



Unit 4 Practice Problems

Lesson 1

Problem 1

A rectangle has a height to width ratio of 3 : 4.5. Give two examples of dimensions for rectangles that could be scaled versions of this rectangle.

Solution

Answers vary. Sample response: A rectangle measuring 6 units by 9 units and a rectangle measuring 9 units by 13.5 units.

Problem 2

One rectangle measures 2 units by 7 units. A second rectangle measures 11 units by 37 units. Are these two figures scaled versions of each other? If so, find the scale factor. If not, briefly explain why.

Solution

No, these two figures are not scaled versions of each other. The 2 unit side is scaled by a factor of 5.5 to correspond to the 11 unit side, but 7 multiplied by 5.5 is 38.5, not 37.

Problem 3

(from Unit 2, Lesson 5)

Ants have 6 legs. Elena and Andre write equations showing the proportional relationship between the number of ants, a , to the number of ant legs l . Elena writes $a = 6 \cdot l$ and Andre writes $l = \frac{1}{6} \cdot a$. Do you agree with either of the equations? Explain your reasoning.

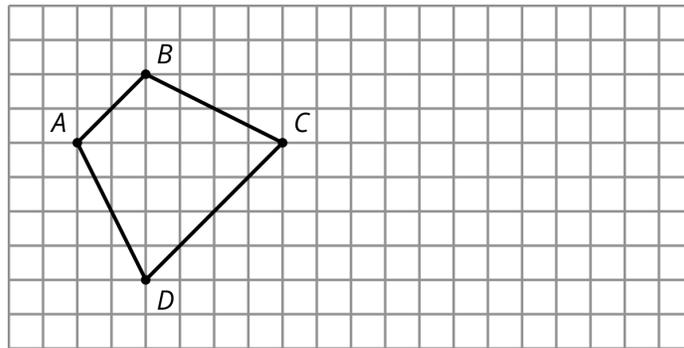
Solution

Neither of them are correct. Although 6 and $\frac{1}{6}$ are the correct constants of proportionality, they are being multiplied by the wrong variables. For example, using Elena's equation, 1 leg is equal to 6 ants.

Problem 4

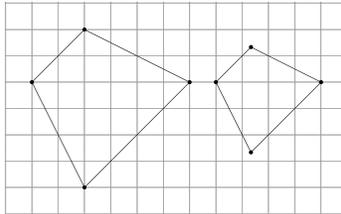
(from Unit 1, Lesson 4)

On the grid, draw a scaled copy of quadrilateral ABCD with a scale factor $\frac{2}{3}$.



Solution

Answers vary. Sample response on the right.



Problem 5

(from Unit 1, Lesson 5)

Solve each equation mentally.

1. $\frac{5}{2} \cdot x = 1$

2. $x \cdot \frac{7}{3} = 1$

3. $1 \div \frac{11}{2} = x$

Solution

1. $x = \frac{2}{5}$

2. $x = \frac{3}{7}$

3. $x = \frac{2}{11}$

Problem 6

(from Unit 1, Lesson 11)

Lin has a scale model of a modern train. The model is created at a scale of 1 to 48.

1. The height of the model train is 102 millimeters. What is the actual height of the train in meters? Explain your reasoning.

2. On the scale model, the distance between the wheels on the left and the wheels on the right is $1\frac{1}{4}$ inches. The state of Wyoming has old railroad tracks that are 4.5 feet apart. Can the modern train travel on those tracks? Explain your reasoning.

Solution

1. 4.896 meters. Sample reasoning:
 - The actual height is 48 times the scaled height. $102 \cdot 48 = 4,896$. 4,896 mm is 4.896 m.
 - 102 mm is 0.102 m. The actual train is 48 times 0.102 m. $0.102 \cdot 48 = 4.896$.
2. No. Sample explanation: The modern train needs tracks that are 60 inches apart, because $1\frac{1}{4} \cdot 48 = 60$. The old tracks are only 54 inches, so they are not wide enough.

Lesson 2

Problem 1

A cyclist rode 3.75 miles in 0.3 hours.

1. How fast was she going in miles per hour?
2. At that rate, how long will it take her to go 4.5 miles?

Solution

1. 12.5 miles per hour
2. 0.36 hours or 21.6 minutes

Problem 2

A recipe for sparkling grape juice calls for $1\frac{1}{2}$ quarts of sparkling water and $\frac{3}{4}$ quart of grape juice.

1. How much sparkling water would you need to mix with 9 quarts of grape juice?
2. How much grape juice would you need to mix with $\frac{15}{4}$ quarts of sparkling water?
3. How much of each ingredient would you need to make 100 quarts of punch?

