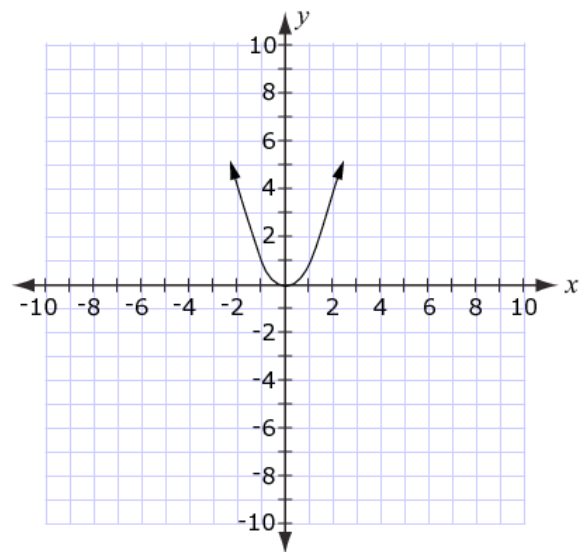**1**

The graph of $y = x^2$ is shown on the grid.

Drag the graph to show the graph of $y = (x - 4)^2 + 2$.

2

Multiply and combine like terms to determine the product of these polynomials.

$(2x - 3)(5x + 6)$

3

Determine whether each expression is equivalent to $(x^3 + 8)$. Select Yes or No for each expression.

	Yes	No
$(x + 8)^3$	☐	☐
$(x - 2)(x^2 + 2x + 4)$	☐	☐
$(x + 2)(x^2 - 2x + 4)$	☐	☐

4

Click on **two** numbers whose product is **irrational.**

Numbers	−5	$\dfrac{1}{3}$	$\dfrac{2}{3}$	$3\sqrt{2}$	$\sqrt{8}$

5

Solve the following equation for n.

$18n^2 - 50 = 0$

Enter one solution in the first box. If there are two solutions, enter the second solution in the second box.

6

Suppose $\angle A$ is an angle such that $\cos A < \sin A$.
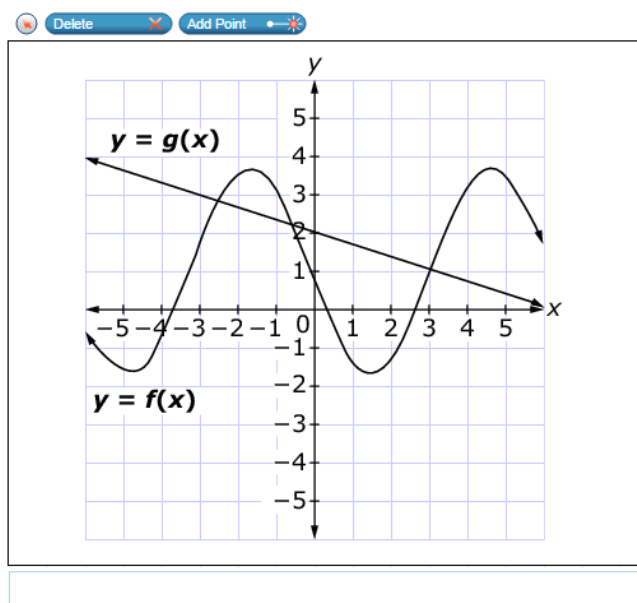Select **all** angle measures that are possible values for $\angle A$.

☐ 25°

☐ 35°

☐ 45°

☐ 55°

☐ 65°

☐ 75°

7

The graphs of $y = g(x)$ and $y = f(x)$ are shown.

Use the Add Point tool to add a point that will satisfy each given condition.

- A point on the graph of g where $x = 0$
- A point on the graph of g where $f(x) > g(x)$
- A point on the graph of f where $f(x) = 0$

8

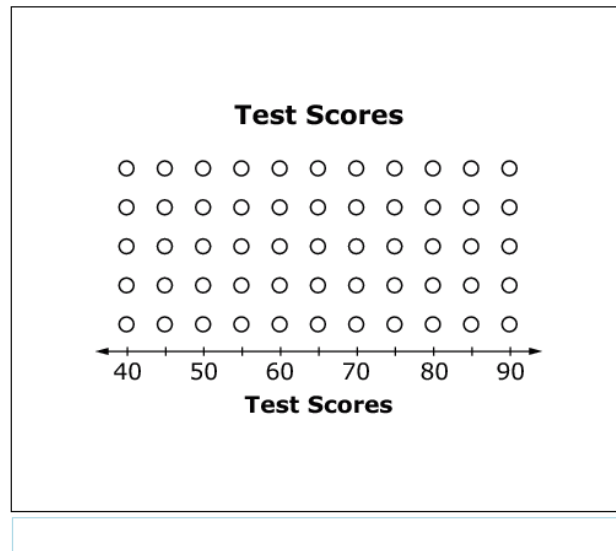Select **all** equations that have at least one integer solution.

