronger?*

  The ball went a longer distance.

Notes

Amplify Science