

Unit 3 – 4

Solve the following by completing the square. Derive the quadratic formula.

$$a \cdot x^2 + b \cdot x + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The Quadratic Formula

Solve the following by quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. $x^2 + 10x - 19 = 0$

2. $x^2 - 12x + 2 = 0$

3. $x^2 + 15x - 8 = 0$

4. $x^2 - 7x - 4 = 0$

5. $2x^2 - 8x - 14 = 0$

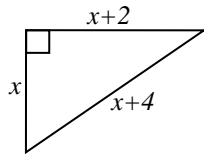
6. $3x^2 - 18x - 5 = 0$

7. $2x^2 - 10x - 3 = 0$

8. $3x^2 - 21x - 5 = 0$

Applications

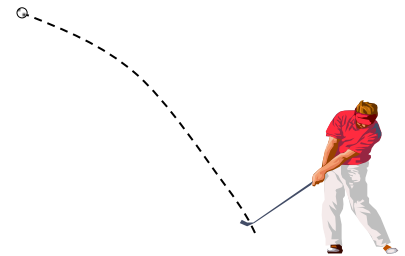
1. Find the value of x that would make the diagram below accurate.



2. A golf ball is hit with an initial vertical velocity of 80 fps

$$h = -16t^2 + 80t$$

- a. How high is the ball after 2 seconds?



- b. How many seconds would it take the ball to hit the ground (the height would be $h=0$)?

- c. When will the ball reach 48 feet?

- d. What is the average rate of the change in height (i.e. vertical velocity) from $t = 1$ to $t = 2$ seconds?

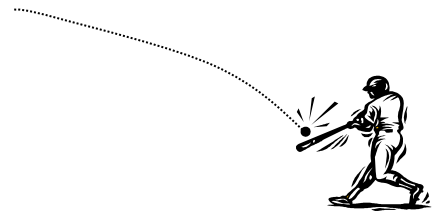
(Hint: Find the slope between the points $(1, \quad)$ and $(2, \quad)$. Evaluate the heights at $t=1$ and $t=2$ to find the corresponding coordinate)

- e. For what values of t is the domain appropriate?

3. A baseball is hit with an initial vertical velocity of 121 fps and the ball was struck 1 foot above ground.

$$h = -16t^2 + 121t + 1$$

- a. How high is the ball after 2 seconds?



- b. How many seconds would it take the ball to hit the ground (the height would be $h = 0$)?

- c. When will the ball reach 30 feet?

- d. When does the ball reach a maximum height?

- e. What is the average vertical velocity from $t = 0.2$ to $t = 0.9$ seconds?

4. A person at a framing store is making a frame mat to go around a picture. The mat is a uniform 2 inches around on each side. The picture's width is 5 less than twice the picture's height. The entire area of the frame with picture included is 221 square inches. What are the dimensions of the picture?

