

# Navigating the print program

## Unit & Sub-Unit Resources

Each unit includes a range of resources designed to support teachers in thinking through the progression of mathematics that students will engage with over the course of the unit. These resources can support teachers in their unit planning, as well as choices they make in response to students' thinking, strengths, and needs that arise over the course of the unit.

**Unit at a Glance**

**Start of the Year**

- Meet & Greet (Optional)**
- Pre-Unit Check (Optional)**

**Assess and Respond**

**Sub-Unit 1**

- 1 Splashing Into Functions**
- 2 Flower Frames**

**Sub-Unit 2**

- 3 A Family Function**
- 4 Alphabet Soup**
- 5 Transformation Station**
- 6 Shifting Gears**

**Sub-Unit 3**

- 7 Mirror, Mirror**
- 8 Symmetry Studio**
- 9 Ferris Functions**
- 10 Coastin' Through Transformations**
- 11 B(ring) It On**
- 12 Mental Models**

**Practice Day**

- Practice Day 1**
- Practice Day 2**

**Assess and Respond**

- End-of-Unit Assessment**

**Pacing:** 16 days (+1 optional day) | Short on time? See pacing considerations below.

All instructional and assessment days are ~45 minutes each.

- 12 Lessons
- 2 Practice Days
- Pre-Unit Check (optional)
- Sub-Unit Quiz
- End-of-Unit Assessment

Every unit has a **Unit at a Glance** page that shows teachers everything they need to know to get started planning out their upcoming unit.

Student Notes sheets support student recall and retention when engaging in digital lessons.

This overview of **concept development** supports teachers in making decisions about potential intervention points during the unit. It indicates at which point students have had multiple opportunities to focus on each key concept or skill. It does not necessarily mean there are no further opportunities to strengthen and develop these skills.

Teachers are provided with thoughtful **pacing considerations** for how they can adjust the pacing of the unit as needed without compromising unit learning goals.

## Unit Overview pages

Teachers will find a comprehensive set of resources for each unit, including an overview of the math of the unit, a visual summary of the Unit at a Glance, materials, a preview of each of the unit assessments, and guidance about differentiation, supporting math identity and community, accessibility, language development, technology, and connections to future learning. Each Unit Overview also includes a professional development activity and a formative Pre-Unit Check that teachers can use to learn more about students' understanding of foundational concepts and skills that will support them in the upcoming unit.

The Sub-Unit Overview page summarizes the **key goals** and **vocabulary** for this part of the unit.

### Sub-Unit 1 Analyzing Functions

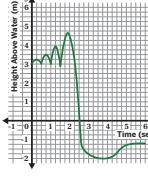
**Sub-Unit 1 Goals**

- Goal: Interpret functions using graphs and function notation.
- Goal: Write the domains and ranges of discrete and continuous functions.
- Language Goal: Describe functions and function families using their key features.

In this sub-unit, students revisit the properties of functions and learn about **function families**. They interpret functions in context to draw conclusions about situations and describe graphs of functions using their key features (domain and range, intervals of increase and decrease, maxima and minima, etc.). They practice evaluating functions in function notation, including when one function is defined in terms of another. In this sub-unit, students are informally introduced to the function families they will explore in more depth throughout the year.



### Math That Matters Most

Concept or Skill	Example
Interpret graphs and function notation statements in context.	The graph shows Remy's height above a pool after beginning the dive. Determine the value of $f(3)$ and interpret it in the situation.  $f(3) = -1.8$ , which means 3 seconds after starting the dive, Remy was 1.8 meters below the water's surface.
Determine the domain or range of functions. Justify if the domain and range are continuous or discrete.	Determine the domain of $f(x)$ . The domain is $0 \leq x \leq 6$ because the function is continuous between 0 and 6 seconds.

Unit 1 2 Sub-Unit 1

**Sub-Unit 2: Translating and Reflecting Functions**

**Sub-Unit 3: Scaling Functions and Modeling**

The **Math That Matters Most** table illustrates for teachers the most important progressions of strategies, skills, and language that develop over the course of the sub-unit.

## Sub-Unit Overview pages

The lessons within each unit are grouped into sub-units that address a related group of concepts. All lessons in each sub-unit include lesson practice and Show What You Know formative assessments, and targeted sub-units include a practice day and assessment.

## Lesson Supports

Throughout this Teacher Edition, lesson guidance for teachers is organized clearly and consistently so that they have all of the information they need at their fingertips.

Unit 1  
Lesson 9

### Ferris Functions

Scaling Functions Vertically

Let's transform a Ferris wheel using vertical scales.

**Lesson modality** shows teachers how they should plan to have students engage in the lesson.

**Focus and Coherence**

Today's Goals

- 1. Goal: Write an equation in function notation of a function that has been scaled vertically.
- 2. Goal: Calculate the factor,  $k$ , needed to transform the graph of one function onto another function.
- 3. Language Goal: Describe the effects of replacing the function  $f(x)$  by  $kf(x)$ . (Reading and Writing)

Students explore scaling vertically by changing the size of a Ferris wheel. They write equations in function notation that represent a function being scaled vertically so that it goes through specific points.

Prior Learning

In Lessons 7 and 8, students explored the effects of replacing  $f(x)$  with  $-f(x)$  and  $f(-x)$ . In Algebra 1, Unit 7, Lesson 15, students described the effects of vertical stretches on the graph of a quadratic function.

Future Learning

In Lesson 10, students will expand their understanding of scaling to include horizontal scales.

**Standards Addressing**

**HSF.BF.B.3**  
Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $kf(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.  
Also Addressing: **HSF.IF.C**  
Mathematical Practices: MP1, MP2, MP6, MP8

**Building On** 8.G.A.3  
**Building Toward** HSF.BF.B.3  
HSF.TF.B.5 \*

In the **Focus and Coherence** section, teachers will find the goals and language goals for the lesson. There is also information on prior learning that has built to the math in this lesson, as well as future learning that this lesson is helping build to.

The **Rigor and Balance** section explains how students develop conceptual understanding, procedural fluency, application, strategic competence, adaptive reasoning, and productive disposition in this lesson.

Where applicable, the **Standards** section will list all standards addressed in this lesson, including standards the lesson builds on and standards the lesson builds toward. The **bolded** words indicate which parts of each standard described are covered in the lesson.

## Lesson Overview

This introductory page orients teachers to the topic, standards, and key learning goals of the lesson, including any new vocabulary terms that will be introduced.

The **Key Takeaways** and **Lesson Takeaway** summarize the most important ideas in the lesson.

The **time frame** and suggested **student grouping** is listed for each part of the lesson.

The screen icon is used to show which **Presentation Screens** or **Digital Student Screens** align to each instructional moment.

### Lesson at a Glance

Standards: HSF.BF.B.3, HSF.IF.C

#### Warm-Up

Independent | 5 min

Pacing: Screens 1-2

Students design a Ferris wheel and explore a graph representing the height of a Ferris wheel cabin from its boarding platform over time.

~ 45 min



Why digital?  
Repeated Challenges offer Responsive Feedback™ to support developing fluency with writing equations of functions that have been scaled vertically.

Independent | 5 min

Pacing: Screens 3-5

Students build an understanding of vertical scaling using graphs and equations.

