



(<http://openupresources.org>)Menu

Close

- [OUR Curriculum \(http://openupresources.org\)](http://openupresources.org)
- [Professional Development \(http://openupresources.org/illustrative-mathematics-professional-development\)](http://openupresources.org/illustrative-mathematics-professional-development)
- [Implementation Support \(http://openupresources.org/illustrative-mathematics-implementation-support\)](http://openupresources.org/illustrative-mathematics-implementation-support)
- [About Us \(http://openupresources.org/about-us/\)](http://openupresources.org/about-us/)
- [Contact \(http://openupresources.org/contact-us/\)](http://openupresources.org/contact-us/)
- [Log Out \(https://auth.openupresources.org/logout/\)](https://auth.openupresources.org/logout/)

Unit 2 Practice Problems

- Lesson 1
- Lesson 2
- Lesson 3
- Lesson 4
- Lesson 5
- Lesson 6
- Lesson 7
- Lesson 8
- Lesson 9
- Lesson 10
- Lesson 11
- Lesson 12
- Lesson 13
- Lesson 14
- Lesson 15
- Lesson 16

Lesson 1

Problem 1

In a fruit basket there are 9 bananas, 4 apples, and 3 plums.

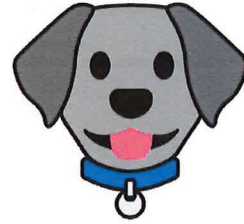
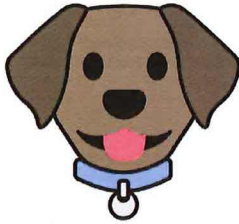
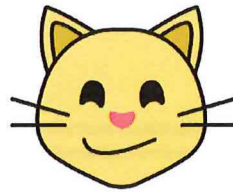
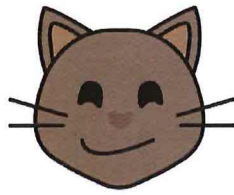
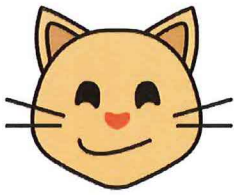
1. The ratio of bananas to apples is _____ : _____.
2. The ratio of plums to apples is _____ to _____.
3. For every _____ apples, there are _____ plums.
4. For every 3 bananas there is one _____.

Solution

1. 9, 4
2. 3, 4
3. 4, 3
4. plum

Problem 2

Complete the sentences to describe this picture.



1. The ratio of dogs to cats is _____.

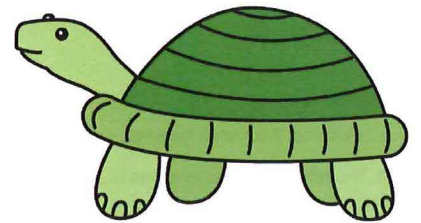
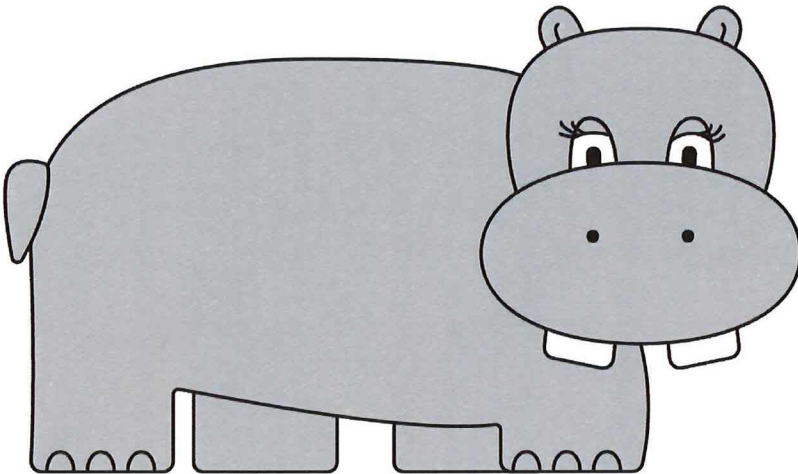
2. For every _____ dogs, there are _____ cats.

Solution

- 1. 3 to 4
- 2. 3, 4

Problem 3

Write two different sentences that use ratios to describe the number of eyes and legs in this picture.



