



# ST Math<sup>®</sup>

## Summer Immersion

### Grade 4 | Problem Solving Journal Answer Key

#### Module 1

##### Day 1

Create a "Get to Know Our Class" chart.

##### Student charts will vary.

Ask the students questions to gather data about the class and record the information on a chart. For example:

- How many students are in this class?
- How many students have brown eyes? (Blue eyes? Green eyes?)
- How many students in the class have black hair? (Brown hair? Blonde hair? Red hair?)

##### Day 2

Describe the class mathematically.

##### Student descriptions will vary.

- Remind students about yesterday's Problem of the Day.
- Generate a list of 3-5 things students want to know about each other. For example:
  - Favorite ice cream flavor, favorite color, number of siblings, number of pets, favorite subject in school, month of birth, favorite sport, etc.

##### Day 3

Create a bar model of a scale fraction with fourths. Use Cuisenaire rods, connecting cubes, or paper strips to create your bar model. Build a number line using your bar model. Include numbers halves, fourths, and eighths up to 3.

##### Student models will vary. Look for:

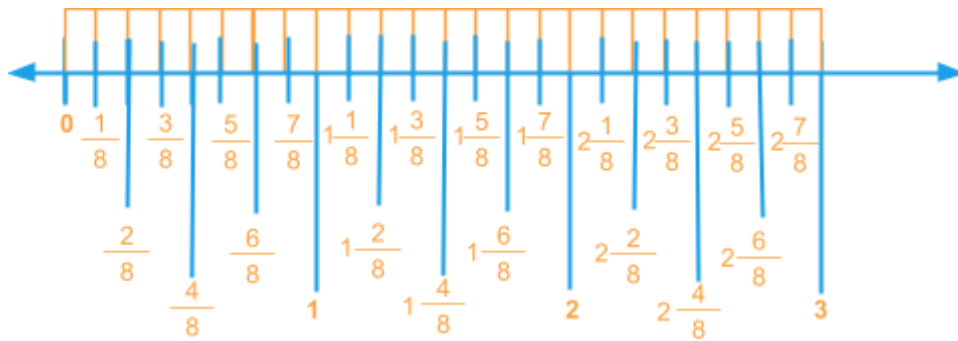
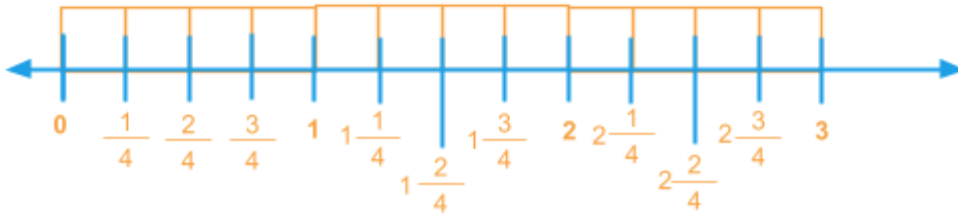
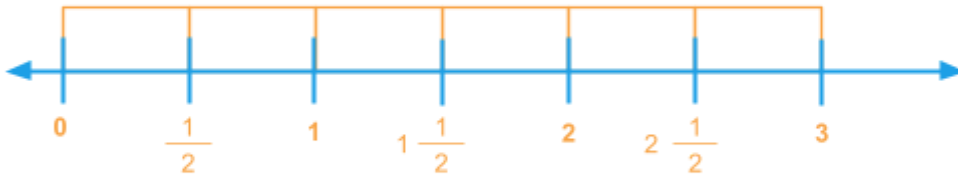
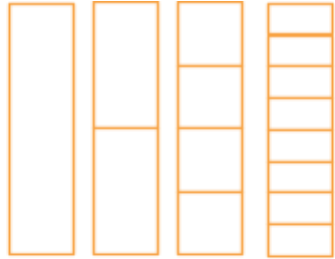
- *The goal of this activity is for students to use a 3D or 2D bar model to build out the intervals on a number line using a consistent whole. In the model below, each whole can be turned on its side to match the intervals that the number line is counting by.*



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Possible student representations:





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### Day 4

Kyle and Juan each had the same size chocolate bar. Kyle cut his into 6 equal size pieces and gave 2 pieces to Carla. Juan cut his bar into 3 equal size pieces and gave 1 piece to Carla. Compare how much chocolate bar each friend has.

