

1. If there were 1 more saucer, the ratio of cups to saucers would be 3:4. If there were 4 more saucers, the ratio of cups to saucers would be 2:3. What is the total number of cups and saucers?

- a. 37
- b. 41
- c. 47
- d. 51
- e. 57

2. Determine the value of $\frac{\frac{-3+8}{-3}}{\frac{10}{8}}$.

- a. $-\frac{9}{10}$
- b. $-\frac{4}{3}$
- c. $\frac{9}{10}$
- d. $\frac{4}{3}$
- e. $-\frac{3}{16}$

3. Which of following expressions is equivalent to $(a - 2b)^2$.

- a. $a^2 + 2b^2$
- b. $a^2 + 4b^2$
- c. $a^2 - 4b^2$
- d. $a^2 - 4ab - 4b^2$
- e. $a^2 - 4ab + 4b^2$

4. Let $A = 2.6 \times 10^{-9}$. Let $B = 8.2 \times 10^{-5}$. Which statement is true about $A \cdot B$?

- a. $A \cdot B < A$ and $A \cdot B < B$.
- b. $A \cdot B > A$ and $A \cdot B < B$
- c. $A \cdot B > A$ and $A \cdot B > B$
- d. $A \cdot B$ is greater than 1.
- e. $A \cdot B$ is less than 0.

5. The summation symbol sigma, \sum , is used as shorthand to indicate a sum of a sequence of numbers. For example, $\sum_{k=1}^5 2k$ means $2 + 4 + 6 + 8 + 10$. The number below sigma indicates the starting value for k in the given formula ($2k$). Increase k by one until you get to the number on top of sigma. Determine the value of $\sum_{k=1}^5 k \cdot (-1)^k$.

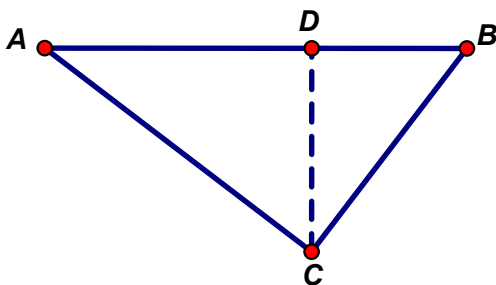
- $-1 + 2 + -3 + 4 + -5 = -3$
- $-1 + -2 + -3 + -4 + -5 = -15$
- $1 + 2 + 3 + 4 + 5 = 15$
- $1 + -2 + 3 + -4 + 5 = 3$
- $1 + 2 + 3 + 4 + -5 = 5$

6. The Pythagorean Theorem states that in a right triangle if a and b are the lengths of the two sides that form the right angle and c is the length of the side opposite the right angle (the hypotenuse), then $a^2 + b^2 = c^2$.

Also, in a right triangle, when the altitude to the hypotenuse is drawn, the original triangle is subdivided into two triangles that are mathematically similar to the original triangle.

The figure below shows right triangle (ABC) with angle C being a right angle. Triangle ACD is similar to triangle ABC. Triangle CBD is similar to triangle ABC.

Suppose that $AC = 8.0$ cm and $BC = 6.0$ cm. Determine the length of **CD**. (Round to the nearest tenth of a centimeter.)



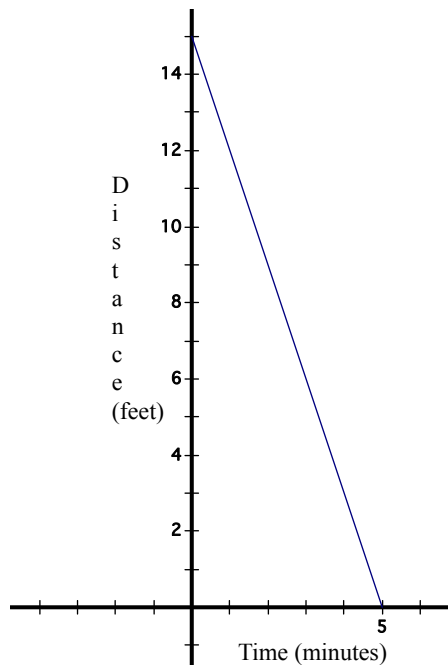
- 10.0 centimeters
 - 6.4 centimeters
 - 5 centimeters
 - 4.8 centimeters
 - 3.6 centimeters
7. Which statement is true about the length of the hypotenuse (side opposite the right angle) of a right triangle whose legs (sides that form the right angle) have lengths that are rational?
- The length of the hypotenuse will always be rational.
 - The length of the hypotenuse will always be irrational.
 - The length of the hypotenuse is sometimes rational and sometimes irrational.
 - The length of the hypotenuse is sometimes shorter than one of the legs.
 - The length of the hypotenuse is equal to the sum of the lengths of the legs.