Solution

Answers vary. Sample responses:

- The ratio of legs to eyes is 8 to 4.
- The ratio of eyes to legs is 4 : 8.
- There are 2 legs for every eye.
- There are 4 legs for every 2 eyes.

Problem 4

(from Unit 1, Lesson 17)

Choose an appropriate unit of measurement for each quantity.

1. area of a rectangle
2. volume of a prism
3. side of a square
4. area of a square
5. volume of a cube

- cm
- cm^3
- cm^2

Solution

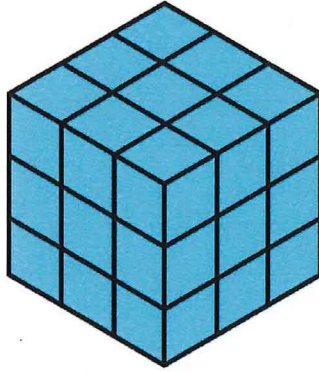
1. cm^2
2. cm^3
3. cm
4. cm^2
5. cm^3

Problem 5

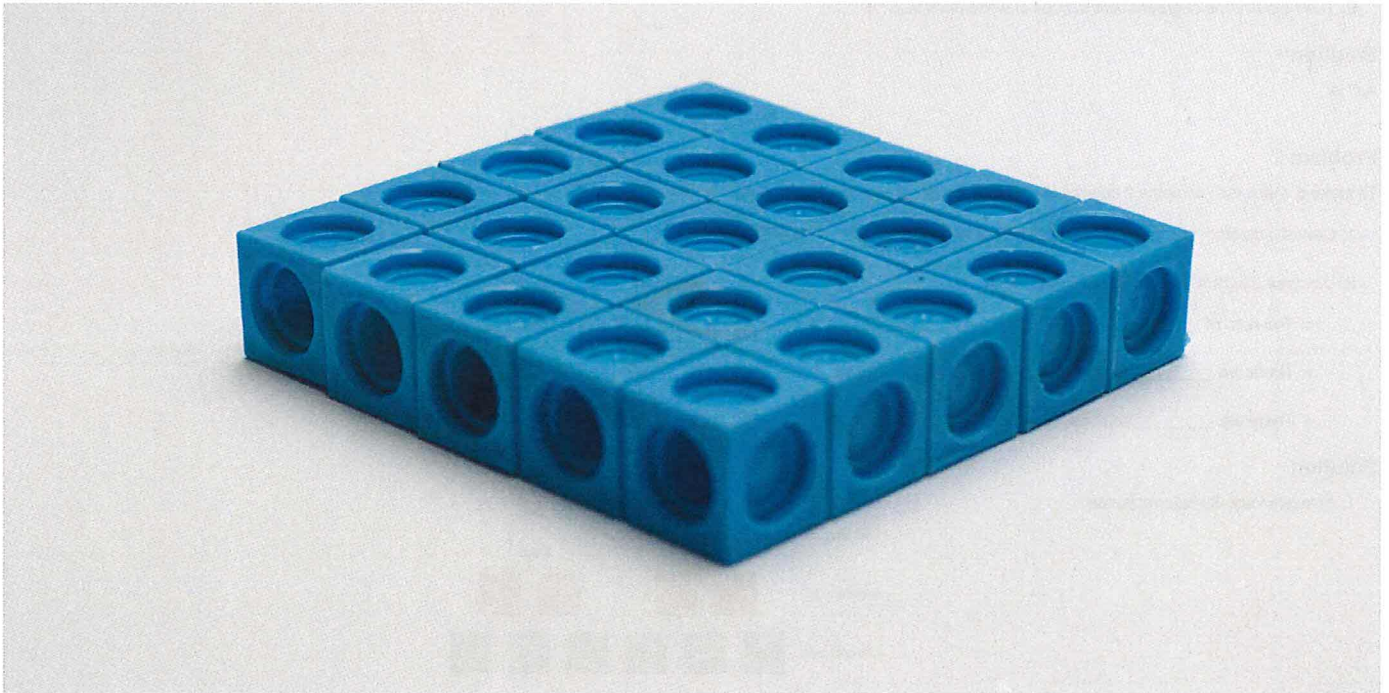
(from Unit 1, Lesson 16)

Find the volume and surface area of each prism.