**All three friends have an equal amount of chocolate.**

*Possible student strategies:*

<p><i>Kyle's Chocolate Bar</i></p> <table border="1"><tr><td></td><td></td><td><i>Carla</i></td></tr></table> <p><i>Juan's Chocolate Bar</i></p> <table border="1"><tr><td></td><td></td><td></td><td><i>Carla</i></td><td><i>Carla</i></td></tr></table>			<i>Carla</i>				<i>Carla</i>	<i>Carla</i>	<p><i>Kyle's Bar:</i></p> $\frac{6}{6} = \frac{2}{6} \text{ (Carla)} + \frac{4}{6} \text{ (Kyle)}$ <p><i>Juan's Chocolate Bar</i></p> $\frac{3}{3} = \frac{1}{3} \text{ (Carla)} + \frac{2}{3} \text{ (Juan)}$ <p><i>Carla's Total</i> = <math>\frac{1}{3} + \frac{2}{6} = \frac{4}{6}</math> or <math>\frac{2}{3}</math></p>
		<i>Carla</i>							
			<i>Carla</i>	<i>Carla</i>					



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### Module 2

#### Day 1

Jana and Deklan each brought the same size pan of brownies for the class party. Jana cut her brownie into 4 equal size pieces. Deklan cut his brownie into 3 equal-sized pieces. They needed to give 24 students the same size piece. How could they do this with their two pans of brownies?

**Student explanations will vary.** Look for:

- 24 total pieces, 12 in each pan, each student receives 1 piece
- 48 total pieces, 24 in each pan, each student receives 2 pieces
- Skip Counting to find common factors
  - 3, 6, 9, **12**, 15, 21, **24**
  - 4, 8, **12**, 16, 20, **24**
- Partitioned pieces
  - 3 pieces each partitioned into 4 more pieces yields 12 pieces.
  - 3 pieces each partitioned into 8 more pieces yields 24 pieces.
  - 4 pieces each partitioned into 3 more pieces yields 12 pieces.
  - 4 pieces each partitioned into 6 more pieces yields 24 pieces.
- Multiplication, missing factor statements.

$3 \times \underline{\quad} = 12$	$4 \times \underline{\quad} = 12$
$3 \times \underline{\quad} = 24$	$4 \times \underline{\quad} = 24$
- Use of commutative property
  - "I know that 3 pieces each cut into 4 more pieces is 12 total pieces, so 4 pieces each cut into 3 more pieces also is 12 total pieces."



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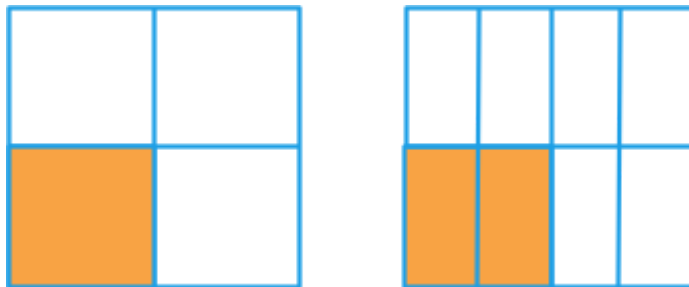
### Day 2

Howard and Imani were in charge of dividing the clay for their table in art class. Each table had 4 students. Howard divided the clay into 4 equal-sized pieces. Imani divided the clay into 8 equal-sized pieces. Both tables fair shared all of their clay. Compare and contrast the clay students at each table received.

**Student models will vary. Look for:**

- *Equal-sized pieces*
- $\frac{4}{4} = \frac{8}{8}$
- *Two  $\frac{1}{8}$  pieces = one  $\frac{1}{4}$  piece.*

