Unit 7 Practice Problems - Answer Key

Lesson 1

Problem 1

Here are questions about two types of angles.

Draw a right angle. How do you know it's a right angle? What is its measure in degrees?

Draw a straight angle. How do you know it's a straight angle? What is its measure in degrees?

Solution

1. 90°. Responses vary. Sample responses: I used a protractor and measured; a square pattern block fits perfectly inside it; the corner of my notebook paper fits perfectly inside it.

2. 180°. Responses vary. Sample response: I drew a straight line, and a straight angle is an angle formed by a straight line.

Problem 2

An equilateral triangle's angles each have a measure of 60 degrees.

1. Can you put copies of an equilateral triangle together to form a straight angle? Explain or show your reasoning.

2. Can you put copies of an equilateral triangle together to form a right angle? Explain or show your reasoning.

Solution

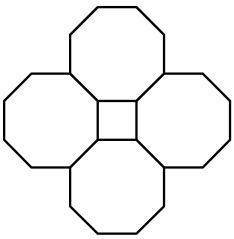
1. Yes. 3 triangles are needed because $180 \div 3 = 60$.

2. No. One 60° angle is not enough, and two is too much.

Problem 3

Here is a square and some regular octagons.

In this pattern, all of the angles inside the octagons have the same measure. The shape in the center is a square. Find the measure of one of the angles inside one of the octagons.



Solution

135°

Problem 4

(from Unit 6, Lesson 17)
The height of the water in a tank decreases by 3.5 cm each day. When the tank is full, the water is 10 m deep. The water tank needs to be refilled when the water height drops below 4 m.

1. Write a question that could be answered by solving the equation $10 - 0.035d = 4$.

2. Is 100 a solution of $10 - 0.035d > 4$? Write a question that solving this problem could answer.

Solution

Answers vary. Sample response:

1. “How many days can pass before the water tank needs to be refilled?”

2. Yes. “Is there still enough water in the tank after 100 days?”

Problem 5

(from Unit 6, Lesson 18)
Use the distributive property to write an expression that is equivalent to each given expression.

1. $-3(2x - 4)$

2. $0.1(-90 + 50a)$

3. $-7(-x - 9)$

4. $\frac{4}{5}(10y + -x + -15)$

Solution

1. $-6x + 12$

2. $-9 + 5a$

3. $7x + 63$

4. $8y - \frac{4}{5}x - 12$

Problem 6

(from Unit 2, Lesson 3)
Lin's puppy is gaining weight at a rate of 0.125 pounds per day. Describe the weight gain in days per pound.

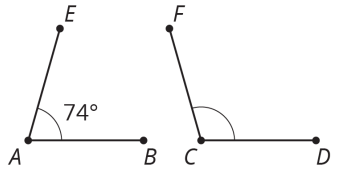
Solution

8 days per pound

Lesson 2

Problem 1

Angles A and C are supplementary. Find the measure of angle C.



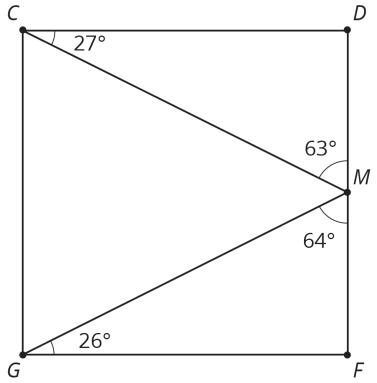
Solution

106°

Problem 2

1. List two pairs of angles in square $CDFG$ that are complementary.

2. Name three angles that sum to 180°.



Solution

1. Any 2 of these pairs: Angles DCM and MCG, angles MGF and MGC, angles MGF and GMF, or angles DCM and DMC.

2. Any 1 of these sets: Angles DMC, CMG, and GMF, angles FGM, GMF, and MFG, angles CDM, DMC, and MCD, or angles MCG, CGM, and GMC.

Problem 3

(from Unit 6, Lesson 22)
Complete the equation with a number that makes the expression on the right side of the equal sign equivalent to the expression on the left side.

$$5x - 2.5 + 6x - 3 = \_\_(2x - 1)$$

Solution

5.5

Problem 4

(from Unit 2, Lesson 4)
Match each table with the equation that represents the same proportional relationship.

A.

x	y
2	8
3	12
4	16
5	20

B.

x	y
3	4.5
6	9
7	10.5
10	15

C.

x	y
2	$\frac{5}{2}$
4	5
6	$\frac{15}{2}$
12	15

1. $y = 1.5x$
2. $y = 1.25x$
3. $y = 4x$

Solution

A. 3

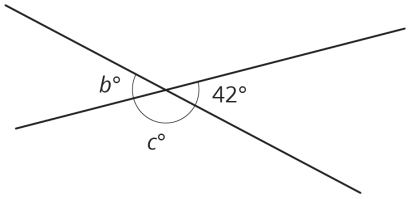
B. 1

C. 2

Lesson 3

Problem 1

Two lines intersect. Find the value of b and c.

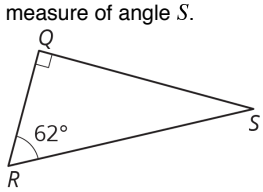


Solution

$c = 138$, $b = 42$

Problem 2

In this figure, angles R and S are complementary. Find the measure of angle S.



Solution

28°

Problem 3

If two angles are both vertical and supplementary, can we determine the angles? Is it possible to be both vertical and complementary? If so, can you determine the angles? Explain how you know.

Solution

Yes, they are both possible. Vertical and supplementary angles must be 90° each, because the two angles must be the same and sum to 180°. Vertical and complementary angles must be 45°, because the two angles must be the same and sum to 90°.

Problem 4

(from Unit 6, Lesson 22)
Match each expression in the first list with an equivalent expression from the second list.

A. $5(x+1)-2x+11$

B. $2x+2+x+5$

C. $\frac{-3}{8}x-9+\frac{5}{8}x+1$

D. $2.06x-5.53+4.98-9.02$

E. $99x+44$

1. $\frac{1}{4}x-8$
2. $\frac{1}{2}(6x+14)$
3. $11(9x+4)$
4. $3x+16$
5. $2.06x+(-5.53)+4.98+(-9.02)$

Solution

A. 4

B. 2

C. 1

D. 5

E. 3

Problem 5

(from Unit 6, Lesson 19)
Factor each expression.