Solution

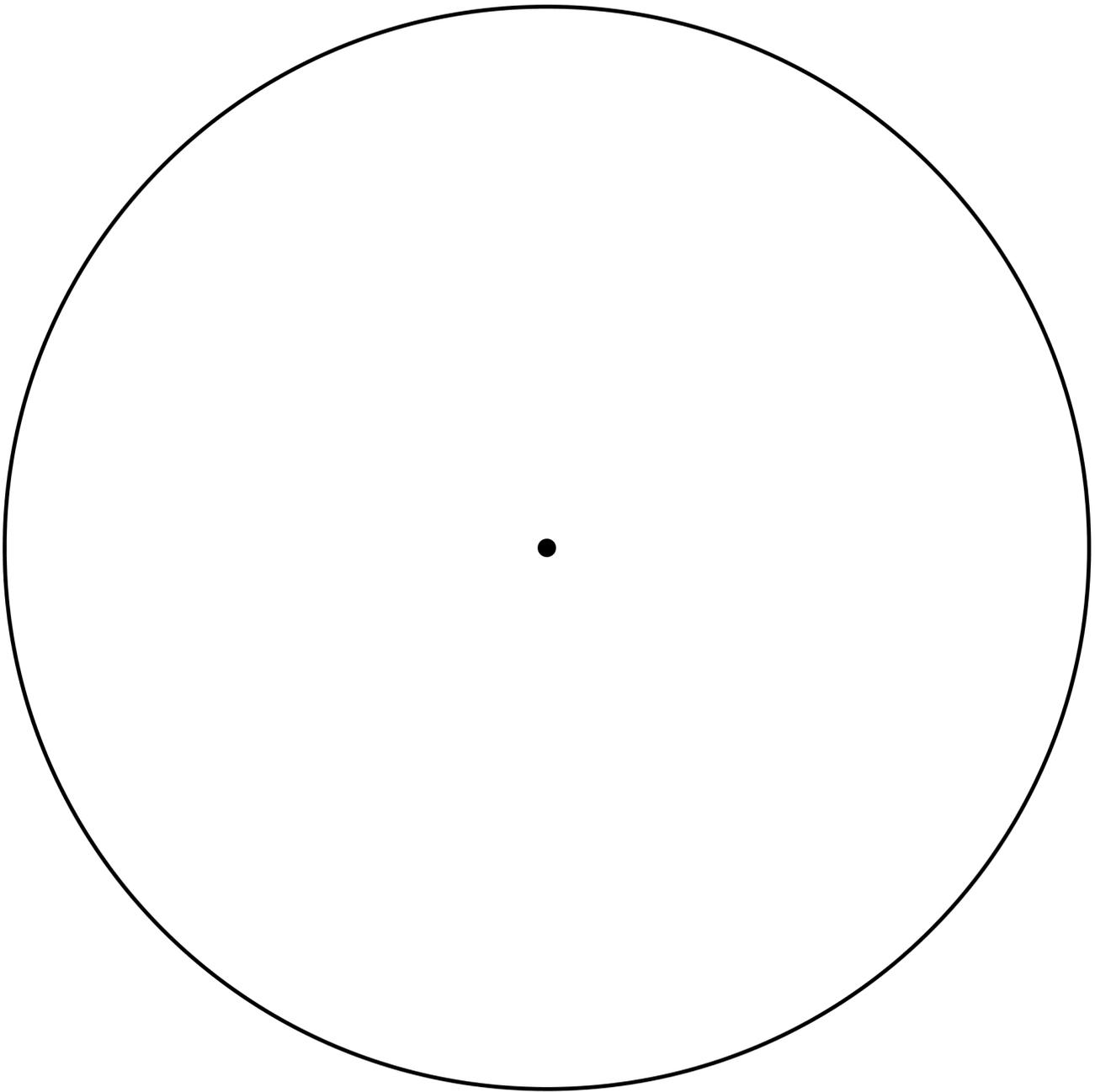
Notice that the ratio $1\frac{1}{2}$ quarts of sparkling water to $\frac{3}{4}$ quarts of grape juice is equivalent to the ratio 2 quarts of sparkling water to 1 quart of grape juice. While not needed, this ratio with whole numbers can help answer all three questions.

1. 18 quarts
2. $\frac{15}{8}$ quarts or equivalent
3. $\frac{200}{3}$ quarts of sparkling water and $\frac{100}{3}$ quarts of grape juice (or equivalent).

Problem 3

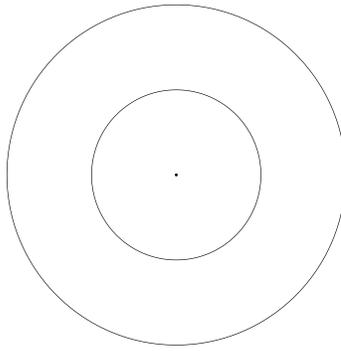
(from Unit 3, Lesson 10)

1. Draw a scaled copy of the circle using a scale factor of 2.
2. How does the circumference of the scaled copy compare to the circumference of the original circle?
3. How does the area of the scaled copy compare to the area of the original circle?



Solution

1. The outer circle is a scaled copy of the inner circle using scale factor 2.



2. The circumference of the scaled copy is twice the circumference of the original.
3. The area of the scaled copy is four times the area of the original.

Problem 4

At a deli counter,

- Someone bought $1\frac{3}{4}$ pounds of ham for \$14.50.
- Someone bought $2\frac{1}{2}$ pounds of turkey for \$26.25.
- Someone bought $\frac{3}{8}$ pounds of roast beef for \$5.50.

Which meat is the least expensive per pound? Which meat is the most expensive per pound? Explain how you know.

Solution

Ham is the least expensive. It costs about \$8.29 per pound, because $14.50 \div 1\frac{3}{4} = 8\frac{2}{7} \approx 8.29$. Roast beef is the most expensive. It costs about \$14.67 per pound, because $5.50 \div \frac{3}{8} = 14\frac{2}{3} \approx 14.67$. Turkey costs about \$10.50 per pound, because $26.25 \div 2\frac{1}{2} = 10.50$. While these prices per pound are not exact, they are far enough apart to put the costs in order with certainty.