☐ $\sqrt{4x} = 5$

☐ $\sqrt{3x} = 75$

☐ $\sqrt{x} = \dfrac{\sqrt{16}}{8}$

☐ $\sqrt{x} = x - 12$

☐ $\sqrt{10-x} = x - 2$

9

Enter the value of x such that $3^{\frac{4}{5}} \cdot 3^{\frac{3}{x}} = \sqrt[5]{3^7}$ is true.

10

Click above the numbers to create a dot plot for the given test scores.

90, 45, 85, 70, 85, 50, 75, 85, 65, 75, 60, 85, 80, 65, 80

Test Scores

```
O  O  O  O  O  O  O  O  O  O  O
O  O  O  O  O  O  O  O  O  O  O
O  O  O  O  O  O  O  O  O  O  O
O  O  O  O  O  O  O  O  O  O  O
O  O  O  O  O  O  O  O  O  O  O
```
40   50   60   70   80   90

Test Scores

You have reached the end of this segment:

Please review your answers before you continue testing. You **will not** be able to come back to these questions later.

Click on a question number below to review it.

| 🚩 | This symbol indicates items that you have marked for review. |

| ⚠ | This symbol indicates unanswered items. |

Questions:

| 1 | 3 | 5 | 7 | 9 |
| 2 | 4 | 6 | 8 | 10 |

****

11
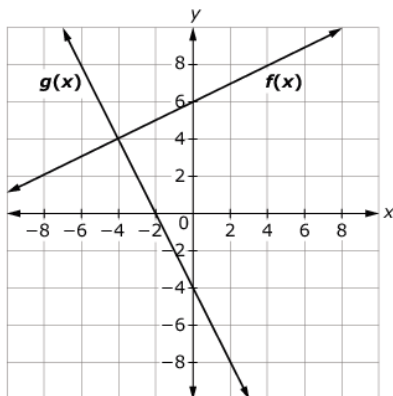
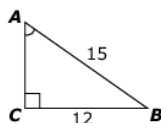This graph shows linear equations $y = f(x)$ and $y = g(x)$.

Enter the solution to the equation $f(x) - g(x) = 0$.
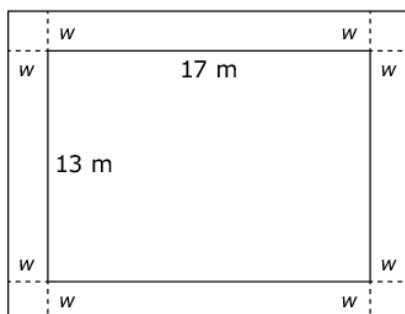
12

Consider this right triangle.

Enter the measure of ∠CAB to the nearest hundredth degree.

13

A rectangular garden measures 13 meters by 17 meters and has a cement walkway around its perimeter, as shown. The width of the walkway remains constant on all four sides. The garden and walkway have a combined area of 396 square meters.

Part A
Enter an equation that could be used to help determine the width, w, of the walkway in the first response box.

Part B
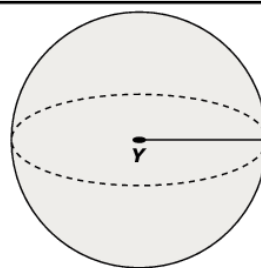Determine the width, in meters, of the walkway. Enter your answer in the second response box.

14

The radius of sphere Y is twice the radius of sphere X. A student claims that the volume of sphere Y must be exactly twice the volume of sphere X.

Part A: Drag numbers into the boxes to create one example to evaluate the student's claim.

Part B: Decide whether the student's claim is true, false, or cannot be determined. Select the correct option.

0
1
2
3
4
5
6
7
8
9

Delete

Part A:
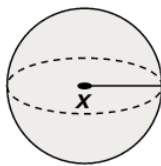
Radius = ☐ in   Radius = ☐ in

Volume = $\frac{4}{3}\pi$ ☐ in³   Volume = $\frac{4}{3}\pi$ ☐ in³
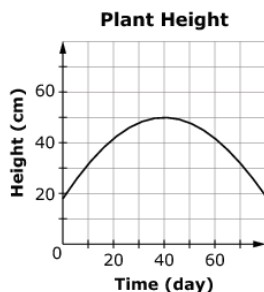
Part B:
     True   False   Cannot be determined

15

The height of a plant, in centimeters, is modeled as a function of time, in days. Consider this graph of the function.

