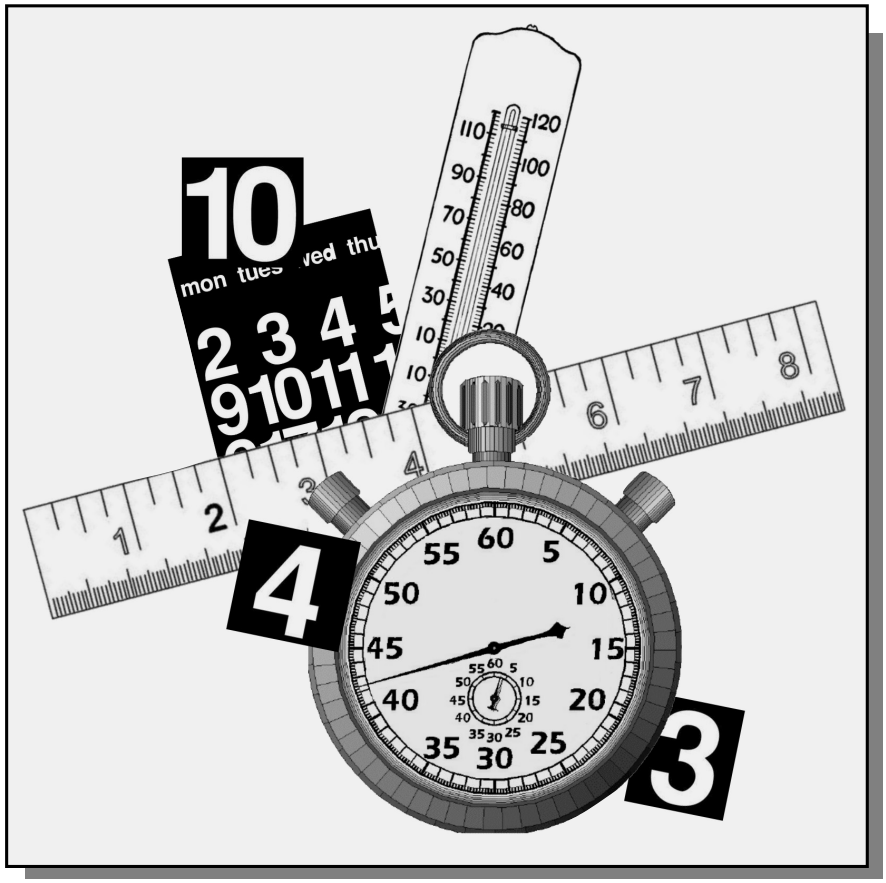
Intermediate Math Skills

Activities



Chapter 2

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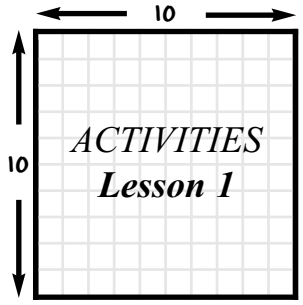
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Geometry

Similar and Congruent

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. ***Similar*** objects have the same _____.
(a) shape (b) size (c) angles (d) straight edge

2. _____ objects have the same shape and size.

3. The Greeks used a _____ and a ***compass*** to make mathematical calculations.

4. An instrument similar to a ruler used to draw straight lines is called a(n) _____ _____.

5. An instrument used to draw circles and arcs is called a(n) _____.

6. State the SAS Property of Triangles.

_____
_____
_____

7. The triangles in Example Set 1 are ***congruent*** because of the _____ _____ Property of Triangles.

8. $\triangle ABC \sim \triangle DEF$ because all _____ angles are congruent.

9. _____ show the corresponding sides and angles of triangles.

10. In Example Set 2, $\triangle ABC \sim \triangle DEF$. _____ (a) True or (b) False

11. $\triangle ABC$ and $\triangle DEF$ are congruent. _____ (a) True or (b) False

12. "If three corresponding sides of one triangle are congruent to three corresponding sides of another triangle, then the two triangles are congruent" is a statement of the _____ Property.

13. In Example Set 3, the two triangles are congruent because all three corresponding _____ are congruent.

14. All three _____ sides are congruent in $\triangle ABC$ and $\triangle DEF$ shown in Example Set 4; therefore, $\triangle ABC \cong \triangle DEF$.

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15. State the Angle-Side-Angle Property.

_____
_____
_____.

16. In Example Set 5, to show the triangles are congruent, only _____ side is shown to be congruent.

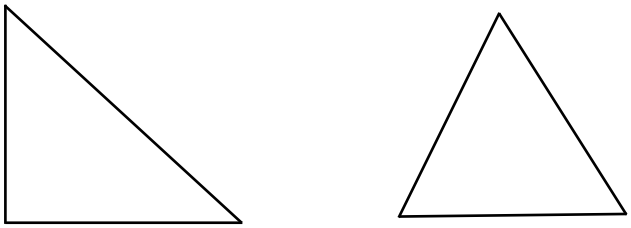
17. In Example Set 6, the triangles shown are congruent because _____ corresponding angles are congruent.

18. In two triangles, one corresponding side, and all corresponding angles are congruent. Choose the property that proves the triangles are congruent. (Draw a picture if necessary.) _____

(a) A-A-A (b) A-S-A (c) S-A-S (d) S-S-S

19. The two triangles below are _____ (congruent, similar, neither). Discuss the reason.

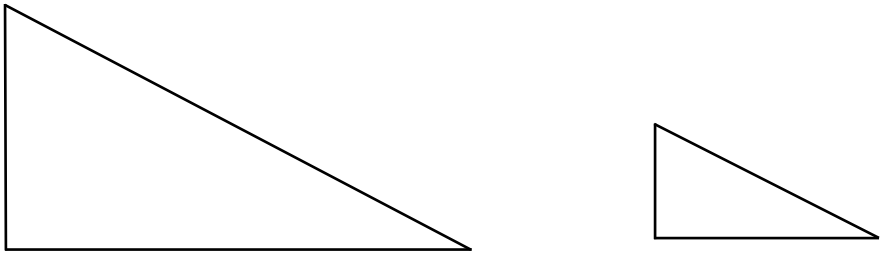
_____
_____
_____
_____.



Determine the property or properties you would use to show that each pair of triangles below in each question (#20-27) are similar.

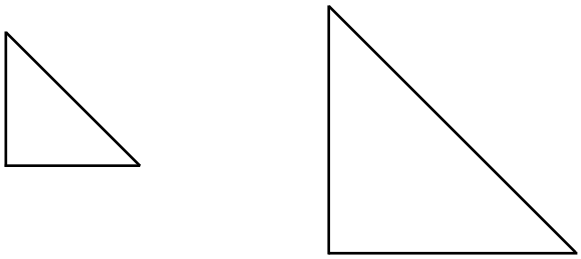
(a) A-A-A **(c) S-A-S** **(e) a, b and c** **(g) none of these**
(b) A-S-A **(d) S-S-S** **(f) all of these**

20. _____



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21. _____



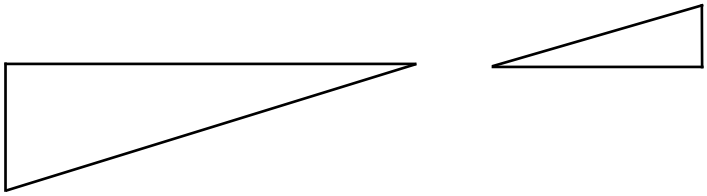
22. _____



23. _____

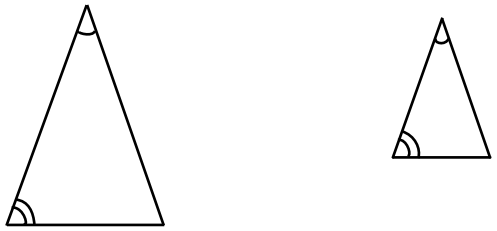


24. _____

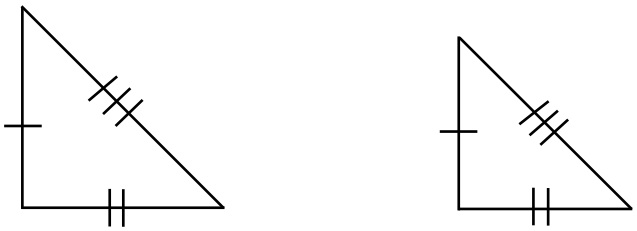


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25. _____ (Hint: If two angles of a triangle are congruent to two angles of another triangle, what can be said about the third angle of the two triangles? The third angle of each triangle are also congruent, because the sum of the angles of a triangle is 180°.)