Problem 5

(from Unit 1, Lesson 11)

Jada has a scale map of Kansas that fits on a page in her book. The page is 5 inches by 8 inches. Kansas is about 210 miles by 410 miles. Select **all** scales that could be a scale of the map. (There are 2.54 centimeters in an inch.)

1. 1 in to 1 mi
2. 1 cm to 1 km
3. 1 in to 10 mi
4. 1 ft to 100 mi
5. 1 cm to 200 km
6. 1 in to 100 mi
7. 1 cm to 1000 km

Solution

E, F

Lesson 3

Problem 1

It takes an ant farm 3 days to consume $\frac{1}{2}$ of an apple. At that rate, in how many days will the ant farm consume 3 apples?

Solution

18 days

Problem 2

To make a shade of paint called jasper green, mix 4 quarts of green paint with $\frac{2}{3}$ cups of black paint. How much green paint should be mixed with 4 cups of black paint to make jasper green?

Solution

24 quarts

Problem 3

An airplane is flying from New York City to Los Angeles. The distance it travels in miles, d , is related to the time in seconds, t , by the equation $d = 0.15t$.

1. How fast is it flying? Be sure to include the units.
2. How far will it travel in 30 seconds?
3. How long will it take to go 12.75 miles?

Solution

1. It is traveling at 0.15 miles per second.
2. It will travel 4.5 miles in 30 seconds.
3. It will take 85 seconds to travel 12.75 miles.

Problem 4

A grocer can buy strawberries for \$1.38 per pound.

1. Write an equation relating c , the cost, and p , the pounds of strawberries.
2. A strawberry order cost \$241.50. How many pounds did the grocer order?

Solution

1. $c = 1.38p$
2. 175 pounds

Problem 5

(from Unit 3, Lesson 10)

Crater Lake in Oregon is shaped like a circle with a diameter of about 5.5 miles.

1. How far is it around the perimeter of Crater Lake?
2. What is the area of the surface of Crater Lake?

Solution

1. About 17 miles (5.5π)
2. About 24 square miles ($\pi \cdot 2.75^2$)

Problem 6

(from Unit 3, Lesson 8)

A 50-centimeter piece of wire is bent into a circle. What is the area of this circle?

Solution

$$\frac{625}{\pi} \text{ or about } 199 \text{ cm}^2$$

Problem 7

(from Unit 1, Lesson 2)

Suppose Quadrilaterals A and B are both squares. Are A and B necessarily scale copies of one another? Explain.

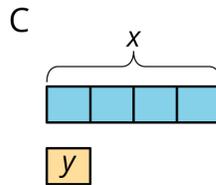
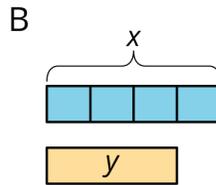
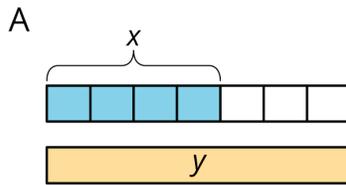
Solution

Yes. Since all four side lengths of a square are the same, whatever scale factor works to scale one edge of A to an edge of B takes all edges of A to all edges of B. Since scaling a square gives another square, B is a scaled copy of A.

Lesson 4

Problem 1

Match each situation with a diagram.



1. Diego drank x ounces of juice. Lin drank $\frac{1}{4}$ less than that.
2. Lin ran x miles. Diego ran $\frac{3}{4}$ more than that.
3. Diego bought x pounds of almonds. Lin bought $\frac{1}{4}$ of that.

Solution

1. B
2. A
3. C

Problem 2

Elena walked 12 miles. Then she walked $\frac{1}{4}$ that distance. How far did she walk all together? Select **all** that apply.

1. $12 + \frac{1}{4}$
2. $12 \cdot \frac{1}{4}$
3. $12 + \frac{1}{4} \cdot 12$
4. $12 \left(1 + \frac{1}{4}\right)$
5. $12 \cdot \frac{3}{4}$
6. $12 \cdot \frac{5}{4}$

Solution

C, D, F

Problem 3

Write a story that can be represented by the equation $y = x + \frac{1}{4}x$.

Solution

Answers vary. Sample response: Andre slept x hours. Diego slept $\frac{1}{4}$ more than that.

Problem 4

(from Unit 4, Lesson 1)

Select all ratios that are equivalent to $4 : 5$.

1. $2 : 2.5$
2. $2 : 3$
3. $3 : 3.75$
4. $7 : 8$
5. $8 : 10$
6. $14 : 27.5$

Solution

A, C, E

Problem 5

(from Unit 3, Lesson 10)

Jada is making circular birthday invitations for her friends. The diameter of the circle is 12 cm. She bought 180 cm of ribbon to glue around the edge of each invitation. How many invitations can she make?

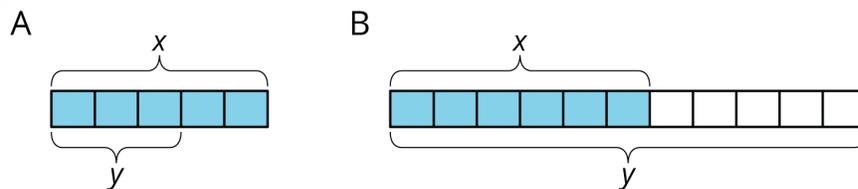
Solution

Each card needs 12π or about 37.7 cm of ribbon. She has enough ribbon for 4 cards since $180 \div 37.7 \approx 4.77$.

