Extended Problems Answer Key

Big Ideas: Extended Problems

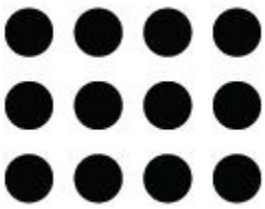
Use or adapt the feedback in this Answer Key as you grade each student paper. Answers will vary. Therefore, you must examine each answer based upon its own merits. Representative examples are shown here.

Total Score: 25 points

1. Matthew, Aisha, Eric, and Natalie visit Wacky World Water Park. While waiting in line to enter the park, they read the brochure to learn more about the amusements at the park. Parts of the brochure are damaged, so they are unable to read some of the information.

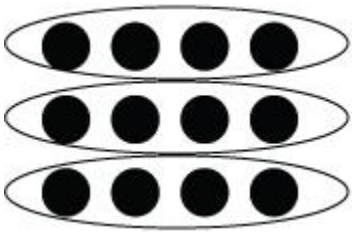
Amusement Name	Description	Number of This Type of Amusement
Sprinklers	There are 5 times as many sprinklers as giant inner tubes.	
Water slides	The water park has 12 water slides.	12
Giant inner tubes	The number of water slides is 3 times the number of giant inner tubes.	
Wave pools		5
Lazy River	The water park has 1 lazy river.	1

(a) This model uses dots to show the number of water slides at the water park.



Show how to find the number of giant inner tubes using the model. Explain your answer.

Sample Response for Part (a)

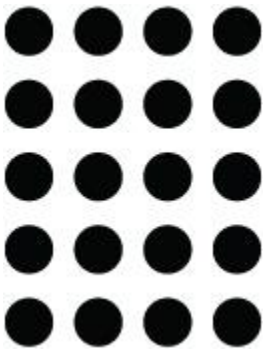


There are 12 water slides, so there are 12 dots in this model. The number of water slides is 3 times the number of giant inner tubes. To find the number of giant inner tubes, divide the 12 dots into 3 equal groups. There are 4 dots in each group. Therefore, there are 4 giant inner tubes at the park.

Note: *Students must indicate three groups of dots with exactly 4 dots in each group, but the dots do not have to be circled in rows.*

(b) Draw a dot model to find the number of sprinklers at the park. Explain your model and your solution.

Sample Response for Part (b)

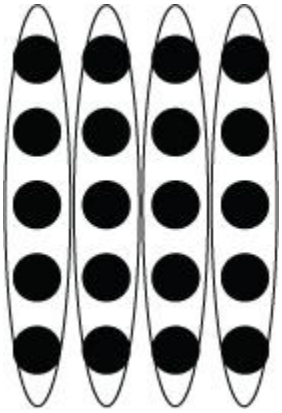


There are 4 giant inner tubes at the park. One group of 4 dots represents the number of giant inner tubes. There are 5 times as many sprinklers as giant inner tubes. The model shows 5 groups of 4 dots. There are 20 dots in all. Therefore, there are 20 sprinklers at the park.

Note: *Students must draw a model in which the number of dots is 5 times the number of giant inner tubes found in Part (a). Dots do not have to be arranged as an array.*

(c) Draw a dot model to find how many times as many sprinklers there are as wave pools. Explain your model and your solution.

Sample Response for Part (c)

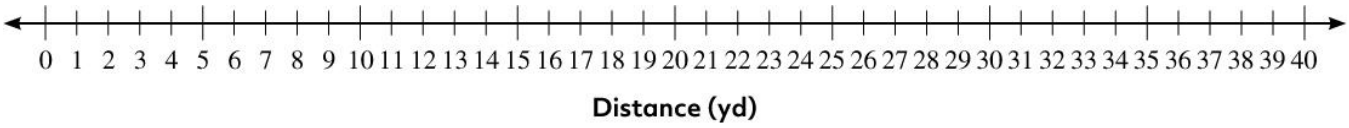


There are 20 sprinklers, so I drew 20 dots to represent the number of sprinklers. There are 5 wave pools. I can circle 4 groups of 5 dots each. Therefore, there are 4 times as many sprinklers as there are wave pools.

