

Guiding Question: Can I use factoring to answer questions about quadratics applications?

p.62-63 Applications of Quadratics

Warm-up

p.62

Find solutions to the quadratic equation by FACTORING

$$40 = 4x^2 + 12x$$

$$\begin{array}{r} -40 \qquad -40 \\ \hline 0 = 4x^2 + 12x - 40 \\ 0 = 4(x^2 + 3x - 10) \end{array}$$

x	x^2	$-2x$
5	$5x$	-10

~~| | | |
|-------|-------|-------|
| 3 | $5x$ | $-2x$ |
| -10 | -10 | -10 |~~

$$0 = 4(x+5)(x-2)$$

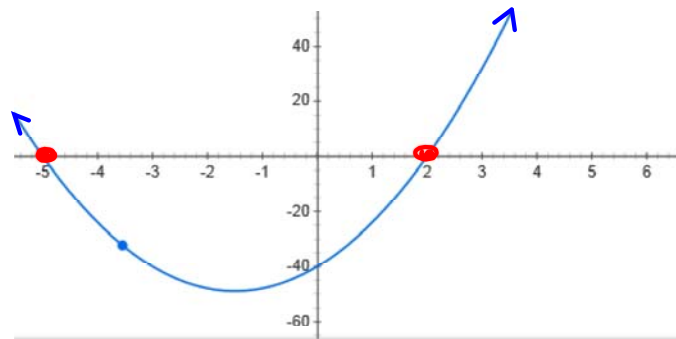
$$x+5=0 \text{ or } x-2=0$$

$$x=-5 \text{ or } x=2$$

We found $x = -5$ and $x = 2$ in our warmup

By setting our equation equal to 0, we determined where the graph of that equation would cross the x-axis.

Graph of $y = 4x^2 + 12x - 40$



1.) Danielle is throwing a ball to her friend Nick, who is standing on a balcony. The height, h (in feet), of the ball above the ground (t) seconds after it is thrown is given by

$$h(t) = -16t^2 + 32t + 20$$

p.63

How can we label our axes for this situation?

a. At what height above the ground is the ball before Danielle throws it? Find $h(0)$.

$$h = -16(0)^2 + 32(0) + 20$$

$$h = 20 \text{ ft.}$$

b. After how many seconds is the ball ON the ground? Set function equal to 0 and solve by factoring.

$$0 = -16t^2 + 32t + 20$$

$$0 = -4(4t^2 - 8t - 5)$$

$2t$	$4t^2$	$-10t$	$-10t$	$2t$
1	$2t$	-5		

$$0 = -4(2t+1)(2t-5)$$

$$2t+1=0 \quad \text{OR} \quad 2t-5=0$$

$$2t=-1 \quad \quad \quad 2t=5$$

$$t=-.5 \quad \quad \quad t=2.5$$

1.) Danielle is throwing a ball to her friend Nick, who is standing on a balcony. The height, h (in feet), of the ball above the ground (t) seconds after it is thrown is given by

$$h(t) = -16t^2 + 32t + 20$$

$$a = -16 \quad b = 32$$

$$X = \frac{-b}{2a}$$

c. What is the Axis of Symmetry? What information does this provide?

$$X = \frac{-32}{2(-16)}$$

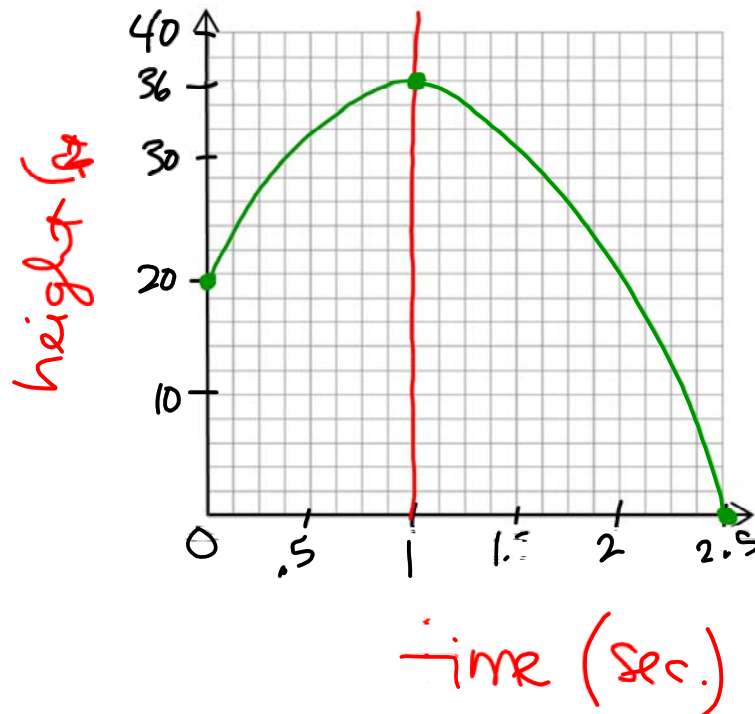
$$X = 1$$

d. Use your answer from part (c) to find the vertex.