1. Prism A: 3 cm by 3 cm by 3 cm



2. Prism B: 5 cm by 5 cm by 1 cm



3. Compare the volumes of the prisms and then their surface areas. Does the prism with the greater volume also have the greater surface area?

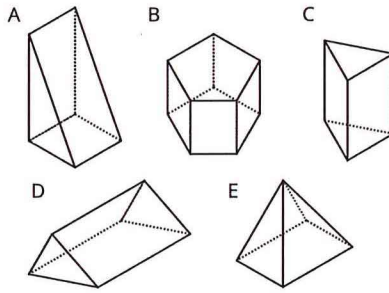
Solution

1. Volume: 27 cubic inches, surface area: 54 square inches
2. Volume: 25 cubic inches, surface area: 70 square inches
3. Prism A has a greater volume, but Prism B has a greater surface area.

Problem 6

(from Unit 1, Lesson 13)

Which figure is a triangular prism? Select all that apply.



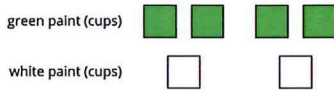
Solution

A, C, D

Lesson 2

Problem 1

Here is a diagram that describes the cups of green and white paint in a mixture.



Select all the statements that accurately describe this diagram.

- A. The ratio of cups of white paint to cups of green paint is 2 to 4.
- B. For every cup of green paint, there are two cups of white paint.
- C. The ratio of cups of green paint to cups of white paint is 4 : 2.
- D. For every cup of white paint, there are two cups of green paint.
- E. The ratio of cups of green paint to cups of white paint is 2 : 4.

Solution

A,C,D

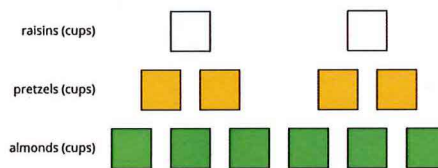
Problem 2

To make a snack mix, combine 2 cups of raisins with 4 cups of pretzels and 6 cups of almonds.

1. Create a diagram to represent the quantities of each ingredient in this recipe.
2. Use your diagram to complete each sentence.
 - The ratio of _____ to _____ to _____ is _____ : _____ : _____.
 - There are _____ cups of pretzels for every cup of raisins.
 - There are _____ cups of almonds for every cup of raisins.

Solution

1. Answers vary. Sample response:



2. Statements:
 - a. Answers vary. Sample response: cups of raisins, cups of pretzels, cups of almonds, 2, 4, 6
 - b. 2
 - c. 3

Problem 3

(from Unit 1, Lesson 17)

1. A square is 3 inches by 3 inches. What is its area?
2. A square has a side length of 5 feet. What is its area?
3. The area of a square is 36 square centimeters. What is the length of each side of the square?

Solution

1. 9 square inches ($3 \cdot 3 = 9$)

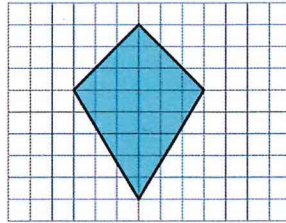
2. 25 square feet ($5 \cdot 5 = 25$)

3. 6 centimeters ($6 \cdot 6 = 36$)

Problem 4

(from Unit 1, Lesson 11)

Find the area of this quadrilateral. Explain or show your strategy.



Solution

24 square units. Possible strategy: Decompose the quadrilateral into two triangles with a horizontal cut. The top triangle has a base of 4 units and a height of 3 units. Its area is 6 square units, as $(4 \cdot 3) \div 2 = 6$. The bottom triangle has a base of 4 units and a height of 5 units. Its area is 10 square units, as $(4 \cdot 5) \div 2 = 10$. $6 + 10 = 16$. The area of the quadrilateral is then 16 square units.

Problem 5

(from Unit 2, Lesson 1)

Complete each equation with a number that makes it true.