26. _____



27. _____



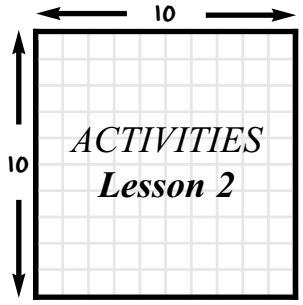
28. One triangle contains an angle of 30°. Another triangle contains angles of 40° and 60°. Is it possible to show similarity in the two triangles? _____ Yes or No. If yes, which similarity property can be used? _____

29. Write the **Life Principle.** "_____ _____."

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Name: _____

Date: _____ Grade: _____



Geometry

Special Triangles

You are making progress! ***Answer the following questions. the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. _____ is right and _____ is wrong.

2. A ***right triangle*** contains one angle of _____ degrees, while the angles of an acute triangle are all less than _____ degrees.

3. The longest side of a right triangle is called the _____.

4. A side of a right triangle that is **NOT** the hypotenuse is called a _____.

5. A ***30 - 60 - 90 triangle*** contains a _____ angle, a _____ angle and a _____ angle.

6. If the other two angles of a right triangle are 30° and 60°, then the ***hypotenuse*** is twice the length of the shortest ***leg*** of the triangle (the side opposite the 30° angle). The other leg (the side opposite the 60° angle) is $\sqrt{3}$ times longer than the shortest leg. This is a statement of the _____ Triangle Property.

7. In Example Set 1, the length of side b = _____ units.

8. In Example Set 1, the _____ Theorem is used to prove the 30 - 60 - 90 Property.

9. In Example Set 2, the length of leg BC is _____.

10. In Example Set 2, the m∠BAC = _____.

Show your calculations to the following question, as you follow the steps in Example Set 2.

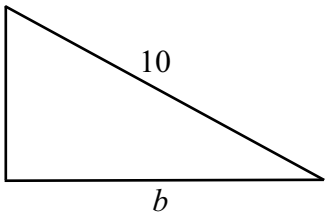
11. The length of the hypotenuse of a 30 - 60 - 90 triangle is 30 inches. Choose the length of the shortest leg. _____

(a) 10 meters (b) 5 inches (c) 3 inches (d) 15 inches

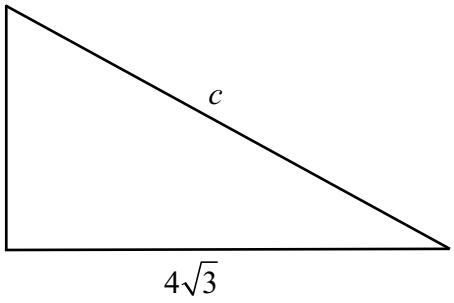
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Refer to Example Set 3 for questions 12-13. Show your work.

12. Determine the length of side *b* in the 30 - 60 - 90 triangle below. _____



13. The length of side *c* in the 30 - 60 - 90 triangle below is _____.



14. $\sqrt{3}$ in decimal form is approximately _____.

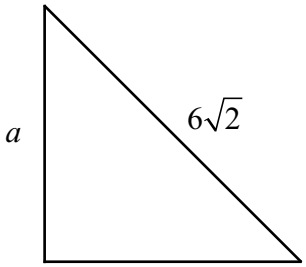
15. "The hypotenuse of an isosceles right triangle has a length equal to $\sqrt{2}$ times the length of one of the two legs" is a statement of the _____ Triangle Property.

16. A ***45 - 45 - 90 triangle*** contains a _____ angle, a _____ angle and a _____ angle.

17. A right triangle containing two congruent sides and two congruent angles is called a(n) _____.

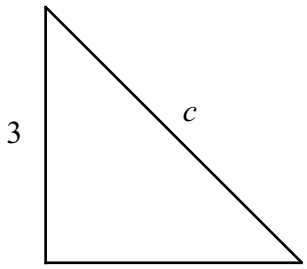
Refer to Example Sets 4, 5, and 6 to answer questions 18-19 to determine the length of the indicated side.

18. *a* = _____ units



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19. c = _____ units



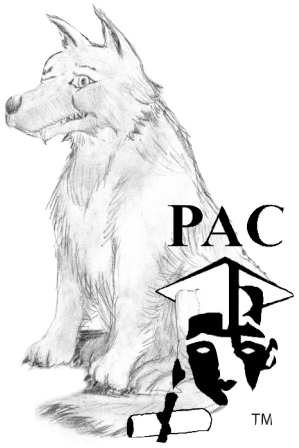
Show your calculations to the following question, as you follow the steps in Example 5.

20. The length of the leg of a 45 - 45 - 90 triangle is 2 centimeters. Choose the length of the hypotenuse. _____

(a) 6 cm (b) $2\sqrt{2}$ cm (c) 4 cm (d) 3 cm

21. Write the **Life Principle.** "_____
_____."

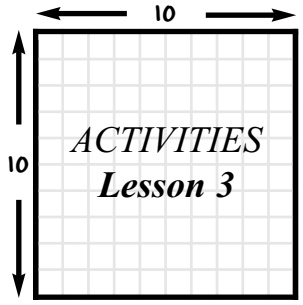
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Name: _____

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Geometry

Special Case Similarity

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The dimensions of similar triangles can be compared and _____.

2. You can use _____ situations from the past to stay away from harm or solve problems in your life today.

3. You should compare previous experiences and _____ the rules.

4. ***Ratios*** and ***proportions*** can be set up between the _____ of similar triangles.

5. A comparison of two numbers, usually written in fraction form is called a _____.

6. A comparison of two ratios written as an equality is called a(n) _____.

Refer to Example Set 1 to answer questions 7-10.

7. $\triangle ABC$ is similar to $\triangle DEF$ because both triangles are _____ triangles. (First sentence of Example Set 1 text.)

8. A 30 - 60 - 90 triangle has a hypotenuse of 24 centimeters. Determine:
(a) the length of the side opposite the 60° angle. _____ (Use the 30 - 60 - 90 Triangle Property to make the calculation.)

(b) The length of hypotenuse = 24; length of side opposite 30° angle (shortest side) ($\frac{1}{2}$ the length of the hypotenuse) = _____

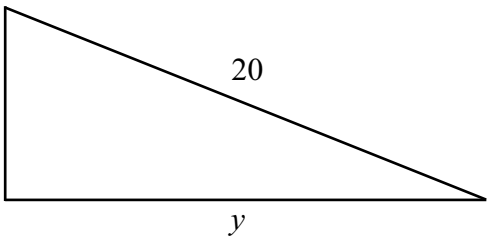
(c) The length of the side opposite the 60° angle (the shortest side times $\sqrt{3}$) = _____

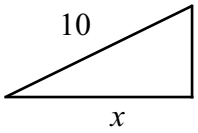
9. Determine the length of the shortest leg of a triangle similar to the triangle in #8 if the hypotenuse of the second triangle is 12. Use the properties of similar triangles to calculate the length. Draw a picture of the two triangles in the space below. Follow the steps in Example Set 1 to set up a proportion and show your work. _____

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10. Use the properties of 30 - 60 - 90 triangles and similar triangles to determine the length of the side labeled x in the 30 - 60 - 90 triangles below. x = _____ (Calculate the length of side y and place the calculation in the proportion, $^{20}/_{y} = {}^{10}/_{x}$. Cross-multiply and then solve for x.)

(a) $5\sqrt{2}$ (b) $2\sqrt{5}$ (c) $3\sqrt{5}$ (d) $5\sqrt{3}$



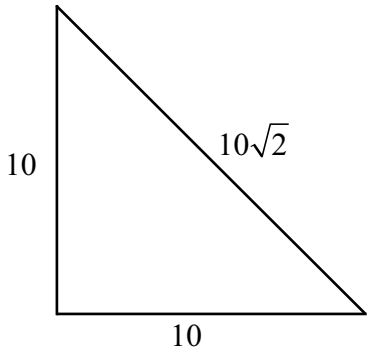


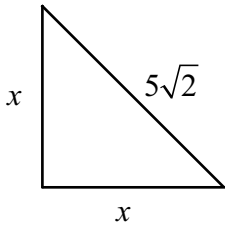
Refer to Example Set 2 to answer questions 11-13.

11. The two triangles in this example are _____ because of the 45 - 45 - 90 Triangle Property.

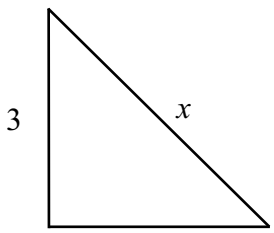
12. Determine the length of x. Use the Properties of Similar Triangles.