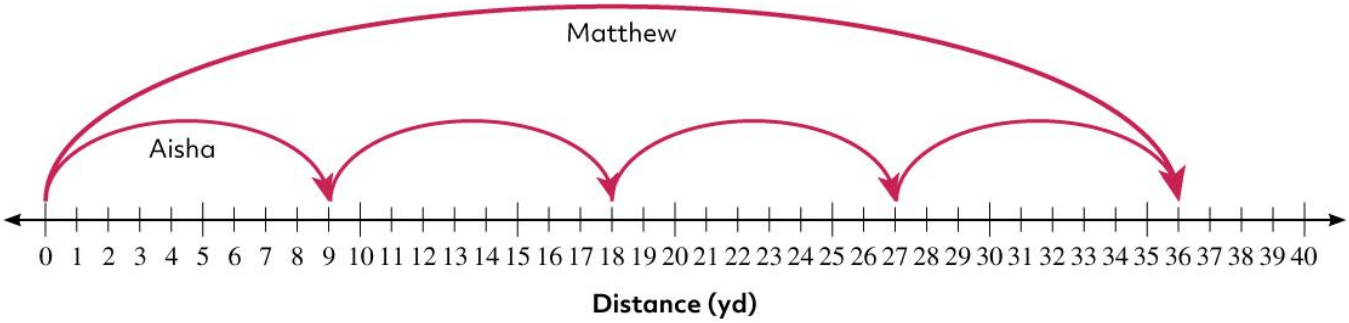
Note: *Students must draw the model in Part (b) and either divide the dots into 4 groups of 5 dots each (shown here) or 5 groups of 4 dots each.*

2. The friends decided to go in the lazy river.

(a) Matthew floated 36 yards down the river. Aisha floated 9 yards. Use this number line to find out how many times as far Matthew floated as Aisha. Show your work on the number line.



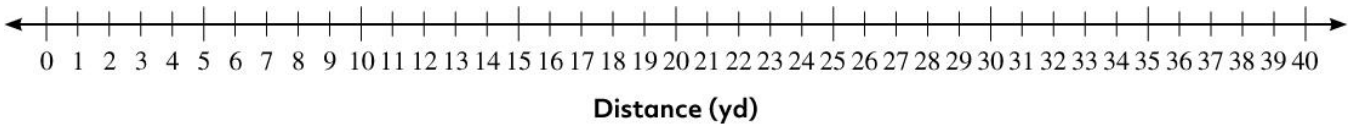
Sample response for Part (a)



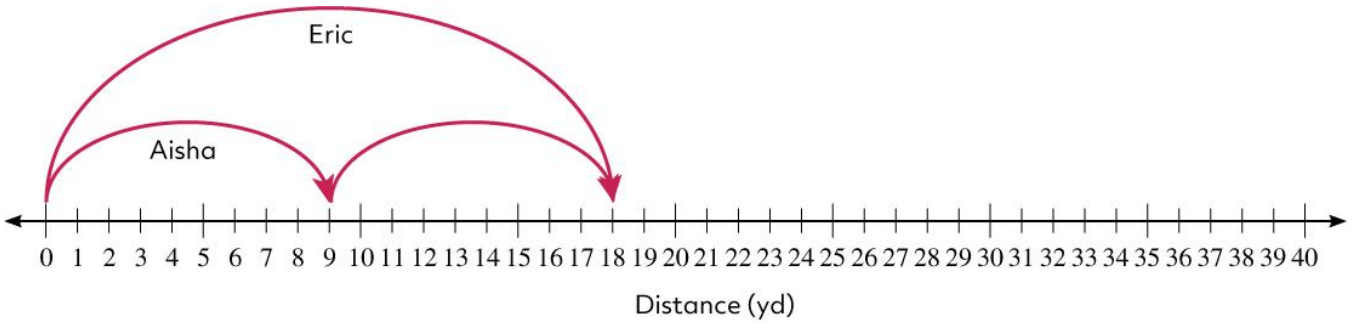
Matthew floated 4 times as far as Aisha.

Note: *Students' drawings must draw four hops of 9 yards each from 0 to 36 to show the distance Aisha floated.*

(b) Eric floated 2 times as far as Aisha. Use this number line to find out how far Eric floated. Show your work on the number line.