Routine: Think-Pair-Share

Key Takeaway (Screen 5): You can scale the graph of a function vertically by multiplying its output by a constant,  $k$ . If  $|k| < 1$ , the function compresses toward the  $x$ -axis. If  $|k| > 1$ , the function stretches away from the  $x$ -axis.

Activity 1

Pair Sharing a Device | 10 min

Pacing: Screens 1-2

Activity 2

Pair Sharing a Device | 7 min

Pacing: Screens 6-8

Students write and compare equations with both positive and negative factors.

Key Takeaway (Screen 8): A negative factor,  $k$ , reflects the graph over the  $x$ -axis in addition to scaling the function vertically.

#### Activity 3

Independent | 13 min

Pacing: Screen 9, Screen 10

Students develop fluency writing equations that transform graphs so that they pass through certain points.

#### Synthesis

Whole Class | 5 min

Pacing: Screen 11

Lessons 1-2: The graph of a function is scaled vertically. All points of the function are multiplied by the same number. The equation of the transformed function can be represented as  $g(x) = k f(x)$ .

#### Show What You Know

Independent | 5 min

Pacing: Screens 12-13

Students demonstrate their understanding by writing an equation to represent a function that has been scaled vertically.

#### Prep Checklist

Assign the digital student screens. Student Notes are also available.

#### This lesson includes:

- Student Screens
- Lesson Practice
- Show What You Know (optional)

#### Student Notes

Consider providing the Student Notes to support student discussion and student thinking.



Unit 1 Lesson 9

53B

Lesson at a Glance

The **Prep Checklist** displays all materials students will need for the lesson.

#### Warm-Up

Independent | 5 min

Pacing: Screens 1-2

**Purpose:** Students design a Ferris wheel and explore a graph representing the height of a Ferris wheel cabin from its boarding platform over time.



Student Notes are also available

**1 Launch**

**1** Invite students to select the color and style of their Ferris wheel cabin.

**Multilingual/English Learners** Create a list of words about Ferris wheels that students might not know, along with visuals or translations of each word in languages spoken by your students. (Reading and Listening)

**Look for** interesting quantities that students would choose to graph, then highlight them during the Connect.

**2 Connect**

**2** Use the Notice and Wonder routine to promote curiosity and help students make sense of the Ferris wheel's graph. (MP1)

**A Accessibility: Memory and Attention** invite students to record their ideas on their notes sheet in the left column.

**Create** a record of the things students noticed and wondered, along with the names of the students who shared them.

**Consider asking:**

“Did  $a$  change how the graph is above and below the  $x$ -axis? Does this make you wonder about what the graph would look like for a Ferris wheel that loads at ground level?”

“Does this graph represent a function? How do you know?”

**Note:** If it doesn't come up naturally, consider asking, “Why is the graph not a circle?”

**Math Identity and Community** Consider celebrating variety and creativity in what students notice and wonder, including things that surprised you or that you think other students may not have noticed.

**Responses vary. See digital for sample responses.**

Unit 1 Lesson 9

53

Warm-Up

**Sample student responses** to the Warm-Up prompt are provided to help teachers prepare to facilitate the conversation.

## Lesson at a Glance

The Lesson at a Glance page describes the purpose of the Warm-Up, Activities, Synthesis, and Show What You Know. Teachers will find suggested timing for each part of the lesson, as well as guidance on whether students should work individually, in pairs, in small groups, or with the whole class.

The page also lists which pages, Presentation Screens, or Digital Student Screens can be used with each part of the

## Warm-Up

Every Amplify Desmos Math lesson begins with a Warm-Up to help draw students into the lesson. It might elicit information from their personal experience or intuition, remind them of a context they have seen before, invite them to think about the previous lesson, or preview a calculation that will appear in the current lesson.

The **Purpose** of each activity is highlighted here, as well as suggestions for the **student grouping**, **time frame**, and **screen pacing** for the activity.

Teachers are provided with thoughtful **Short on time?** suggestions for how they can adjust their facilitation of the lesson as needed without compromising lesson goals.

Each lesson notes the corresponding **Teacher Presentation Screens** or related **Student Edition** pages also available to support the lesson.

**Activity 1 Ferris Transformations**  
Purpose: Students build an understanding of vertical scaling using graphs and equations.

**1 Launch**  
Demonstrate how to change the size of the Ferris wheel using the dashboard's Student View.

**2 Monitor**  
Encourage students to click on each set of corresponding points.

**3**  
**Students using digital**  
Ride Rebuild  
Your community is considering changing the size of the Ferris wheel. You are a member of the community and are trying to figure out what the new Ferris wheel will look like. You are given the graph of the current Ferris wheel and the graph of the new Ferris wheel. You are asked to determine how the new Ferris wheel will look like.  
a. Describe how the new Ferris wheel will look like.  
b. Sketch the new Ferris wheel.

**4**  
**Students using digital**  
Check These Outputs  
Here is the graph of Aspergum's design. The function  $g(x)$  represents the Ferris wheel's height above the ground. The graph of  $g(x)$  is a transformation of the graph of  $f(x)$ .  
a. Click each point on  $g(x)$  to see its corresponding point on  $f(x)$ .  
b. What type of transformation does  $g(x)$  have?  
c. Transformation: Reflection  
d. Transformation: Stretch  
e. Transformation: Compress  
f. Transformation: Reflect  
g. Transformation: Stretch  
h. Transformation: Reflect  
i. Transformation: Compress  
j. Transformation: Reflect  
k. Transformation: Reflect  
l. Transformation: Reflect  
m. Transformation: Reflect  
n. Transformation: Reflect  
o. Transformation: Reflect  
p. Transformation: Reflect  
q. Transformation: Reflect  
r. Transformation: Reflect  
s. Transformation: Reflect  
t. Transformation: Reflect  
u. Transformation: Reflect  
v. Transformation: Reflect  
w. Transformation: Reflect  
x. Transformation: Reflect  
y. Transformation: Reflect  
z. Transformation: Reflect  
Describe the scaling in as much detail as you can.

**5**  
**Students using digital**  
A Transformation Equation  
Algebraically create a table of values from the graph of  $g(x)$ .  
x: 0, 2.5, 5, 7.5, 10  
y: 0, 2.5, 5, 7.5, 10  
y<sub>1</sub>: 0, 2.5, 5, 7.5, 10  
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Lessons conclude with the **Show What You Know** which presents an opportunity for students to reflect on the main learning goals of the lesson. This is a great way for both students and teachers to access a formative check for understanding.

Whole Class | 5 min | Pacing: Screen 11

## Synthesis

**Encourage Students** to change the factor of  $f(x)$  to support their thinking.

Invite students to respond independently, then share their thinking with a partner.

**Capture and share a variety of ideas, such as:**

- Multiplying the outputs by a factor.
- Stretching the graph horizontally or vertically.
- Reflecting the function over the  $x$ -axis if the factor is negative.

**Math Identity and Connection** for students to share strategies they & celebrate the students who

**Note:** If time allows, invite students to preview their thinking based on the following questions.

**Independent** | 5 min | Pacing: Screens 12-13

### Show What You Know

**Purpose:** Students demonstrate their understanding by writing an equation to represent a function that has been scaled vertically.

