



# ST Math<sup>®</sup>

## Summer Immersion

### Grade 5 | 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

Trisha was in charge of making a sign for each  $\frac{1}{4}$  mile distance for a 2-mile race. She marked the distances in decimals. What numbers did Trisha write on her signs?

**0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2 or 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00**

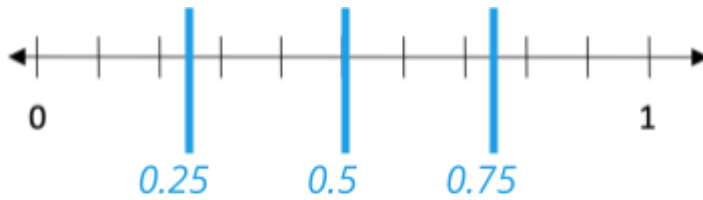


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### Day 4 (Have students refer to Module 1 Day 3 POD.)

Trisha's coach gave her this number line to record her distances for the first mile. Mark and label the quarter-mile distances shown on her signs. If needed, you can draw the number line larger below.





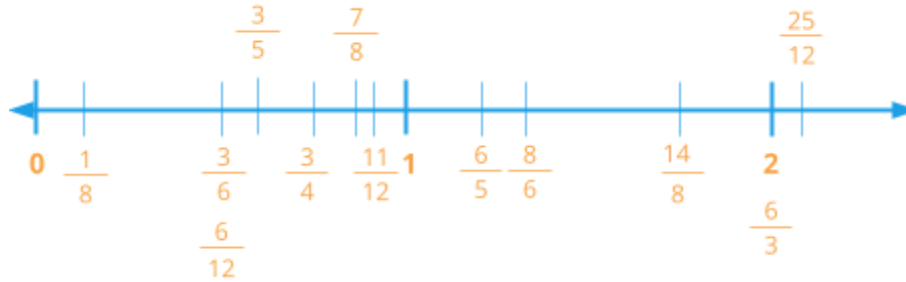
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### Module 2

#### Day 1

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

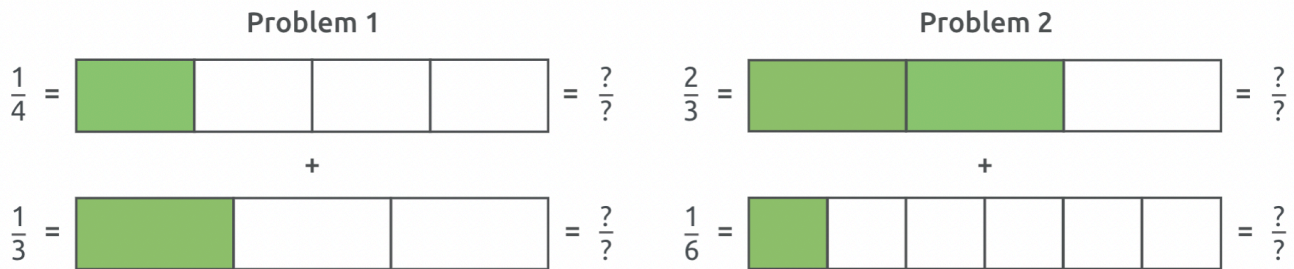


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### Day 2

Use the bars below to add the fractions by turning them into equivalent fractions with the same denominator.  $\frac{1}{4} + \frac{1}{3} = ?$  Do the same to problem number 2.  $\frac{2}{3} + \frac{1}{6} = ?$



#### Problem 1

$$\frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$$

#### Problem 2

$$\frac{2}{3} + \frac{1}{6} = \frac{4}{6} + \frac{1}{6} = \frac{5}{6}$$



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### Day 3

Darla wanted to make 2 gallons of punch to take to the school picnic. She found a recipe that called for  $\frac{3}{4}$  gallon of fruit punch, 2 quarts of orange juice,  $\frac{3}{8}$  gallon of lime soda, and  $\frac{1}{2}$  gallon of water. If Darla makes this recipe, will she have as much punch as she wants? Justify your solution.

**Yes, Darla 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) $\frac{1}{2}$ gallon = 2 quarts (Water) $\frac{3}{8}$ gallon = $1 \frac{1}{2}$ quart (lime soda) $3 + 2 + 2 + 1 \frac{1}{2} = 8 \frac{1}{2}$ quarts altogether  Quarts in one gallon = 4 Quarts in two gallons = 8 $8 \frac{1}{2} > 8$	<p>FP FP FP OJ 1 gallon</p> <p>OJ H2O H2O L S 1 gallon</p> <p>L S <math>\frac{1}{8}</math> gallon</p>
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### Day 4

Kevin filled 4 glasses with different amounts of water so they would make different sounds when he rubbed his finger along the rim. Glass A held  $\frac{5}{8}$  cup of water, glass B held  $\frac{3}{4}$  cup of water, glass C held  $\frac{3}{6}$  cup of water, glass D held  $\frac{2}{6}$  cup of water. How much water did Kevin use? How much water could he put in a fifth glass if he had 3 cups of water?