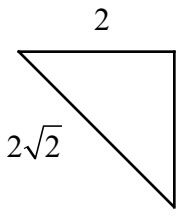
$$\frac{10\sqrt{2}}{10} = \frac{5\sqrt{2}}{x} \rightarrow 10\sqrt{2} \bullet x = _____ \bullet 5\sqrt{2} \rightarrow \frac{10\sqrt{2}x}{10\sqrt{2}} = \frac{50\sqrt{2}}{10\sqrt{2}} \rightarrow x = _____$$





13. Look at the two 45 - 45 - 90 triangles below and determine the length of the hypotenuse, labeled x. Use the properties of 45 - 45 - 90 triangles and similar triangles. x = _____





$$\frac{2\sqrt{2}}{2} = \frac{x}{3} \rightarrow 2\sqrt{2} \bullet 3 = _____ \bullet 2 \rightarrow \frac{2x}{2} = \frac{6\sqrt{2}}{2} \rightarrow x = _____$$

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14. The triangles shown in this lesson were _____ triangles.
(a) congruent (b) parallel (c) special case (d) unknown dimension

15. Write the **Life Principle.** "_____
_____."

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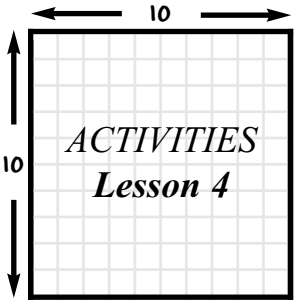
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Name: _____

Date: _____ Grade: _____


Networks

Networks



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Computers and other things that are connected are called a(n) _____.

2. This vignette tells of bridges in a city in _____ in the 1700s.

3. There were _____ islands in the middle of the river.

4. ***Citizens*** are legal inhabitants of a city, state or country, to which they owe _____ and from which they are entitled to receive _____.

5. Seven _____ connected the islands to the shore and each other.

6. A mathematician named _____ drew a diagram of the islands, shore and bridges in the form of a(n) _____ to determine if it was possible to begin and end at the same point, having crossed each bridge only once.

7. Professor K believes that drawing a(n) _____ of a problem can help you solve it.

8. Figure 4.1 is a diagram of the _____ Bridge problem.

9. In Mr. Euler's network there are _____ bridges and _____ *vertices*.

10. A(n) _____ is a starting or stopping place or where lines intersect.

11. An odd ***vertex*** has a(n) _____ number of paths meeting at that point.

12. An even vertex has a(n) _____ number of paths meeting at that point.

13. Mr. Euler determined that the Kšnigsburg bridges could be crossed only once each before returning to the starting place. _____ (a) True or (b) False

14. If there are exactly _____ odd vertices in a network, it is possible to complete the network without traversing a path twice.

15. Each odd vertex must be a(n) _____ or _____ point.

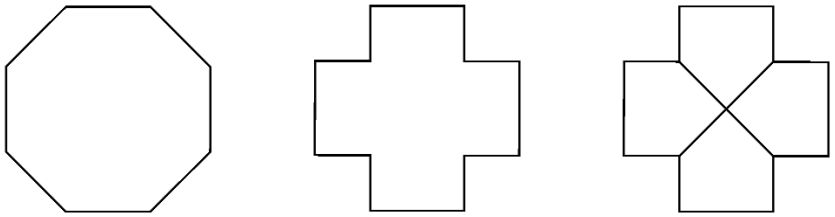
16. If all the vertices of a network are _____, then it is possible to complete the network without traversing a path twice.

17. A network that is traversable and the starting and stopping point are the same point is called a(n) _____ Circuit.

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18. In Example Set 1, which circuits are traversable? Choose the correct answer. _____
(a) a, b, c, d (b) a, b, e (c) b, c, d, e, f (d) e, f

19. Choose the letter of the network below that is **NOT** traversable. _____



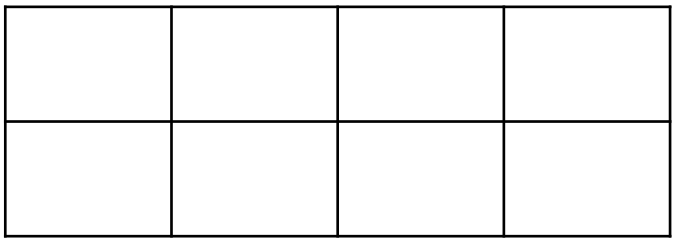
(a) (b) (c)

20. Delivery persons are interested in networks, especially _____.

21. Mailmen prefer Euler circuits so they do not have to waste time back tracking along the same streets on which they already made deliveries. _____
(a) True or (b) False

Apply what you have learned about networks and refer to Example Set 2 to work problems 22-24.

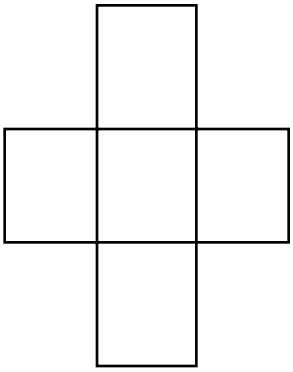
22. The network below is traversable. _____ (a) True or (b) False



23. There are eight odd vertices in #22, therefore, the network _____ (is, is not) traversable.

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24. Is the network in the figure below traversable? _____ Is the network a Euler Circuit? _____



25. Write the **Life Principle.** "_____
_____."

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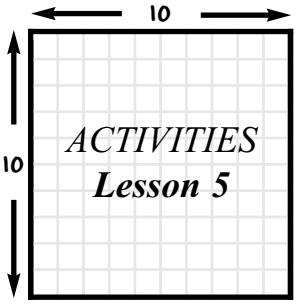


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Networks

Other Networks



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. ***Toll*** roads are free of charge. _____ (a) True or (b) False

2. A(n) _____ is a person who watches over his money very closely.

3. Professor K calculated the time and gasoline to _____ toll roads because he wanted the _____ (most, least) costly route.

4. As used in this vignette, *efficient* means _____ or fastest.

5. Figure 5.1 is a diagram of a portion of a map of _____.

6. Each intersection is labeled with a letter to name it and a number representing how many _____ it takes to proceed through that intersection.

7. There are time variations in Figure 5.1 because of heavier or lighter _____ patterns.

8. The ***rule of thumb*** in network problems when moving from each location to another location is always to choose the next path with the _____ value.

9. A commonly accepted rule is called a(n) _____.

Refer to Example Set 1 to answer questions 10-12.

10. Professor K leaves *Start* and proceeds to point _____.

11. Following the path as set out by the rule of thumb for network problems such as this, it will take _____ minutes to make the trip from *Start* to *Finish*.

12. In checking other routes, Professor K discovered that the quickest route would take only _____ minutes.

13. The general rule of thumb is not always the fastest route, but it is the _____ to calculate.

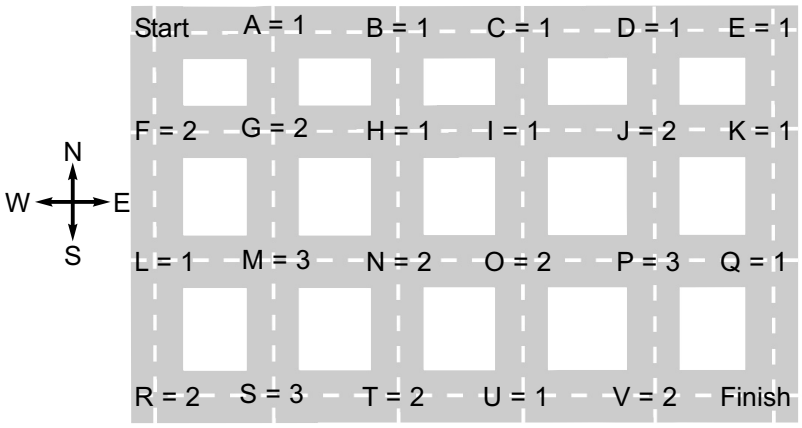
14. In Example Set 2, Professor K used the opposite of the general rule of thumb and calculated that the longest route would take _____ minutes.

15. _____ are sometimes placed on a path that you choose.