#### Today's Goal

- Goal:** Write an equation in function notation of a function that has been scaled vertically.
- Goal:** Calculate the scale factor,  $k$ , needed to transform the graph of one function onto another function.
- Language Goal:** Describe the effects of replacing the function  $f(x)$  by  $kf(x)$ . (Reading and Writing)

**Students using digital**

**Students using print**

## D Differentiation Beyond the Lesson

Here are options for responding to student work on the Show What You Know and throughout the lesson.

**Support**

Provide targeted intervention.

If student work shows **partial understanding**, consider interventions of functions that are scaled vertically.

- You may choose not to intervene now. Students will have more opportunities to write equations of transformed functions in Lessons 10-12.

**Strength**

Reinforce students' understanding.

If student work shows **conceptual understanding**, consider:

- Assigning the **Lesson Practice**
- Inviting students to review the **Summary** and complete the **'Try This' problem**.
- Revisiting the **Repeated Challenges** in **Activity 3**.

**Stretch**

Challenge students and extend their learning.

If students would enjoy an **additional challenge**, consider:

- Encouraging them to complete the **DOK3 Practice Problem**

**Professional Learning**

Consider the next three lessons you will teach. How will students' work today in this lesson and learning unknown factors prepare them for this work in Lessons 10-17? What are ways that you might call back to student strategies from this lesson?

Unit 1 Lesson 9

Unit 1 Lesson 9

Unit 1 Lesson 9

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Show What You Know (Differentiation)

Each Show What You Know is accompanied by a table with suggestions in three categories: students who need **support**, would benefit from more practice to **strengthen** their understanding, or are interested in a **stretch** to deepen or extend their thinking.

## Synthesis

The Synthesis is an opportunity for students to put the key ideas from the lesson into their own words. There is typically an open-ended prompt followed by a discussion for students to consolidate and refine their ideas about the learning goals. If time allows, it is also an opportunity for students to revise their responses after the discussion.

Each **Lesson Practice** includes a **Summary** and **Try This** problem. Students can highlight big ideas of the lesson in the summary or share it with a caregiver or classmate. They can also engage with the Try This to further apply the lesson content.

<h2>Lesson Practice <span>Independent</span></h2> <p>Students continue developing their conceptual understanding, fluency, and application of topics from this lesson and previous lessons/units (spiral review). Invite students to refer to the <b>Lesson Summary</b> to support them with this practice and their learning throughout the year.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p><b>Lesson Summary</b></p> <p>You can scale a function vertically by multiplying its outputs by a factor. When the factor is greater than 1, the graph stretches vertically. When the factor is between 0 and 1, the graph compresses vertically.</p> <p>The function <math>y(x)</math> scales <math>y(x)</math> vertically by a factor of 2. The equation is <math>y(2x) = 2y(x)</math>. The graph is stretched vertically.</p> <p>The function <math>y(x)</math> scales <math>y(x)</math> vertically by a factor of <math>\frac{1}{2}</math>. The equation is <math>y(\frac{1}{2}x) = \frac{1}{2}y(x)</math>. The graph is compressed vertically.</p> <ul style="list-style-type: none"> <li>For example, <math>(1, 3)</math> on <math>y(x)</math> corresponds to <math>(1, 6)</math> on <math>y(2x)</math>. For example, <math>(1, 3)</math> on <math>y(x)</math> corresponds to <math>(2, 3)</math> on <math>y(\frac{1}{2}x)</math>.</li> </ul> </div>	<div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p><b>Lesson Practice</b> A2.1.9</p> <p>1. Which of the following equations represents a function that is reflected over the <math>x</math>-axis?  <input checked="" type="radio"/> A. <math>y = -x + 2</math>  <input type="radio"/> B. <math>y = 2x</math>  <input type="radio"/> C. <math>y = -2x</math></p> <p>2. The maximum of <math>y(x)</math> is 4 and the minimum is 1. Order the expressions based on the distance of the maximum or minimum to the <math>x</math>-axis, from closest to farthest.  <input checked="" type="radio"/> A. <math>\frac{1}{2}y(x)</math>  <input type="radio"/> B. <math>y(x)</math>  <input type="radio"/> C. <math>2y(x)</math>  <input type="radio"/> D. <math>10y(x)</math>  <input type="radio"/> E. <math>-10y(x)</math></p> <p><b>Closest</b>      <b>Farthest</b></p> <p><b>Problems 3–4:</b> Write an equation for <math>y(x)</math> as a transformation of <math>y(x)</math>.</p> <p>3. <math>y(x) = -\frac{1}{2}x^2 + 2</math></p> <p>4. <math>y(x) = \frac{1}{2}(x - 3)^2 + 1</math></p> </div>																											
<div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p><b>Try This</b></p> <p>Here are the graphs of the functions <math>y(x)</math> and <math>y(x)</math>. Write an equation for <math>y(x)</math> as a transformation of <math>y(x)</math>.</p> <p><math>y(x) =</math> </p> <p><b>Lesson Summary</b> Try This</p> </div>	<div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p><b>Lesson Practice Item Analysis</b></p> <table border="1"> <thead> <tr> <th>Problem(s)</th> <th>DOK</th> <th>Standard(s)</th> </tr> </thead> <tbody> <tr> <td><b>On-Lesson</b></td> <td></td> <td></td> </tr> <tr> <td>1–2</td> <td>1</td> <td>HSF.BF.B.3</td> </tr> <tr> <td>3–6</td> <td>2</td> <td>HSF.BF.B.3</td> </tr> <tr> <td><b>Test Practice</b></td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>2</td> <td>HSF.BF.B.3</td> </tr> <tr> <td>8</td> <td>3</td> <td>HSF.BF.B.3</td> </tr> <tr> <td><b>Spiral Review</b></td> <td></td> <td></td> </tr> <tr> <td>Fluency</td> <td>9–10</td> <td>HS.A.SSE.B.3 ★</td> </tr> </tbody> </table> <p><b>2.</b> Is the statement <b>Always</b>, <b>Sometimes</b>, or <b>Never</b> true?</p> <p><b>Always</b>      <b>Sometimes</b>      <b>Never</b></p> <p><b>Explore your thinking</b></p> <p><b>Explanation:</b> Whenever you scale a function vertically, you multiply the outputs by the same factor. If the factor is greater than 1, the graph stretches vertically. If the factor is between 0 and 1, the graph compresses vertically. If the factor is negative, the graph reflects over the <math>x</math>-axis when multiplied by the factor. You will find the same conclusion for your <math>y(x)</math> functions.</p> <p><b>3.</b> Using the graph, list three transformations <math>y(x)</math> that it is not a function of.</p> <p></p> <p><b>4.</b> Using the graph, list three transformations <math>y(x)</math> that it is not a function of.</p> <p></p> <p><b>5.</b> <b>Special Review</b></p> <p>Previously, <math>y(x) = 2x</math>. Change one number in each equation so the outputs of the function are closer to the <math>x</math>-axis. <b>Reasoning:</b> vary</p> <p><b>6.</b> <math>y(x) = (x - 4)^2 + 7</math>  <math>y(x) = (x - 4)^2 + 8</math></p> <p><b>7.</b> <math>y(x) = 2(x - 4)^2 + 7</math>  <math>y(x) = 2(x - 4)^2 + 8</math></p> <p><b>8.</b> <math>y(x) = 2(x - 4)^2 + 7</math>  <math>y(x) = 2(x - 4)^2 + 8</math></p> <p><b>9.</b> <math>y(x) = 2(x - 4)^2 + 7</math>  <math>y(x) = 2(x - 4)^2 + 8</math></p> <p><b>10.</b> <math>y(x) = 2(x - 4)^2 + 7</math>  <math>y(x) = 2(x - 4)^2 + 8</math></p> <p><b>Reflection</b></p> <p>1. Did it always take just 2 problems you were stuck on and then figured out?  2. Did the space to use a calculator or share something you proud of?</p> <p><b>Lesson Practice</b></p> </div>	Problem(s)	DOK	Standard(s)	<b>On-Lesson</b>			1–2	1	HSF.BF.B.3	3–6	2	HSF.BF.B.3	<b>Test Practice</b>			7	2	HSF.BF.B.3	8	3	HSF.BF.B.3	<b>Spiral Review</b>			Fluency	9–10	HS.A.SSE.B.3 ★
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## Lesson Practice