1. $15a-13a$
2. $-6x-18y$
3. $36abc+54ad$

Solution

1. $a(15-13)$
2. $-6(1x+3y)$ (or $6(-x-3y)$)

3. $9a(4bc + 6d)$

Problem 6

(from Unit 6, Lesson 17)
The directors of a dance show expect many students to participate but don't yet know how many students will come. The directors need 7 students to work on the technical crew. The rest of the students work on dance routines in groups of 9. For the show to work, they need at least 6 full groups working on dance routines.

1. Write and solve an inequality to represent this situation, and graph the solution on a number line.

2. Write a sentence to the directors about the number of students they need.

Solution

1. $\frac{x-7}{9} \geq 6$, $x \geq 61$. The number line should have a closed circle at $x = 61$. Some students may start at $x = 61$ and draw a line with an arrow extending to the right; others may draw dots on integers to the right of $x = 61$.

2. The directors need at least 61 students to show up. (Possibly, they may only be happy if they get 61, 70, 79, etc. students so they have even groups of nine.)

Problem 7

(from Unit 2, Lesson 5)
A small dog gets fed $\frac{3}{4}$ cup of dog food twice a day. Using d for the number of days and f for the amount of food in cups, write an equation relating the variables. Use the equation to find how many days a large bag of dog food will last if it contains 210 cups of food.

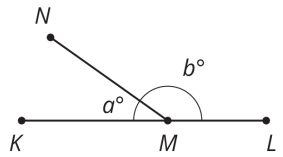
Solution

$f = 1.5 \cdot d$ or equivalent. The bag will last 140 days since $210 \div 1.5 = 140$.

Lesson 4

Problem 1

M is a point on line segment KL. NM is a line segment. Select **all** the equations that represent the relationship between the measures of the angles in the figure.



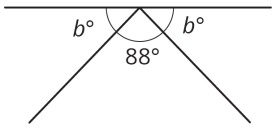
A. $a = b$
B. $a + b = 90$
C. $b = 90 - a$
D. $a + b = 180$
E. $180 - a = b$
F. $180 = b - a$

Solution

D, E

Problem 2

Which equation represents the relationship between the angles in the figure?



A. $88 + b = 90$
B. $88 + b = 180$
C. $2b + 88 = 90$

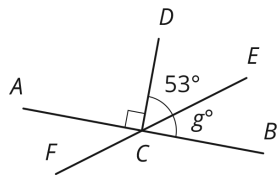
D. $2b + 88 = 180$

Solution

D

Problem 3

Segments AB, EF, and CD intersect at point C, and angle ACD is a right angle. Find the value of g.



Solution

37

Problem 4

(from Unit 6, Lesson 12)
Select **all** the expressions that are the result of decreasing x by 80%.

A. $\frac{20}{100}x$
B. $x - \frac{80}{100}x$
C. $\frac{100-20}{100}x$
D. $0.80x$
E. $(1 - 0.8)x$

Solution

A, B, E

Problem 5

(from Unit 6, Lesson 8)
Andre is solving the equation $4(x + \frac{3}{2}) = 7$. He says, “I can subtract $\frac{3}{2}$ from each side to get $4x = \frac{11}{2}$ and then divide by 4 to get $x = \frac{11}{8}$.” Kiran says, “I think you made a mistake.”

1. How can Kiran know for sure that Andre’s solution is incorrect?

2. Describe Andre’s error and explain how to correct his work.

Solution

Answers vary. Sample responses:

1. He can substitute Andre's solution into the equation. If the solution is correct, the resulting equation will be true. $4(\frac{11}{8} + \frac{3}{2})$ is $11\frac{1}{2}$, not 7, so the solution is incorrect.

2. Andre subtracted $\frac{3}{2}$ from each side, but that doesn’t remove the $\frac{3}{2}$ from the equation because $\frac{3}{2}$ is part of an expression multiplied by 4. Andre could divide each side by 4 to get $x + \frac{3}{2} = \frac{7}{4}$ and then subtract $\frac{3}{2}$ on each side to get $x = \frac{1}{4}$. (Or, he could use the distributive property to write $4x + 6 = 7$, subtract 6 from each side to get $4x = 1$, and then divide by 4 on each side to get $x = \frac{1}{4}$.)

Problem 6

(from Unit 6, Lesson 7)
Solve each equation.

1. $\frac{1}{7}x + \frac{3}{4} = \frac{9}{8}$

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

3. $\frac{3}{2} = \frac{4}{3}x + \frac{2}{3}$

4. $0.3x + 7.9 = 9.1$

5. $11.03 = 8.78 + 0.02x$

Solution

1. $x = \frac{21}{8}$

2. $x = \frac{5}{6}$

3. $x = \frac{5}{8}$

4. $x = 4$

5. $x = 112.5$

Problem 7

(from Unit 2, Lesson 5)
A train travels at a constant speed for a long distance. Write the two constants of proportionality for the relationship between distance traveled and elapsed time. Explain what each of them means.

time elapsed (hr)	distance (mi)
1.2	54
3	135
4	180

Solution

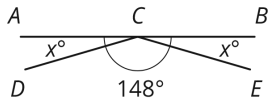
45. The train travels 45 miles in 1 hour

$\frac{1}{45}$. It takes $\frac{1}{45}$ hours for the train to travel 1 mile

Lesson 5

Problem 1

Segments AB, DC, and EC intersect at point C. Angle DCE measures 148°. Find the value of x.

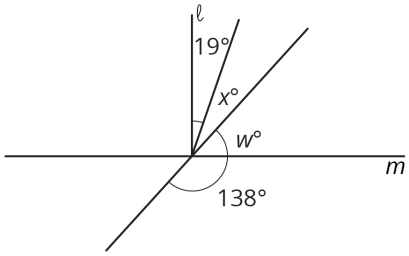


Solution

16

Problem 2

Line ℓ is perpendicular to line m. Find the value of x and w.



Solution

$x = 29$ and $w = 42$

Problem 3

If you knew that two angles were complementary and were given the measure of one of those angles, would you be able to find the measure of the other angle? Explain your reasoning.

Solution

Yes, because one angle would be known and if two angles are complementary, then the measures of the two angles sum to 90°.

Problem 4

(from Unit 6, Lesson 15)
For each inequality, decide whether the solution is represented by $x < 4.5$ or $x > 4.5$.

1. $-24 > -6(x - 0.5)$
2. $-8x + 6 > -30$
3. $-2(x + 3.2) < -15.4$

Solution

1. $x > 4.5$
2. $x < 4.5$
3. $x > 4.5$

Problem 5

(from Unit 4, Lesson 2)
A runner ran $\frac{2}{3}$ of a 5 kilometer race in 21 minutes. They ran the entire race at a constant speed.