Plant Height

Enter the average rate of change for the height of the plant, measured in centimeters per day, between day 0 and day 20.

☐

16

Which statement is correct about the values of x and y in the following equation?

$7x + xy = xy + 21$

Ⓐ The equation is true for all ordered pairs (x, y).

Ⓑ There are no (x, y) pairs for which this equation is true.

Ⓒ For each value of x, there is one and only one value of y that makes the equation true.

Ⓓ For each value of y, there is one and only one value of x that makes the equation true.

The graph of an exponential function f passes through $(0, 1)$ and $(2, 4)$, as shown.

f(x)
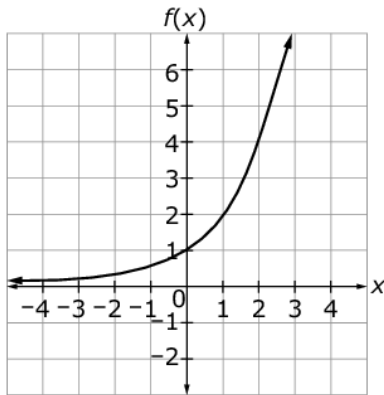
What is the value of $f(6)$?

The dot plots below compare the number of minutes 30 flights made by two airlines arrived before or after their scheduled arrival times.

Airline P

Airline Q
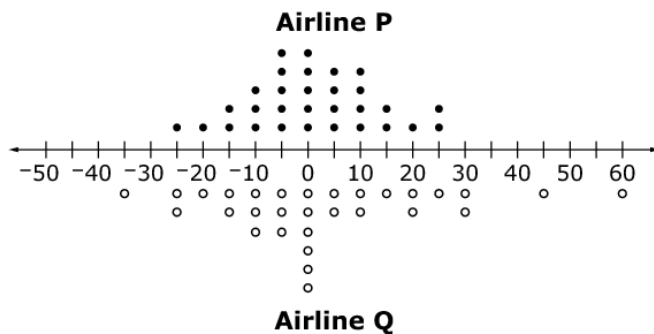
- Negative numbers represent the minutes the flight arrived before its scheduled time.
- Positive numbers represent the minutes the flight arrived after its scheduled time.
- Zero indicates the flight arrived at its scheduled time.

Assuming you want to arrive as close to the scheduled time as possible, from which airline should
you buy your ticket? Use the ideas of center and spread to justify your choice.

19

Ashley claims that when you multiply two different **square roots** together, the product is always **rational**. For example, $\sqrt{2} \cdot \sqrt{18} = \sqrt{36} = 6$ and $\sqrt{3} \cdot \sqrt{27} = \sqrt{81} = 9$.

She also claims that when you multiply two different **cube roots** together, the product is always **irrational**. For example, $\sqrt[3]{2} \cdot \sqrt[3]{18} = \sqrt[3]{36} \approx 3.3019$ and $\sqrt[3]{3} \cdot \sqrt[3]{27} = \sqrt[3]{81} \approx 4.3267$.

Which statement correctly classifies Ashley's claims and provides appropriate reasoning?

- Ⓐ Ashley is correct because her examples support both claims.

- Ⓑ Ashley is correct about the product of square roots always being rational, but the product of cube roots can sometimes be rational.

- Ⓒ Ashley is incorrect about the product of square roots always being rational, but she is correct that the product of cube roots is always irrational.

- Ⓓ Ashley is incorrect because sometimes the product of square roots can be irrational and sometimes the product of cube roots can be rational.

20

Jim can paint a house in 12 hours. Alex can paint the same house in 8 hours.

Enter an equation that can be used to find the time in hours, t, it would take Jim and Alex to paint the house together.

José and Tina are studying geometric transformations.
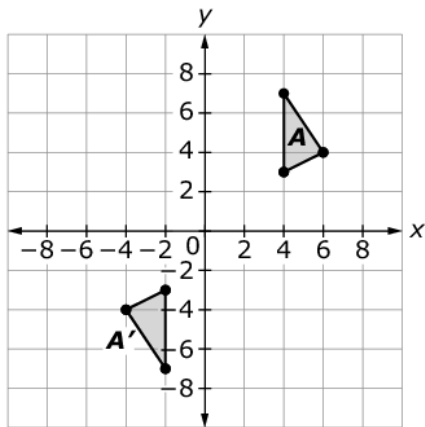
José is able to move triangle _A_ to triangle _A'_ using the following sequence of basic transformations:

1. Reflection across the _x_-axis
2. Reflection across the _y_-axis
3. Translation two units to the right

Tina claims that the same three transformations, done in any order, will always produce the same result. Explain why Tina's claim is incorrect.