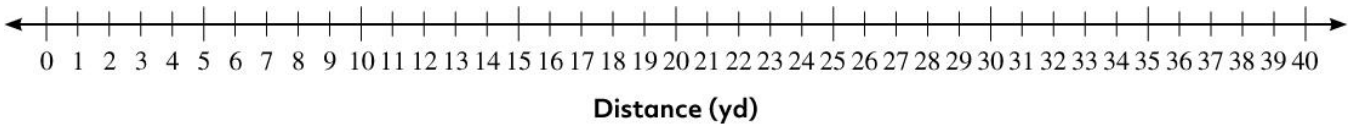
Sample response for Part (b)



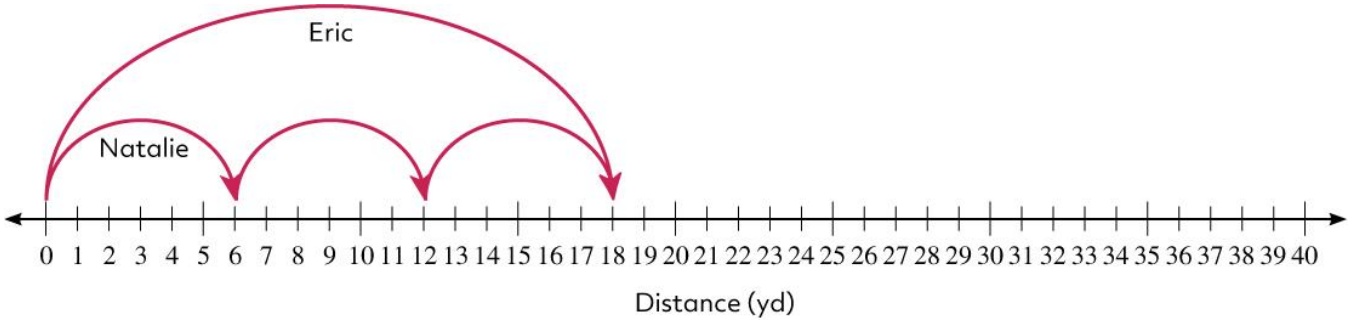
Eric floated 18 yards down the river.

Note: *Students' drawings must include two hops of 9 yards each from 0 to 18 to show the distance Eric floated.*

(c) Eric also floated 3 times as far as Natalie. Use this number line to find out how far Natalie floated down the river. Show your work on the number line.



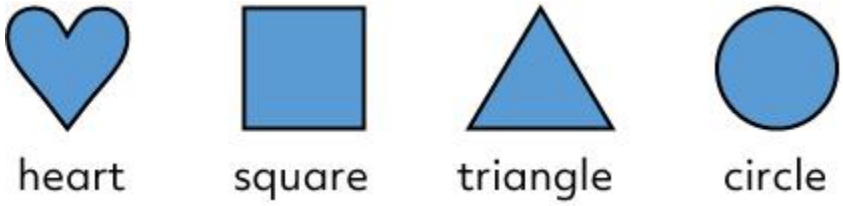
Sample response for Part (c)



Natalie floated 6 yards down the river.

Note: *Students' drawings must include three hops of 6 yards each from 0 to 18 to show the distance that Natalie floated.*

3. Matthew and Natalie stop at a stand where they can design their own bead bracelets. There are different shaped beads to choose from:



(a) Matthew sets up the beads of his bracelet in a pattern. The rule for his pattern is square, circle, triangle, triangle. He repeats the rule three times as he puts the beads on the bracelet. Draw the beads of Matthew's bracelet by following his pattern's rule.

Sample response for Part (a)

Note: *Students must draw three correct repetitions of the rule.*

(b) Natalie is having difficulty deciding what pattern to use for her bracelet. Help Natalie by choosing a pattern for her.

- Write the rule for Natalie's pattern. The rule must include at least three different shapes.
- Draw the beads of Natalie's bracelet by following the rule you created in part (b). Repeat the rule three times in your pattern.