1. $\frac{1}{8} \cdot 8 = \underline{\hspace{2cm}}$

2. $\frac{3}{8} \cdot 8 = \underline{\hspace{2cm}}$

3. $\frac{1}{8} \cdot 7 = \underline{\hspace{2cm}}$

4. $\frac{3}{8} \cdot 7 = \underline{\hspace{2cm}}$

Solution

1. 1 (or equivalent)

2. 3 (or equivalent)

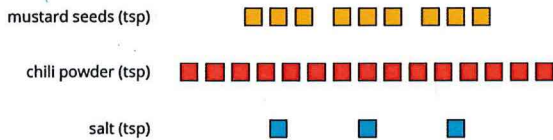
3. $\frac{7}{8}$ (or equivalent)

4. $\frac{21}{8}$ (or equivalent, $2\frac{5}{8}$ for example)

Lesson 3

Problem 1

A recipe for 1 batch of spice mix says, "Combine 3 teaspoons of mustard seeds, 5 teaspoons of chili powder, and 1 teaspoon of salt." How many batches are represented by the diagram? Explain or show your reasoning.



Solution

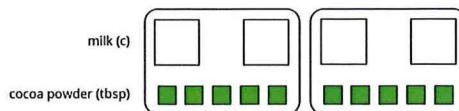
The diagram represents 3 batches of spice mix. It shows 3 times the amount of each ingredient in the recipe: 9 teaspoons of mustard ($3 \cdot 3$), 15 teaspoons of chili powder ($3 \cdot 5$), and 3 teaspoons of salt ($3 \cdot 1$).

Problem 2

Priya makes chocolate milk by mixing 2 cups of milk and 5 tablespoons of cocoa powder. Draw a diagram that clearly represents two batches of her chocolate milk.

Solution

Answers vary. Sample response:



Problem 3

In a recipe for fizzy grape juice, the ratio of cups of sparkling water to cups of grape juice concentrate is 3 to 1.

1. Find two more ratios of cups of sparkling water to cups of juice concentrate that would make a mixture that tastes the same as this recipe.
2. Describe another mixture of sparkling water and grape juice that would taste different than this recipe.

Solution

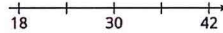
Answers vary. Sample responses:

1. 6 to 2
2. 6 to 3

Problem 4

(from Unit 2, Lesson 1)

Write the missing number under each tick mark on the number line.



Solution

24, 36 (intervals of 6)

Problem 5

(from Unit 2, Lesson 1)

At the kennel, there are 6 dogs for every 5 cats.

1. The ratio of dogs to cats is _____ to _____.
2. The ratio of cats to dogs is _____ to _____.
3. For every _____ dogs there are _____ cats.
4. The ratio of cats to dogs is _____ : _____.

Solution

1. 6 to 5
2. 5 to 6
3. 6, 5
4. 5 : 6

Problem 6

(from Unit 1, Lesson 17)

Elena has 80 unit cubes. What is the volume of the largest cube she can build with them?

Solution

64 cubic units (from a 4 by 4 by 4 cube)

Problem 7

(from Unit 2, Lesson 1)

Fill in the blanks to make each equation true.

1. $3 \cdot \frac{1}{3} = \underline{\hspace{2cm}}$
2. $10 \cdot \frac{1}{10} = \underline{\hspace{2cm}}$
3. $19 \cdot \frac{1}{19} = \underline{\hspace{2cm}}$
4. $a \cdot \frac{1}{a} = \underline{\hspace{2cm}}$
(As long as a does not equal 0.)
5. $5 \cdot \underline{\hspace{2cm}} = 1$
6. $17 \cdot \underline{\hspace{2cm}} = 1$
7. $b \cdot \underline{\hspace{2cm}} = 1$

Solution

1. 1 (or equivalent)
2. 1 (or equivalent)
3. 1 (or equivalent)
4. 1 (or equivalent)
5. $\frac{1}{5}$ (or equivalent)

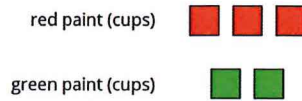
6. $\frac{1}{17}$ (or equivalent)

7. $\frac{1}{b}$ (or equivalent)

Lesson 4

Problem 1

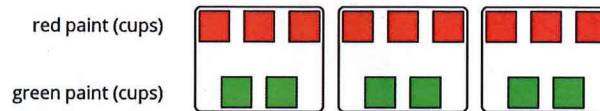
Here is a diagram showing a mixture of red paint and green paint needed for 1 batch of a particular shade of brown.



Add to the diagram so that it shows 3 batches of the same shade of brown paint.