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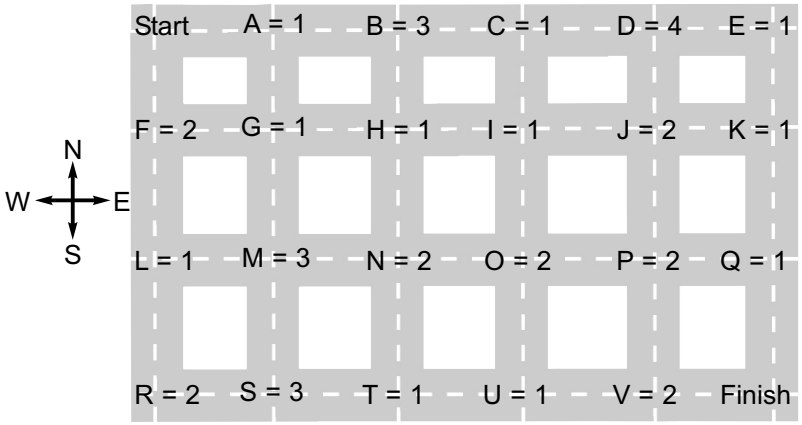
16. In Example Set 3, Professor K is attempting to calculate the path that will take the _____ amount of time.

17. Look at the figure below. The numbers represent the number of minutes to move through each intersection. Using the general rule of thumb, calculate the time of the fastest route from *Start* to *Finish*. You may only move East and South. _____ minutes.



18. Look at the figure below. The numbers represent the number of minutes to move through each intersection. Using the general rule of thumb, calculate the time of the fastest route from *Start* to *Finish*. You may only move East and South. _____

(a) 9 (b) 8 (c) 7 (d) 12



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19. Look at the figure below. The numbers represent the number of minutes to move through each intersection. Using the general rule of thumb, determine the fastest path using the form that Professor K used in the example for this lesson.

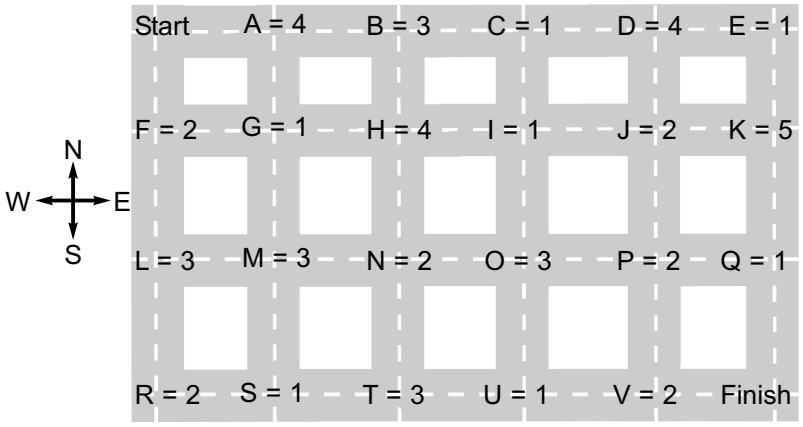
(Start A → B → C → Finish) _____

(a) Start - A - G - M - S - T - U - V - Finish

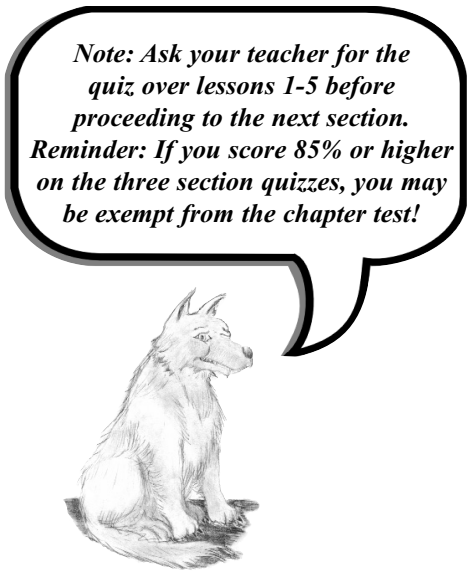
(b) Start - F - G - M - S - T - U - V - Finish

(c) Start - A - B - C - D - E - K - Q - Finish

(d) either a or b



20. Write the **Life Principle.** "_____
_____."



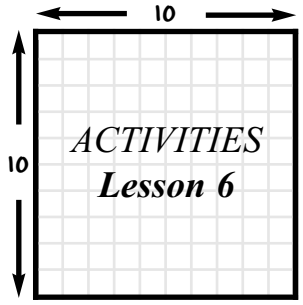
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Name: _____

Date: _____ Grade: _____





Geometry

Reflect

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. A(n) _____ is a reflected image.

2. A ***reflection*** is also *thinking* or *remembering things* that have happened in your _____.

3. Reflecting on things that you have studied helps you to retain in your _____ what you have learned.

4. To _____ can mean *to bend light*, or *mentally to think or concentrate* on something.

5. _____ sometimes deal with reflections.

6. Reflections in mathematics are usually made about a(n) _____.

7. All reflections are _____ to the original shape.

8. An example of a reflection that occurs in nature is the _____ of butterfly wings.

Refer to Example Set 1 to answer questions 9-14.

9. The line of reflection is _____.

10. _____ is a reflection of ∆ABC.

11. ∆DEF is just like ∆ABC only _____ around.

12. When you look in a mirror your image is _____.

13. ∆ABC_____ ∆DEF.

14. The reflected image is the _____ from the line as the original image.

Refer to Example Set 2 to answer questions 15-16.

15. ∆DEF is a reflection about a(n) _____ line of ∆ABC.

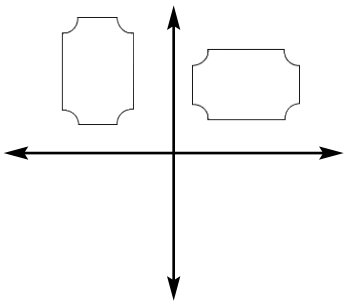
16. Flipping the object is like turning the _____ in a notebook.

17. In Example Set 3 the line CD is reflected about the vertical line _____ to become the line HG.

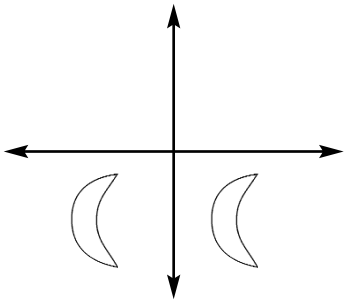
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Write "Yes" on the blank if the following diagrams represent a reflection. Write "No" on the blank if the diagram does not represent a reflection.

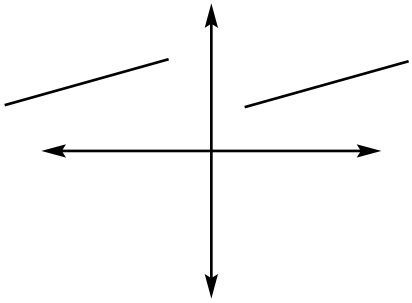
18. _____



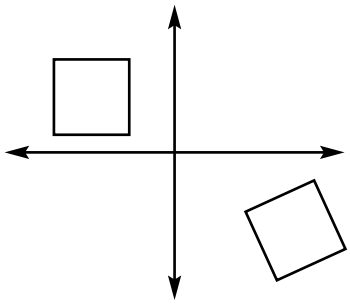
19. _____



20. _____

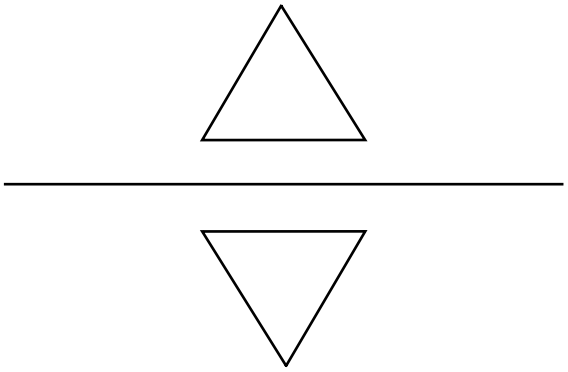


21. _____

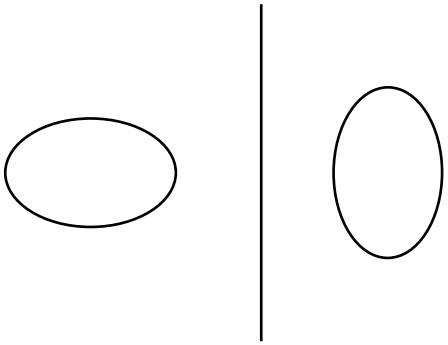


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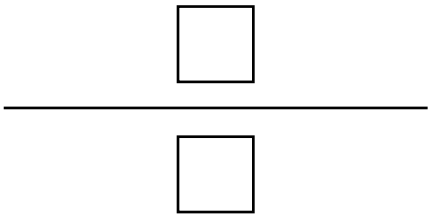
22. _____



23. _____

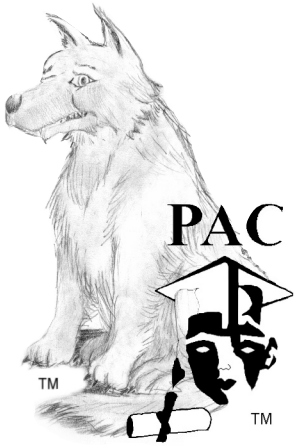


24. _____



25. Write the **Life Principle.** "_____
_____."

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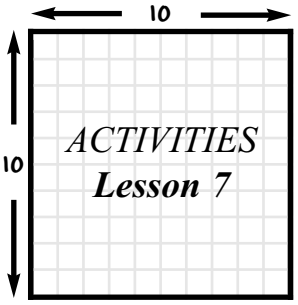


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Graphs

On The Slopes



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The roofs of houses and other buildings are usually _____.