Sample response for Part (b)

Possible answer: circle, triangle, heart

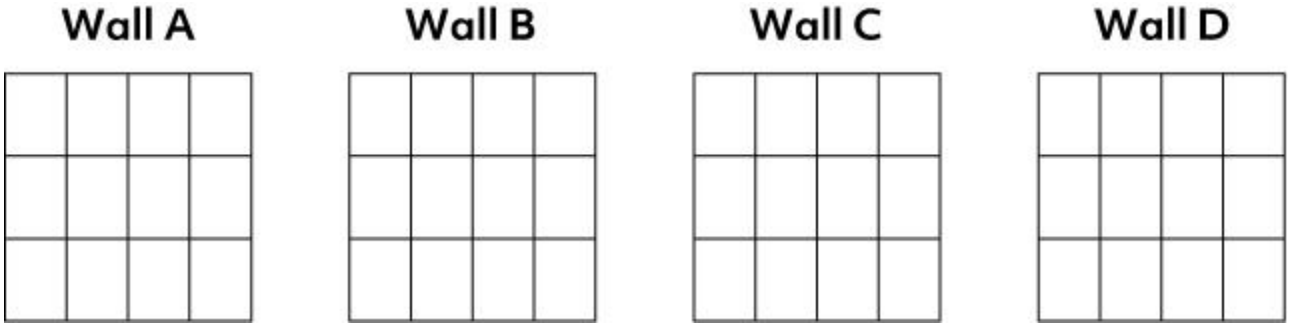
Note: *Answers will vary. Students' rules must include at least three different shapes. Students' pattern must be drawn according to this rule. The rule must be repeated three times.*

4. The friends rent lockers in one of the locker rooms to store their belongings while they are at the park. There are 4 walls of lockers. The walls are labeled A, B, C, and D. When they arrive at the park, all the lockers are available.

(a) Below is a model of the walls of the locker room. The small rectangles represent lockers on the walls.

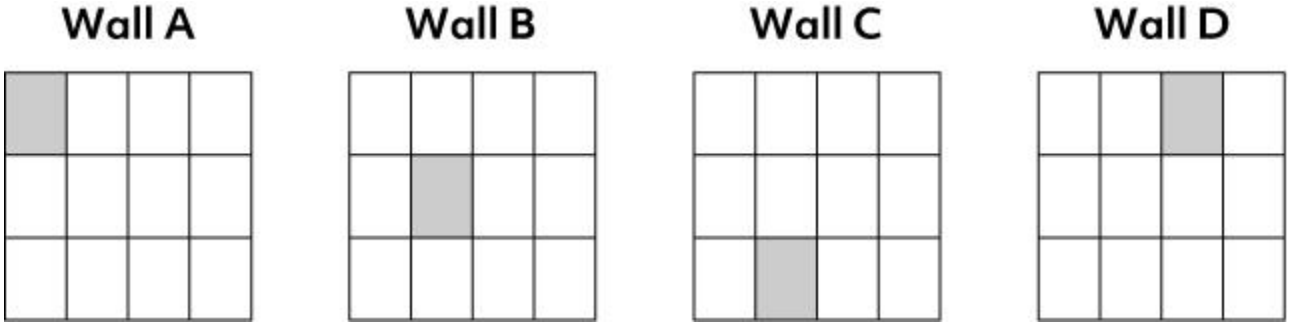
Each friend chooses a different wall and rents $\frac{1}{12}$ of the lockers on that wall.

- Shade the correct number of rectangles on each wall to show lockers the friends rented.



- Write a multiplication expression that shows the portion of wall space that the friends use given that they together use 4 lockers that are each $\frac{1}{12}$ of a wall.

Sample response for Part (a)

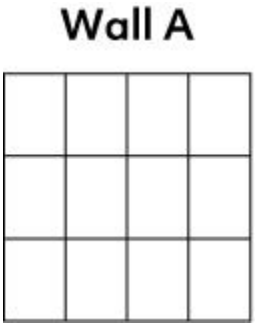


Expression: $4 \times \frac{1}{12}$

Note: *Students must shade one rectangle in each model. Students may shade any one of the small rectangles for each wall. The expression must be a multiplication expression.*

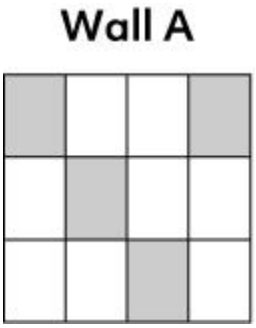
(b) A person working at the park asks the friends to use the lockers on wall A so that guests fill one wall at a time.

- Shade the correct number of rectangles to show the number of lockers on wall A that the friends rent.



- What fraction of the lockers on wall A do the friends use?
- How does this fraction compare with the expression you wrote in part (a)? Use the models in parts (a) and (b) to explain.