Solution

Answers vary. Sample response:



Problem 2

Diego makes green paint by mixing 10 tablespoons of yellow paint and 2 tablespoons of blue paint. Which of these mixtures produce the same shade of green paint as Diego's mixture? Select all that apply.

- A. For every 5 tablespoons of blue paint, mix in 1 tablespoon of yellow paint.
- B. Mix tablespoons of blue paint and yellow paint in the ratio 1 : 5.
- C. Mix tablespoons of yellow paint and blue paint in the ratio 15 to 3.
- D. Mix 11 tablespoons of yellow paint and 3 tablespoons of blue paint.

Solution

B and C

Problem 3

To make 1 batch of sky blue paint, Clare mixes 2 cups of blue paint with 1 gallon of white paint.

- 1. Explain how Clare can make 2 batches of sky blue paint.
- 2. Explain how to make a mixture that is a darker shade of blue than the sky blue.
- 3. Explain how to make a mixture that is a lighter shade of blue than the sky blue.

Solution

- 1. Mix 4 cups of blue paint and 2 gallons of white paint.
- 2. Answers vary. Sample response: 3 cups of blue paint and 1 gallon of white paint. Mixing the same amount of white paint with more blue paint will make a darker shade of blue.
- 3. Answers vary. Sample response: 2 cups of blue paint and 2 gallons of white paint. Mixing the same amount of blue paint with more white paint will make a lighter shade of blue.

Problem 4

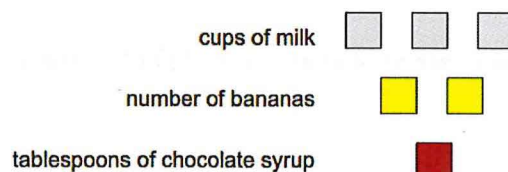
(from Unit 2, Lesson 2)

A smoothie recipe calls for 3 cups of milk, 2 frozen bananas and 1 tablespoon of chocolate syrup.

- 1. Create a diagram to represent the quantities of each ingredient in the recipe.
- 2. Write 3 different sentences that use a ratio to describe the recipe.

Solution

- 1. Answers vary. Sample response:

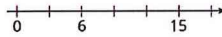


2. Answers vary. Sample response: The ratio of cups of milk to number of bananas is 3 : 2, the ratio of bananas to tablespoons of chocolate syrup is 2 to 1, for every tablespoon of chocolate syrup, there are 3 cups of milk.

Problem 5

(from Unit 2, Lesson 1)

Write the missing number under each tick mark on the number line.



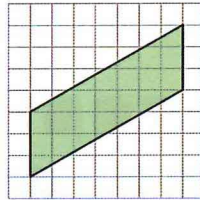
Solution

0, 3, 6, 9, 12, 15, 18 (intervals of 3)

Problem 6

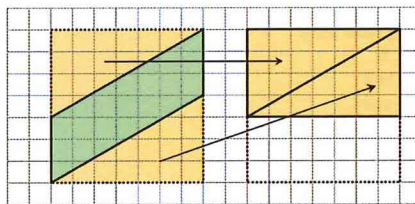
(from Unit 1, Lesson 4)

Find the area of the parallelogram. Show your reasoning.



Solution

21 square units. Reasoning varies. Sample reasoning: Draw a square around the parallelogram; its area is 49 square units, because $7 \cdot 7 = 49$. Rearrange the triangles above and below the parallelogram to form a rectangle; the area of this rectangle is 28 square units, because $4 \cdot 7 = 28$. Subtracting the area of the triangles from the area of the square, we have 21 square units. $49 - 28 = 21$.



Problem 7

(from Unit 2, Lesson 1)

Complete each equation with a number that makes it true.

1. $11 \cdot \frac{1}{4} = \underline{\hspace{2cm}}$
2. $7 \cdot \frac{1}{4} = \underline{\hspace{2cm}}$
3. $13 \cdot \frac{1}{27} = \underline{\hspace{2cm}}$
4. $13 \cdot \frac{1}{99} = \underline{\hspace{2cm}}$
5. $x \cdot \frac{1}{y} = \underline{\hspace{2cm}}$
(As long as y does not equal 0.)