1. How long did it take to run the entire race?
2. How many minutes did it take to run 1 kilometer?

Solution

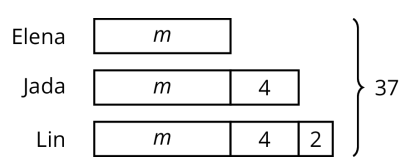
1. 31.5 minutes
2. 6.3 minutes

One way to find the answers to both questions is using a ratio table:

distance (km)	time (min)
$\frac{10}{3}$	21
10	63
5	31.5
1	6.3

Problem 6

(from Unit 6, Lesson 12)
Jada, Elena, and Lin walked a total of 37 miles last week. Jada walked 4 more miles than Elena, and Lin walked 2 more miles than Jada. The diagram represents this situation:



Find the number of miles that they each walked. Explain or show your reasoning.

Solution

Elena: 9 miles, Jada: 13 miles, Lin: 15 miles

Possible strategies:

- $3m + 10 = 37$, $m = 9$
- Start with the total of 37 miles, subtract 10, and divide by 3

Problem 7

(from Unit 6, Lesson 19)
Select **all** the expressions that are equivalent to $-36x + 54y - 90$.

A. $-9(4x - 6y - 10)$
B. $-18(2x - 3y + 5)$
C. $-6(6x + 9y - 15)$
D. $18(-2x + 3y - 5)$
E. $-2(18x - 27y + 45)$
F. $2(-18x + 54y - 90)$

Solution

B, D, E

Lesson 6

Problem 1

A rectangle has side lengths of 6 units and 3 units. Could you make a quadrilateral that is not identical using the same four side lengths? If so, describe it.

Solution

Yes, you could make a parallelogram or a kite using the side lengths 3, 3, 6, and 6.

Problem 2

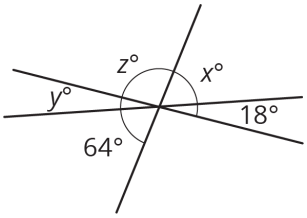
Come up with an example of three side lengths that can not possibly make a triangle, and explain how you know.

Solution

Answers vary. Sample response: the lengths 1 foot, 1 inch, and 1 inch can not possibly make a triangle, because if you attach the 1 inch lengths to either end of the 1 foot length, the 1 inch lengths are too short to connect at their other ends.

Problem 3

(from Unit 7, Lesson 3)
Find x, y, and z.



Solution

$x = 64, y = 18, z = 98$

Problem 4

(from Unit 7, Lesson 1)
How many right angles need to be put together to make:

1. 360 degrees?

2. 180 degrees?

3. 270 degrees?

4. A straight angle?

Solution

1. 4

2. 2

3. 3

4. 2

Problem 5

(from Unit 6, Lesson 8)
Solve each equation.

$\frac{1}{7}(x + \frac{3}{4}) = \frac{1}{8}$

$\frac{9}{2} = \frac{3}{4}(z + \frac{2}{3})$

$1.5 = 0.6(w + 0.4)$

$0.08(7.97 + v) = 0.832$

Solution

1. $\frac{1}{8}$

2. $\frac{16}{3}$

3. 2.1

4. 2.43

Problem 6

(from Unit 4, Lesson 3)

1. You can buy 4 bottles of water from a vending machine for $7. At this rate, how many bottles of water can you buy for $28? If you get stuck, consider creating a table.

2. It costs $20 to buy 5 sandwiches from a vending machine. At this rate, what is the cost for 8 sandwiches? If you get stuck, consider creating a table.