Sample response for Part (b)



The friends used $\frac{4}{12}$ of the lockers on Wall A.

$4 \times \frac{1}{12}$ equals $\frac{4}{12}$. The model in part (a) is described by the expression $4 \times \frac{1}{12}$. There are 4 small rectangles shaded in this model. The model in part (b) is described by the fraction $\frac{4}{12}$. There are 4 small rectangles shaded in this model as well. Each small rectangle represents $\frac{1}{12}$. Therefore, in each model four $\frac{1}{12}$

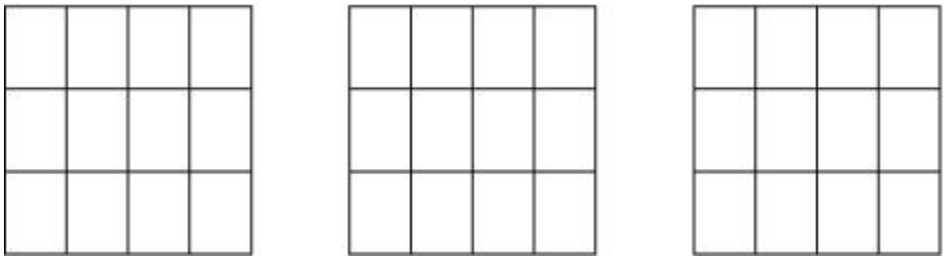
parts are shaded. Since both models have the same number of shaded rectangles, the expression $4 \times \frac{1}{12}$ and the fraction $\frac{4}{12}$ are equal.

Note: *Students may shade any four of the small rectangles. Students must correctly state that* $\frac{4}{12}$ *of the lockers are used on Wall A. The answer* $\frac{1}{3}$ *is also acceptable.*

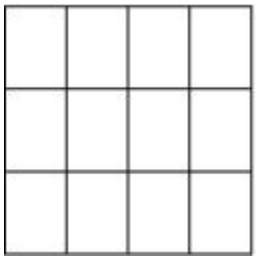
(c) Later in the day, $\frac{2}{12}$ of the lockers on wall B are rented. Three times as many lockers are rented on wall C. Eric says the expression $3 \times \frac{2}{12}$ represents the fraction of the lockers on wall C that are rented. Aisha says that $\frac{6}{12}$ represents the fraction of the lockers on wall C are rented. Both friends are correct.

- Shade these two models to show $3 \times \frac{2}{12}$ and $\frac{6}{12}$.

Model $3 \times \frac{2}{12}$



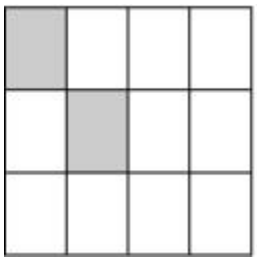
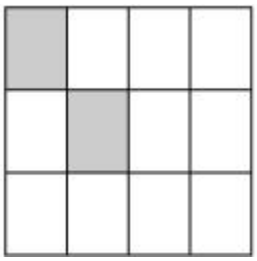
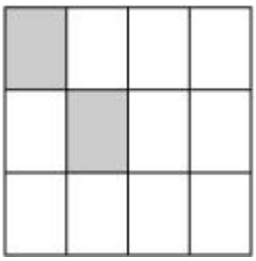
Model $\frac{6}{12}$



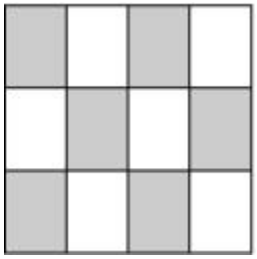
- Explain how the models show that $3 \times \frac{2}{12} = \frac{6}{12}$.

Sample response for Part (c)

Model $3 \times \frac{2}{12}$

Model $\frac{6}{12}$



In the model of $3 \times \frac{2}{12}$, 6 rectangles are shaded in all. In the model of $\frac{6}{12}$, 6 rectangles are also shaded. Six $\frac{1}{12}$ parts are shaded in each model. Therefore, $3 \times \frac{2}{12} = \frac{6}{12}$.

Note: *Students may shade any 2 rectangles in each grid for the model of* $3 \times \frac{2}{12}$*. Students may correctly shade any 6 rectangles in the model of* $\frac{6}{12}$.