

Differentiating instruction

Multiple pathways to the math

Working with advisor Dr. Paulo Tan and experts at the English Learners Success Forum (ELSF), the Amplify Math curriculum team has developed intentional and point-of-use differentiated supports that invite all students into the mathematical conversation.

Unit 3 | Lesson 2

Proportional Relationships

Let's explore the connection between points that lie on the line of a proportional relationship and the slope of the line.

Warm-up Heart Rate

1. Find your pulse. Count the number of heartbeats in 30 seconds and complete the first row in the table.

Time

Number of heartbeats

30 seconds

30

1 minute

60

2. Assume the number of heartbeats per second remains constant. Based on your response to Problem 1, predict the number of heartbeats you will have in 1 minute.

Sample response: The constant of proportionality is $\frac{1}{2}$. $30 \times \frac{1}{2} = 15$. The number that I can multiply 60 by $\frac{1}{2}$ to obtain 60. So, I predict I will have 60 heartbeats in 1 minute.

1 Launch

Activate prior knowledge by asking students what they know about heart rates and if they know how to locate their pulse. Have students share how to find their pulse, assist where needed, and make sure everyone is ready before starting the timer. Ask students how they think their heart rate might change after running a race. Then display a timer for 20 seconds to begin the activity. **Note:** Provide access to rulers throughout the duration of this lesson.

2 Monitor

Help students get started by showing them multiple ways of finding their pulse.

Look for points of confusion:

- Not being able to find their heart rate in beats per minute. Ask how many seconds are in 1 minute, and prompt students to think about how they can use ratios to find the number of heartbeats.
- Incorrectly counting the number of heartbeats in 20 seconds. Ask students to count aloud for you or a partner, and consider modeling how to count heartbeats. Provide a range for expected heartbeats, anywhere from 30 to 40. Then run the timer a second time.

3 Connect

Ask: "How did you find your heart rate in beats per minute, as it is typically measured? How could you find your heart rate in beats per second?"

Highlight strategies using ratios or extending the table to find a heart rate out of 60 seconds.

Have students share if they think the heart rate represents a proportional relationship without revealing the answer. Use student answers discussing graphs to transition to Activity 1.

Differentiated Support

Accessibility: Guide Processing and Visualization

If available, play the audio of a heart beating for five seconds to demonstrate how to count a heartbeat. Alternatively, if students have difficulty finding and counting their pulse, play the audio of a heart beating for 30 seconds and have students use that value to complete the Warm-up.

Power-up

For students who need additional support determining the slope of a line (from the Pre-Unit Readiness Assessment, Problem 4):

Use Problem 4 from the Pre-Unit Readiness Assessment and have students draw several slope triangles. Remind students that the slope is the vertical change divided by the horizontal change.

Pre-Unit Readiness Assessment (continued)

6. Select all the expressions that are equivalent to 10^3 .

A. 30

B. 3,000

C. $1,000 \times 3$

D. 10×3

E. $10 \times 10 \times 10$

F. 100

G. 1,000

7. Select all the figures that appear to have at least one right angle.

A.

B.

C.

D.

E.

F.

8. Determine the area of this polygon.

PRINT

DIGITAL

Pre-Unit Readiness Assessment

Amplify Math's Pre-Unit Readiness Assessment helps teachers identify student needs. The problems of the Pre-Unit Readiness Assessment cover the lessons' prerequisite skills to help teachers know where they might provide additional support before and during the lessons in the unit, informing instruction by identifying specific student needs for the unit. Using these insights, teachers can use the flexible built-in support to differentiate appropriately at point of use.

Differentiated Support

Accessibility: Guide Processing and Visualization

If available, play the audio of a heart beating for five seconds to demonstrate how to count a heartbeat. Alternatively, if students have difficulty finding and counting their pulse, play the audio of a heart beating for 20 seconds and have students use that value to complete the Warm-up.

Power-up

For students who need additional support determining the slope of a line (from the Pre-Unit Readiness Assessment, Problem 4):

Use Problem 4 from the Pre-Unit Readiness Assessment and have students draw several slope triangles. Remind students that the slope is the vertical change divided by the horizontal change.

32 | AmplifyMath

Accessibility and extension supports

Every Amplify Math lesson begins with a warm-up activity. But some students may require additional support with unfinished learning to get them ready for the grade-level content addressed in a particular lesson. Based on students’ performance on formative practice problems, students who need this support are automatically identified for teachers, and given differentiated Power-ups to the grade-level content.