Solution

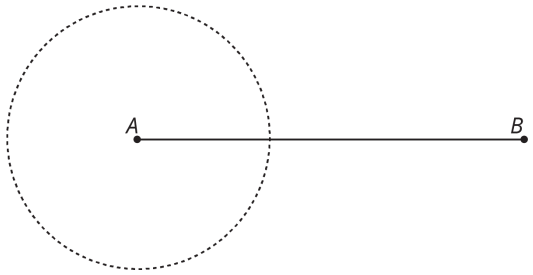
1. 16

2. $32

Lesson 7

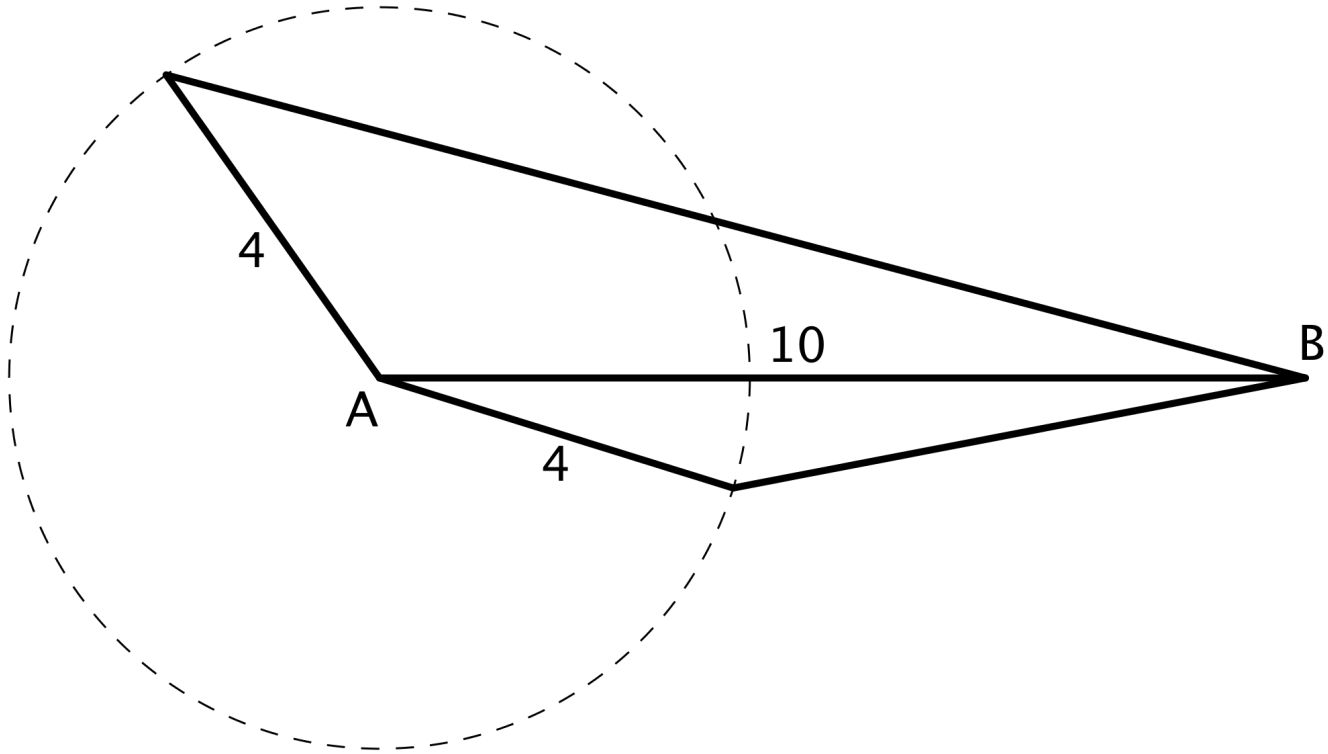
Problem 1

In the diagram, the length of segment AB is 10 units and the radius of the circle centered at A is 4 units. Use this to create two unique triangles, each with a side of length 10 and a side of length 4. Label the sides that have length 10 and 4.



Solution

Answers vary. Possible response:



Problem 2

Select **all** the sets of three side lengths that will make a triangle.

A. 3, 4, 8
B. 7, 6, 12
C. 5, 11, 13
D. 4, 6, 12
E. 4, 6, 10

Solution

B, C

Problem 3

Based on signal strength, a person knows their lost phone is exactly 47 feet from the nearest cell tower. The person is currently standing 23 feet from the same cell tower. What is the closest the phone could be to the person? What is the furthest their phone could be from them?

Solution

24 feet, 70 feet

Problem 4

(from Unit 7, Lesson 2)
Each row contains the degree measures of two complementary angles. Complete the table.

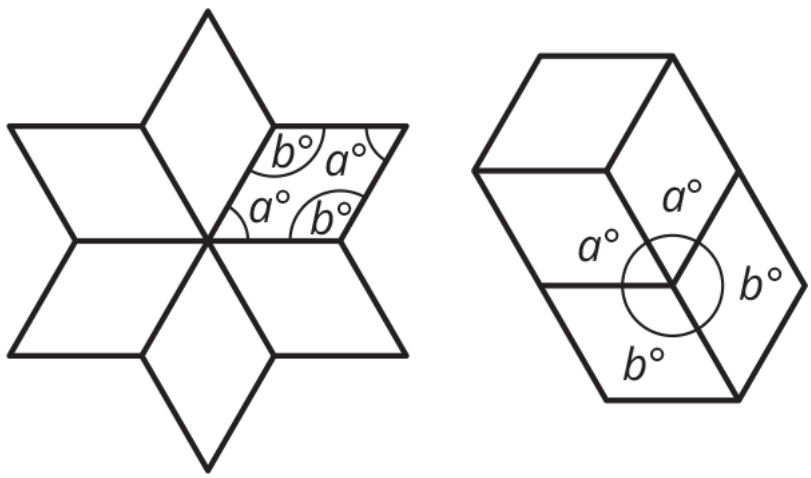
measure of an angle	measure of its complement
80°	
25°	
54°	
x	

Solution

measure of an angle	measure of its complement
80°	10°
25°	65°
54°	36°
x	$90 - x$

Problem 5

(from Unit 7, Lesson 1)
Here are two patterns made using identical rhombuses. Without using a protractor, determine the value of a and b. Explain or show your reasoning.



Solution

$a = 60$ because 6 a's make 360. $b = 120$ because 2 a's and 2 b's make 360.

Problem 6

(from Unit 4, Lesson 3)
Mai's family is traveling in a car at a constant speed of 65 miles per hour.

1. At that speed, how long will it take them to travel 200 miles?

2. How far do they travel in 25 minutes?

Solution

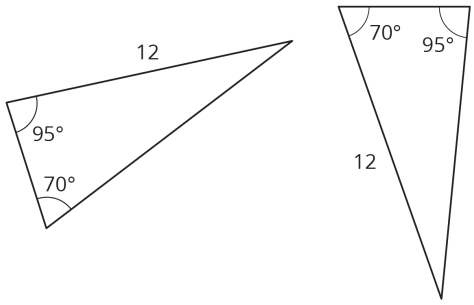
1. $3\frac{5}{65}$ hours or about 3 hours and 4.6 minutes ($200 \div 65$ hours)

2. $65 \cdot \frac{25}{60}$ miles or about 27.1 miles

Lesson 8

Problem 1

Are these two triangles identical? Explain how you know.

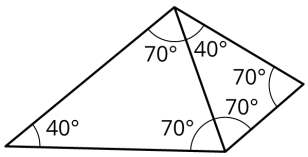


Solution

No, these two triangles are not identical. They have two of the same angle measures and one side length is the same, but the sides and angles are arranged differently in each triangle. In the triangle on the left, the side marked 12 is adjacent to the 95° angle. In the triangle on the right, the side marked 12 is adjacent to the 70° angle.

Problem 2

Are these triangles identical? Explain your reasoning.



Solution

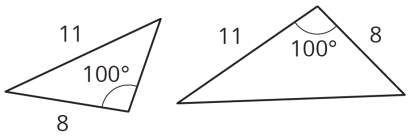
No, they are not identical. Although they have the same angle measurements, two of the side lengths are different.

Problem 3

Tyler claims that if two triangles each have a side length of 11 units and a side length of 8 units, and also an angle measuring 100°, they must be identical to each other. Do you agree? Explain your reasoning.

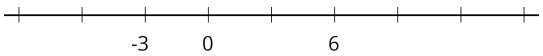
Solution

No, it is possible to build two different triangles with these measurements.



Problem 4

(from Unit 5, Lesson 8)
The markings on the number line are equally spaced. Label the other markings on the number line.



Solution

-9, -6, -3, 0, 3, 6, 9, 12, 15

Problem 5

(from Unit 5, Lesson 9)
A passenger on a ship dropped his camera into the ocean. If it is descending at a rate of -4.2 meters per second, how long until it hits the bottom of the ocean, which is at -1,875 meters?

Solution

It will take about 446 seconds, which is about 7 and a half minutes.

Problem 6

(from Unit 4, Lesson 3)
Apples cost $1.99 per pound.