*Possible student models:*



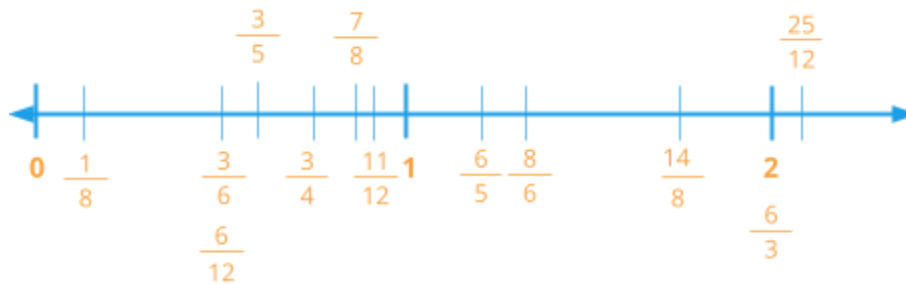


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## Grade 4 | Problem Solving Journal Answer Key

### Day 3

Draw a number line. Place the following fractions  $\frac{3}{6}$ ,  $\frac{7}{8}$ ,  $\frac{11}{12}$ ,  $\frac{8}{6}$ ,  $\frac{1}{8}$ ,  $\frac{3}{4}$ ,  $\frac{25}{12}$ ,  $\frac{6}{3}$ ,  $\frac{6}{12}$ ,  $\frac{6}{5}$ ,  $\frac{3}{5}$ , and  $\frac{14}{8}$  on the number line. Select three of the fractions you placed on the number line and explain how you and your partner determined where to place these fractions on the number line. Challenge yourself.



Student explanations will vary. Look for:

- *Benchmarks*
  - $\frac{1}{2} = \frac{3}{6} = \frac{6}{12}$
  - $2 \text{ wholes} = \frac{6}{3}$
- *Common Numerator Comparison*
  - $\frac{3}{4} > \frac{3}{5} > \frac{3}{6}$
- *Pieces away from one whole:*
  - $\frac{11}{12} > \frac{7}{8} > \frac{3}{4}$
  - $\frac{25}{12} > 2 \text{ wholes}$
  - $\frac{6}{5} = 1\frac{1}{5}$ ,  $\frac{8}{6} = 1\frac{1}{3}$ ,  $1\frac{1}{5} < 1\frac{1}{3}$



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#### Day 4

Isabella baked a pan of lasagna for her family of 4. She cut the lasagna into eight equal pieces. Explain how much lasagna each family member might eat. Write equations/inequalities to compare how much each family member ate. Find at least 3 different ways the family could share the lasagna.

**Student explanations will vary. Look for:**

- *Equal-sized pieces (eighths)*
- *Different combinations of eighths, to include leftovers at times.*
- *Comparisons are represented by  $<$ ,  $>$  or  $=$  sign.*
- *Pieces are represented as eighths ( $\frac{1}{8}$ ) or multiple eighths (such as  $\frac{3}{8}$ ).*
- *Understanding that one whole piece of lasagna is  $\frac{1}{8}$  of the whole lasagna.*



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## Grade 4 | Problem Solving Journal Answer Key

### Module 3

#### Day 1

Keyton wanted to make 2 gallons of punch to take to the school picnic. He found a recipe that called for  $\frac{3}{4}$  gallon of fruit punch, 2 quarts of orange juice, 3 quarts of lime soda, and  $\frac{1}{2}$  gallon of water. If Keyton makes this recipe, will he have as much punch as he wants? Justify your solution.

**Yes, Keyton will have more than 2 gallons of punch to take to the school picnic.**

*Possible student strategies:*

$\frac{3}{4}$ gallon = 3 quarts (Fruit Punch) 2 quarts (Orange Juice) 3 quarts (Lime soda)	<table border="1"><tbody><tr><td>FP</td><td>FP</td><td>FP</td><td>OJ</td></tr></tbody></table>	FP	FP	FP	OJ	1 gallon
FP	FP	FP	OJ			
$\frac{1}{2}$ gallon = 2 quarts (Water)	<table border="1"><tbody><tr><td>Lime</td><td>Lime</td><td>Lime</td><td>OJ</td></tr></tbody></table>	Lime	Lime	Lime	OJ	1 gallon
Lime	Lime	Lime	OJ			
$3 + 2 + 3 + 2 = 10$ quarts altogether	<table border="1"><tbody><tr><td>H2O</td><td>H2O</td></tr></tbody></table>	H2O	H2O	$\frac{1}{2}$ gallon		
H2O	H2O					
Quarts in one gallon = 4 Quarts in two gallons = 8 $10 > 8$						





