Activity: Communicating About Math

Sharpen your students' math argument skills to prepare for The Hardest Math Problem Contest!

Objective
Students will use proportional relationships to solve multistep math problems, then explain their process effectively.

Standards
Common Core Math
6.RP.A.3 solve real-world rate and ratio problems
7.RP.A.3 solve multistep ratio, percent, and proportional relationships problems.

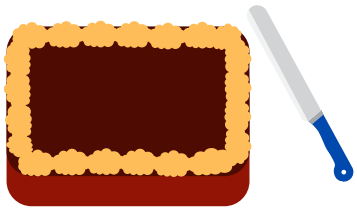
Time
60 minutes

Materials
- Explain Your Math Thinking activity sheet
- Scrap paper for students

Note: For Challenge 1, the students' submission will just be the numerical answer (recorded in the submission template by the coach).

For Challenge 2, students will need to have written solutions that accompany their numerical answer - this activity is a great practice for writing up solutions for Challenge 2!

Kick-off Discussion



[5 min] Challenge student groups to find as many ways as they can to cut a rectangular "cake" into 12 equal pieces for sharing. How many solutions could they find? Lead a discussion.

Encourage students that there are many ways to solve a problem and lots of interesting pathways to a solution! Their math arguments will help others understand the strategy and reasoning that led to their solution.

Activity Directions: Explain Your Math

1 **[10 min]** Distribute the Explain Your Math Thinking activity sheet. Use these strategies together as a class to interpret the example:
1. Read the question. Sketch or jot notes as you read.
2. Find the problem you're being asked to solve (sale price of graphic novels).
3. Find unit measurements (such as hours, dollars, miles, percentages) and draw a box around them.
   Underline information you'll use to solve the problem and cross out information that isn't needed. **(eg. *$20 novels are 15% off*. *~~$10 prints are 50% off.~~*).**

2 **[10 min]** Read the first math argument aloud ***("I multiplied 20 by 0.15 to get 3")***. Discuss the tips and tricks which help to make an argument stronger. Ask students to state what was missing from the math argument you read aloud. Explore ways that students may have solved the same problem differently **(eg. 15% = 3/20, $20.00 x 85%)**. Challenge students to explain their thinking.

3 **[15 min]** Ask students to apply the tips and tricks from the activity sheet to interpret, solve, and write a strong math argument for the second problem labeled "Your Turn" **(numerical answer: 56 orders)**.

4 **[10 min]** As a class, compare the different ways students solved problems and shared their math reasoning in their arguments. Discuss which tips and strategies your students found most helpful.

5 [**5 min**] Tell students that they have practiced reasoning and communication skills that they'll use for The Hardest Math Problem student contest.

☑ **Suggested follow-up:** The next day, distribute the Challenge 1 math problems and collect their answers for the submission in the Challenge 1 Submission Template.

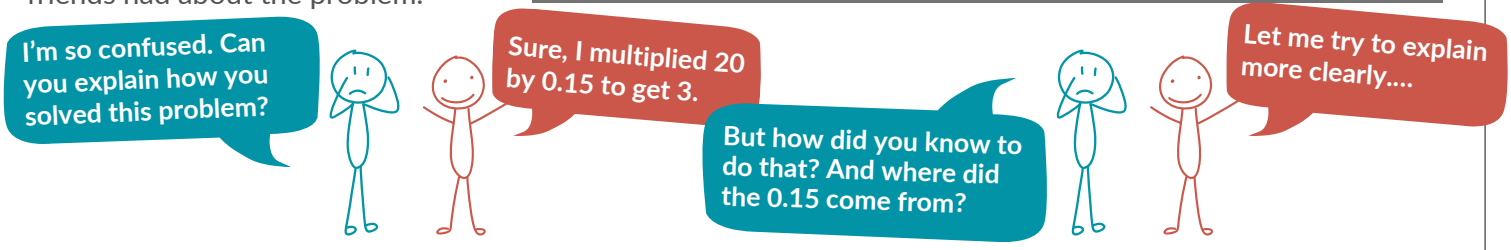
Learn more at https://www.hardestmathproblem.org/.

Explain Your Math Thinking Activity Sheet

EXAMPLE

Math skills rely on both numbers and words. Calculating an answer is important—and so is explaining it. Consider the conversation two friends had about the problem.

Kwame draws graphic novels. His website is having a sale! His $20 novels are 15% off. His $10 art prints are 50% off. What is the sale price of his graphic novels?



Share how you broke down the problem (your problem-solving strategies).

Clarify and define key terms.

Use complete sentences.

Include units, such as dollars or miles/hour.

Include the real-world context, not just the math.

*If your problem has more than one question, part, or step, remember to give an answer for each one!

Point out your conclusion.

MATH ARGUMENT

Step 1 In order to find the sale price of the graphic novels, I must first find the dollar value of the discount (the amount subtracted from the original price).

To make it easier to multiply, I converted the 15% discount to its equivalent decimal, 0.15.

Step 2I multiplied the regular price of the novels by that decimal (the discount): $20.00 x 0.15 = $3.00.

That means $3.00 is the value of the 15% discount.

Step 3 Now I can use the discount price to find the sale price (regular price minus the discount). Since the discount would be removed from the full price, and subtraction is the operation for removal, I subtracted the $3.00 discount from the $20.00 price to find the sale price of $17.00.

Answer Kwame's graphic novels are on sale for $17.00.

YOUR TURN

On a separate sheet, write a strong math argument to support your solution to the problem below. Then, switch with a classmate and give each other feedback.

As a gift for his customers, Kwame includes 3 stickers with every order he ships. Kwame has printed 168 stickers, the exact amount he'll need. How many orders are being shipped?

Now that you've sharpened your calculation and reasoning skills, give The Hardest Math Problem Contest a try! You'll use your skills to explain how you solved a real-world math problem.