1. How much do $3\frac{1}{4}$ pounds of apples cost?

2. How much do x pounds of apples cost?

3. Clare spent $5.17 on apples. How many pounds of apples did Clare buy?

Solution

1. $6.47 (this number is rounded to the nearest cent)

2. $1.99x$

3. About 2.6 pounds. $1.99x = 5.17$, so $x \approx 2.598$. Most grocery store scales round to the nearest tenth.

Problem 7

(from Unit 3, Lesson 5)
Diego has a glue stick with a diameter of 0.7 inches. He sets it down 3.5 inches away from the edge of the table, but it rolls onto the floor. How many rotations did the glue stick make before it fell off of the table?

Solution

$3.5 \div 2.2$ times (about 1.6 times)

Lesson 9

Problem 1

Use a protractor to try to draw each triangle. Which of these three triangles is impossible to draw?

1. A triangle where one angle measures 20° and another angle measures 45°
2. A triangle where one angle measures 120° and another angle measures 50°
3. A triangle where one angle measures 90° and another angle measures 100°

Solution

It is impossible to draw a triangle where one angle measures 90° and another angle measures 100°.

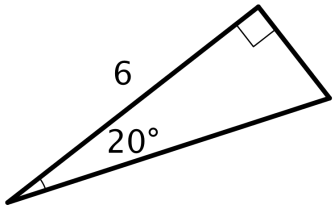
Problem 2

A triangle has an angle measuring 90°, an angle measuring 20°, and a side that is 6 units long. The 6-unit side is in between the 90° and 20° angles.

1. Sketch this triangle and label your sketch with the given measures.
2. How many unique triangles can you draw like this?

Solution

1.



2. There is only one triangle that fits this description, so long as the 6-unit side is between the two given angles.

Problem 3

(from Unit 5, Lesson 13)

1. Find a value for x that makes -x less than $2x$.

2. Find a value for x that makes -x greater than $2x$.

Solution

Answers vary. Sample response:

1. 1, because -1 is less than $2 \cdot 1$.

2. -3, because 3 is greater than $2 \cdot$ -3.

Problem 4

(from Unit 5, Lesson 3)
One of the particles in atoms is called an electron. It has a charge of -1. Another particle in atoms is a proton. It has charge of +1.

The overall charge of an atom is the sum of the charges of the electrons and the protons. Here is a list of common elements.

	charge from electrons	charge from protons	overall charge
carbon	-6	+6	0
aluminum	-10	+13	
phosphide	-18	+15	
iodide	-54	+53	
tin	-50	+50	

Find the overall charge for the rest of the atoms on the list.

Solution

Aluminum: $(-10) + (+13) = +3$

Phosphide: $(-18) + (+15) = -3$

Iodide: $(-54) + (+53) = -1$

Tin: $(-50) + (+50) = 0$

Problem 5

(from Unit 4, Lesson 3)
A factory produces 3 bottles of sparkling water for every 7 bottles of plain water. If those are the only two products they produce, what percentage of their production is sparkling water? What percentage is plain?

Solution

30% of the production is sparkling water. 70% of the production is plain water.

Lesson 10

Problem 1

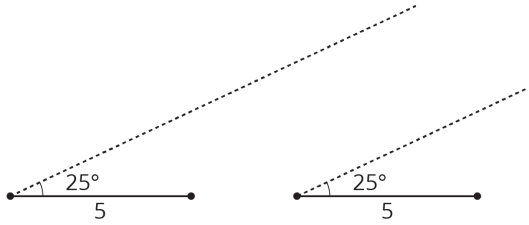
A triangle has sides of length 7 cm, 4 cm, and 5 cm. How many unique triangles can be drawn that fit that description? Explain or show your reasoning.

Solution

You can only draw one unique triangle with those same 3 measures. If you start by drawing the 7 cm side and then draw circles of radii 4 cm and 5 cm at each endpoint, the circles will cross at two places. Connecting the endpoints of the 7 cm side to those crossing points will produce two identical triangles, each having side lengths 7 cm, 4 cm, and 5 cm. There are no other points that could be the third vertex of the triangle.

Problem 2

A triangle has one side that is 5 units long and an adjacent angle that measures 25°. The two other angles in the triangle measure 90° and 65°. Complete the two diagrams to create two *different* triangles with these measurements.



Solution

Answers vary.

Problem 3

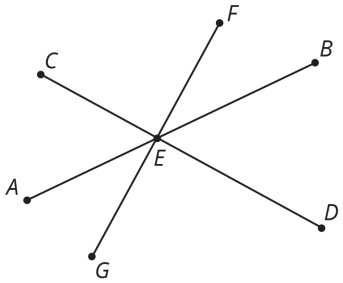
Is it possible to make a triangle that has angles measuring 90 degrees, 30 degrees, and 100 degrees? If so, draw an example. If not, explain your reasoning.

Solution

No, if you try to draw a triangle that has a 90 degree angle on the end of a side and a 100 degree angle on the other end of the same side, there is no way to make the other two sides meet to form a triangle.

Problem 4

(from Unit 7, Lesson 2)
Segments CD, AB, and FG intersect at point E. Angle FEC is a right angle. Identify any pairs of angles that are complementary.



Solution

- FEB and DEB
- CEA and AEG

These are also complementary, but students may not have the tools to identify them yet:

- FEB and CEA
- DEB and AEG

Problem 5

(from Unit 5, Lesson 15)
Match each equation to a step that will help solve the equation for x.

A. $3x = -4$

B. $-4.5 = x - 3$

C. $3 = \frac{-x}{3}$

D. $\frac{1}{3} = -3x$

E. $x - \frac{1}{3} = 0.4$

F. $3 + x = 8$

G. $\frac{x}{3} = 15$

H. $7 = \frac{1}{3} + x$

1. Add $\frac{1}{3}$ to each side.
2. Add $\frac{-1}{3}$ to each side.
3. Add 3 to each side.
4. Add -3 to each side.
5. Multiply each side by 3.
6. Multiply each side by -3.
7. Multiply each side by $\frac{1}{3}$.
8. Multiply each side by $\frac{-1}{3}$.

Solution

A. 7

B. 3

C. 6

D. 8

E. 1

F. 4

G. 5

H. 2

Problem 6

(from Unit 4, Lesson 8)

1. If you deposit $300 in an account with a 6% interest rate, how much will be in your account after 1 year?
2. If you leave this money in the account, how much will be in your account after 2 years?