Daily practice problems for each lesson are included both online and in the Student Edition, including Fluency, Test Practice, and Spiral Review.

Practice Days are always **print-based** and may involve **materials** like Problem Cards.

**Unit 1 | Lessons 1–8**

**Practice Day 1**

**Purpose:** Students practice the concepts, skills, and strategies developed in Lessons 1–8. Consider using this Practice Day as preparation for the upcoming Sub-Unit Quiz.

**45 min**

**Preparation**

**Materials**

- Option 1: Stations
  - Student Edition
  - Task Cards, one set per station
- Option 2: Group Problems
  - Student Edition
  - Task Cards, one set per group

**A Accessibility: Affective Functioning** Consider intentionally pairing students with different strengths (e.g., group work, organization, understanding of tasks) to support collaboration.

**Standards**

**HSF.BF.B.3**

Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k \neq 0$  (vertical shift); by  $kf(x)$ ,  $k > 0$  (vertical stretch or compression); by  $|kf(x)|$  (vertical stretch or compression followed by reflection across the x-axis); by  $f(kx)$  (horizontal stretch or compression); by  $f(x - h)$  (horizontal shift). Find the value of  $k$  given the graphs. Explain the effect of each transformation on the graph using technology. Include recognizing even and odd functions as well as graphs and algebraic expressions for them.

Also Addressing: HSF.IF.A.1, HSF.IF.B.5 • Mathematical Practices: MP1, MP3

**Facilitation Options**

**Option 1: Stations**

This structure promotes student movement and supports students with different needs. Consider creating a task into smaller, more manageable groups.

**Pairs or Small Groups**

Distribute the task cards evenly around the room. Consider creating prevent crowding.

Consider sharing that there group should start at a different station and rotate clockwise and to each record their findings.

**Other considerations:**

- What/who will rotate?
- Encourage groups to rotate their stations.
- Return task cards while groups are rotating.
- When will rotation occur?
- Set a specific amount of time.
- Invite groups to rotate at the same time.

**Task Cards (online)**

**Task A: Total Transformation**

1. Match each transformation with its graph.  $f(x)$  is the parent function.

- $f(x) + 4$
- $f(x) - 4$
- $f(x) + 4$
- $f(x) - 4$
- $f(x) + 4$
- $f(x) - 4$

2. The function  $g(x)$  is an odd function.  $f(x)$  is the parent function.

3. Identify all statements that are true about  $f(x)$  and  $g(x)$ .

- $f(x) = g(x)$
- $f(x) = -g(x)$
- $f(x) = g(-x)$
- $f(x) = -g(-x)$

**Task B: Dots on the Point**

1. Choose one: A, B, C

2. Choose one: A, B, C

3. Choose one: A, B, C

**Task C: Odd or Even?**

1. The function  $g(x)$  is an odd function.  $f(x)$  is the parent function.

2. Identify all statements that are true about  $f(x)$  and  $g(x)$ .

- $f(x) = g(x)$
- $f(x) = -g(x)$
- $f(x) = g(-x)$
- $f(x) = -g(-x)$

**Task D: Practice Day 1 (continued)**

1. The graph of  $f(x)$  is a function.  $f(x)$  is the parent function.

2. The graph of  $g(x)$  is a function.  $g(x)$  is the parent function.

3. The graph of  $h(x)$  is a function.  $h(x)$  is the parent function.

4. The graph of  $j(x)$  is a function.  $j(x)$  is the parent function.

5. The graph of  $k(x)$  is a function.  $k(x)$  is the parent function.

6. The graph of  $l(x)$  is a function.  $l(x)$  is the parent function.

7. The graph of  $m(x)$  is a function.  $m(x)$  is the parent function.

8. The graph of  $n(x)$  is a function.  $n(x)$  is the parent function.

9. The graph of  $p(x)$  is a function.  $p(x)$  is the parent function.

10. The graph of  $q(x)$  is a function.  $q(x)$  is the parent function.

11. The graph of  $r(x)$  is a function.  $r(x)$  is the parent function.

12. The graph of  $s(x)$  is a function.  $s(x)$  is the parent function.

13. The graph of  $t(x)$  is a function.  $t(x)$  is the parent function.

14. The graph of  $u(x)$  is a function.  $u(x)$  is the parent function.

15. The graph of  $v(x)$  is a function.  $v(x)$  is the parent function.

16. The graph of  $w(x)$  is a function.  $w(x)$  is the parent function.

17. The graph of  $x(x)$  is a function.  $x(x)$  is the parent function.

18. The graph of  $y(x)$  is a function.  $y(x)$  is the parent function.

19. The graph of  $z(x)$  is a function.  $z(x)$  is the parent function.

20. The graph of  $u(x)$  is a function.  $u(x)$  is the parent function.

21. The graph of  $v(x)$  is a function.  $v(x)$  is the parent function.

22. The graph of  $w(x)$  is a function.  $w(x)$  is the parent function.

23. The graph of  $x(x)$  is a function.  $x(x)$  is the parent function.

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31. The graph of  $z(x)$  is a function.  $z(x)$  is the parent function.

32. The graph of  $u(x)$  is a function.  $u(x)$  is the parent function.

33. The graph of  $v(x)$  is a function.  $v(x)$  is the parent function.

34. The graph of  $w(x)$  is a function.  $w(x)$  is the parent function.

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The Teacher Guide typically provides **two different approaches for facilitating** Practice Day activities.

## Practice Day

Practice Days are included before each Sub-Unit Quiz and End-of-Unit Assessment. These lessons provide an opportunity for students to consolidate and apply their knowledge and skills from the preceding lessons. Practice Days often incorporate student movement and collaboration.

Unit 1 | Sub-Unit Quiz
Additional data on student thinking can be found in Teacher Report King

### Assess and Respond

Sub-Unit Quiz
Independent | 45 min

**Facilitation:** Assign the Sub-Unit Quiz to learn about your students' understanding of the concepts and skills so far in this unit. Text to speech is available in the digital version. If time allows, consider inviting students to complete one or more of the tasks in the Unit Synthesis and Reflection.