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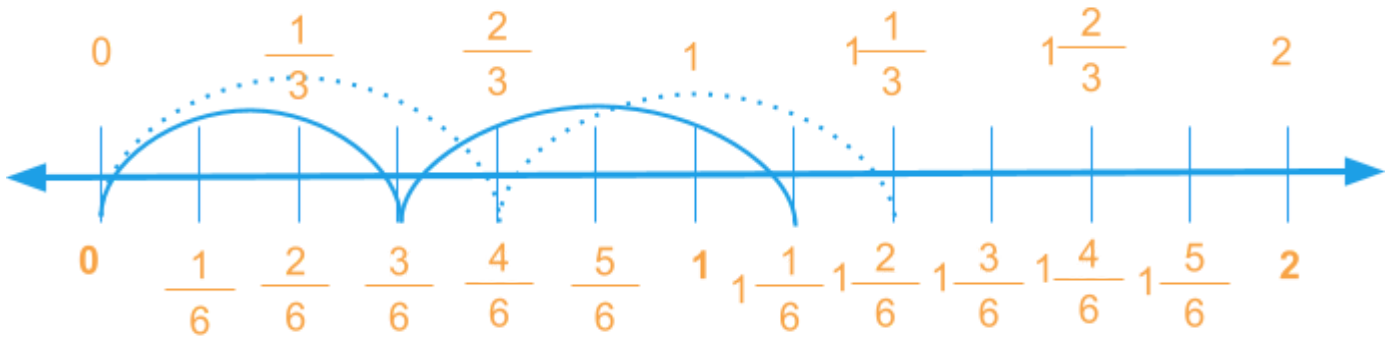
### Day 2

Fill in the blank with the correct symbol ( $>$ ,  $<$ , or  $=$ ). Explain how you determined the symbol to use. Then use a number line to compare these two addition expressions.  $\frac{3}{6} + \frac{4}{6}$  \_\_\_\_\_  $\frac{2}{3} + \frac{2}{3}$

$$\frac{3}{6} + \frac{4}{6} < \frac{2}{3} + \frac{2}{3}$$

**Student explanations will vary.** Look for:

- $\frac{3}{6} + \frac{4}{6}$  is less than  $\frac{2}{3} + \frac{2}{3}$  because the sum is farther to the right on the number line.
- $\frac{2}{3} = \frac{4}{6}$ , so  $\frac{2}{3} + \frac{2}{3} = \frac{4}{6} + \frac{4}{6}$ .  $\frac{3}{6} + \frac{4}{6}$  is less than  $\frac{4}{6} + \frac{4}{6}$ .





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### Day 3

Joan and Brett were decorating picture frames for a class store project. They needed  $3\frac{1}{4}$  feet of ribbon to decorate all their frames. Joan had  $2\frac{1}{2}$  feet of ribbon but used  $\frac{3}{4}$  of a foot of her ribbon for another project. Brett had  $2\frac{3}{4}$  feet of ribbon but used  $\frac{5}{4}$  of a foot of his ribbon for another project. Do they have enough ribbon for their project? Justify your solution.

**Yes, Joan and Brett have enough ribbon for their project.**

*Possible student solutions:*

$2\frac{1}{2} + 2\frac{3}{4} = 5\frac{1}{4}$ <p><i>Original amount of total ribbon</i></p> $\frac{3}{4} + \frac{5}{4} = \frac{8}{4}$ <p><i>Amount of ribbon used</i></p> $\frac{8}{4} = 2 \text{ wholes}$ $5\frac{1}{4} - 2 = 3\frac{1}{4}$ <p><i>Remaining ribbon</i></p>	$2\frac{1}{2} - \frac{3}{4} = 1\frac{3}{4}$ <p><i>Joan's remaining ribbon</i></p> $2\frac{3}{4} - \frac{5}{4} = 1\frac{1}{2}$ <p><i>Brett's remaining ribbon</i></p> $1\frac{1}{2} + 1\frac{3}{4} = 3\frac{1}{4}$ <p><i>Combined Ribbon</i></p>



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### Day 4

Iris and her brother needed  $2\frac{1}{2}$  bags of popcorn kernels to make enough popcorn to sell at the school bake sale. Iris had  $1\frac{1}{4}$  bags and her brother had  $1\frac{3}{8}$  bags. Do they have enough bags of popcorn kernels? Explain how you know.