Solution

1. $\frac{11}{4}$ (or equivalent)
2. $\frac{7}{4}$ (or equivalent)
3. $\frac{13}{27}$ (or equivalent)
4. $\frac{13}{99}$ (or equivalent)
5. $\frac{x}{y}$ (or equivalent)

Lesson 5

Problem 1

Each of these is a pair of equivalent ratios. For each pair, explain why they are equivalent ratios or draw a diagram that shows why they are equivalent ratios.

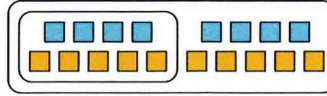
1. 4 : 5 and 8 : 10
2. 18 : 3 and 6 : 1

3. $2 : 7$ and $10,000 : 35,000$

Solution

Answers vary. Sample response:

1.



The diagram shows that 8 to 10 is the same as 2 groups of 4 to 5 so these are equivalent ratios.

2. $18 \cdot \frac{1}{3} = 6$ and $3 \cdot \frac{1}{3} = 1$.

3. $2 \cdot (5,000) = 10,000$ and $7 \cdot (5,000) = 35,000$.

Problem 2

Explain why $6 : 4$ and $18 : 8$ are not equivalent ratios.

Solution

Answers vary. Sample response: $6 : 4$ is not equivalent to $18 : 8$ because 18 is $6 \cdot 3$, but 8 is not $4 \cdot 3$.

Problem 3

Are the ratios $3 : 6$ and $6 : 3$ equivalent? Why or why not?

Solution

Answers vary. Sample response: No, the ratio $3 : 6$ is not equivalent to $6 : 3$. The ratio $3 : 6$ represents 3 of one type of object for every 6 of another type of object while the ratio $6 : 3$ represents 6 of the first type of object for every 3 of the second type of object.

Problem 4


(from Unit 2, Lesson 4)

This diagram represents 3 batches of light yellow paint. Draw a diagram that represents 1 batch of the same shade of light yellow paint.

white paint (cups) 

yellow paint (cups) 

Solution

white paint (cups) 

yellow paint (cups) 

Problem 5

(from Unit 2, Lesson 1)

In the fruit bowl there are 6 bananas, 4 apples, and 3 oranges.

1. For every 4 _____, there are 3 _____.
2. The ratio of _____ to _____ is $6 : 3$.
3. The ratio of _____ to _____ is 4 to 6.
4. For every 1 orange, there are _____ bananas.

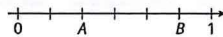
Solution

1. apples, oranges
2. bananas, oranges
3. apples, bananas
4. 2

Problem 6

(from Unit 2, Lesson 1)

Write fractions for points A and B on the number line.



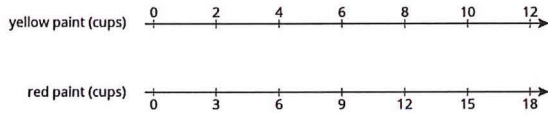
Solution

$A = \frac{2}{6}$ or $\frac{1}{3}$ $B = \frac{5}{6}$

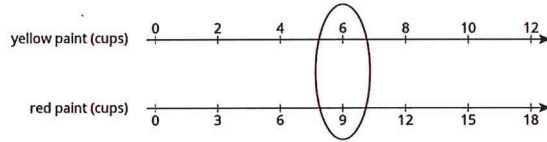
Lesson 6

Problem 1

A particular shade of orange paint has 2 cups of yellow paint for every 3 cups of red paint. On the double number line, circle the numbers of cups of yellow and red paint needed for 3 batches of orange paint.



Solution



Problem 2

This double number line diagram shows the amount of flour and eggs needed for 1 batch of cookies.



1. Complete the diagram to show the amount of flour and eggs needed for 2, 3, and 4 batches of cookies.
2. What is the ratio of cups of flour to eggs?
3. How much flour and how many eggs are used in 4 batches of cookies?
4. How much flour is used with 6 eggs?
5. How many eggs are used with 15 cups of flour?