Lesson 5

Problem 1

1. Match each diagram with a description and an equation.



Descriptions:

An increase by $\frac{2}{3}$

An increase by $\frac{5}{6}$

A decrease by $\frac{2}{5}$

A decrease by $\frac{5}{11}$

Equations:

$$y = 1.8\bar{3}x$$

$$y = 1.\bar{6}x$$

$$y = 0.6x$$

$$y = 0.4x$$

2. Draw a diagram for one of the unmatched equations.

Solution

1. Diagram A: A decrease by $\frac{2}{5}$ and $y = 0.6x$
Diagram B: An increase by $\frac{5}{6}$ and $y = 1.8\bar{3}x$

2. Answers vary.

Problem 2

At the beginning of the month, there were 80 ounces of peanut butter in the pantry. Since then, the family ate 0.3 of the peanut butter. How many ounces of peanut butter are in the pantry now?

1. $0.7 \cdot 80$
2. $0.3 \cdot 80$
3. $80 - 0.3$
4. $(1 + 0.3) \cdot 80$

Solution

A

Problem 3

(from Unit 4, Lesson 4)

1. On a hot day, a football team drank an entire 50-gallon cooler of water and half as much again. How much water did they drink?
2. Jada has 12 library books checked out and Han has $\frac{1}{3}$ less than that. How many books does Han have checked out?

Solution

1. 75 gallons
2. 8 books

Problem 4

(from Unit 4, Lesson 4)

If x represents a positive number, select all expressions whose value is greater than x .

1. $(1 - \frac{1}{4})x$
2. $(1 + \frac{1}{4})x$
3. $\frac{7}{8}x$
4. $\frac{9}{8}x$

Solution

B, D

Problem 5

(from Unit 2, Lesson 6)

A person's resting heart rate is typically between 60 and 100 beats per minute. Noah looks at his watch, and counts 8 heartbeats in 10 seconds.

1. Is his heart rate typical? Explain how you know.
2. Write an equation for h , the number of times Noah's heart beats (at this rate) in m minutes.

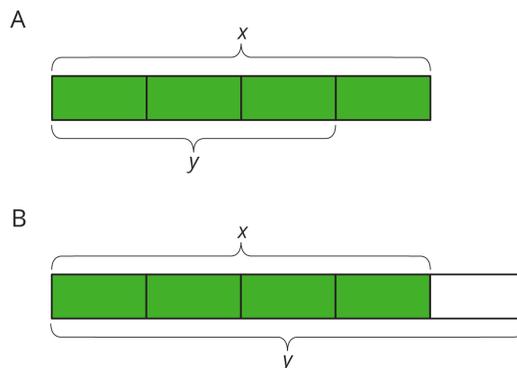
Solution

1. No. Noah's heart rate is 48 beats per minute, because $10 \cdot 6 = 60$, and $8 \cdot 6 = 48$.
2. $h = 48m$

Lesson 6

Problem 1

For each diagram, decide if y is an increase or a decrease relative to x . Then determine the percent increase or decrease.



Solution

For A, y is a 25% decrease of x .

For B, y is a 25% increase of x .

Problem 2

Draw diagrams to represent the following situations.

1. The amount of flour that the bakery used this month was a 40% increase relative to last month.
2. The amount of milk that the bakery used this month was a 75% decrease relative to last month.

Solution

Answers vary.

Problem 3

Write each percent increase or decrease as a percentage of the initial amount. The first one is done for you.

1. This year, there was 40% more snow than last year.
The amount of snow this year is 140% of the amount of snow last year.
2. This year, there were 25% fewer sunny days than last year.
3. Compared to last month, there was a 50% increase in the number of houses sold this month.
4. The runner's time to complete the marathon was a 10% less than the time to complete the last marathon.

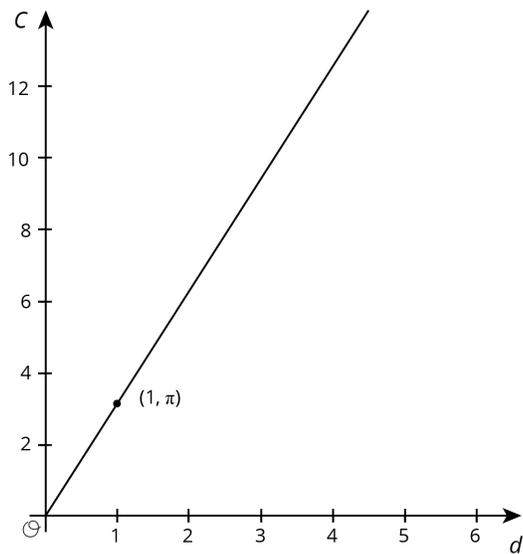
Solution

1. The amount of snow this year is 140% of the amount of snow last year.
2. The number of sunny days this year is 75% of the number of sunny days last year.
3. The number of houses sold this month is 150% of the number of houses sold last month.
4. The runner's time to complete the marathon was 90% of the time to complete the last marathon.

Problem 4

(from Unit 3, Lesson 3)

The graph shows the relationship between the diameter and the circumference of a circle with the point $(1, \pi)$ shown. Find 3 more points that are on the line.



Solution

Answers vary. Possible answers: $(0, 0)$, $(2, 2\pi)$, $(3, 9.4)$

Problem 5

(from Unit 4, Lesson 4)

Priya bought x grams of flour. Clare bought $\frac{3}{8}$ more than that. Select **all** equations that represent the relationship between the amount of flour that Priya bought, x , and the amount of flour that Clare bought, y .