**Yes, Iris and her brother have enough bags of popcorn kernels.**

*Possible student strategies:*

$1\frac{1}{4} = 1\frac{2}{8} \text{ (Iris)}$ $1\frac{3}{8} \text{ (Brother)}$ $1\frac{2}{8} + 1\frac{3}{8} = 2\frac{5}{8}$ $2\frac{5}{8} > 2\frac{1}{2}$	
$1\frac{3}{8} = 1\frac{2}{8} + \frac{1}{8}$ <p><i>Brother's Amount</i></p> $1\frac{2}{8} = 1\frac{1}{4}$ $1\frac{1}{4} + 1\frac{1}{4} = 2\frac{1}{2}$ <p><i>They have enough and <math>\frac{1}{8}</math> bags extra.</i></p>	



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# ST Math. Summer Immersion

## Grade 4 | Problem Solving Journal Answer Key

### Module 4

#### Day 1

Erica needs  $2\frac{1}{2}$  yards of cloth to make a blanket. She found  $1\frac{6}{8}$  yards of red cloth and  $\frac{4}{8}$  of blue cloth. Does she have enough to make the blanket? Explain how you know.

**No, She only has  $2\frac{2}{8}$  or  $2\frac{1}{4}$  yards of cloth. That is less than the  $2\frac{1}{2}$  she needs. She and her brother have enough bags of popcorn kernels.**

*Possible student strategies:*

$1\frac{6}{8} + \frac{4}{8} = 2\frac{2}{8}$ <p>She needs <math>2\frac{1}{2}</math>, She has <math>2\frac{2}{8}</math></p> $2\frac{1}{2} > 2\frac{2}{8}$	<p><math>1\frac{6}{8} + \frac{4}{8} = 2\frac{2}{8}</math></p> <p><math>2\frac{1}{2} &gt; 2\frac{2}{8}</math></p>
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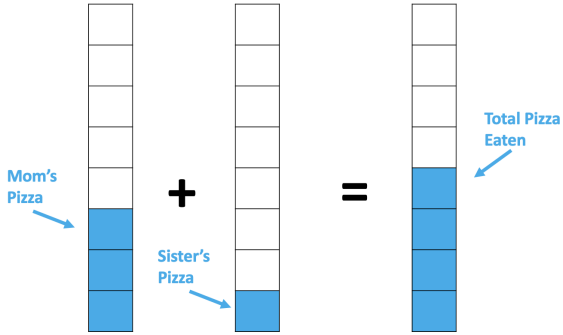
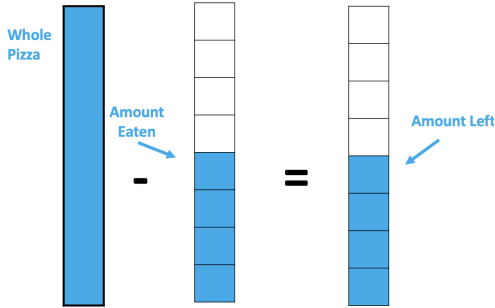
## Grade 4 | Problem Solving Journal Answer Key

### Day 2

Demarius made pizza for his family. He gave  $\frac{3}{8}$  of the pizza to his mom,  $\frac{1}{8}$  of the pizza to his sister, and ate the rest himself. Who ate more Demarius or his family? Explain how you know.

**They both ate the same amount. His mom ate  $\frac{3}{8}$  and his sister ate  $\frac{1}{8}$  that totals  $\frac{4}{8}$ . That means  $\frac{4}{8}$  of the pizza is left and  $\frac{4}{8} = \frac{4}{8}$  are equal.**

*Possible student strategies:*

$\frac{3}{8} + \frac{1}{8} = \frac{4}{8}$ <p>Mom's pizza + sister's pizza</p> $1 - \frac{4}{8} = \frac{4}{8}$ <p>Whole pizza — what mom and sister ate</p> $\frac{4}{8} = \frac{4}{8} \text{ are equal}$	 <p>Mom's Pizza + Sister's Pizza = Total Pizza Eaten</p>  <p>Whole Pizza - Amount Eaten = Amount Left</p> <p><math>\frac{4}{8} = \frac{4}{8}</math> Demarius and his family ate the same amount of pizza</p>
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### Day 3

Carlos drinks  $\frac{2}{6}$  cup of milk at breakfast and again at lunch. At dinner, Carlos drinks  $\frac{4}{6}$  cup of milk. How much milk does Carlos drink in 1 day? Explain how you know.