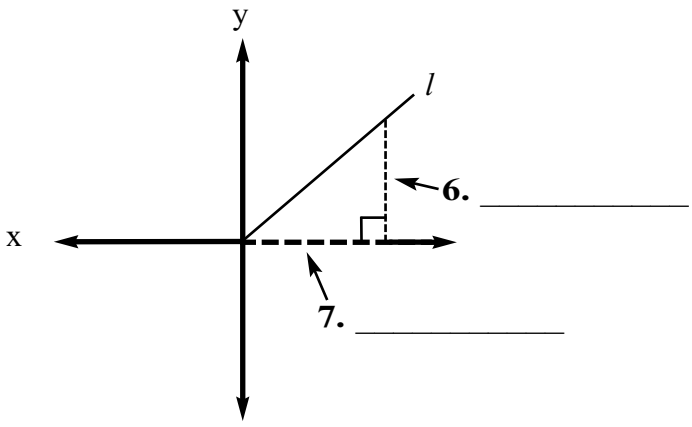
2. Construction workers refer to the slant of a roof as _____.

3. Mathematicians refer to this as _____.

4. _____ tells a builder what a roof will look like or how steep it will be when the building is completed.

5. ***Slope*** tells a mathematician how a(n) _____ appears on a graph.

Refer to Figure 7.1 and write the appropriate answer on the blanks.



8. The figure above shows a(n) _____ system with an x-axis and a y-axis.

9. The distance along the x-axis is known as the _____.

10. The distance along the y-axis is called the _____.

11. To determine the slope of a line, a(n) _____ is set up between the ***rise*** and the ***run***.

12. The basic word formula for slope is _____.

13. The letter, _____, is used to represent the slope.

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14. The math statement formula for slope is _____.

15. Points on a Cartesian coordinate system are labeled _____.

16. When a point is labeled (x, y) this is known as the _____ of a point.

17. The x-value is known as the _____.

18. The y-value is known as the _____ of the point.

19. In Figure 7.2, the coordinates of point A are _____.

20. In Figure 7.2, the coordinates of point E are _____.

21. Example Set 1 shows how to determine the _____ of a line that could be drawn between each point.

Refer to Example Set 1 to answer questions 22-25.

22. The slope of the line between the points (0, 0) and (3, 3) is _____.

23. The slope of the line between the points (2, 2) and (4, 4) is _____.

24. Calculate the slope of the line between the points (0, 0) and (4, 4). Show your work and place your answer on the blank. _____

25. Calculate the slope of the line between the points (2, 2) and (3, 3). Show your work and place your answer on the blank. _____

26. The slope of a line between any two points on that line is _____ the slope between any two other points on the same line.

(a) equal to (b) more than (c) less than

Refer to Example Set 2 to answer questions 27-29

27. Calculate the slope of the line between the points (4, 2) and (2, 1). Show your work and place your answer on the blank. _____

(a) $^1/_3$ (b) $^2/_1$ (c) $^1/_2$ (d) $^4/_1$ (e) none of these

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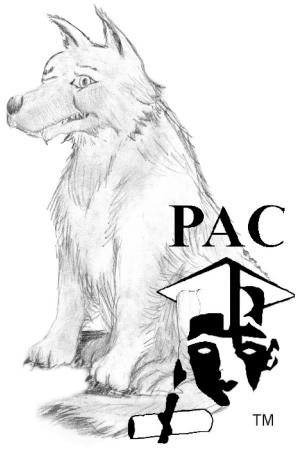
28. Calculate the slope of the line between the points (6, 2) and (3, 1). Show your work and place your answer on the blank. _____

(a) $^1/_3$ (b) 2 (c) $^1/_2$ (d) 6 (e) none of these

29. Calculate the slope of the line between the points (12, 6) and (3, 3). Show your work and place your answer on the blank. _____

30. Write the **Life Principle.** "_____
_____."

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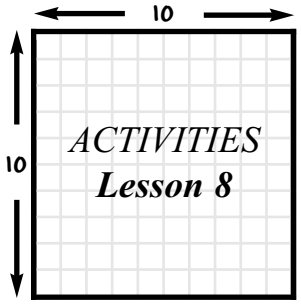
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Date: _____ Grade: _____



Graphs

More Slopes



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The roofs of houses have a(n) _____ along the top.

2. When looking at the end of a house, the area above the top of the wall is called a _____.

3. A ***gable*** is usually _____ shaped.

4. Most of the time the slope or _____ of the roof on both sides of the ***ridge*** is the same.

5. A slope can be _____ or _____.

6. The line AB points upward, left to right and has a(n) _____ slope.

7. The line BC points downward, left to right and has a(n) _____ slope.

8. Figure 8.2 shows the line segments AB and BC placed on a(n) _____ _____ system with an x-axis and a y-axis.

9. ***Origin*** means the point at which the x and y axis _____.

10. The _____ in this figure has a coordinate of (0, 0).

11. The length of the overhang of the ***rafters*** would have to be _____ to the calculation of the length of the rafter.

12. The length of the rafters can be calculated using the _____.

Refer to Example Set 1 to answer questions 13-16.

13. The ordinate of any point located on the x-axis is _____.

14. The abscissa of any point located on the y-axis is _____.

15. The slope of line one is positive. The slope of line two is _____.

16. _____ slopes slant downward, left to right.

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17. To subtract a larger number from a smaller number, you must think of the problem as subtracting the smaller number from the larger and then use the sign of the _____.

18. All lines with a(n) _____ slope move upward, going left to right.

Refer to Example Set 2 to answer questions 19-24. Calculate the slope of a line through the following points. Then tell if the graph of the line will slope upward or downward, going left to right.

19. (2, 4) and (3, 7) _____

(a) 3, downward (c) -3, downward (e) $^{1}/_{3}$, upward

(b) $^{3}/_{1}$, upward (d) $-^{3}/_{1}$, downward

20. (1, 1) and (8, 0) _____

(a) -7, downward (c) $^{-7}/_{1}$, upward (e) none of these

(b) 7, upward (d) $^{1}/_{7}$, upward

21. (-1, 0) and (3, 1) _____

(a) $^{1}/_{4}$, upward (c) 4, upward (e) none of these

(b) $^{-1}/_{4}$, downward (d) $^{4}/_{1}$, downward

22. (1, 1) and (8, 0)

slope = _____

upward or downward _____

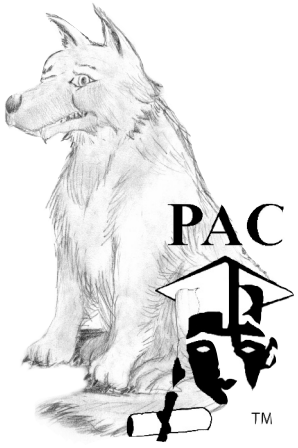
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23. (4, 2) and (2, 1)
slope = _____
upward or downward _____

24. (10, 15) and (8, 14)
slope = _____
upward or downward _____

25. Write the **Life Principle.** "_____
_____."

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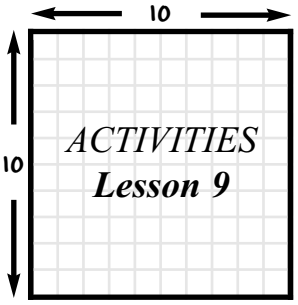


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Graphs

Slopes Again



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. In working with slopes of lines there are rules to understand that help us to _____ the relationship of two lines to each other.