8. In base eight, each place value position has a value that is a power of eight, as shown in the table below:

Base eight numeral	1_{eight}	10_{eight}	100_{eight}	1000_{eight}	$10\ 000_{\text{eight}}$
Value (Written in base ten)	$8^0 = 1$	$8^1 = 8$	$8^2 = 64$	$8^3 = 512$	$8^4 = 4096$

What is the value of 0.5_{eight} written in base ten?

- 40
 - 50
 - 0.5
 - 0.625
 - 0.125
9. The graph below shows turtle's distance (in feet) from a rock as a function of time (in minutes). What is the slope of the graph and what does it mean?



- The slope is -3 feet per minute. It means that the turtle got 3 feet closer to the rock every minute.
- The slope is 5 minutes. It means the turtle reached the rock in 5 minutes.
- The slope is 5 feet per minute. It means the turtle got 5 feet closer to the rock every minute.
- The slope is 15 feet. It means the turtle started 15 feet away from the rock.
- The slope is 3 feet per minute. It means that the turtle got 3 feet farther from the rock every minute.

10. I can never remember the formula for converting Celsius temperature to Fahrenheit. I do remember how to convert Fahrenheit (F) to Celsius (C). That formula is $C = (F - 32) \cdot \frac{5}{9}$.

Use that formula to determine the one I cannot remember.

a. $F = (C + 32) \cdot \frac{5}{9}$

b. $F = (C + 32) \cdot \frac{9}{5}$

c. $F = \frac{9}{5}C + 32$

d. $F = \frac{9}{5}C - 32$

e. $F = 32 - \frac{9}{5}C$

11. Jay knows it takes him 9.5 minutes to run a mile. He can walk a mile in 12 minutes. Jay uses a greenway loop for exercise. It takes him 30 minutes of running and 40 minutes of walking to complete the greenway loop. How long is the greenway loop? (Round to the nearest tenth of a mile.)

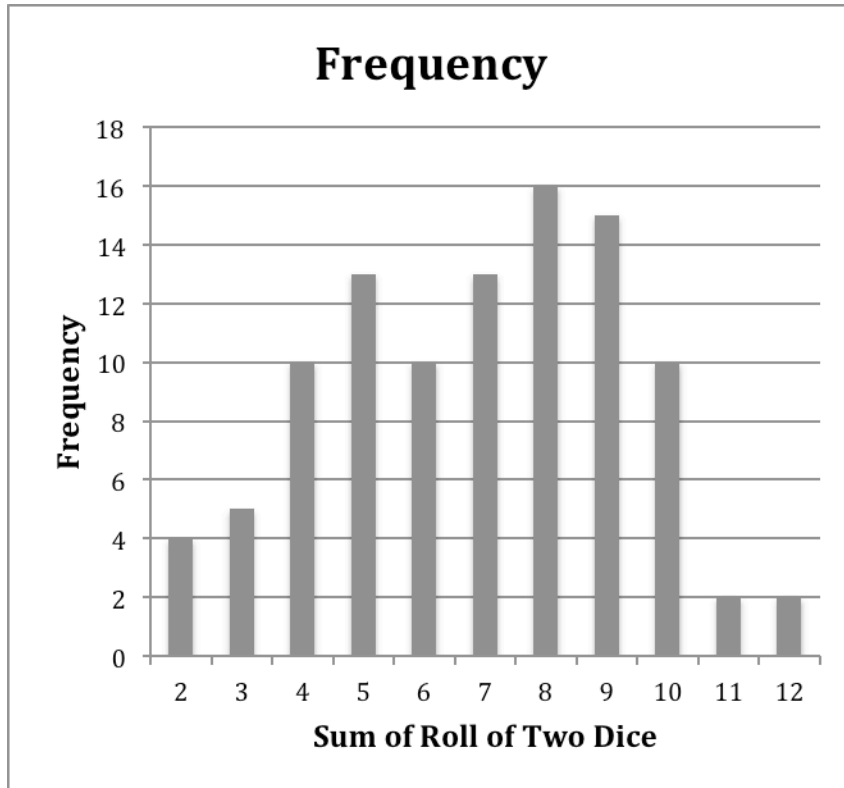
- a. 12.8 miles
- b. 6.5 miles
- c. 10.4 miles
- d. 5.6 miles
- e. 4.5 miles

12. A store offers a 5% discount for paying cash. During a recent promotion, the store also offered a 12% discount off retail for each item. Which of the following statements is **FALSE**?