**Kevin used  $2\frac{5}{24}$  cups of water. Glass 5 can hold  $\frac{19}{24}$  cup of water.**

*Student strategies will vary.*

### Possible Student Strategies

#### Establishing Common Denominators

$$\begin{aligned}\frac{3}{4} &= \frac{6}{8} \text{ (B)} \\ \frac{5}{8} \text{ (A)} + \frac{6}{8} \text{ (B)} &= \frac{11}{8} = \frac{33}{24} \\ \frac{3}{6} \text{ (C)} + \frac{2}{6} \text{ (D)} &= \frac{5}{6} = \frac{20}{24} \\ 33 + 20 &= \frac{53}{24} \\ \frac{53}{24} &= 2\frac{5}{24}\end{aligned}$$

#### Using $\frac{1}{2}$ as a benchmark

$$\begin{aligned}\frac{5}{8} &= \frac{1}{2} + \frac{1}{8} \\ \frac{3}{4} &= \frac{1}{2} + \frac{1}{4} \\ \frac{3}{6} &= \frac{1}{2} \\ \frac{2}{6} &= \frac{1}{2} - \frac{1}{6} \\ \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} &= 2 \text{ wholes} \\ \frac{1}{8} + \frac{1}{4} &= \frac{3}{8} \\ \frac{3}{8} - \frac{1}{6} &= \frac{9}{24} - \frac{4}{24} \\ \frac{9}{24} - \frac{4}{24} &= \frac{5}{24} \\ 2 \text{ wholes and } &\frac{5}{24}\end{aligned}$$



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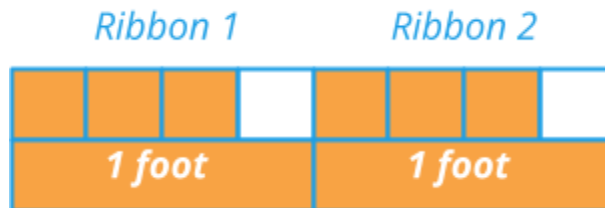
### Module 3

#### Day 1

Partner A: Ribbon at Jones' Ribbon Shop is sold in various lengths. Rebecca bought two pieces of red ribbon to make hair bows. She selected the red ribbon from the bin with lengths of  $\frac{3}{4}$  foot. How much ribbon did Rebecca buy? Compare your problem with your partner's problem.

**Rebecca bought  $1\frac{1}{2}$  ft of ribbon.**

*Possible Student Strategy:*



$$\frac{3}{4} + \frac{3}{4} = \frac{6}{4}$$
$$\frac{6}{4} = 1\frac{2}{4} \text{ or } 1\frac{1}{2} \text{ ft.}$$

Partner B: Ribbon at Jones' Ribbon Shop is sold in various lengths. Chris bought a piece of ribbon that was 2 feet long. He used  $\frac{3}{4}$  of the ribbon. What length of ribbon did he use? Compare your problem with your partner's problem.

**Chris used  $1\frac{1}{2}$  ft of ribbon.**

*Possible Student Strategy:*



$$\frac{1}{4} \text{ of } 2 \text{ feet is } \frac{1}{2} \text{ ft.}$$
$$\frac{3}{4} \text{ of } 2 \text{ feet is } 1\frac{1}{2} \text{ ft.}$$

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



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- The same solution derived from two different representations.

### Day 2

Partner A: Janet discovered that the distance to the park and back to her house is  $\frac{3}{4}$  mile. She ran to the park and back home 5 times. How far did she run? • Compare your problem with your partner's problem.

**Janet ran  $3\frac{3}{4}$  miles.**

Partner B: Bailey lives 5 miles from the park. She decided to run to the park. She got  $\frac{3}{4}$  of the way there, stopped, and called her mother to pick her up. How far did Bailey run? • Compare your problem with your partner's problem.