2. In Figure 9.1 the slopes of the two lines are _____.

3. The lines in Figure 9.1 will never ***intersect*** or _____.

4. The lines in Figure 9.1 are _____.

5. The lines in Figure 9.2 are _____ to each other.

6. ***Perpendicular*** lines intersect at _____.

7. The slopes are negative _____ of each other.

8. When the magnitude (positive value) of the slopes of the lines in Figure 9.2 are multiplied together their product is _____.

9. In Figure 9.3 the slopes are **NOT** the same. That means that the lines will _____ at some point.

10. Vertical lines have a(n) _____ slope.

11. Horizontal lines have a slope of _____.

Determine if the lines with the slopes described below intersect, are parallel or are perpendicular. Refer to Example Set 1 as necessary.

12. $m_1 = 3$ and $m_2 = 1$ _____

13. m_1 = zero and m_2 = undefined _____

14. $m_1 = -2$ and $m_2 = 1$ _____

15. $m_1 = -4$ and $m_2 = -4$ _____

16. $m_1 = 5$ and $m_2 = {}^{1}/_{5}$ _____

17. $m_1 = 14$ and $m_2 = -{}^{1}/_{14}$ _____

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Calculate the slope of the lines through the following points. Then tell if the lines are parallel, perpendicular or if they intersect. Show your work. Refer to Example Set 2 as necessary.

18. l_1 through the points (3, 2) and (1, 4) and l_2 through the points (6, 5) and (0, 4)

slope l_1 = _____; slope l_2 = _____

parallel, perpendicular or intersect _____

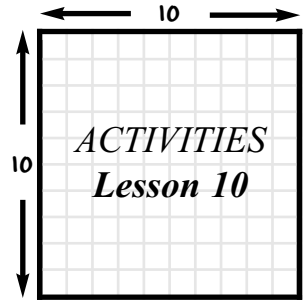
19. l_1 through the points (9, 4) and (3, 2) and l_2 through the points (7, 7) and (0, 4)

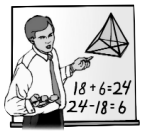
slope l_1 = _____; slope l_2 = _____

parallel, perpendicular or intersect _____

20. Write the **Life Principle.** "_____
_____."

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Fundamentals

Factors

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. In mathematics, numbers are often changed by a certain _____.

2. The statements, "twice as large as something" and "one-third as much as something" refer to numbers changed by certain _____.

3. This lesson involves comparisons of one thing to another in _____ to a factor.

Refer to Example Set 1 to answer questions 4-5. Show your work and write your answer on the blank.

4. Calculate the weight of an astronaut on the Moon if his weight on the Earth is 252 pounds.

_____

5. If the gravitational pull of the planet Mars is five-sixths that of the Earth, calculate the weight of an astronaut on Mars if his weight on the Earth is 180 pounds. _____

Refer to Example Set 2 to answer questions 6-9. Show your work and write your answer on the blank.

6. Sally is one-third as old as Tom. Tom is one-half the age of Peggy. Peggy is 60 years old. Calculate the ages of Sally and Tom.

Sally _____ Tom _____

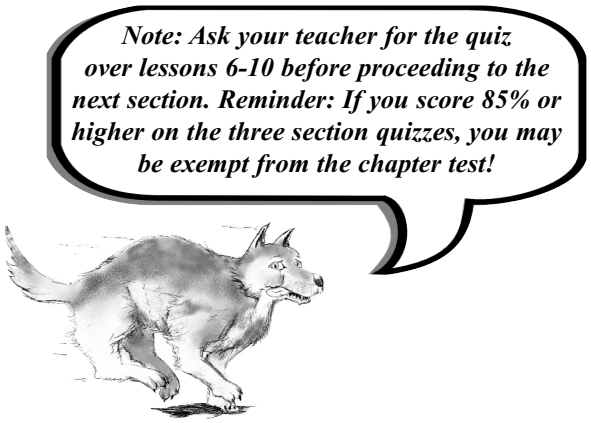
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7. John is 4 years old. Timothy is twice as old as Jimmy. Jimmy is one-fourth as old as John. Calculate the ages of Timothy and Jimmy.
Timothy _____ Jimmy _____

8. If the income tax in a certain state is one-half that of the federal income tax, calculate the state tax rate if the federal tax rate is 26%.
State Tax Rate_____
(a) 52% (b) 26% (c) 13% (d) 12%

9. Robert's car can go four times as far on a gallon of gas as Eddy's car. If Eddy used 24 gallons of gasoline on his weekend trip of 200 miles to the coast, calculate how far Robert's car could have gone with the same amount of fuel.
Miles for Robert's car_____
(a) 50 miles (b) 600 miles (c) 800 miles (d) 1,000 miles

10. Write the **Life Principle.** "_____
_____."

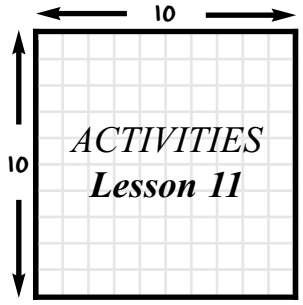


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Radicals

Radicals



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. To be _____ means to want to change the way things are commonly done.

2. Many ***reformers*** in history have been known to propose _____ ideas that were first rejected before becoming accepted later by everyone.

3. Even the notion of the Colonies becoming independent from _____ was a radical idea to most colonists.

4. This lesson presents problems involving _____.

5. A(n) _____ is a mathematical expression containing a radical.

Refer to Example Set 1 to answer questions 6-8.

6. $\sqrt{81}$ = _____

7. $\sqrt[3]{-27}$ = _____

8. $3 \bullet 3 \bullet 3 \bullet 3$ = _____

9. The radical symbol, $\sqrt{\ }$, means to calculate the _____ equal ***factors*** of the number under the radical sign.

10. The symbol, $\sqrt[4]{\ }$ means there are _____ equal factors of the number under the radical symbol.

11. The small raised number in front of the radical sign is called the _____.

12. One of the equal factors of the number under the radical sign is called the _____.

13. In mathematics one of the numbers multiplied together in a multiplication problem is called a(n) _____.

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Refer to Example Set 2 to answer questions 14-17. Write the index for each of the following radical expressions.

14. $\sqrt{2}$ index = _____
(a) 1 (b) 2 (c) 3 (d) 4 (e) 0

15. $\sqrt[4]{1}$ index = _____

16. $\sqrt[5]{23}$ index = _____
(a) 1 (b) 3 (c) 5 (d) 23 (e) none of these

17. $\sqrt{81}$ index = _____

18. A(n) _____ is the positive root in a square root problem.

19. The square root of 9 could be 3 or _____.

20. 3 is considered the principal square root of 9 since it is the _____ root.

Refer to Example Set 3 to answer questions 21-24. Determine the principal square root for each of the following radical expressions.

21. $\sqrt{1}$ = _____
(a) -1 (b) 1 (c) 2 (d) none of these

22. $\sqrt{36}$ = _____
(a) 9 (b) 3 (c) 12 (d) 6

23. $\sqrt{25}$ = _____

24. $\sqrt{121}$ = _____

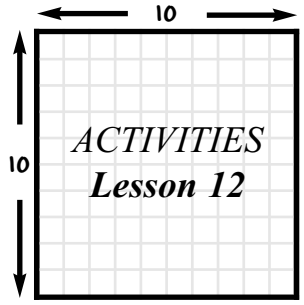
25. Write the **Life Principle.** "_____
_____."

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Algebra

Expression



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. In the United States of America many people from different _____ are brought together.

2. The United States has been called the "_____ of the world".

3. All the people of different backgrounds and heritages operate together for _____.

4. In mathematics _____ and _____ are brought together with different mathematical operations.

5. _____ are mathematical expressions containing ***constants*** and ***variables***.

6. _____ are a type of algebraic expression because they contain variables.

7. The formula for the area of a rectangle is _____=_____.

8. The formula for the volume of a rectangular prism is _____ = _____.

Refer to Example Set 1 to answer questions 9-10. Show your work and write your answer on the blank.

9. Calculate the area of a rectangle with a length of 6 meters and a width of 4 meters.

_____

(a) 10 sq meters (c) 48 sq meters (e) none of these
(b) 12 sq meters (d) 24 sq meters

10. Calculate the volume of a rectangular prism with dimensions of 3 inches by 4 inches by 2 inches. _____

(a) 9 cubic in. (c) 24 cubic in. (e) none of these
(b) 24 sq in. (d) 11 cubic in.

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11. The _____ allows you to group factors together for multiplication.