- a. If you pay cash for an item during the promotion, the final price will be the same no matter which discount you apply first.
- b. If you pay cash for an item during the promotion, the final price will be 83.6% of the retail price.
- c. If you pay cash for an item during the promotion, the final price will be 88% of 95% of the retail price.
- d. If you pay cash for an item during the promotion, the part of the retail price you do NOT have to pay will be 5% of 12% of the retail price.
- e. If you pay cash for an item during the promotion, the final price will be 95% of 88% of the retail price.

13. In the game of Pig, you roll a six-sided die whose sides are numbered from 1 to 6. You get the number of points that you roll. You keep all the points you roll unless you roll the number 1. When you roll a 1, you lose all the points you have gained and your turn ends. Before you roll a 1, you may quit rolling whenever you want and keep the points you have accumulated. You have decided that on your next turn you will try to roll three times and then stop. What is the probability that you can roll 3 times without rolling a 1?
- a. $\frac{5}{6}$
 - b. $\frac{25}{36}$
 - c. $\frac{25}{216}$
 - d. $\frac{125}{216}$
 - e. $\frac{1}{216}$
14. Which of the following statements is reasonable?
- a. A bite-size candy bar has a volume of approximately 1 cubic decimeter.
 - b. A sheet of notebook paper covers an area of about 6 square decimeters.
 - c. A football is about 0.75 meters long.
 - d. A six-month old baby weighs about 2 kilograms.
 - e. Normal body temperature is about 60° Celsius.
15. Will has a collection of toy cars and trucks. Half of his toys are trucks. The rest are cars. Fourteen of his vehicles are red. 38 of his vehicles are metal. Twenty five percent of his collection consists of cars that are not metal and that are not red. Will has 6 red cars that are not metal, 8 metal cars that are not red, and 4 red metal cars. How many vehicles are in Will's collection?
- a. Will has 100 vehicles in his collection.
 - b. Will has 72 vehicles in his collection.
 - c. Will has 70 vehicles in his collection.
 - d. Will has 66 vehicles in his collection.
 - e. Will has 54 vehicles in his collection.
16. A rhombus is a quadrilateral with all four sides congruent. Which statement is **FALSE**?
- a. Every rhombus has 2 lines of symmetry.
 - b. Every rhombus has rotational symmetry.
 - c. The diagonals of every rhombus are perpendicular to each other.
 - d. The diagonals of every rhombus bisect each other.
 - e. The diagonals of every rhombus are congruent to each other.

17. Experimental probability involves repeating an "experiment" and compiling the data in order to estimate the actual probability of a particular event. Albert decided to determine the probability of rolling a sum of 7 or more. He rolled a pair of six-sided dice (with the sides numbered from 1 to 6) 100 times. The histogram below shows the results of his experiment.



According to the chart shown, what is the experimental probability of rolling a sum or seven or more?

- a. 0.58
 - b. 0.13
 - c. 0.16
 - d. 0.23
 - e. 0.45
18. A football team plays in a large stadium. At the current ticket price of \$10, the attendance is 27,000 but the stadium will hold many more people than that. A survey indicates that for every dollar that the ticket price is decreased, 3000 more people will attend. What would be the income from all the tickets sold if the price were decreased to \$8 per ticket?
- a. The income would be \$216,000.
 - b. The income would be \$240,000.
 - c. The income would be \$264,000.
 - d. The income would be \$236,000.
 - e. The income would be \$256,000.

19. Put these numbers in order from least to greatest: $\left(\frac{2}{3}\right)^{80}$ $\left(\frac{3}{2}\right)^{80}$ $\left(\frac{2}{3}\right)^{-90}$

a. $\left(\frac{2}{3}\right)^{80}$ $\left(\frac{3}{2}\right)^{80}$ $\left(\frac{2}{3}\right)^{-90}$