1. $y = \frac{3}{8}x$
2. $y = \frac{5}{8}x$
3. $y = x + \frac{3}{8}x$
4. $y = x - \frac{3}{8}x$
5. $y = \frac{11}{8}x$

Solution

C, E

Lesson 7

Problem 1

A bakery used 25% more butter this month than last month. If the bakery used 240 kilograms of butter last month, how much did it use this month?

Solution

300 kilograms

Problem 2

Last week, the price of oranges at the farmer's market was \$1.75 per pound. This week, the price has decreased by 20%. What is the price of oranges this week?

Solution

\$1.40 per pound, because 20% of 1.75 is 0.35 and $1.75 - 0.35 = 1.40$

Problem 3

Noah thinks the answers to these two questions will be the same. Do you agree with him? Explain your reasoning.

- This year, a herd of bison had a 10% increase in population. If there were 550 bison in the herd last year, how many are in the herd this year?
- This year, another herd of bison had a 10% decrease in population. If there are 550 bison in the herd this year, how many bison were there last year?

Solution

No, the answers are different. Although the answer to both problems will be larger than 550, the number of bison in each 10% change is different because the original values are not the same.

Problem 4

(from Unit 4, Lesson 5)

Elena walked 12 miles. Then she walked 0.25 that distance. How far did she walk all together? Select **all** that apply.

1. $12 + 0.25 \cdot 12$
2. $12(1 + 0.25)$
3. $12 \cdot 1.25$
4. $12 \cdot 0.25$
5. $12 + 0.25$

Solution

A, B, C

Problem 5

(from Unit 3, Lesson 8)

A circle's circumference is 600 m. What is a good approximation of the circle's area?

1. 300 m^2
2. $3,000 \text{ m}^2$
3. $30,000 \text{ m}^2$
4. $300,000 \text{ m}^2$

Solution

C

Problem 6

(from Unit 2, Lesson 6)

The equation $d = 3t$ represents the relationship between the distance (d) in inches that a snail is from a certain rock and the time (t) in minutes.

1. What does the number 3 represent?
2. How many minutes does it take the snail to get 9 inches from the rock?
3. How far will the snail be from the rock after 9 minutes?

Solution

1. The constant of proportionality or the speed of the snail, 3 inches per minute.
2. 3 minutes
3. 27 inches

Lesson 8

Problem 1

A pair of designer sneakers was purchased for \$120. Since they were purchased, their price has increased by 15%. What is the new price?

Solution

\$138

Problem 2

Elena's aunt bought her a \$150 savings bond when she was born. When Elena is 20 years old, the bond will have earned 105% in interest. How much will the bond be worth when Elena is 20 years old?

Solution

\$307.50

Problem 3

In a video game, Clare scored 50% more points than Tyler. If c is the number of points that Clare scored and t is the number of points that Tyler scored, which equations are correct? Select **all** that apply.

1. $c = 1.5t$
2. $c = t + 0.5$
3. $c = t + 0.5t$
4. $c = t + 50$
5. $c = (1 + 0.5)t$

Solution

A, C, E

Problem 4

(from Unit 4, Lesson 6)

Draw a diagram to represent each situation:

1. The number of miles driven this month was a 30% decrease of the number of miles driven last month.

Unit 4 Practice Problems

2. The amount of paper that the copy shop used this month was a 25% increase of the amount of paper they used last month.

Solution

Answers vary. Sample responses:

1. A tape diagram showing 10 equal pieces labeled “number of miles driven last month” on the top with one below it that is just 7 pieces long and is labeled, “number of miles driven this month.”
2. A tape diagram showing 4 equal pieces labeled “amount of paper they used last month” on the top with one below it that is 5 pieces long and is labeled, “amount of paper they used this month.”

Problem 5

(from Unit 4, Lesson 5)

Which decimal is the best estimate of the fraction $\frac{29}{40}$?

1. 0.5
2. 0.6
3. 0.7
4. 0.8

Solution

C

Problem 6

(from Unit 3, Lesson 3)

Could 7.2 inches and 28 inches be the diameter and circumference of the same circle? Explain why or why not.

Solution

No, since $7.2 \cdot \pi \approx 22.6$.

Lesson 9

Problem 1

The student government snack shop sold 32 items this week.

snack type	number of items sold
fruit cup	8
veggie sticks	6
chips	14
water	4

For each snack type, what percentage of all snacks sold were of that type?

Solution

Fruit cup: 25%, veggie sticks: 18.75%, chips: 43.75%, water: 12.5%

Problem 2

Select **all** the options that have the same value as $3\frac{1}{2}\%$ of 20.

1. 3.5% of 20
2. $3\frac{1}{2} \cdot 20$
3. $(0.35) \cdot 20$
4. $(0.035) \cdot 20$
5. 7% of 10

Solution

A, D, E

Problem 3

22% of 65 is 14.3. What is 22.6% of 65? Explain your reasoning.

Solution

14.69. 22.6% of 65 is 22% of 65 (or 14.3) and an additional 0.6% of 65. 1% of 65 is 0.65. 0.1% of 65 is 0.065. 0.6% of 65 is $6 \cdot (0.065) = 0.39$. So 22.6% of 65 is 14.69, because $14.3 + 0.39 = 14.69$.

Problem 4

(from Unit 4, Lesson 7)

A bakery used 30% more sugar this month than last month. If the bakery used 560 kilograms of sugar last month, how much did it use this month?