Item Analysis
Differentiation (Sub-Unit Quiz)

Sub-Unit Goals
Problem(s)
To respond to student thinking, consider:

Sub-Unit Goals	Problem(s)	To respond to student thinking, consider:
Interpret functions using graphs and function notation. (Lessons 1, 5)	1a, 1b, 2a, 2b	<b>Support</b> <ul style="list-style-type: none"> <li>• Reviewing the Lesson 1 Summary and inviting students to color code the inputs and outputs on the graph and equation.</li> <li>• Reviewing the Lesson 2 Summary and inviting students to summarize it in their own words.</li> <li>• Reviewing Lesson 3, Activity 1 and creating an anchor chart for the key features of functions.</li> <li>• Reviewing Algebra 1, Unit 4, Lesson 9 (Elevator Stories).</li> <li>• Reviewing Algebra 1, Unit 4, Lesson 5 (Crush-a-Graph).</li> </ul>
Describe functions and function families using their key features. (Lessons 2–3)	3, 4a	<b>Support</b> <ul style="list-style-type: none"> <li>• Reviewing the Lesson 6 and Lesson 7 Summaries and creating an anchor chart about the effect of each type of transformation on equations and reflections.</li> <li>• Reviewing the Repeated Challenges in Lesson 6, Activity 3.</li> <li>• Reviewing the Repeated Challenges in Lesson 7, Activity 3.</li> </ul>
Describe translations or reflections that move one function onto another. (Lessons 4, 6–7)	4b	<b>Support</b> <ul style="list-style-type: none"> <li>• Reviewing the Lesson 6 and Lesson 7 Summaries and creating an anchor chart about the effect of each type of transformation on equations and reflections.</li> <li>• Reviewing the Repeated Challenges in Lesson 6, Activity 3.</li> <li>• Reviewing the Repeated Challenges in Lesson 7, Activity 3.</li> </ul>
Write equations that represent translations and reflections of functions. (Lessons 6–7)	5	<b>Support</b> <ul style="list-style-type: none"> <li>• Reviewing the Lesson 8 Summary and inviting students to draw multiple even and odd functions based on their definitions.</li> <li>• Reviewing Lesson 8, Activity 3 and inviting students to highlight the symmetry they see in the graphs and tables.</li> <li>• Selecting a few related practice problems from Lesson 8 and giving individualized feedback.</li> </ul>

Assessment Resources
Unit 1
5IC
Assess and Respond

An **Item Analysis** is provided to show what concepts and skills are assessed in each problem.

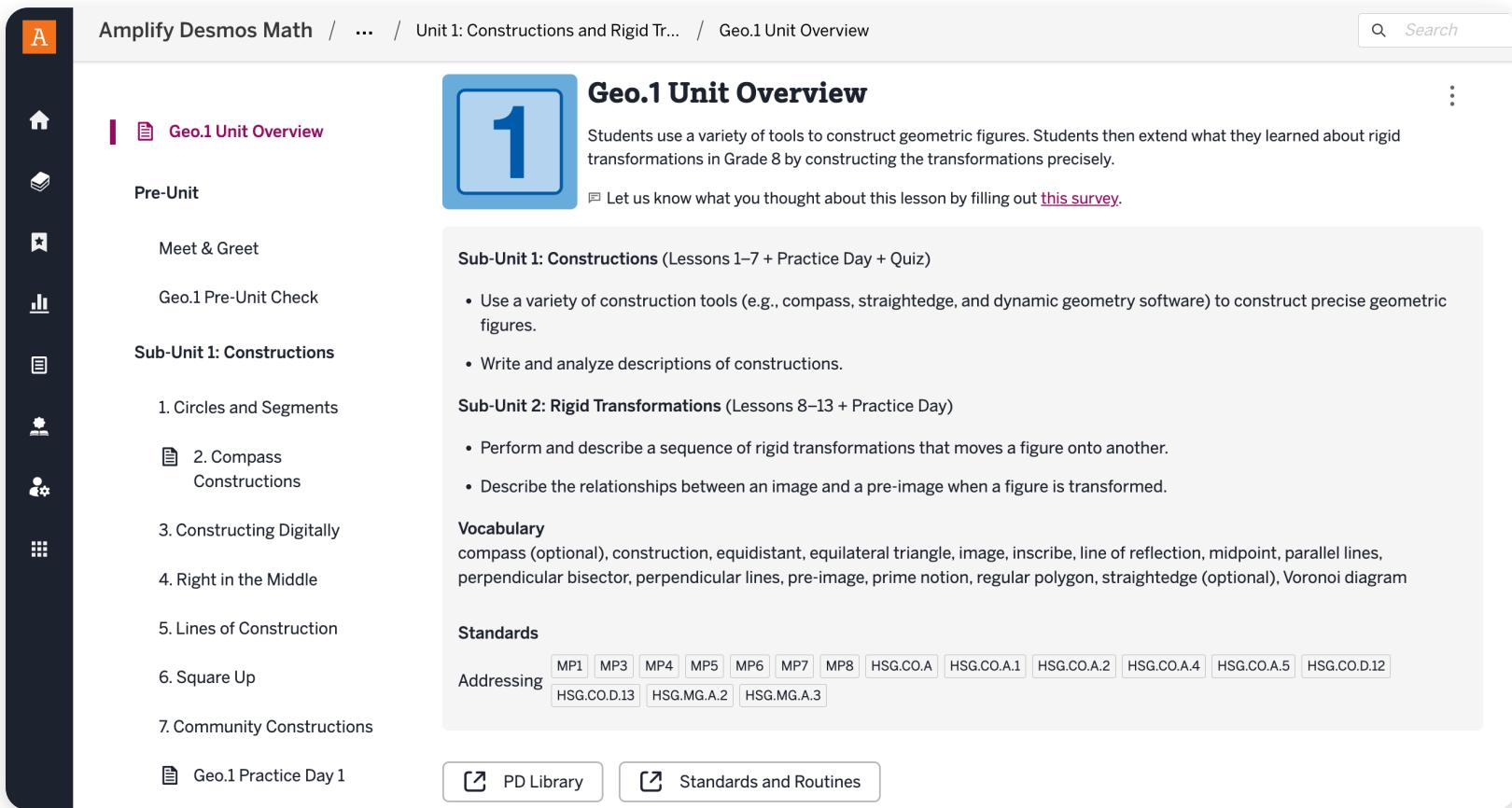
A **Differentiation** table suggests specific materials from the unit to **Support**, **Strengthen**, or **Stretch** students' understanding based on their responses to different assessment problems.

## Assess and Respond

Each unit typically includes one or two Sub-Unit Quizzes. Quizzes are designed for students to show what they know and can do based on what they have learned so far in the unit. Each unit includes Assess and Respond guidance for the Pre-Unit Check, Sub-Unit Quizzes, and End-of-Unit Assessment.