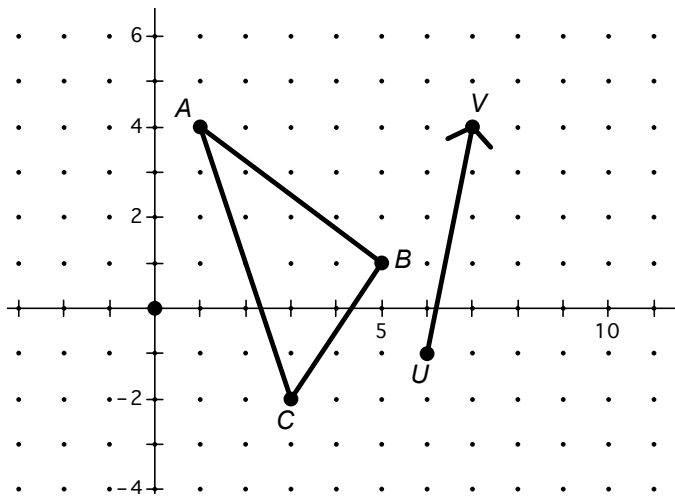
b. $\left(\frac{3}{2}\right)^{80}$ $\left(\frac{2}{3}\right)^{-90}$ $\left(\frac{2}{3}\right)^{80}$

c. $\left(\frac{2}{3}\right)^{-90}$ $\left(\frac{2}{3}\right)^{80}$ $\left(\frac{3}{2}\right)^{80}$

d. $\left(\frac{2}{3}\right)^{-90}$ $\left(\frac{3}{2}\right)^{80}$ $\left(\frac{2}{3}\right)^{80}$

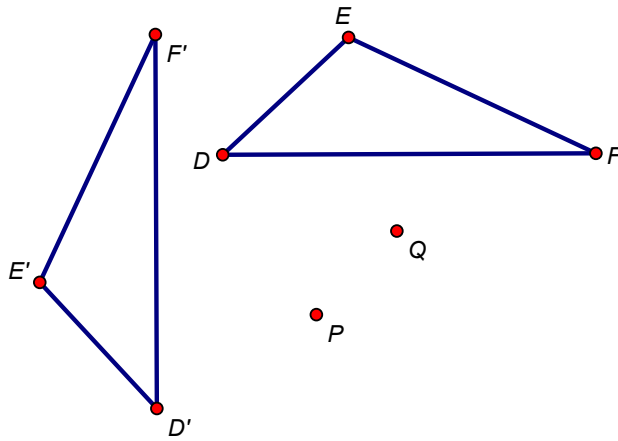
e. $\left(\frac{2}{3}\right)^{80}$ $\left(\frac{2}{3}\right)^{-90}$ $\left(\frac{3}{2}\right)^{80}$

20. The triangle below will be translated (slid) as indicated by the given vector (\overline{UV}) to create its image. What will be the coordinates of the point that is the image of point C on the new triangle?

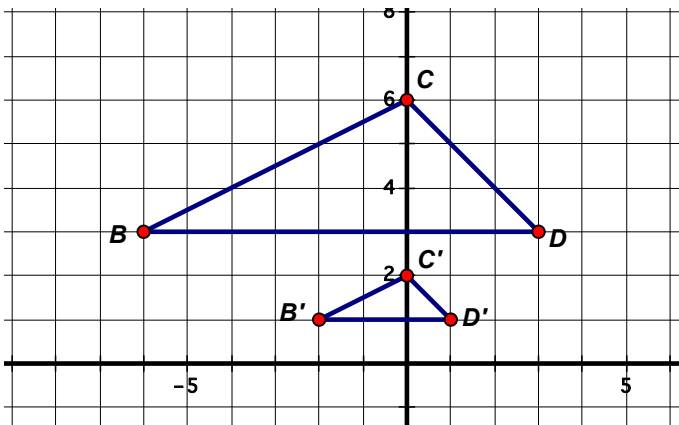


- The image of C is (4, 3).
- The image of C is (6, -1).
- The image of C is (9, 2).
- The image of C is (8, -1).
- The image of C is (7, 4).

21. Triangle DEF is rotated about a point to produce its image, triangle D'E'F'. Determine which point is the center and determine the angle of the rotation.