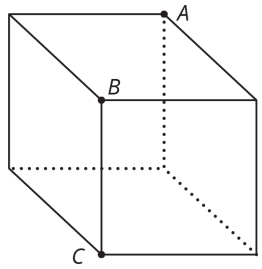
Solution

1. $318
2. $337.08

Lesson 11

Problem 1

A cube is cut into two pieces by a single slice that passes through points A, B, and C. What shape is the cross section?



Solution

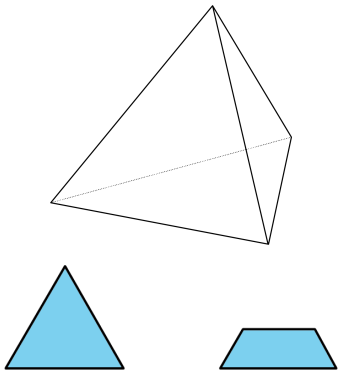
Rectangle

Problem 2

Describe how to slice the three-dimensional figure to result in each cross section.

Three-dimensional figure:

Cross sections:

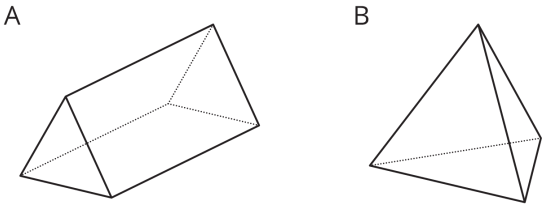


Solution

To get a cross section that is a triangle, make a slice that is parallel to one of the pyramid's faces. To get a cross section that is a trapezoid, make a slice that is perpendicular to one of the pyramid's faces that does not pass through the pyramid's opposite vertex.

Problem 3

Here are two three-dimensional figures.



Describe a way to slice one of the figures so that the cross section is a rectangle.

Solution

If you slice figure A perpendicular to its triangular bases, the cross section is a rectangle.

Problem 4

(from Unit 7, Lesson 2)
Each row contains the degree measures of two supplementary angles. Complete the table.

measure of an angle	measure of its supplement
80°	
25°	
119°	
x	

Solution

measure of an angle	measure of its supplement
80°	100°
25°	155°
119°	61°
x	$180 - x$

Problem 5

(from Unit 4, Lesson 8)
Two months ago, the price, in dollars, of a cell phone was c.

1. Last month, the price of the phone increased by 10%. Write an expression for the price of the phone last month.

2. This month, the price of the phone decreased by 10%. Write an expression for the price of the phone this month.

3. Is the price of the phone this month the same as it was two months ago? Explain your reasoning.

Solution

1. $1.1c$ or equivalent (Because 10% of c is $0.1c$ and, adding this to c, gives $1.1c$)

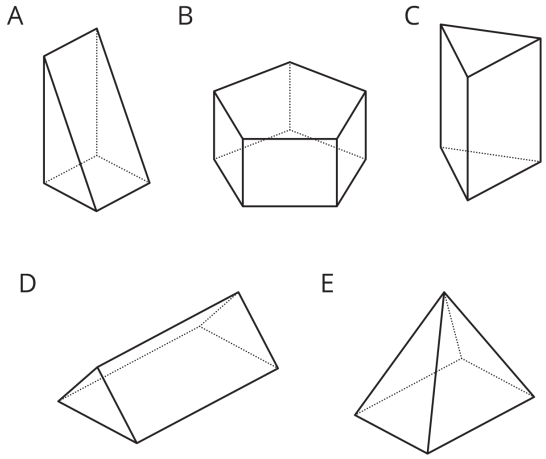
2. $0.99c$ or equivalent (Because 10% of $1.1c$ is $0.11c$ and this gives $0.99c$ when subtracted from $1.1c$)

3. No, the phone is a little bit cheaper now than it was a month ago. The 10% discount this month is on the higher price so it is more than the 10% increase a month ago.

Lesson 12

Problem 1

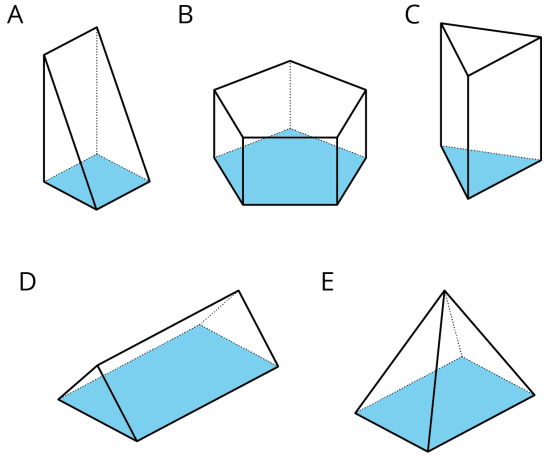
1. Select **all** the prisms.
2. For each prism, shade one of its bases.



Solution

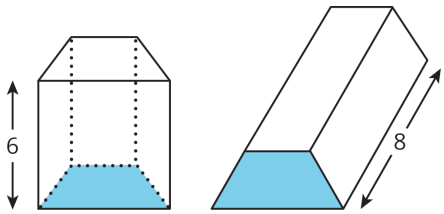
1. A, B C, D

2.



Problem 2

The volume of both of these trapezoidal prisms is 24 cubic units. Their heights are 6 and 8 units, as labeled. What is the area of a trapezoidal base of each prism?



Solution

The prism with a height of 6 units has a base with area 4 square units, because $24 \div 6 = 4$. The prism with a height of 8 units has a base with area 3 square units, because $24 \div 8 = 3$.

Problem 3

(from Unit 7, Lesson 2)
Two angles are complementary. One has a measure of 19 degrees. What is the measure of the other?

Solution

71 degrees

Problem 4

(from Unit 7, Lesson 2)
Two angles are supplementary. One has a measure that is twice as large as the other. Find the two angle measures.

Solution

60° and 120°

Problem 5

(from Unit 6, Lesson 22)
Match each expression in the first list with an equivalent expression from the second list.

A. $7(x+2) - x + 3$

B. $6x + 3 + 4x + 5$

C. $\frac{-2}{5}x - 7 + \frac{3}{5}x - 3$

D. $8x - 5 + 4 - 9$

E. $24x + 36$

1. $\frac{1}{5}x - 10$
2. $6x + 17$
3. $2(5x + 4)$
4. $12(2x + 3)$
5. $8x + (-5) + 4 + (-9)$

Solution

A. 2

B. 3

C. 1

D. 5

E. 4

Problem 6

(from Unit 4, Lesson 8)
Clare paid 50% more for her notebook than Priya paid for hers. Priya paid x for her notebook and Clare paid y dollars for hers. Write an equation that represents the relationship between y and x.