Students are never labeled as above or below grade level in Amplify Math. The wide range of differentiated instructional supports are categorized as either **accessibility** or **extension** supports within the Teacher Edition. These supports can be implemented flexibly as students may not need support for every lesson, but instead a particular activity within a lesson.

Grounded in the Universal Design for Learning (UDL) framework and guidelines (CAST, 2018), our accessibility supports provide students with the help they may need on a given activity and makes the content accessible for all students.

Examples of **accessibility supports** include:

- Removing or restricting physical requirements (for example, providing measurements instead of having students do the measuring).
- Scaffolding directions.
- Chunking the task into smaller, more manageable parts.
- Providing checklists, tables, and graphic organizers.
- Optimizing access to tools, such as physical and digital manipulatives, and technology.
- Providing options for students to use annotations and color coding to highlight connections.

Extension support provides teachers with opportunities for students to examine grade-level mathematics at a deeper level as opposed to introducing future grade or course mathematics.

Extension support subcategories include:

- Math Enrichment
- Math Around the World
- Interdisciplinary Connections

Activity 1 Making Coffee for the Masses

Students examine a table of ratios to determine whether the values are proportional and notice that all the ratios are related by the same factor.

1. Will the coffee taste the same each day? Explain your thinking.

Yes. Sample response: The coffee will taste the same on each day because all of the ratios are equivalent. This means that they are related in the same way.

2. How can you tell whether the water and coffee beans are in a proportional relationship?

Sample response: I can tell the water and coffee beans are in a proportional relationship by noticing that I can multiply the left column by $\frac{5}{2}$ to get the number in the right column for each row.

Day	Coffee beans (oz)	Water (fluid oz)
Tuesday	40	30
Wednesday	35	20
Thursday	25	31 $\frac{1}{2}$
Friday	44	60
Saturday	80	180
Sunday	60	75

1. Launch

Activate background knowledge by asking students whether they have ever cooked, or helped cook, for a large group. Ask, "How did you adjust the recipes?" Provide access to calculators.

2. Monitor

Help students get started by suggesting they calculate the amount of water needed for 1 oz of coffee beans.

Look for points of confusion:

• Thinking the coffee will not taste the same because the difference in the numbers is not the same. Have students refer to the Warm-up to determine whether this was true for the latte.

Look for productive strategies:

• Dividing the number in the second column by the number in the first column to determine the missing factor.

3. Connect

Have students share how they found the factor that relates the amount of coffee beans to the amount of water. Look for a strategy that determines the unit rate and also one that divides a value in the second column by the first.

Highlight that this table shows a proportional relationship, even though it is not obvious without performing some calculations. Students may be more familiar with tables of equivalent ratios from Grade 6, where the relationship was more evident.

Define the **constant of proportionality** as the number in a proportional relationship, by which the value for one quantity is multiplied to get the value for the other quantity.

Ask, "Where in the table can you see the constant of proportionality? I can see it as a factor in each row or as the unit rate for ounces of coffee."

Note: If students have not yet done this, annotate the table in each row to show the constant of proportionality.

Differentiated Support

Accessibility: Vary Demands to Optimize Challenge

Have students first compare only Tuesday and Wednesday to determine whether the ratios of coffee beans to water are equivalent. Then have them compare to each next day, pausing after each one to discuss.

Extension: Math Enrichment

Have students complete the following problem:
How much does Kiran use each day, on average, of each ingredient?
About 4.8 ounces of coffee beans and about 36 fluid ounces of water.

Math Language Development

MLR1: Stronger and Clearer Each Time

Have students share their responses to Problem 2 with 2 other partners, asking questions for clarity and reasoning. Have them write a second draft that reflects shared ideas and refinement of their initial thoughts.

English Learners

Allow students to write their first draft in their primary language.

Lesson 2 Introducing Proportional Relationships With Tables 103

Differentiated Support

Accessibility: Vary Demands to Optimize Challenge

Have students first compare only Tuesday and Wednesday to determine whether the ratios of coffee beans to water are equivalent. Then have them compare to each next day, pausing after each one to discuss.

Extension: Math Enrichment

Have students complete the following problem:
How much does Kiran use each day, on average, of each ingredient?
About 4.8 ounces of coffee beans and about 36 fluid ounces of water.

Program guide (Grades 6–8, Algebra 1) | 33