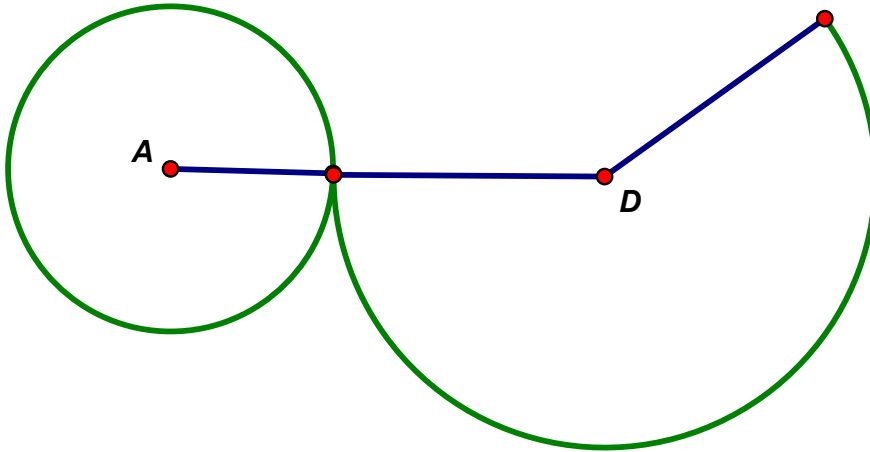


- The center is P and the angle is 180° .
 - The center is P and the angle is 90° clockwise.
 - The center is P and the angle is 90° counterclockwise.
 - The center is Q and the angle is 90° counterclockwise.
 - The center is Q and the angle is 90° clockwise.
22. Triangle B'C'D' is the image of triangle BCD. The image is a scale construction of triangle BCD. What statement is FALSE about the relationship between the triangle and its image?

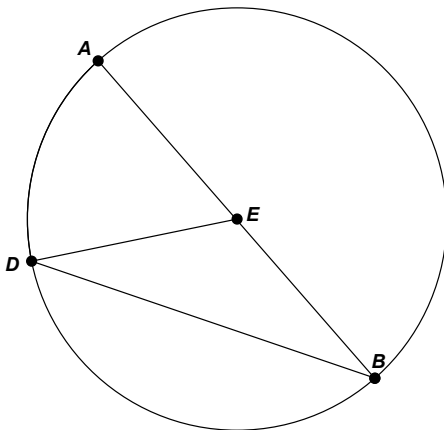


- The scale factor from triangle BCD to its image is $\frac{1}{3}$.
- The area of triangle BCD is 9 times the area of its image.
- The length of each side of triangle BCD is 200% longer than the corresponding side of its image.
- The perimeter of triangle BCD is 3 times as long as the perimeter of its image.
- The area of triangle B'C'D' is $\frac{1}{3}$ the area of triangle BCD.

23. The figure below shows the net of a right circular cone. The radius of the base circle A is 3 cm. The radius of lateral surface D is 5 cm. When the cone is assembled, what will be its height?

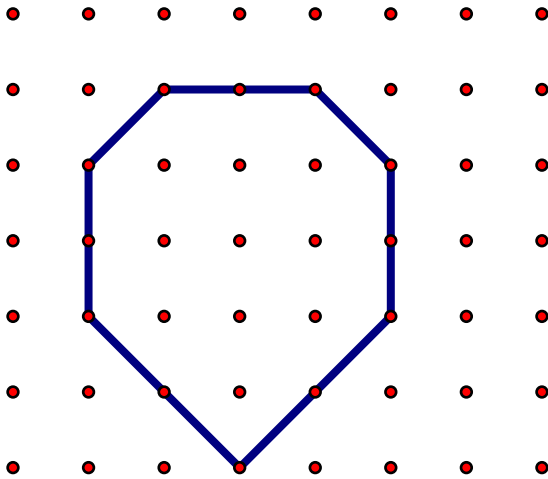


- The height of the cone will be 3 cm.
 - The height of the cone will be 4 cm.
 - The height of the cone will be 5 cm.
 - The height of the cone will be 3π cm.
 - The height of the cone will be 5π cm.
24. Point E is the center of the circle. The measure of angle AED is 60° . Determine the measure of angle EBD.

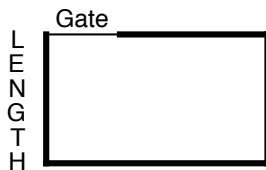


- There is not enough information given to determine the measure of angle EBD.
- The measure of angle EBD is 60° .
- The measure of angle EBD is 30° .
- The measure of angle EBD is 20° .
- The measure of angle EBD is 45° .