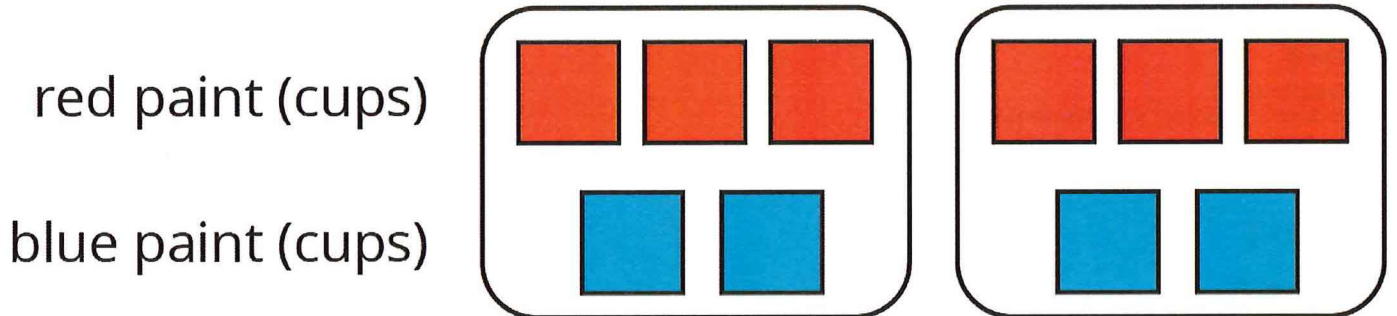
Solution

1. Flour in cups: 5, 10, 15, 20. Number of eggs: 3, 6, 9, 12.
2. 5 : 3 or equivalent
3. 20 cups of flour and 12 eggs
4. 10 cups
5. 9 eggs

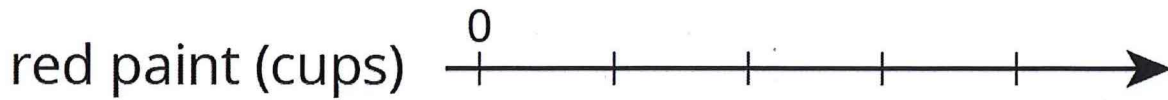
Problem 3

Here is a representation showing the amount of red and blue paint that make 2 batches of purple paint.

1. On the double number line, label the tick marks to represent amounts of red and blue paint used to make batches of this shade of purple paint.



2. How many batches are made with 12 cups of red paint?
3. How many batches are made with 6 cups of blue paint?



Solution

1. Red (cups): 0, 3, 6, 9, 12; Blue (cups): 0, 2, 4, 6, 8
2. 4 batches
3. 3 batches

Problem 4

(from Unit 2, Lesson 1)

Diego estimates that there will need to be 3 pizzas for every 7 kids at his party. Select all the statements that express this ratio.

- A. The ratio of kids to pizzas is 7 : 3.
- B. The ratio of pizzas to kids is 3 to 7.
- C. The ratio of kids to pizzas is 3 : 7.
- D. The ratio of pizzas to kids is 7 to 3.
- E. For every 7 kids there need to be 3 pizzas.

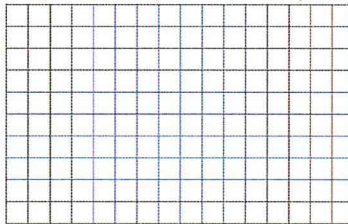
Solution

A, B, E

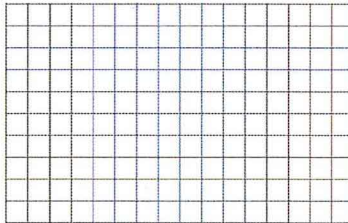
Problem 5

(from Unit 1, Lesson 6)

1. Draw a parallelogram that is not a rectangle that has an area of 24 square units. Explain or show how you know the area is 24 square units.



2. Draw a triangle that has an area of 24 square units. Explain or show how you know the area is 24 square units.



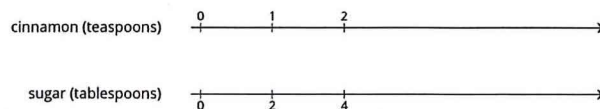
Solution

Answers vary. There are many possible pairs of base and height lengths to make an area of 24 square units.

Lesson 7

Problem 1

A recipe for cinnamon rolls uses 2 tablespoons of sugar per teaspoon of cinnamon for the filling. Complete the double number line diagram to show the amount of cinnamon and sugar in 3, 4, and 5 batches.



Solution