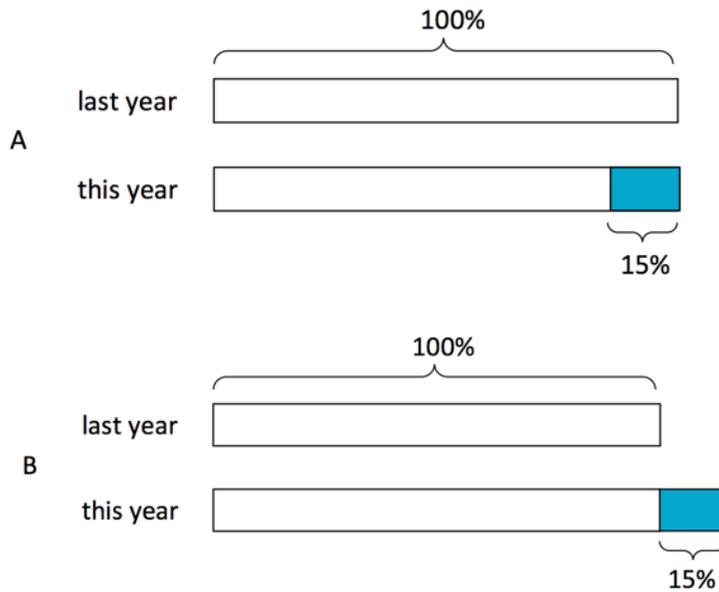
Solution

728 kilograms

Problem 5

(from Unit 4, Lesson 6)

Match each diagram to a situation. The diagrams can be used more than once.



1. The amount of apples this year decreased by 15% compared with last year's amount.
2. The amount of pears this year is 85% of last year's amount.
3. The amount of cherries this year increased by 15% compared with last year's amount.
4. The amount of oranges this year is 115% of last year's amount.

Solution

1. A
2. A
3. B
4. B

Problem 6

(from Unit 2, Lesson 6)

A certain type of car has room for 4 passengers.

1. Write an equation relating the number of cars (n) to the number of passengers (p).
2. How many passengers could fit in 78 cars?
3. How many cars would be needed to fit 78 passengers?

Solution

1. $p = 4n$
2. 312 passengers, because $4 \cdot 78 = 312$

3. 20 cars, because $78 \div 4 = 19.5$ and you can't use half of a car.

Lesson 10

Problem 1

In a city in Ohio, the sales tax rate is 7.25%. Complete the table to show the sales tax and the total price including tax for each item.

item	price before tax (\$)	sales tax (\$)	price including tax (\$)
pillow	8.00		
blanket	22.00		
trash can	14.50		

Solution

item	price before tax (\$)	sales tax (\$)	price including tax (\$)
pillow	8.00	0.58	8.58
blanket	22.00	1.60	23.60
trash can	14.50	1.05	15.55

For the blanket and the trash can, the tax is rounded to the nearest cent: it is rounded up for the blanket and rounded down for the trash can.

Problem 2

The sales tax rate in New Mexico is 5.125%. Select **all** the equations that represent the sales tax, t , you would pay in New Mexico for an item of cost c ?

1. $t = 5.125c$
2. $t = 0.5125c$
3. $t = 0.05125c$
4. $t = c \div 0.05125$
5. $t = \frac{5.125}{100}c$

Solution

C, E

Problem 3

Here are the prices of some items and the amount of sales tax charged on each in Nevada.

cost of item (\$)	sales tax (\$)
10	0.46
50	2.30
5	0.23

1. What is the sales tax rate in Nevada?
2. Write an expression for the amount of sales tax charged, in dollars, on an item that costs c dollars.

Solution

1. 4.6%
2. $0.046c$ or equivalent

Problem 4

(from Unit 4, Lesson 9)
Find each amount:

- 3.8% of 25
- 0.2% of 50
- 180.5% of 99

Solution

1. 0.95
2. 0.1
3. 178.695

Problem 5

(from Unit 4, Lesson 8)
On Monday, the high was 60 degrees Fahrenheit. On Tuesday, the high was 18% more. How much did the high increase from Monday to Tuesday?

Solution

10.8 degrees Fahrenheit.

Problem 6

(from Unit 3, Lesson 4)
Complete the table. Explain or show your reasoning.

object	radius	circumference
ceiling fan	2.8 ft	
water bottle cap	13 mm	
bowl		56.5 cm
drum		75.4 in

Solution

		circumference
ceiling fan	2.8 ft	17.6 ft
water bottle cap	13 mm	82 mm
bowl	9 cm	56.5 cm
drum	12 in	75.4 in

The constant of proportionality is $2 \cdot \pi$. The given radii is multiplied by 6.28 to find the missing circumferences, and the given circumferences is divided by 6.28 to find the missing radii.

Lesson 11

Problem 1

A car dealership pays \$8,350 for a car. They mark up the price by 17.4% to get the retail price. What is the retail price of the car at this dealership?

Solution

\$9802.90, although most dealerships round to the nearest 5 or 10.

Problem 2

A store has a 20% off sale on pants. With this discount, the price of one pair of pants before tax is \$15.20. What was the original price of the pants?

1. \$3.04
2. \$12.16
3. \$18.24
4. \$19.00

Solution

D

Problem 3

Lin is shopping for a couch with her dad and hears him ask the salesperson, "How much is your commission?" The salesperson says that her commission is $5\frac{1}{2}\%$ of the selling price.

1. How much commission will the salesperson earn by selling a couch for \$495?

2. How much money will the store get from the sale of the couch?

Solution

1. \$27.23. 5.5% of 495 is 27.225.