25. The polygon below is constructed on centimeter grid paper. What is the area of the polygon shown?



- The area is 14 square **centimeters**.
 - The area is 0.15 square **decimeters**.
 - The area is 1.5 square **decimeters**.
 - The area is 1.4 square **decimeters**.
 - The area is 1.5 square **centimeters**.
26. You have 80 feet of wire fence to put around a small garden. Your gate is 4 feet wide. The wire fence does not go across the gate. You want to make a rectangular garden with the greatest area that could be enclosed by the wire fence. The drawing below shows the layout for the garden. The dark line shows the wire fence. What length should the indicated side be so that the area is the greatest? (Round to the nearest tenth of a foot.)

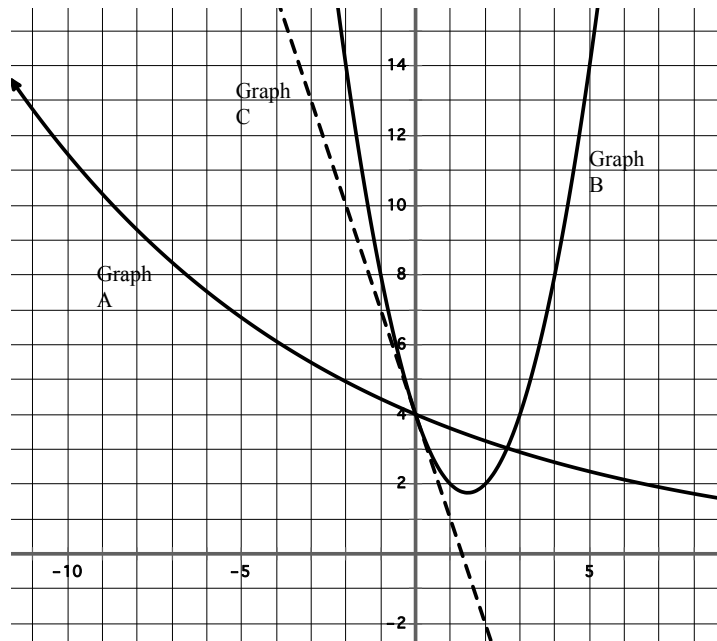


- If you use all 80 feet of fence, it does not matter what length that side. All areas would be the same.
- The length of the indicated side should be 20.0 feet to make the maximum area.
- The length of the indicated side should be 21.0 feet to make the maximum area.
- The length of the indicated side should be 9.16 feet to make the maximum area.
- The length of the indicated side should be 8.94 feet to make the maximum area.

27. Below are the graphs of three different equations. Note that Graph C is made with a dashed line just to distinguish it from the others. All graphs contain the point $(0, 4)$ and are continuous. These are the equations of the graphs in no particular order:

Equation K: $y = 4 - 3x$ Equation L: $y = x^2 - 3x + 4$ Equation M: $y = 4 \cdot (0.9)^x$

Which graph goes with which equation?



- A is the graph of equation L. B is the graph of equation M. C is the graph of equation K.
 - A is the graph of equation M. B is the graph of equation K. C is the graph of equation L.
 - A is the graph of equation L. B is the graph of equation K. C is the graph of equation M.
 - A is the graph of equation M. B is the graph of equation L. C is the graph of equation K.
 - A is the graph of equation K. B is the graph of equation M. C is the graph of equation L.
28. A bank offers 5% interest per year compounded annually. Your parents want to put enough money into the account now so that in 10 years there will be \$20,000 in the account. They do not plan to put any more money into the account nor do they plan to take any out. How much money should they put in there now so that there will be \$20,000 in 10 years? (Round to the nearest penny.)

- They should invest \$12,278.27.
- They should invest \$32,577.90.
- They should invest \$1,905.50.
- They should invest \$2000.00.
- They should invest \$10,000.

29. The height, h , in feet of a projectile that is launched vertically into the air can be determined by this equation: $h = -16t^2 + v_0t + h_0$, where t is the number of seconds since launch, v_0 is the initial velocity, and h_0 is the initial height of the platform from which it is launched. Suppose a projectile is launched with an initial velocity of 96 feet per second. Three seconds after launch the projectile was 156 feet in the air. What was the height of the platform from which the projectile was launched?
- The height of the platform was 96 feet.
 - The height of the platform was 0 feet.
 - The height of the platform was 12 feet.
 - The height of the platform was 24 feet.
 - The height of the platform was 300 feet.
30. An identity is an equation that is true for all values of the variable. Which equation below is not an identity?
- $15 + 12x = 3(5 + 4x)$
 - $15(4x - 2) = 60x - 30$
 - $60x - 30 = (12x - 6)5$
 - $18 + 3x = 6(3 + 2x)$
 - $60x + 30 = 6(10x + 5)$