The diagram shows the end view of a roll of paper towels when it is full and the end view of the roll after some of the paper towels have been used.

Full Roll of Paper Towels

2.5 in

1.5 in

Partial Roll of Paper Towels

1.25 in

1.5 in
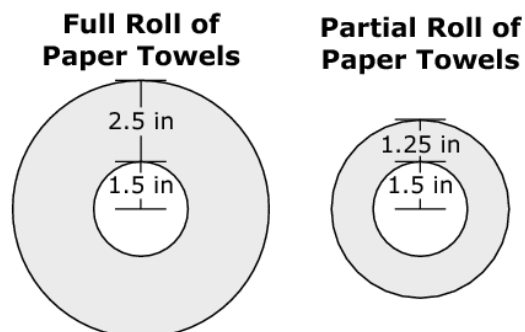
When the full roll of paper towels is unrolled, it has a length of 528 inches of paper towels of uniform width and thickness. Enter the length, in inches, of the paper towels remaining on the partial roll.

At a local fair, the price of admission includes the opportunity for a person to spin a wheel for free ride tickets.

- Each spin of the wheel is a random event.
- The result from each spin of the wheel is independent of the results of previous spins.
- Each spin of the wheel awards tickets according to the probabilities shown below.

Spin the Wheel

1 ticket	35%
2 tickets	25%
3 tickets	20%
5 tickets	15%
10 tickets	5%

Let X be the number of tickets a person wins based on 2 spins. There are 13 possible values for X.

Some values of X are more common than others. For example, winning only 2 tickets in 2 spins is a somewhat
common occurrence with probability 0.1225. It means the person wins 1 ticket on the first spin and 1 ticket on
the second spin $(0.35 \cdot 0.35)$. A list of the possible values of X and the corresponding probabilities for most
values of X is shown below.

Fill in the three missing probability values in the table.

X	Probability
2	0.1225
3	0.1750
4	
5	0.1000
6	0.1450
7	0.0750
8	0.0600
10	
11	0.0350
12	0.0250
13	
15	0.0150
20	0.0025

Consider this function given in recursive form.

$f(1) = -3$
$f(n) = 3f(n-1); n \geq 2$

Select the equivalent explicit function for $n \geq 1$.

Ⓐ $f(n) = -3(n)$

Ⓑ $f(n) = -1(3)^n$

Ⓒ $f(n) = -3(n-1)$

Ⓓ $f(n) = -1(3)^{(n-1)}$

Samantha invented a new outdoor game. The game requires attaching a rope between the tops of two poles of different heights. Read the instructions Samantha created. Use all the given information to determine the maximum allowable distance between the base of pole A and the base of pole B.

Game Instructions

Materials needed: Pole A, Pole B, 10 feet of rope

Setup:
- Place pole A perpendicular to the ground so that its height is 3 feet.
- Place pole B perpendicular to the ground so that its height is 7 feet.
- The length of the rope must extend at least 6 inches past the top of each pole for proper assembly.
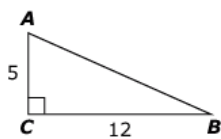- Attach the rope to the top of the two poles.

Enter the **maximum** distance between the base of pole A and the base of pole B to the nearest whole foot.

Determine values of c and d for which the equation $\sqrt{3x+1} - \sqrt{cx+d} = 0$ has no solution.

Enter a value for c in the first response box.

Enter a value for d in the second response box.

Consider this right triangle.

Determine if each expression is equivalent to the length of $\overline{AC}$. Select Yes or No for each expression.

	Yes	No
$13\sin(B)$	☐	☐
$13\cos(A)$	☐	☐
$12\tan(A)$	☐	☐
$12\tan(B)$	☐	☐

28

Given the formula $K = \frac{1}{2}mv^2$, where

- K represents kinetic energy,
- m represents mass and has units of kilograms (kg), and
- v represents velocity and has units of meters per second (m/s).

Select an appropriate measurement unit for kinetic energy.

(A) $\dfrac{kg\ m}{s^2}$

(B) $\dfrac{kg\ m^2}{s}$

(C) $\dfrac{kg\ m^2}{s^2}$

(D) $\dfrac{kg^2\ m^2}{s^2}$

29

There is a traffic jam on a highway. From an aerial view, a reporter is trying to estimate the number of vehicles stuck in the traffic jam.

Select **all** information that will help the reporter make a reasonable estimate of the number of vehicles in the traffic jam.

☐ the cause of the traffic jam

☐ the average length of a vehicle

☐ the number of lanes on the highway

☐ the average distance between vehicles

☐ the average number of people in each vehicle

☐ the distance from the beginning to the end of the traffic jam