Solution

$y = 1.5x$ (or equivalent)

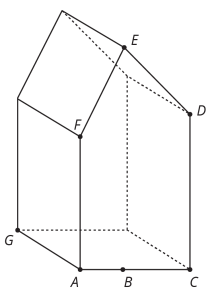
Lesson 13

Problem 1

You find a crystal in the shape of a prism. Find the volume of the crystal.

The point B is directly underneath point E, and the following lengths are known:

- From A to B: 2 mm
- From B to C: 3 mm
- From A to F: 6 mm
- From B to E: 10 mm
- From C to D: 7 mm
- From A to G: 4 mm

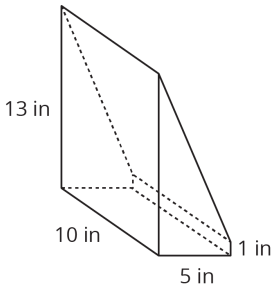


Solution

166 cubic millimeters

Problem 2

A rectangular prism with dimensions 5 inches by 13 inches by 10 inches was cut to leave a piece as shown in the image. What is the volume of this piece? What is the volume of the other piece not pictured?



Solution

350 cubic inches, 300 cubic inches

Problem 3

(from Unit 7, Lesson 9)
A triangle has one side that is 7 cm long and another side that is 3 cm long.

1. Sketch this triangle and label your sketch with the given measures. (If you are stuck, try using a compass or cutting some straws to these two lengths.)

2. Draw one more triangle with these measures that is not identical to your first triangle.

3. Explain how you can tell they are not identical.

Solution

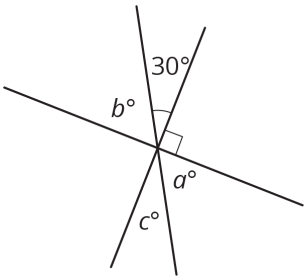
1. Answers vary.

2. Answers vary.

3. Responses vary. Sample response: If I cut one of the triangles out and place it on top of the other triangles, the triangles do not match up.

Problem 4

(from Unit 7, Lesson 4)
Select **all** equations that represent a relationship between angles in the figure.



A. $90 - 30 = b$
B. $30 + b = a + c$
C. $a + c + 30 + b = 180$
D. $a = 30$
E. $a = c = 30$
F. $90 + a + c = 180$

Solution

A, B, C, F

Problem 5

(from Unit 4, Lesson 9)
A mixture of punch contains 1 quart of lemonade, 2 cups of grape juice, 4 tablespoons of honey, and $\frac{1}{2}$ gallon of sparkling water. Find the percentage of the punch mixture that comes from each ingredient. Round your answers to the nearest tenth of a percent. (Hint: 1 cup = 16 tablespoons)

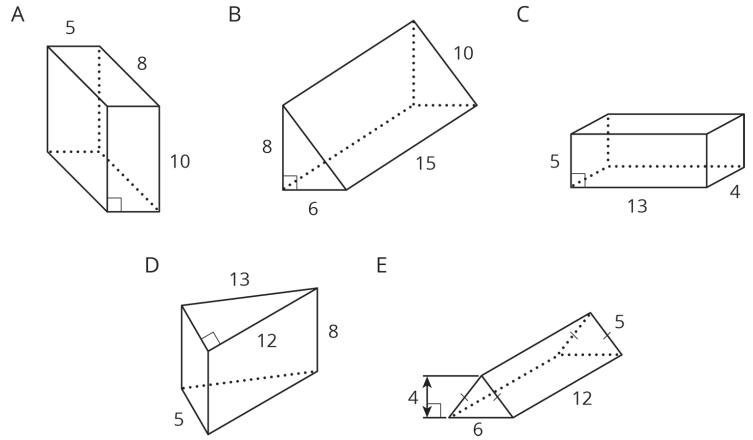
Solution

Lemonade: 28.1%, Grape Juice: 14.0%, Honey: 1.8%, Seltzer Water: 56.1%

Lesson 14

Problem 1

Edge lengths are given in units. Find the surface area of each prism in square units.

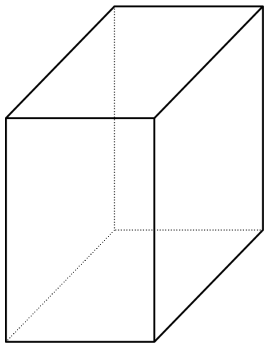


Solution

1. 340
2. 408
3. 274
4. 300
5. 216

Problem 2

(from Unit 7, Lesson 11)
Priya says, “No matter which way you slice this rectangular prism, the cross section will be a rectangle.” Mai says, “I’m not so sure.” Describe a slice that Mai might be thinking of.

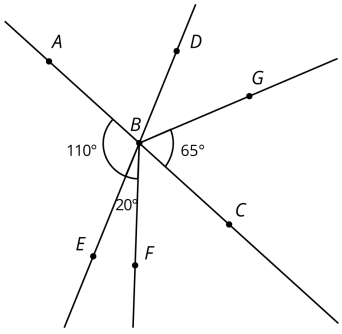


Solution

If you keep your slices parallel to a set of faces, then the cross section does have to be a rectangle. But if you can slice in any direction, you can get a triangle. Imagine slicing off one small corner of the prism.

Problem 3

(from Unit 7, Lesson 5)
B is the intersection of line AC and line ED. Find the measure of each of the angles.



1. The measure of angle ABF
2. The measure of angle ABD
3. The measure of angle EBC
4. The measure of angle FBC
5. The measure of angle DBG

Solution

1. 130 degrees (sum of angles ABE and EBF)
2. 70 degrees (supplementary with angle ABE)
3. 70 degrees (vertical with ABD)
4. 50 degrees (subtract the measure of angle EBF from the measure of angle EBC)
5. 45 degrees (subtract the measures of angles ABD and CBG from 180°)

Problem 4

(from Unit 6, Lesson 20)
Write each expression with fewer terms.

1. $12m - 4m$
2. $12m - 5k + m$
3. $9m + k - (3m - 2k)$

Solution

1. $8m$
2. $13m - 5k$
3. $6m + 3k$

Problem 5

(from Unit 4, Lesson 9)

1. Find 44% of 625 using the facts that 40% of 625 is 250 and 4% of 625 is 25.
2. What is 4.4% of 625?
3. What is 0.44% of 625?