**Bailey ran  $3\frac{3}{4}$  miles.**

### Possible Student Strategies:

<p><b>Janet</b></p> <p><math>\frac{3}{4}</math> represents the distance to the park and back each time.</p> <p>5 represents the number of laps Janet completed.</p>	<p>Repeated Addition</p> $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}$	<p>Multiplication of Fractions</p> $\frac{3}{4} \times 5 = \frac{15}{4}$ $\frac{15}{4} = 3\frac{3}{4}$	<p>Grouping <math>\frac{3}{4}</math> into <math>1\frac{1}{2}</math></p> $\frac{3}{4} + \frac{3}{4} = 1\frac{1}{2} \text{ mi (2 laps)}$ $1\frac{1}{2} + 1\frac{1}{2} = 3 \text{ mi (4 laps)}$ $3 + \frac{3}{4} = 3\frac{3}{4} \text{ miles (5 laps)}$
<p><b>Bailey</b></p> <p><math>\frac{3}{4}</math> represents what fraction of the whole distance Bailey ran before stopping.</p> <p>5 represents the intended whole distance of the run.</p>	<p><math>\frac{3}{4}</math> of 5</p> <p>5 miles split into four equal sections makes each section <math>1\frac{1}{4}</math> miles.</p> $1\frac{1}{4} + 1\frac{1}{4} + 1\frac{1}{4} = 3\frac{3}{4}$		<p>Benchmarks</p> $\frac{1}{2} \text{ of } 5 \text{ is } 2\frac{1}{2}$ $\frac{1}{2} \text{ of } 2\frac{1}{2} \text{ is } 1\frac{1}{4}$ $\frac{1}{4} \text{ of } 5 \text{ is } 1\frac{1}{4}$ $2\frac{1}{2} + 1\frac{1}{4}$





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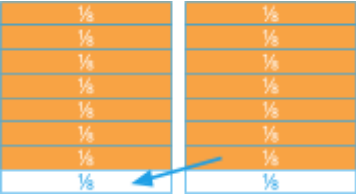
## Grade 5 | Problem Solving Journal Answer Key

### Day 3

James built a launchpad for his toy spaceship. The pad was 2 feet by  $\frac{7}{8}$  foot. What was the area of James' launchpad?

**James' launchpad was  $1\frac{3}{4}$  square feet.**

### Possible Student Strategies

Array Model	Repeated Addition	Multiplication
	$\frac{7}{8} + \frac{7}{8} = \frac{14}{8}$ $\frac{14}{8} = 1\frac{6}{8}$ $1\frac{6}{8} = 1\frac{3}{4}$	$\frac{7}{8} \times 2 = \frac{14}{8}$ $\frac{14}{8} = 1\frac{6}{8}$ $1\frac{6}{8} = 1\frac{3}{4}$



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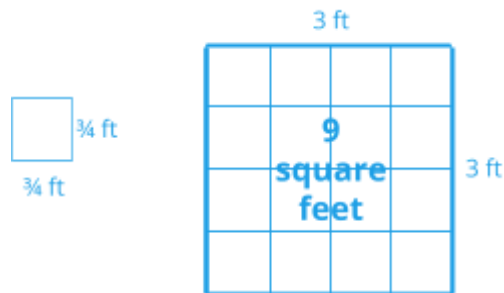
### Day 4

LeVonne tiled her bedroom with carpet squares. Her bedroom is 12 tiles by 16 tiles. The carpet tiles she used were  $\frac{3}{4}$  ft. by  $\frac{3}{4}$  ft. What is the area of LeVonne's bedroom?

**LeVonne's bedroom is 108 square feet. Student strategies will vary. Look for:**

- Each tile is  $\frac{9}{16}$  square feet.
- Every 16 tiles is 9 square feet.
- There are 192 total tiles.

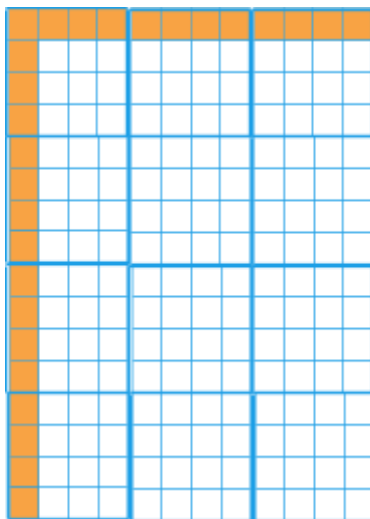
*Possible Student Strategy*



*A row of 4,  $\frac{3}{4}$  - foot tiles has a length of 3 feet.*

*A 4x4 array of  $\frac{3}{4}$  - foot tiles will have dimensions of 3 feet by 3 feet or 9 square feet in area.*

*12 x 16 small tiles = 3 x 4 large, 9 sqft groups. 9 sq feet x 12 tiles = 108 square feet*





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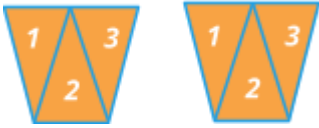
### Module 4

#### Day 1

Bill, Jack, and Jill each had an empty pail. They had to carry 2 gallons of water up the hill. If they each carried the same amount of water, how much water did each friend carry? Prove that the total amount of water they carried equals two pails of water.