2. \$467.77

Problem 4 (from Unit 4, Lesson 9)

A college student takes out a \$7,500 loan from a bank. What will the balance of the loan be after one year (assuming the student has not made any payments yet):

1. if the bank charges 3.8% interest each year?

2. if the bank charges 5.3% interest each year?

Solution

1. \$7,785.00

2. \$7,897.50

Problem 5

(from Unit 4, Lesson 5)

Match the situations with the equations.

1. Mai slept for x hours, and Kiran slept for $\frac{1}{10}$ less than that.

2. Kiran practiced the piano for x hours, and Mai practiced for $\frac{2}{5}$ less than that.

3. Mai drank x oz of juice and Kiran drank $\frac{4}{3}$ more than that.

4. Kiran spent x dollars and Mai spent $\frac{1}{4}$ less than that.

5. Mai ate x grams of almonds and Kiran ate 1.5 times more than that.

6. Kiran collected x pounds of recycling and Mai collected $\frac{3}{10}$ less than that.

7. Mai walked x kilometers and Kiran walked $\frac{3}{8}$ more than that.

8. Kiran completed x puzzles and Mai completed $\frac{3}{5}$ more than that.

$$y = 2.33x$$

$$y = 1.375x$$

$$y = 0.6x$$

$$y = 0.9x$$

$$y = 0.75x$$

$$y = 1.6x$$

$$y = 0.7x$$

$$y = 2.5x$$

Solution

1. $y = 0.9x$

2. $y = 0.6x$

3. $y = 2.33x$

4. $y = 0.75x$

5. $y = 2.5x$

6. $y = 0.7x$

7. $y = 1.375x$

8. $y = 1.6x$

Lesson 12

Problem 1

A music store marks up the instruments it sells by 30%.

1. If the store bought a guitar for \$45, what will be its store price?
2. If the price tag on a trumpet says \$104, how much did the store pay for it?
3. If the store paid \$75 for a clarinet and sold it for \$100, did the store mark up the price by 30%?

Solution

1. \$58.50

2. \$80.00

3. No. The store marked the price up by $\frac{1}{3}$ or about 33.3% (rounded to the nearest tenth of a percent). The store needed to sell it for \$97.50 to have a 30% markup.

Problem 2

A family eats at a restaurant. The bill is \$42. The family leaves a tip and spends \$49.77.

1. How much was the tip in dollars?

2. How much was the tip as a percentage of the bill?

Solution

1. \$7.77

2. 18.5%

Problem 3

The price of gold is often reported per ounce. At the end of 2005, this price was \$513. At the end of 2015, it

was \$1060. By what percentage did the price per ounce of gold increase?

Solution

About 107% ($1060 - 513 = 547$ and $547 \div 513 \approx 1.07$)

Problem 4

(from Unit 2, Lesson 7)

A phone keeps track of the number of steps taken and the distance traveled. Based on the information in the table, is there a proportional relationship between the two quantities? Explain your reasoning.

number of steps	distance in kilometers
950	1
2,852	3
4,845	5.1

Solution

No, there is not a proportional relationship. Since the first row shows that there are 950 steps in 1 kilometer, there should be 2,850 steps in 3 kilometers (since $950 \cdot 3 = 2,850$), but the table shows 2,852 steps.

Problem 5

(from Unit 4, Lesson 4)

Noah picked 3 kg of cherries. Mai picked half as many cherries as Noah. How many total kg of cherries did Mai and Noah pick?

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

2. $3 - \frac{1}{2}$

3. $(1 + \frac{1}{2}) \cdot 3$

4. $1 + \frac{1}{2} \cdot 3$

Solution

C

Lesson 13

Problem 1

The depth of a lake is 15.8 m.

1. Jada accurately measured the depth of the lake to the nearest meter. What measurement did Jada get?
2. By how many meters does the measured depth differ from the actual depth?
3. Express the measurement error as a percentage of the actual depth.

Unit 4 Practice Problems

Solution

1. 16 m
2. 0.2 m
3. 1.27%, because $0.2 \div 15.8 \approx 0.01265$.

Problem 2

A watermelon weighs 8,475 grams. A scale measured the weight with an error of 12% under the actual weight. What was the measured weight?

Solution

7,458 grams, $8,475 \times 0.88 = 7,458$

Problem 3

Noah's oven thermometer gives a reading that is 2% greater than the actual temperature.

1. If the actual temperature is 325°F, what will the thermometer reading be?
2. If the thermometer reading is 76°F, what is the actual temperature?

Solution

1. 331.5 degrees Fahrenheit, $325 \times 1.02 = 331.5$
2. Approximately 74.5 degrees Fahrenheit, $76 \div 1.02 \approx 74.5$

Problem 4

(from Unit 4, Lesson 4)

At the beginning of the month, there were 80 ounces of peanut butter in the pantry. Now, there is $\frac{1}{3}$ less than that. How many ounces of peanut butter are in the pantry now?

1. $\frac{2}{3} \cdot 80$
2. $\frac{1}{3} \cdot 80$
3. $80 - \frac{1}{3}$
4. $(1 + \frac{1}{3}) \cdot 80$

Solution

A

Problem 5

(from Unit 3, Lesson 7)

1. Fill in the table for side length and area of different squares.

Unit 4 Practice Problems

side length (cm)	area (cm ²)
3	
100	
25	
s	

2. Is the relationship between the side length of a square and the area of a square proportional?

Solution

- 1.

side length (cm)	area (cm ²)
3	9
100	10,000
25	625
s	s^2

2. No. There is no number the numbers in the first column of the table can be multiplied by to get the numbers in the second column.

