

Functions

1. Given the quadratic function $f(x) = (x - 3)(x + 5)$

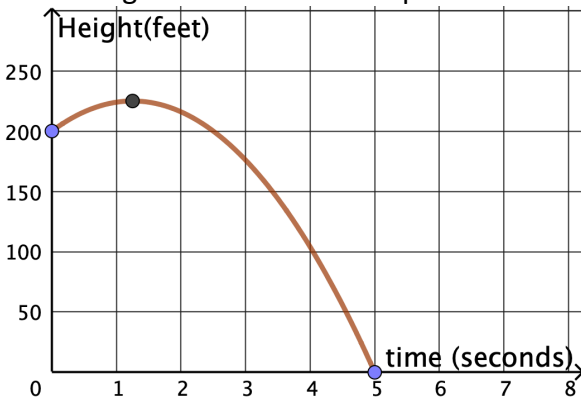
a) What are the x-intercepts?

b) What is the y-intercept?

c) What is the equation of the axis of symmetry?

d). What are the x- and y-coordinates of the vertex?

2. The height of a ball thrown upwards from the top of a building is shown below.



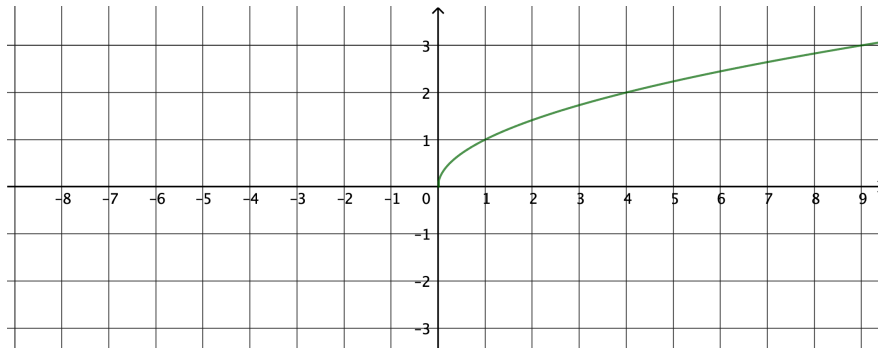
a) What are the **approximate** coordinates of the vertex and what does the vertex show in this situation?

b) What are the coordinates of the **y-intercept** and what does it represent in this situation?

c) What are the coordinates of the **x-intercept** and what does it represent in this situation?

d) Evaluate $f(4)$ and explain what it means in this situation

3. Below is the graph of $y = \sqrt{x}$.



Sketch the following:

a) $y = -\sqrt{x}$

c) $y = -\sqrt{x - 2}$

b) $y = -\sqrt{-x}$

d) $y = \sqrt{-(x + 2)}$

4. If $f(x) = x^2 - 3$ and $g(x) = 2x + 1$

a) Evaluate $f(7)$?

b) Evaluate $g(5)$?

c) Evaluate $f(4) + g(-7)$

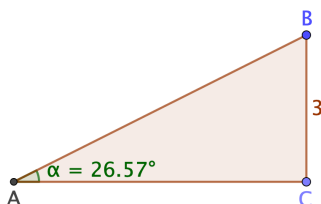
d) Evaluate $f(g(1))$

5. Factor each of the following:

a) $y = x^2 + 7x + 10$

b) $y = x^2 - 2x + 15$

6. Find the length of the hypotenuse in this triangle



7. Given a bag of 8 white and 4 blue marbles, Janice pulls out one marble, keeps it out, then pulls out a second marble. Which of the following shows the probability that both marbles are blue?

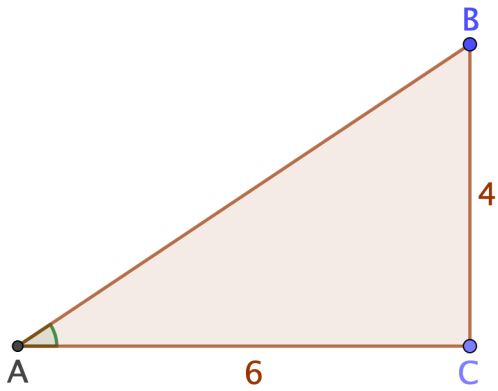
a) $\frac{8}{12} \cdot \frac{8}{12}$

b) $\frac{8}{12} \cdot \frac{7}{12}$

c) $\frac{8}{12} \cdot \frac{7}{11}$

d) $\frac{8}{12} \cdot \frac{8}{11}$

8. What is the measure of the angle at point A in the diagram below?



Solutions

1. Given the quadratic function $f(x) = (x - 3)(x + 5)$

a) What are the x-intercepts?