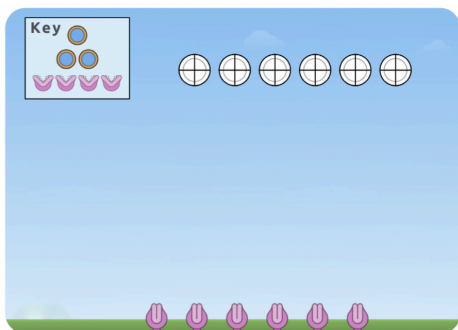
**Each friend took  $\frac{2}{3}$  of a gallon of water up the hill.**

#### Possible Student Strategies

<p><i>2 gallons, divided into thirds</i></p> <p>1 gallon      1 gallon</p> 	<p><i>Non-anticipatory sharing</i></p> $\frac{1}{2} + \frac{1}{6} = \frac{3}{6} + \frac{1}{6}$ $\frac{4}{6} = \frac{2}{3}$	<p><i>2 divided by 3</i></p> $\frac{2}{3}$
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#### Day 2

How many pies will 6 monsters eat? Write an equation to show you could solve the problem.



*In this puzzle, 4 fruit monsters eat every 3 whole pies. Each monster eats  $\frac{3}{4}$  of a pie. With 6 monsters, they would eat  $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}$  or  $4\frac{1}{2}$  pies*





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### Module 5

#### Day 1

My dog's food comes in 8-pound bags. My dog eats  $\frac{1}{4}$  of a pound of food each meal. How many meals will one bag of dog food serve?

**One bag of dog food will serve 32 meals.**

#### Possible Student Strategies

##### Repeated Subtraction

$$8 - \frac{1}{4} = 7 \frac{3}{4}$$

$$7 \frac{3}{4} - \frac{1}{4} = 7 \frac{2}{4}$$

$$7 \frac{2}{4} - \frac{1}{4} = 7 \frac{1}{4}$$

$$7 \frac{1}{4} - \frac{1}{4} = 7$$

$$7 - \frac{1}{4} = 6 \frac{3}{4}$$

$$6 \frac{3}{4} - \frac{1}{4} = 6 \frac{2}{4}$$

$$6 \frac{2}{4} - \frac{1}{4} = 6 \frac{1}{4}$$

$$6 \frac{1}{4} - \frac{1}{4} = 6$$

$$6 - \frac{1}{4} = 5 \frac{3}{4}$$

$$5 \frac{3}{4} - \frac{1}{4} = 5 \frac{2}{4}$$

$$5 \frac{2}{4} - \frac{1}{4} = 5 \frac{1}{4}$$

$$5 \frac{1}{4} - \frac{1}{4} = 5$$

$$5 - \frac{1}{4} = 4 \frac{3}{4}$$

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

$$4 \frac{2}{4} - \frac{1}{4} = 4 \frac{1}{4}$$

$$4 \frac{1}{4} - \frac{1}{4} = 4$$

$$4 - \frac{1}{4} = 3 \frac{3}{4}$$

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

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

$$3 \frac{1}{4} - \frac{1}{4} = 3$$

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

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

$$2 \frac{2}{4} - \frac{1}{4} = 2 \frac{1}{4}$$

$$2 \frac{1}{4} - \frac{1}{4} = 2$$

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

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

$$1 \frac{2}{4} - \frac{1}{4} = 1 \frac{1}{4}$$

$$1 \frac{1}{4} - \frac{1}{4} = 1$$

$$1 - \frac{1}{4} = \frac{3}{4}$$

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

$$\frac{2}{4} - \frac{1}{4} = \frac{1}{4}$$

$$\frac{1}{4} - \frac{1}{4} = 0$$

32 groups of  $\frac{1}{4}$ , or 32 meals, could be taken away from 8 pounds.

##### Grouping

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

4 meals for every 1 pound  
4 meals x 8 pounds = 32 meals

##### Reasoning Up

$\frac{1}{4}$  pound = 1 meal  
1 pound = 4 meals  
8 pounds = 32 meals



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### Day 2

The art teacher had 6 cups of sparkles for an art project. He gave each student in Ms. Clark's class  $\frac{1}{3}$  of a cup of sparkles to use. How many students are there in Ms. Clark's class? Write the equation and draw a picture to show how you got your answer.

**There are 18 students in Ms. Clark's class.**

#### Possible Student Strategies

<p><i>Repeated Addition</i></p> $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1 \text{ cup}$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1 \text{ cup}$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1 \text{ cup}$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1 \text{ cup}$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1 \text{ cup}$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1 \text{ cup}$	<p><i>Grouping</i></p> $\frac{1}{3} \times 3 = 1 \text{ cup}$ <p><i>For every three students who received sparkles, the art teacher used one cup of sparkles.</i></p> <p><i>Since there were 6 cups of sparkles, 6 times as many students (3 x 6) were in the class.</i></p>	<p><i>Reasoning Up</i></p> $1 \div \frac{1}{3} = 3$ $6 \div \frac{1}{3} = 18$
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