**Carlos drinks  $\frac{8}{6}$  or  $1 \frac{2}{6}$  or  $1 \frac{1}{3}$  cups of milk each day.**

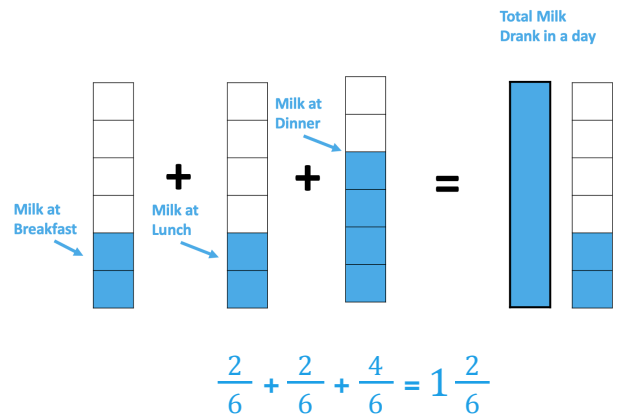
*Possible student strategies:*

$$\frac{2}{6} + \frac{2}{6} = \frac{4}{6}$$

Carlos drinks the same amount ( $\frac{2}{6}$ ) at breakfast and lunch. That totals  $\frac{4}{6}$

At dinner he drinks  $\frac{4}{6}$ .

$$\frac{4}{6} + \frac{4}{6} = \frac{8}{6} = 1 \frac{2}{6}$$





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### Day 4

Bev is knitting a scarf for her mother. She knits  $\frac{4}{3}$  of a foot on Monday,  $\frac{2}{3}$  of a foot on Tuesday, and  $1\frac{2}{3}$  of a foot on Wednesday. Bev thinks she has knitted 4 feet of her scarf. Is she correct? Explain how you know.

**Bev has knitted  $3\frac{2}{3}$  feet of the scarf, which is less than 4 feet, so Bev is not correct.**

*Possible student strategies:*

$$\frac{4}{3} + \frac{2}{3} = \frac{6}{3}$$

$$\frac{6}{3} = 2$$

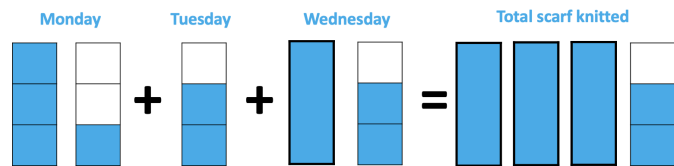
On Monday and Tuesday, Bev knitted 2 feet of the scarf.

$$2 + 1\frac{2}{3} = 3\frac{2}{3}$$

The total amount that Bev knitted on Monday, Tuesday and Wednesday is  $3\frac{2}{3}$

$$3\frac{2}{3} < 4$$

Bev was not correct.



$$\frac{4}{3} + \frac{2}{3} + 1\frac{2}{3} = 3\frac{2}{3}$$

$$3\frac{2}{3} < 4$$

Bev was not correct.