Set the y-value to 0 and solve for x:

$$0 = (x - 3)(x + 5)$$

$$x = 3 \text{ and } x = -5$$

$$(3, 0) \text{ and } (-5, 0)$$

b) What is the y-intercept?

Set the x-value to 0 and find y:

$$y = (0 - 3)(0 + 5) = -15$$

$$y\text{-intercept} = (0, -15)$$

c) What is the equation of the axis of symmetry?

The axis of symmetry is the vertical line that passes through the x-value halfway between the two x-intercepts: halfway between 3 and -5 is the x-value of -1

$$\text{Axis of symmetry: } x = -1$$

d). What are the x- and y-coordinates of the vertex?

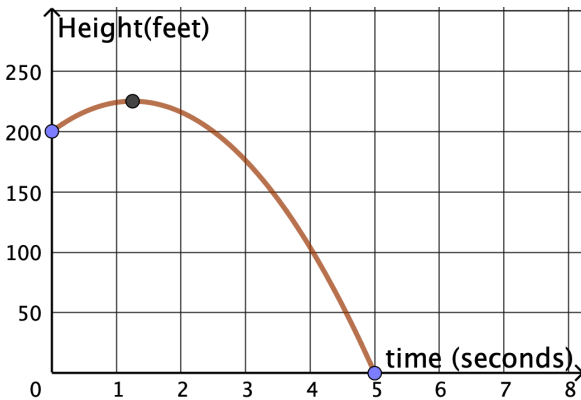
x-value of vertex is same as x-value from axis of symmetry, so $x = -1$.

Plug in -1 for x to find y-value:

$$(y = (-1 - 3)(-1 + 5) = (-4)(4) = -16)$$

$$\text{Vertex} = (-1, -16)$$

2. The height of a ball thrown upwards from the top of a building is shown below.



a) What are the **approximate** coordinates of the vertex and what does the vertex show in this situation?

About (1.3, 225). This means that the ball reaches its maximum height of 225 feet 1.3 seconds after being thrown.

b) What are the coordinates of the **y-intercept** and what does it represent in this situation?

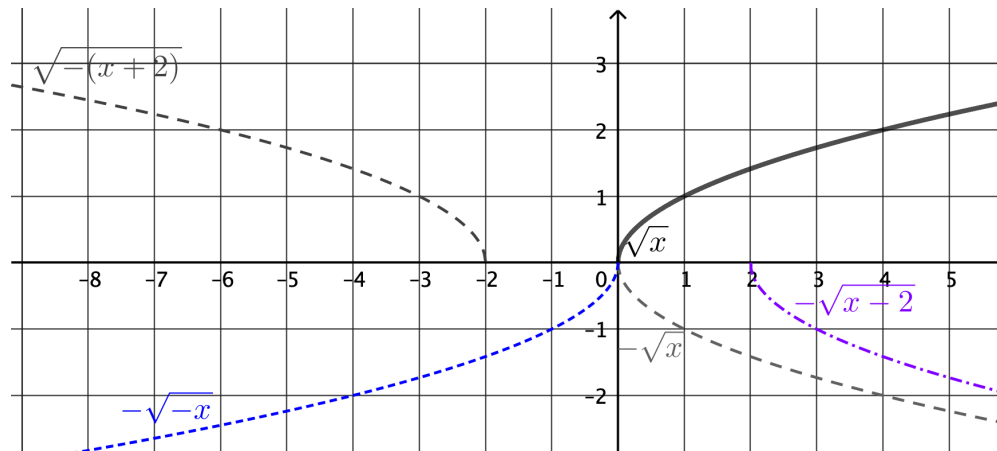
The y-intercept is at (0, 200) and shows that the height of the ball was 200 feet when the ball was first thrown upward.

c) What are the coordinates of the **x-intercept** and what does it represent in this situation?