12. The grouping of like objects in a mathematical expression is known as _____ _____.

13. A(n) _____ is a number or letter whose value does not change.

14. A(n) _____ is a letter used to represent a number.

15. A number, variable or a product of more than one number or variable not separated by addition or subtraction symbols is called a(n) _____.

16. A ***coefficient*** is the number in front of a(n) _____ in a ***term***.

Determine the coefficient of the following terms in questions 17-19. Refer to Example Set 2 as necessary.

17. $23x$: coefficient _____

18. $100x$: coefficient _____

19. x: coefficient _____

20. _____ are terms that contain the exact same variable or variables.

21. _____ are terms that contain different variables.

22. The terms $4x$, $54x$, $4y$ are _____ (like, unlike) terms.

Refer to Example Set 3 to simplify the following mathematical expressions. Show your work and place your answer on the blank.

23. $5x + 14 + 12x + 15$ _____

(a) $46x$ (c) $19x + 27$ (e) b and c

(b) $17x + 29$ (d) $29 + 17x$ (f) b and d

24. $6 + 11x + 3x + 7$ _____

(a) $17x + 10$ (b) $27x$ (c) $14x + 13$ (d) $17x + 7$

25. $2xy + 7xyz + 9xy + 10 + 6xyz$ _____

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26. $12xy + 8xyz + 8xy + 2 + 8xyz$ _____

27. $5x + 2x^2 + 4x^3 + 2x^2 + 9x + 5x^3$ _____

(a) $27x^{12}$ (c) $27x^3$ (e) b and d
(b) $14x + 4x^2 + 9x^3$ (d) $9x^3 + 4x^2 + 14x$ (f) none of these

28. $2x + 2x^2 + 2x^3 + 2x^2 + 2x + 2x^3$ _____

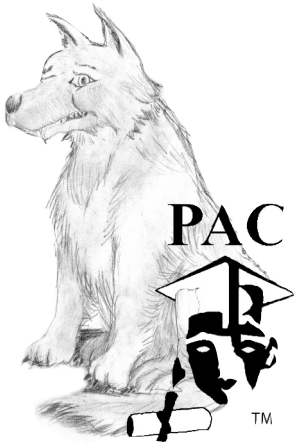
29. $x + x^2 + x^3 + x^2 + x + x^3 + 1$ _____

30. The _____ of Addition states that the order that numbers are added together does not matter.

31. Choose the example of the Distributive Property.
(a) $3(x + 4) = (3 \bullet x) + (3 \bullet 4)$ (b) $5x + 8$ (c) $x = x$ (d) $x + y = y + x$

32. Write the **Life Principle.** "_____
_____."

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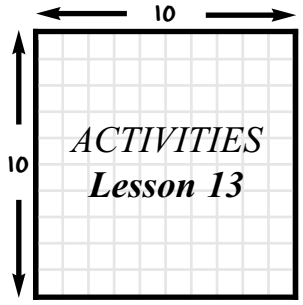


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Fractions

Algebraic Fractions



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Some algebraic expressions are written in _____ form.

2. To simplify ***fractional algebraic*** expressions, you must follow the _____ mathematical rules when performing operations on the fractions as you did with numerical fractions.

3. A fractions containing only numbers is a(n) _____.

4. To add fractions: the denominators must be _____, then add the numerators.

5. To subtract fractions: the denominators must be _____, then subtract the numerators.

6. To multiply fractions: place the product of the factors of the numerators in the _____ of the answer and place the product of the factors of the denominators in the _____ of the answer.

7. To divide fractions: find the _____ of the fraction to the right of the division operation symbol, then multiply the resulting fractions.

Refer to Example Set 1 as you perform the indicated operations in problems 8-11. Reduce your answers. Show your work and write your answer on the blank.

8. $\frac{1}{5} \bullet \frac{1}{4} =$ _____

(a) $^1/_9$ (b) $^2/_9$ (c) $^1/_{20}$ (d) $^4/_5$

9. $\frac{2}{7} + \frac{4}{7} =$ _____

(a) $^6/_{14}$ (b) $^6/_7$ (c) $^8/_7$ (d) $^8/_{49}$

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10. $\frac{5}{7} - \frac{4}{7} =$ _____

11. $\frac{2}{8} + \frac{2}{16} =$ _____

Refer to Example Set 2 to answer questions 12-15. Show your work and write the answer on the blank.

12. $\frac{x}{3} \bullet \frac{y}{4} =$ _____

13. $\frac{x}{4} + \frac{3y}{4} =$ _____

14. $\frac{8}{z} - \frac{6}{z} =$ _____

15. $\frac{a}{b} \div \frac{d}{c} =$ _____

(a) $\frac{ad}{bc}$ (b) $\frac{a+d}{b+c}$ (c) $\frac{ac}{bd}$ (d) none of these

Refer to Example Set 2 to answer questions 16-19. Show your work and write the answer on the blank.

16. $\frac{x+y}{5}+\frac{2x+3y}{5}=$ _____

17. $\frac{5x+3y}{y}-\frac{2x+3y}{y}=$ _____

(a) $\frac{3x}{y}$ (b) $\frac{3x}{0}$ (c) $\frac{3x+6y}{y}$ (d) $\frac{3x-3y}{y}$

18. $\frac{x+y}{2x}-\frac{x+y}{2x}=$ _____

19. $\frac{4x+6y}{x}+\frac{3x+2y}{x}=$ _____

20. Write the **Life Principle:** *"*_____

_____*."*

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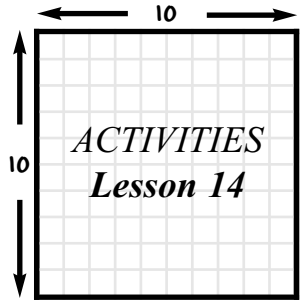


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Algebra

Algebraic Order



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Often algebraic expressions contain terms that are written in _____ form.

2. Algebraic expressions also contain addition, subtraction, multiplication and division _____ symbols.

3. A(n) _____ is a word formed from the first letter of each word of a group of words.

4. "Please Excuse My Dear Aunt Sally" is the basis of an ***acronym*** to help you remember _____, _____, _____, _____, _____, _____.

5. ***PEMDAS*** is the order in which _____ are performed in mathematical expressions.

Simplify the following expressions. Refer to Example Set 1 to work problems 6-9. Show your work. Write the answer on the blank.

6. 2[2 + 4(3 - 2)] + 3 = _____

7. 3[5 + 2(3 + 2)] + 1 = _____

8. 1[3 + 3(6 - 2)] + 7 = _____

(a) 19 (b) 20 (c) 21 (d) 22

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9. $3[9 + 4(3 + 2)] + 12 =$ _____
(a) 99 (b) 59 (c) 44 (d) 89

Simplify the following expressions. Refer to Example Set 2 to work problems 10-13. Show your work. Write the answer on the blank.

10. $2^2 + [4^2 - 3(4 - 2)] + 4 =$ _____

11. $4^2 + [2^2 + 2(5 - 3)] + 7 =$ _____

12. $1^2 + [1^2 - 2(7 - 2)] + 2^2 =$ _____

13. $2^2 + [3^2 - 4(7 - 6)] + 4^2 =$ _____

Simplify the following algebraic expressions. Refer to Example Set 3 to work problems 14-16. Show your work. Write the answer on the blank.

14. $2x + \{3(x - 2)\} + 4 =$ _____

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15. $3x + \{4(x - 3)\} - 6 =$ _____

16. $x + \{5(x + 10)\} - 6 =$ _____
(a) $51x - 6$ (b) $2x + 44$ (c) $6x + 44$ (d) $5x - 16$

Simplify the following algebraic expressions. Refer to Example Set 3 to work problems 17-19. Show your work. Write the answer on the blank.

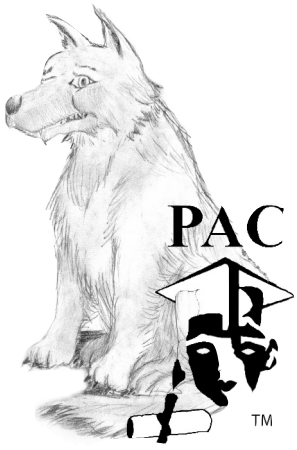
17. $2x^2 + 2\{2[2(x + 2)] + 2x^2\} + 2 =$ _____

18. $3x^2 + 2\{3[2(x + 1)] + 3x^2\} - 2 =$ _____

19. $5x^2 + 3\{2[4(x + 3)] - 3x^2\} + 2 =$ _____

20. Write the **Life Principle.** "_____
_____."

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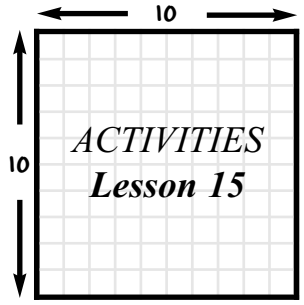


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Algebra

More Order



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Often algebraic expressions contain terms that are raised to powers, contain addition, subtraction, multiplication and division operation symbols, and may be written in _____ form.