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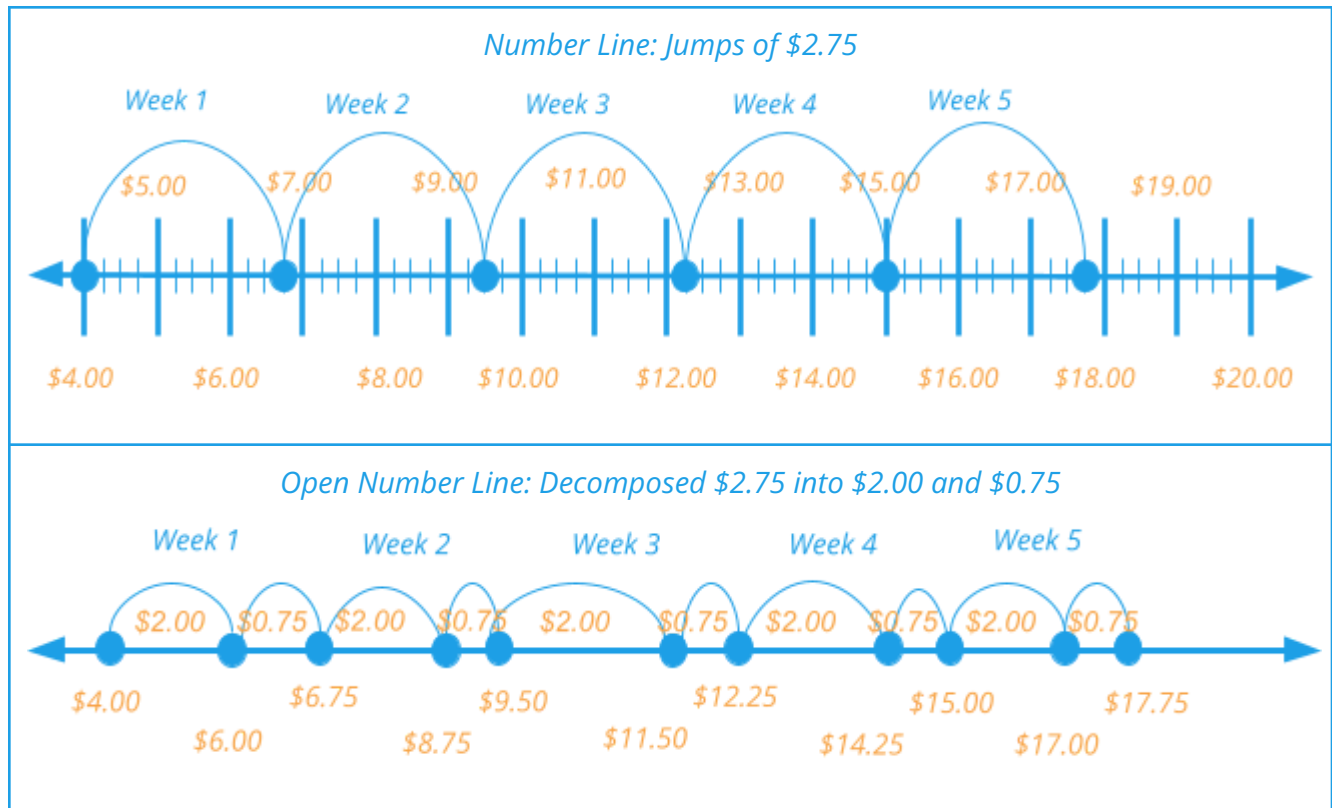
### Module 5

#### Day 1

Barry had \$4.00. He earned \$2.75 a day for 5 days taking care of his neighbor's dog. How much money does he have now? Use a number line to show how much money Barry has now.

**Barry has \$17.75.**

*Possible student strategies:*





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### Day 2

Loretta keeps time for each lap she runs around a track. The first lap she ran in 1.83 minutes. The second lap she ran in 1.9 minutes. She ran for three laps. Her total time for the three laps was 4.48 minutes. How long was her third lap?

**Loretta's third lap was 0.75 minutes.**

*Possible student strategies:*

$$1.83 + 1.9 = 3.73$$

*Combined time for first two laps*

$$3.73 + 0.27 = 4.00$$

*Difference to nearest whole*

$$4.00 + 0.48 = 4.48$$

*Difference to total time*

$$0.27 + 0.48 = 0.75$$

*Total difference (third lap)*

$$4.48 - 1.83$$

*Total time minus first lap time*

$$1.83 = 1.43 + 0.4$$

*Decomposing first lap into friendly values*

$$4.48 - 1.43 = 3.05$$

$$3.05 - 0.4 = 1.65$$

*Subtracting the total time by the first lap using friendly values.*

$$1.9 = 1.6 + 1.3$$

*Decomposing the second lap into friendly values*

$$1.65 - 1.6 = 1.05$$

$$1.05 - 0.3 = 0.75$$

*Subtracting the remaining time by the second lap using friendly values.*