# Navigating the digital program

## Unit Landing Page



The screenshot shows the Unit Landing Page for the Geo.1 Unit Overview. The page has a dark header with the Amplify Desmos Math logo and a search bar. On the left, a vertical sidebar with icons for Home, Unit Overview, Pre-Unit, Sub-Unit, and Standards. The main content area features a large blue box with the number '1' and the title 'Geo.1 Unit Overview'. Below this, a text box states: 'Students use a variety of tools to construct geometric figures. Students then extend what they learned about rigid transformations in Grade 8 by constructing the transformations precisely.' A call-to-action button says 'Let us know what you thought about this lesson by filling out [this survey](#)'. The 'Sub-Unit 1: Constructions' section includes a list of sub-topics: 1. Circles and Segments, 2. Compass Constructions, 3. Constructing Digitally, 4. Right in the Middle, 5. Lines of Construction, 6. Square Up, and 7. Community Constructions. The 'Sub-Unit 2: Rigid Transformations' section includes a list of sub-topics: 1. Circles and Segments, 2. Compass Constructions, 3. Constructing Digitally, 4. Right in the Middle, 5. Lines of Construction, 6. Square Up, and 7. Community Constructions. The 'Vocabulary' section lists: compass (optional), construction, equidistant, equilateral triangle, image, inscribe, line of reflection, midpoint, parallel lines, perpendicular bisector, perpendicular lines, pre-image, prime notion, regular polygon, straightedge (optional), Voronoi diagram. The 'Standards' section shows 'Addressing' with boxes for MP1 through MP8, HSG.CO.A, HSG.CO.A.1 through HSG.CO.A.5, and HSG.CO.D.12, HSG.CO.D.13, HSG.MG.A.2, and HSG.MG.A.3. Navigation buttons at the bottom include 'Geo.1 Practice Day 1', 'PD Library', and 'Standards and Routines'.

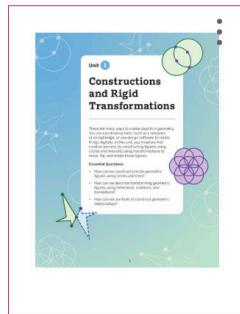
On the Unit Landing Page for each unit, you'll find Unit-at-a-Glance information, including sub-unit descriptions and learning goals, vocabulary found in the unit, and standards addressed in the unit (where applicable).

## Paper Resources

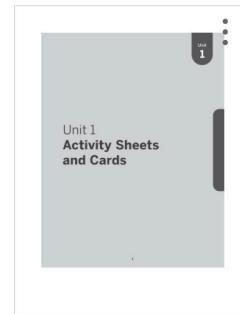
Unit Teacher Edition



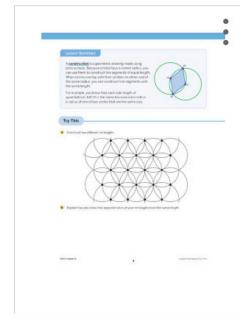
Unit Student Edition



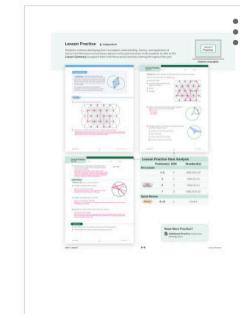
Unit Activity Sheets and Cards



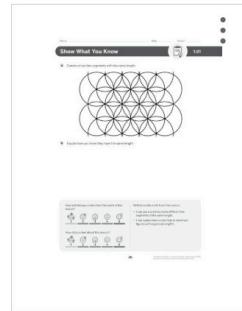
Unit Lesson Practice



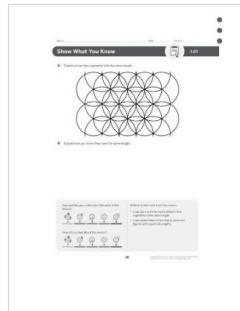
Unit Lesson Practice (Answers)



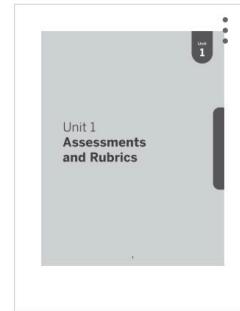
Unit Show What You Know



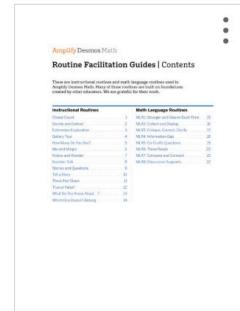
Unit Show What You Know (Answers)



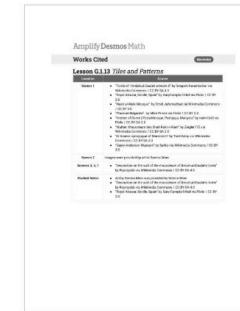
Unit Assessments and Rubrics



Routine Facilitation Guide



G.1 Works Cited



The Unit Landing Page also includes a variety of paper resources available for that unit. Those resources include:

- A printable PDF of the Teacher Edition and Student Edition pages for the entire unit (the Teacher Edition pages include assessment answer keys)
- Unit lesson practice, Show What You Know, and assessments

- Routine Facilitation Guides for the routines found in the unit
- Activity Sheets and Cards for lessons in the unit that call for additional resources not included in the Student Edition

# Lesson Landing Page

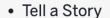
Like the print Lesson Overview, the Lesson Landing page has helpful information for planning and facilitating the lesson.

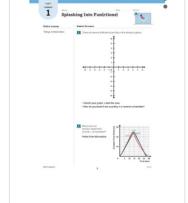
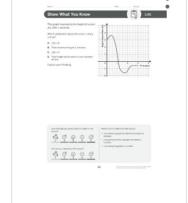
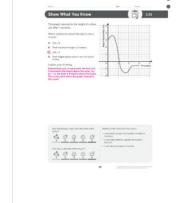
A Amplify Desmos Math / ... / Unit 1: Transformations of Functions / Lesson 1: Splashing Into Functions

B  Search

C        

D               

E                         

F    

### **A Differentiation Beyond the Lesson**

The Differentiation Beyond the Lesson tab provides guidance and differentiation resources after each lesson for students in three categories: Support, Strengthen, and Stretch.

### **B At a Glance**

The At a Glance button will pull up a preview of the lesson Warm-Up, lesson activities, Synthesis, and Show What You Know. You'll find suggested timing for each part of the lesson, as well as guidance on whether students should work individually, in pairs, or with the whole class. The Focus and Coherence and Rigor and Balance information for the lesson is also found here.

### **C Practice Problems**

Every Amplify Desmos Math lesson includes a digital Practice Problems set, which you and students can access via the Lesson Landing Page.

### **D Lesson prep**

In the gray box on the Lesson Landing Page, you'll find the goals for that lesson, any materials needed for the lesson, vocabulary found in that lesson, and standards addressed in the lesson.

### **E Lesson Thumbnails**

Teacher Presentation Screens enhance lessons and are for the teacher to project. Lessons where student devices are suggested have Student Activity Screens.