Lesson 14

Problem 1

A student estimated that it would take 3 hours to write a book report, but it actually took her 5 hours. What is the percent error for her estimate?

Solution

40%, because $5 - 3 = 2$ and $2 \div 5 = 0.4$

Problem 2

A radar gun measured the speed of a baseball at 103 miles per hour. If the baseball was actually going 102.8 miles per hour, what was the percent error in this measurement?

Solution

0.19%, because $103 - 102.8 = 0.2$ and $0.2 \div 102.8 \approx 0.0019$

Problem 3

It took 48 minutes to drive downtown. An app estimated it would be less than that. If the error was 20%, what was the app's estimate?

Solution

40 minutes, because $48 \div 1.20 = 40$

Problem 4

A farmer estimated that there were 25 gallons of water left in a tank. If this is an underestimate by 16%, how much water was actually in the tank?

Solution

About 29.8 gallons, because $25 \div 0.84 \approx 29.8$

Problem 5

(from Unit 4, Lesson 4)

For each story, write an equation that describes the relationship between the two quantities.

1. Diego collected x kg of recycling. Lin collected $\frac{2}{5}$ more than that.
2. Lin biked x km. Diego biked $\frac{3}{10}$ less than that.
3. Diego read for x minutes. Lin read $\frac{4}{7}$ of that.

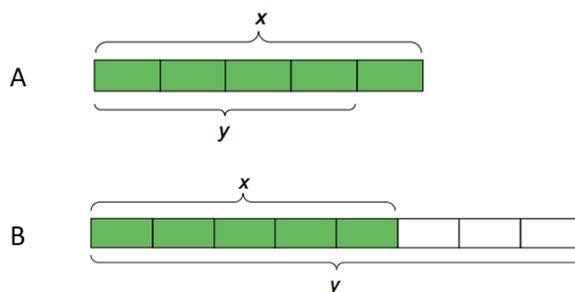
Solution

1. $y = \frac{7}{5}x$
2. $y = \frac{7}{10}x$
3. $y = \frac{4}{7}x$

Problem 6

(from Unit 4, Lesson 12)

For each diagram, decide if y is an increase or a decrease of x . Then determine the percentage.



Solution

A Decrease: y is a 20% decrease of x

B Increase: y is a 60% increase of x

Problem 7

(from Unit 3, Lesson 10)

Lin is making a window covering for a window that has the shape of a half circle on top of a square of side length 3 feet. How much fabric does she need?

Solution

16.07 square feet

Lesson 15

Problem 1

Jada measured the height of a plant in a science experiment and finds that, to the nearest $\frac{1}{4}$ of an inch, it is $4\frac{3}{4}$ inches.

1. What is the largest the actual height of the plant could be?
2. What is the smallest the actual height of the plant could be?
3. How large could the percent error in Jada's measurement be?

Solution

1. At most $4\frac{7}{8}$ inches tall (if it were taller, then $4\frac{3}{4}$ would not be the nearest quarter inch measurement)
2. At least $4\frac{5}{8}$ inches tall
3. About 2.6% ($0.125 \div 4\frac{3}{4}$)

Problem 2

(from Unit 2, Lesson 5)

Water is running into a bathtub at a constant rate. After 2 minutes, the tub is filled with 2.5 gallons of water. Write two equations for this proportional relationship. Use w for the amount of water (gallons) and t for time (minutes). In each case, what does the constant of proportionality tell you about the situation?

Solution

$w = 1.25t$; Every minute the amount of water increases by 1.25 gallons.

$t = 0.8w$; Every 0.8 minutes the amount of water increases by 1 gallon.

Problem 3

(from Unit 4, Lesson 5)

Noah picked 3 kg of cherries. Jada picked half as many cherries as Noah. How many total kg of cherries did Jada and Noah pick?

1. $3 + 0.5$
2. $3 - 0.5$
3. $(1 + 0.5) \cdot 3$
4. $1 + 0.5 \cdot 3$

Solution

C

Problem 4

The reading on a car's speedometer has 1.6% maximum error. The speed limit on a road is 65 mph.

1. The speedometer reads 64 mph. Is it possible that the car is going over the speed limit?
2. The speedometer reads 66 mph. Is the car definitely going over the speed limit?

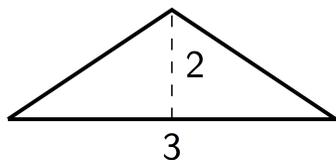
Solution

1. Yes, the car might be going more than 65 mph. 1.6% of 64 is 1.024, so the car could be going 65.024 mph which is over the speed limit.
2. No, the car might be going less than 65 mph. 1.6% of 66 is 1.056, so the car could be going as slow as 64.944 mph which is less than the speed limit.

Problem 5

(from Unit 3, Lesson 7)

Here is a shape with some measurements in cm.



1. Complete the table showing the area of different scaled copies of the triangle.

scale factor	area (cm ²)
1	
2	
5	
s	

2. Is the relationship between the scale factor and the area of the scaled copy proportional?

Solution

1. Complete the table showing the area of different scaled copies of the triangle.

scale factor	area (cm ²)
1	3
2	12
5	75
s	$3s^2$

2. No, the relationship between the scale factor and the area of the scaled copy is not proportional.



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