2. To ***evaluate*** algebraic expressions you must remember the acronym, _____.

Look at Example Set 1 to answer questions 3-5.

3. First, the _____ is simplified.

4. There are _____ sets of grouping symbols in both the numerator and the denominator.

5. Once the numerator and denominator are simplified, you must put them back in _____ form.

Simplify the following numerical expressions. Show your work and write your answer on the blank.

6. $\frac{2[3+2(2-1)]}{2[3(4-2)]} =$ _____

7. $\frac{3[4+2(4+2)]}{2[5(3-2)]} =$ _____

Look at Example Set 2 to answer questions 8-14.

8. In the numerator, $3\{2 + 4[x + 2(x - 3)]\} \rightarrow 3\{2 + 4[x +$_____$x - 2 \bullet 3)]\}$

9. $3\{2 + 4[x + 2x - 2 \bullet 3)]\} \rightarrow 3\{2 + 4[x + 2x -$ _____$]\}$

10. $3\{2 + 4[x + 2x - 6]\} \rightarrow 3\{2 + 4[x(1 +$_____$) - 6]\}$

11. $3\{2 + 4[x(1 + 2) - 6]\} \rightarrow 3\{2 + 4[3x - 6]\} \rightarrow 3\{2 +$ _____$x - 24\}$

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12. $3\{2 - 24 + 12x\} \rightarrow 3\{- 22 + 12x\} \rightarrow 3\{_____x - 22\} \rightarrow 36x - 66$

13. $5(x + 7) \rightarrow 5x +$ _____

14. $\dfrac{3\{2+4[x+2(x-3)]\}}{5(x+7)} =$ _____

Simplify the following algebraic expressions. Show your work and write your answer on the blank.

15. $\dfrac{2+3(x+1)}{2(x+3)} =$ _____

(a) $^4/_3$ (b) $\dfrac{x+5}{6}$ (c) $\dfrac{3x+5}{2x+6}$ (d) $^7/_8$

16. $\dfrac{2[x+2(x-2)]}{3(x+1)} =$ _____

17. $\dfrac{3\{1+2[x+3(x-2)]\}}{4(x+2)} =$ _____

18. $\dfrac{2+4[5+2(x+4)]}{2(x-3)} =$ _____

19. $\dfrac{4\{3+2[x+2(x-2)]\}}{3(x+1)} =$ _____

(a) $2x - 20$ (b) $^{-7}/_2$ (c) $\dfrac{28x}{3x+1}$ (d) $\dfrac{24x-20}{3x+3}$

20. Write the **Life Principle.** "_____
_____."

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Intermediate Math Skills

Mathematics Chart

LENGTH - ENGLISH SYSTEM

12 inches	=	1 foot
3 feet	=	1 yard
5.5 yards	=	1 rod
320 rods	=	1 mile
1,760 yards	=	1 mile
5,280 feet	=	1 mile

VOLUME - ENGLISH SYSTEM

1 tablespoon, Tbsp, T	=	3 teaspoons, tsp
1 cup, c	=	16 tablespoons, Tbsp, T
1 pint, pt	=	2 cups, c
1 quart, qt	=	2 pints, pts
1 gallon, gal	=	4 quarts, qts

WEIGHT - ENGLISH SYSTEM

1 pound, lb	=	16 ounces, oz
1 hundredweight, cwt	=	100 pounds, lbs
1 ton	=	20 hundredweight, cwt
1 ton	=	2000 pounds, lbs

LENGTH - METRIC SYSTEM

1 meter	=	1,000 millimeters
1 meter	=	100 centimeters
1 kilometer	=	1,000 meters
1 centimeter	=	10 millimeters

VOLUME - METRIC SYSTEM

1 liter	=	1,000 milliliters
1 liter	=	100 centiliters
1 kiloliter	=	1,000 liters
1 centiliter	=	10 milliliters

WEIGHT - METRIC SYSTEM

1 gram	=	1,000 milligrams
1 gram	=	100 centigrams
1 kilogram	=	1,000 grams
1 centigram	=	10 milligrams

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Mathematics Chart

PERFECT SQUARES

$\sqrt{1}=1$	$\sqrt{25}=5$	$\sqrt{81}=9$	$\sqrt{169}=13$
$\sqrt{4}=2$	$\sqrt{36}=6$	$\sqrt{100}=10$	$\sqrt{196}=14$
$\sqrt{9}=3$	$\sqrt{49}=7$	$\sqrt{121}=11$	$\sqrt{225}=15$
$\sqrt{16}=4$	$\sqrt{64}=8$	$\sqrt{144}=12$	$\sqrt{256}=16$

PERFECT CUBES

$\sqrt[3]{1}=1$	$\sqrt[3]{-8}=-2$	$\sqrt[3]{64}=4$	$\sqrt[3]{-125}=-5$
$\sqrt[3]{-1}=-1$	$\sqrt[3]{27}=3$	$\sqrt[3]{-64}=-4$	$\sqrt[3]{216}=6$
$\sqrt[3]{8}=2$	$\sqrt[3]{-27}=-3$	$\sqrt[3]{125}=5$	$\sqrt[3]{-216}=-6$

$$P = \frac{\text{the number of elements in the set containing favorable outcomes}}{\text{the number of elements in the sample set}}$$

$$Midpoint = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

FORMULAS

Surface Area	Area	Volume	Perimeter/ Circumference	Others
Sphere: $A_s = 4\pi r^2$	**Triangle:** $A = {}^1\!/_2 bh$	**Sphere:** $V = {}^4\!/_3 \pi r^3$	**Perimeter of a Rectangle:** $P = 2w + 2l$	**Pythagorean Theorem:** $c^2 = a^2 + b^2$
Cylinder: $A_s = 2\pi rh + 2\pi r^2$	**Rectangle:** $A = l \times w$	**Cone:** $V = {}^1\!/_3 \pi r^2 h$	**Circumference of a Circle:** $C = 2\pi r$ or $C = \pi d$	**Convert to Fahrenheit:** $F = {}^9\!/_5 C + 32$
Cube: $A_s = 6s^2$	**Circle:** $A = \pi r^2$	**Rectangular Prism:** $V = l \times w \times h$		**Convert to Celsius:** $C = {}^5\!/_9 (F - 32)$
Lateral Surface Area of a Cone: $A_{ls} = \pi rl$	**Trapezoid:** $A = {}^1\!/_2 (b_1 + b_2)h$	**Square Pyramid:** $V = ({}^1\!/_3) lwh$		**Distance:** $d = r \bullet t$
		Triangular Prism: $V = {}^1\!/_2 bhl$		**Slope:** $y = mx = b$
		Cylinder: $V = \pi r^2 h$		**Simple Interest:** $I = prt$

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Mathematics Chart

TIME CONVERSIONS

1 week = 7 days
1 year = 12 months

CONVERSIONS

English to Metric	
1 ounce (oz)	28.35 grams (g)
1 pound (lb)	454 grams (g)
1 ton (T)	907.2 kilograms (kg)

Metric to English	
1 gram (g)	.035 ounce (oz)
1 kilogram (kg)	2.2 pounds (lb)
1 metric ton (mt)	2200 pounds (lb)

English to Metric	
1 cubic inch	16.39 cubic cm
1 gallon	3.785 liters
1 cubic foot	28.316 liters
1 quart	.946 liters

Metric to English	
1 cubic cm	.061 cubic inch
1 cubic meter	35.315 cubic feet
1 liter	1.05 quarts
1 liter	.264 gallon

English to Metric	
1 inch	2.54 cm
1 foot	0.3048 meter
1 yard	0.9144 meter
1 mile	1.6 km

Metric to English	
1 centimeter	0.3937 in.
1 meter	39.37 in.
1 meter	1.09 yds
1 kilometer	0.6213 mile

AREA CONVERSIONS

1 square centimeter = 0.155000 sq in.
1 square meter = 10.763910 sq ft
1 square inch = 645.16 sq mm
1 square foot = 0.09290304 sq meter
1 square yard = 0.836127 sq meter
1 square foot = 144 sq in.

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