### **F Paper resources**

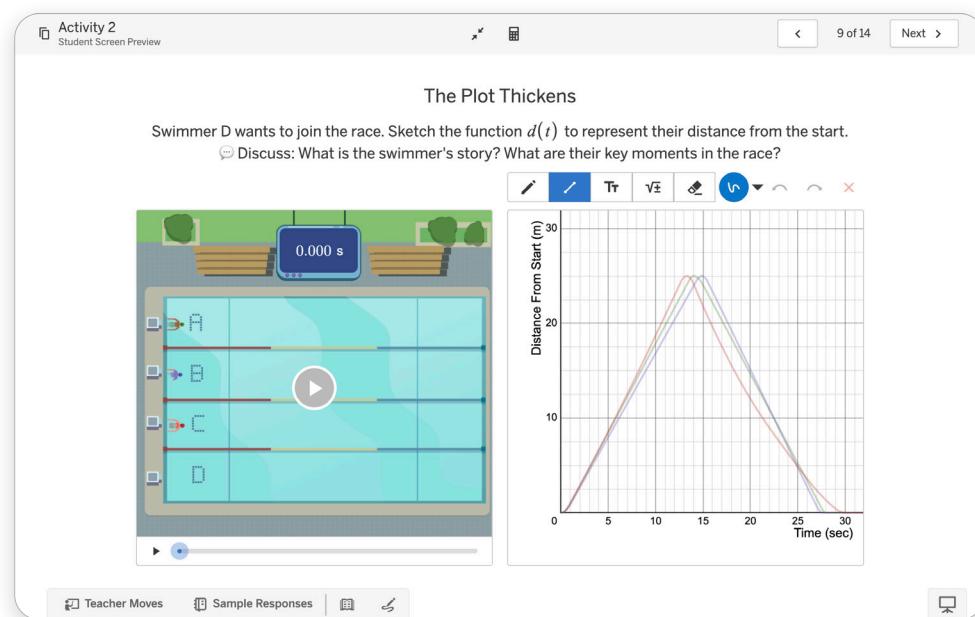
Paper resources for each lesson include print Teacher Edition pages, print Student Edition pages, and the lesson Show What You Know printable PDF.

## Student Screens

Student Screens make the lesson highly interactive for students working on devices individually or in pairs or small groups. You can preview by clicking Activity Screens from the lesson landing page.

To make planning and teaching seamless, tips for instruction are available in both the print Teacher Edition and digitally at point of use. At the bottom of Activity Screens, the teacher will see suggestions for facilitation to support great classroom conversations:

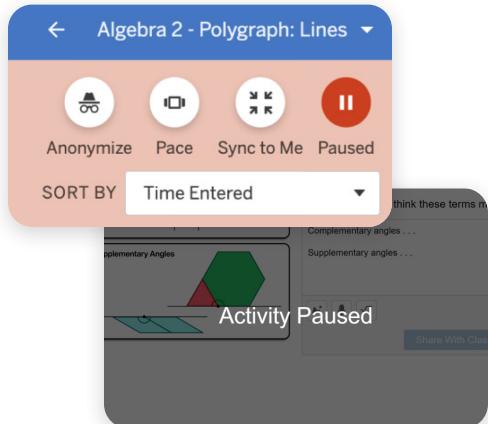
- **Teacher moves:** Suggestions for pacing, facilitation moves, discussion questions, examples of early student thinking, and ideas for early finishers, as well as opportunities to build and develop the math community in your classroom.
- **Sample responses:** One or more examples of a possible student response to the problem.
- **Student supports:** Facilitation suggestions to support students with disabilities and multilingual students.



## Assign

Getting your students started with a digital lesson is a breeze. To have your students try one of these program preview lessons, simply generate and share a single-session code by clicking the arrow next to **@Assign**. If you have individual classes set up, getting students online is even quicker!

CLASS	STUDENTS	SCHEDULED FOR	DUEDATE	TEACH
Grade 7	0 of 0	Jul 28, 2025 at 4:21 pm	-	<b>Teach</b>



Pause allows you to stop the lesson and gather student attention—whether for a brief announcement or a class discussion.

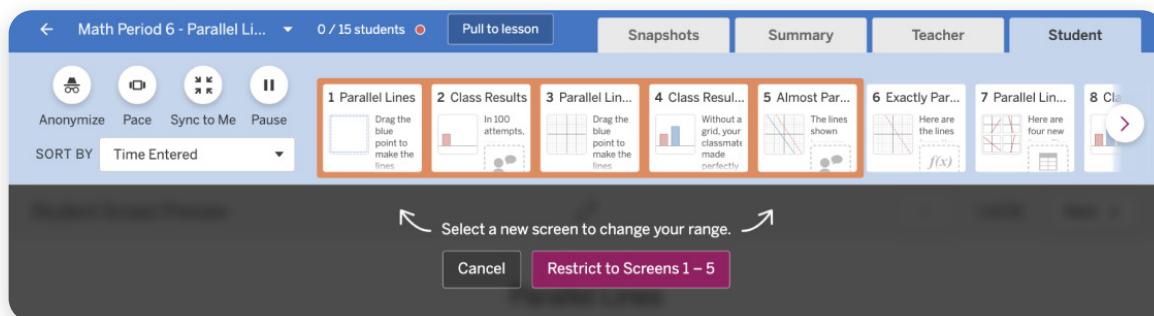
Keep an activity paused for as long (or as briefly) as you want. When you're ready for students to continue, press the Pause button again to resume the activity.

With Pause activated, students can see their current screen but cannot interact with the activity at all.

## Pacing

Pacing allows you to lead students through part of an activity one screen or one section at a time. To activate, click the Pacing icon. Then select the screen (or screens) you'd like to gather your students on. They'll automatically go to that location in the activity, and the navigation outside of that range will temporarily be disabled.

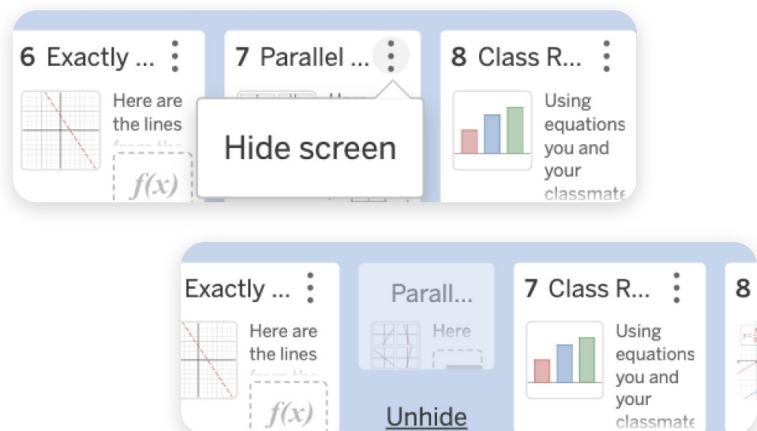
Once Pacing is activated, you'll see clear indicators for what screens your students may access. You can edit or extend that range, or even disable pacing, with a single click.



## Hide screens

Are you running out of time in class? Or do you want to refine an activity to better suit your students' needs? You can hide screens from students by clicking the Menu (three vertical dots) on the screen's thumbnail. This allows for non-sequential teacher pacing.

Notice that the screens automatically renumber themselves when one is hidden. Change your mind? Simply click Unhide and students will be able to access the screen again.



## Teacher supports and facilitation tools

### Teacher Dashboard

The powerful Teacher Dashboard helps teachers play an active role as discussion facilitators, monitoring student work in real time, choosing moments to share and discuss, and synthesizing learning. Teachers get insight into student thinking in real time, meaning they can select student work to display and discuss quickly and easily, and ask better questions to guide more productive discussions.