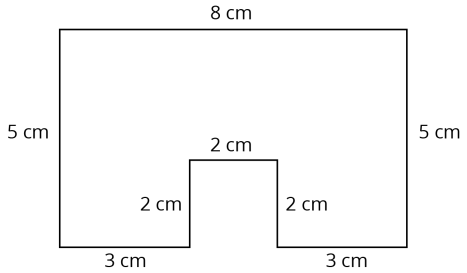
Solution

1. 275 (Because 44% of a number equals 40% of the number plus an additional 4% of the number)
2. 27.5
3. 2.75

Lesson 15

Problem 1

Here is the base of a prism.



1. If the height of the prism is 5 cm, what is its surface area? What is its volume?

2. If the height of the prism is 10 cm, what is its surface area? What is its volume?

3. When the height doubled, what was the percent increase for the surface area? For the volume?

Solution

1. $SA = 222 \text{ cm}^2$, $V = 180 \text{ cm}^3$

2. $SA = 372 \text{ cm}^2$, $V = 360 \text{ cm}^3$

3. The surface area increased by about 67.6%. The volume increased by 100% (doubled).

Problem 2

Select **all** the situations where knowing the volume of an object would be more useful than knowing its surface area.

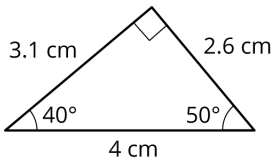
A. Determining the amount of paint needed to paint a barn.
B. Determining the monetary value of a piece of gold jewelry.
C. Filling an aquarium with buckets of water.
D. Deciding how much wrapping paper a gift will need.
E. Packing a box with watermelons for shipping.
F. Charging a company for ad space on your race car.
G. Measuring the amount of gasoline left in the tank of a tractor.

Solution

B, C, E, G

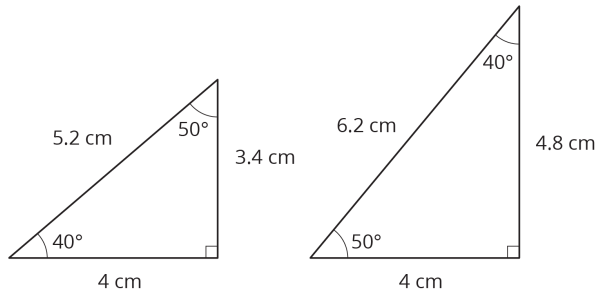
Problem 3

(from Unit 7, Lesson 9)
Han draws a triangle with a 50° angle, a 40° angle, and a side of length 4 cm as shown. Can you draw a different triangle with the same conditions?



Solution

Answers vary. Sample response: Yes, if we rearrange the angles and side, there are more possibilities.



Problem 4

(from Unit 7, Lesson 3)
Angle H is half as large as angle J. Angle J is one fourth as large as angle K. Angle K has measure 240 degrees. What is the measure of angle H?

Solution

30°

Problem 5

(from Unit 4, Lesson 9)
The Colorado state flag consists of three horizontal stripes of equal height. The side lengths of the flag are in the ratio $2:3$. The diameter of the gold-colored disk is equal to the height of the center stripe. What percentage of the flag is gold?

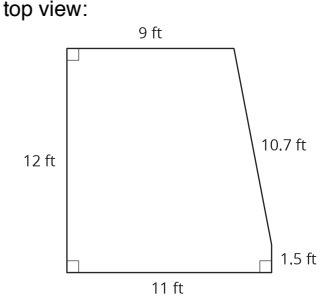
Solution

Approximately 5.82% (the exact proportion is $\frac{\pi}{54}$ or equivalent)

Lesson 16

Problem 1

A landscape architect is designing a pool that has this top view:



1. How much water will be needed to fill this pool 4 feet deep?

2. Before filling up the pool, it gets lined with a plastic liner. How much liner is needed for this pool?

3. Here are the prices for different amounts of plastic liner. How much will all the plastic liner for the pool cost?

plastic liner (ft^2)	cost ($)
25	3.75
50	7.50
75	11.25

Solution

1. 486 ft^3

2. 298.3 ft^2

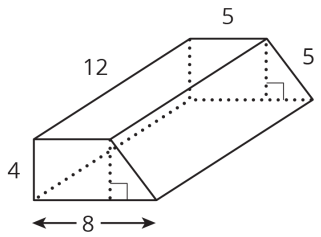
3. \$44.75

Problem 2

(from Unit 7, Lesson 13)
Shade in a base of the trapezoidal prism. (Be careful! The base is not the same as the bottom.)

- Find the area of the base you shaded.

- Find the volume of this trapezoidal prism.



Solution

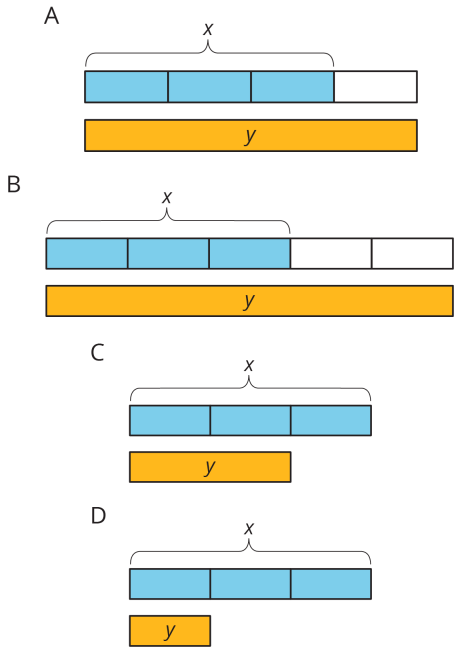
The bases of the prism are the two trapezoids. Students may shade either the trapezoid at the front or the trapezoid at the back.

1. 26

2. 312

Problem 3

(from Unit 4, Lesson 9)
For each diagram, decide if y is an increase or a decrease of x. Then determine the percentage that x increased or decreased to result in y.



Solution

1. Increase, $33\frac{1}{3}\%$

2. Increase, $66\frac{2}{3}\%$

3. Decrease, $33\frac{1}{3}\%$

4. Decrease, $66\frac{2}{3}\%$

Problem 4

(from Unit 4, Lesson 10)
Noah is visiting his aunt in Texas. He wants to buy a belt buckle whose price is $25. He knows that the sales tax in Texas is 6.25%.

1. How much will the tax be on the belt buckle?

2. How much will Noah spend for the belt buckle including the tax?

3. Write an equation that represents the total cost, c, of an item whose price is p.

Solution

1. $1.56 (requires rounding)

2. $26.56

3. $c = 1.0625p$ or equivalent