The x-intercept is at (5,0) and means that the ball hit the ground 5 seconds after being thrown.

d) Evaluate $f(4)$ and explain what it means in this situation

3. Below is the graph of $y = \sqrt{x}$.



Sketch the following:

a) $y = -\sqrt{x}$

Flips over the x-axis

c) $y = -\sqrt{x-2}$

*Flips over the y-axis and moves **right** 2 units*

b) $y = -\sqrt{-x}$

Flips over both x and y axes

d) $y = \sqrt{-(x+2)}$

*Flips over y-axis and moves **left** 2 units*

4. If $f(x) = x^2 - 3$ and $g(x) = 2x + 1$

a) Evaluate $f(7)$?

$$f(7) = 7^2 - 3 = \mathbf{46}$$

b) Evaluate $g(5)$?

$$g(5) = 2(5) + 1 = \mathbf{11}$$

c) Evaluate $f(4) + g(-7)$

$$\begin{aligned} f(4) + g(-7) &= \\ 4^2 - 3 + 2(-7) + 1 &= \\ 16 - 3 - 14 + 1 &= \mathbf{0} \end{aligned}$$

d) Evaluate $f(g(1))$

$$\begin{aligned} g(1) &= 2(1) + 1 = 3 \\ f(3) &= 3^2 - 3 = \mathbf{6} \end{aligned}$$

5. Factor each of the following: *Use Target sum and product*

a) $y = x^2 + 7x + 10$

Find two numbers that multiply to 10 and add to 7: 5 and 2

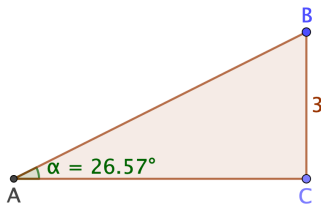
$$y = (x + 5)(x + 2)$$

b) $y = x^2 - 2x + 15$

Find 2 numbers that multiply to -15 and add to -2. One will be negative and one will be positive. -5 and 3

$$y = (x - 5)(x + 3)$$

6. Find the length of the hypotenuse in this triangle



Using SohCahToa, we know the **opposite side** and want to find the **hypotenuse** so that means using Sin:

$$\sin 26.57 = 3/x$$

$$x \cdot \sin 26.57 = 3$$

$$x = 3 / \sin 26.57$$

From calculator: **6.7**

7. Given a bag of 8 white and 4 blue marbles, Janice pulls out one marble, keeps it out, then pulls out a second marble. Which of the following shows the probability that both marbles are blue?

a) $\frac{8}{12} \cdot \frac{8}{12}$

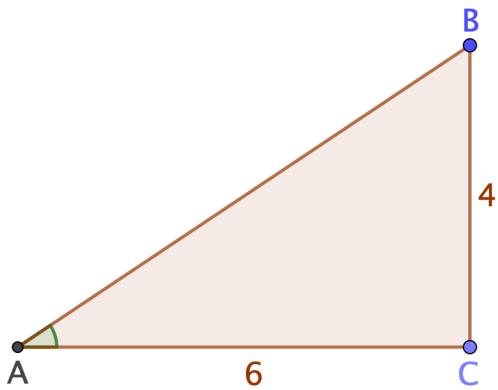
b) $\frac{8}{12} \cdot \frac{7}{12}$

c) $\frac{8}{12} \cdot \frac{7}{11}$

d) $\frac{8}{12} \cdot \frac{8}{11}$

c) $\frac{8}{12} \cdot \frac{7}{11}$ is the correct answer because there is an 8/12 chance of pulling a white marble first. Then there will be 7 white marbles out of 11 left so we then multiply by 7/11

8. What is the measure of the angle at point A in the diagram below?



Side BC is the opposite side and AC is the adjacent side when angle BAC (at point A) is the reference angle. Therefore, we use tangent:

$$\tan A = 4/6 = 0.667$$

$$\text{From calculator: } 2^{\text{nd}} \tan 0.667 = 33.7^{\circ}$$