To teach a lesson with students on devices, click the Dashboard link next to your single-session code or class name to launch your Teacher Dashboard with facilitation tools.

Activity Sessions

CLASS	STUDENTS	DATE	LINK
E5YPM2	0	Jan 3, 2024 at 10:50 am	<a href="#">Dashboard</a>
YMMVC5	0	Nov 17, 2023 at 3:18 pm	<a href="#">Dashboard</a>

The Teacher Dashboard has four tabs at the top. In addition to these views, the Teacher Dashboard also has facilitation tools, including the Class Conversation Toolkit and Written Feedback.

Weight for It [SAMPLE] 9 students

Warm Up Activity 1 Activity 2

1 Warm ... 2 Weight ... 3 "d" is ... 4 What ... 5 Equal ... 6 Weight ... 7 Group ... 8 Squirrel ... 9 Class ... 10 Lesso ... 11 Cool ... 12

Anonymized Pace Sync to Me Pause

SORT BY Time Entered

Student Screen Preview

Warm-Up

Here are some weights on a see-saw.

1. Drag the movable point to adjust one of the weights.

2. Discuss what you notice and wonder.

Teacher Student

1 of 12 Next >

Teacher Moves Sample Responses Student Supports

## Snapshots

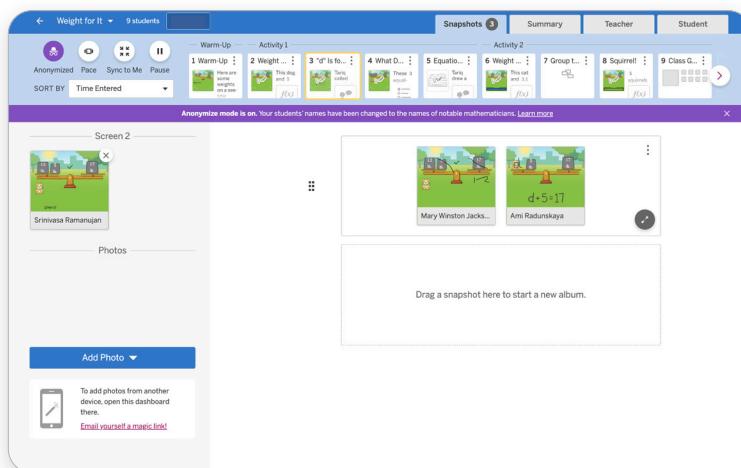
Peg Smith and Mary Kay Stein's *5 Practices for Orchestrating Productive Mathematics Discussions* offers a clear and useful framework for facilitating class discussions around student thinking. We added a Snapshot tool to make it even easier to select and sequence student work for those discussions. Try your hand at selecting and sequencing student work for discussion during your next Amplify Desmos Math lesson.

### Snapshot student screens

To select a response for discussion, simply click the camera icon.



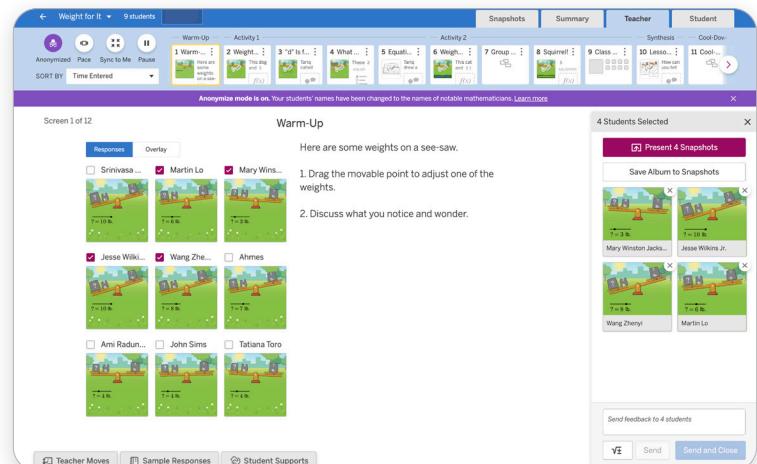
Then, in the Snapshots View, you can organize your snapshots into albums. Each album can hold up to four snapshots.



Present your albums to facilitate class discussions. Consider entering a title or question, or simply share your discussion prompt aloud! (Note: The teacher must present the album of snapshots to students in order for the album to show on student devices.)

### Snapshot in Teacher View

To select a response for discussion in the Teacher View, click the response's checkbox to bring up the snapshots and the Feedback sidebar.



You can select up to four pieces of work and present them to students right from the Teacher View, or save them as an album in Snapshots.

## Dashboard summary view

When you open a dashboard, you will first see the Summary View. Here you will see a row for each student in the activity session, along with a quick overview of where they are in the activity, a symbol to let you know more about their work on that screen, and a triangle indicator in the corner if you've sent the student feedback on that screen.

You can click on any of these boxes to see the current state of the student's screen. You might use a student screen as a jumping-off point for a class discussion and modify the screen together with the class. Any changes you make will not change the work for the student.

Student	1 Warm-Up	2 What Is...	3 Probabi...	4 Prob-b...	5 Sample...	6 Prob-b...	7 How M...	8
Rishi	•	•	✓	•	•	•	•	
Victor	•	•	✓	•	•	•	•	✓
Juana	•	•	✓	•	•	•	•	✓
Deven	•	•	✓	•	•	•	•	✓
Remy	•	•	✓	•	•	•	•	✓
Yolanda	•	•	✓					
Anushka	•	•	✓	•		•	•	✓

Here is what the symbols on this page mean:

- Dash:** There is no required input for this screen, but students still need to look at it.
- Check:** Everything on this screen is correct.
- Cross:** Something on this screen is incorrect.
- Warning:** Something on this screen isn't merely incorrect but indicates the student may have misunderstood the question itself—intervene ASAP!
- Dot:** This screen requires teacher interpretation.

You might also see a triangle indicator in the corner. Here's what they mean:

- Teal triangle:** You sent feedback to the student on that screen, but the student has not yet seen the feedback.
- Gray triangle:** You sent feedback to the student on that screen and the student has seen the feedback.

## Teacher View

In the dashboard, you can use the Teacher View to answer questions like:

- How did all my students answer this question?
- What answers were most common?

If the screen has some components that can be correct or incorrect, you can check the Show Correctness checkbox in the upper-right corner of the screen. This will add icons to pieces of work showing if they're correct or incorrect.

You can also leave written feedback and create and present albums of snapshots from the Teacher View by selecting the student response checkboxes.

← Prob-bear-bilities ▾ 15 students

Snapshots 2 Summary Teacher Student

Anonymize Pace Sync to Me Pause

SORT BY Time Entered

— Warm-Up — — Activity 1 — — Activity 2 —

1 Warm-Up 2 What Is... 3 Probabi... 4 Prob-b... 5 Sample... 6 Prob-b... 7 How M... 8

Screen 4 of 15

Prob-bear-bility

1. Here is a randomizer. Press "Spin" to get a random creature.  
2. Drag the point to show how likely you think it is to get a bear on one spin.

Responses Overlay

Rishi Victor Juana

Deven Remy Yolanda

Responses Overlay

Rishi Victor Juana

Deven Remy Anushka

Teacher Moves Sample Responses