$$h = -16(1)^2 + 32(\cdot) + 20$$

$$h = 36$$

Use the information that we found to sketch the graph of the situation



- 2.) A submarine is an enclosed ship that can dive under water and reach deep depths of the ocean. The submarine Big Blue went on a trial run. The depth, in yards, of the submarine (t) minutes after the trial begins is given by $d(t) = t^2 - 9t$.
- What is the beginning depth of the submarine?

$$d = (0)^2 - 9(0)$$

$$d = 0$$

- After how many minutes is the submarine at sea level, or a depth of 0?

$$0 = t^2 - 9t$$

$$0 = t(t - 9)$$

$$t = 0 \quad \text{OR} \quad t - 9 = 0$$

$$t = 9$$

- 2.) A submarine is an enclosed ship that can dive under water and reach deep depths of the ocean. The submarine Big Blue went on a trial run. The depth, in yards, of the submarine (t) minutes after the trial begins is given by $d(t) = t^2 - 9t$.

$$a=1 \quad b=-9 \quad x = \frac{-b}{2a}$$

- c. When will the submarine reach its deepest depth?

$$x = \frac{-(-9)}{2(1)} \quad x = 4.5$$

- d. What is the deepest depth?

$$d = (4.5)^2 - 9(4.5)$$

$$d = -20.25$$

Please write the following question on [pg. 62](#)

- e. After how many minutes is the submarine at a depth of exactly -8?

$$-8 = t^2 - 9t$$

$$\begin{array}{r} -8 \\ +8 \\ \hline 0 = t^2 - 9t + 8 \end{array}$$

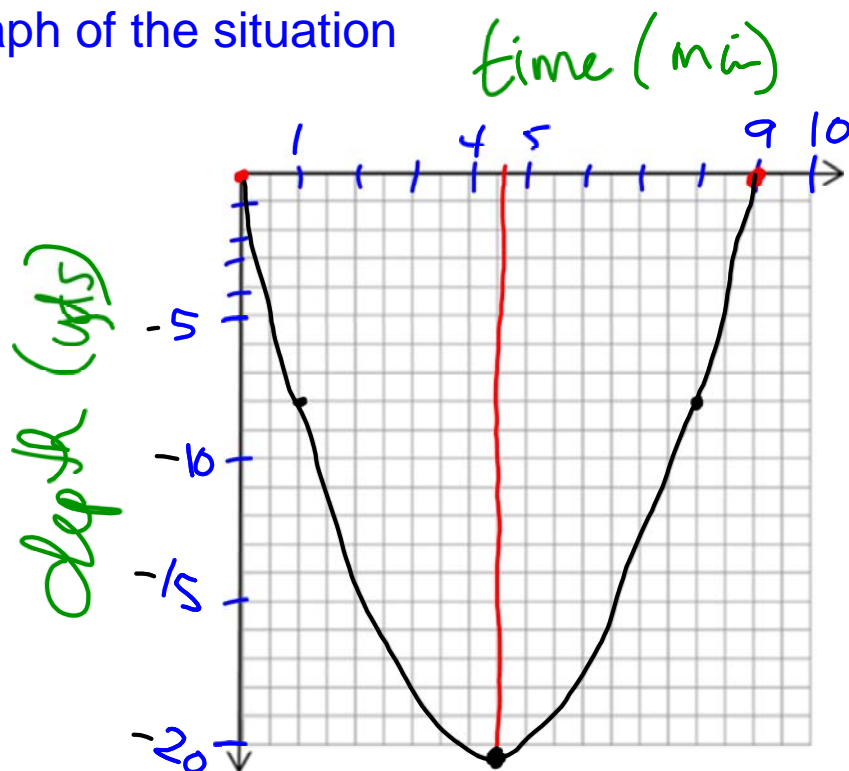
$$t \quad \begin{array}{|c|c|} \hline & -9 \\ \hline t & -8t \\ \hline -8 & 8 \\ \hline \end{array} \quad \begin{array}{l} -9 \\ \hline -8t \\ \hline 8 \end{array} \quad t$$

$$0 = (t-8)(t-1)$$

$$t-8=0 \quad \text{or} \quad t-1=0$$

$$t=8 \quad \quad \quad t=1$$

Use the information that we found to sketch the graph of the situation



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Homework: Solving Quadratic Application Problems Worksheet