

4.5 Quadratic Equations

SOLVING Quadratics BY FACTORING	1	Move all terms to one side & set equal to 0
	2	factor
	3	Set each factor equal to 0 and solve
	4	Write answer as a set $x = \{ \dots \}$

Directions: Solve each equation by factoring.

<p>1. $8x^2 - 16x = 0$ $8x(x-2) = 0$ $8x = 0 \mid x - 2 = 0$ $x = 0 \mid x = 2$ $x = 0, 2$</p>	<p>2. $x^2 + 18 = 9x$ $x^2 - 9x + 18 = 0$ $(x-6)(x-3) = 0$ $x-6 = 0 \mid x-3 = 0$ $x = 6 \mid x = 3$ $x = 6, 3$</p>
<p>3. $20x^2 = 45$ $20x^2 - 45 = 0$ $5(4x^2 - 9) = 0$ $5(2x-3)(2x+3) = 0$ $x = \pm \frac{3}{2}$ $2x-3 = 0 \mid 2x+3 = 0$ $x = 3/2 \mid x = -3/2$</p>	<p>4. $6x^2 + 5x - 4 = 0$ $ac = -24$ $\begin{matrix} 6x^2 + 8x & -3x - 4 & = & 6 \\ \hline 2x(3x+4) & -1(3x+4) & = & 0 \end{matrix}$ $(2x-1)(3x+4) = 0$ $x = 1/2, -4/3$ $2x-1 = 0 \mid 3x+4 = 0$ $x = 1/2 \mid x = -4/3$</p>
<p>5. $2x^2 - 5x + 3 = -2x^2 + 7x - 6$ $4x^2 - 12x + 9 = 0$ $ac = 36$ $4x^2 - 6x + 6x + 9 = 0$ $2x(2x-3) - 3(2x-3) = 0$ $(2x-3)(2x-3) = 0$ $x = 3/2$</p>	<p>6. $2x^2 = x + 21$ $ac = -42$ $2x^2 - x - 21 = 0$ $-7 \ 6$ $2x^2 - 7x + 6x - 21 = 0$ $x(2x-7) + 3(2x-7) = 0$ $(x+3)(2x-7) = 0$ $x = -3, 7/2$</p>

SOLVE BY GRAPHING

Using a graphing calculator, you can graph a quadratic equation, and find the zeros.

1. Graph the function in a viewing window that contains the zeros of the function
 - a. Enter equation in y=
 - b. Adjust window accordingly
2. Press 2nd → TRACE to access the calculate menu zoom 0
3. Select option 2, the ZERO option
4. Set the Left Bound for the zero you desire to find
5. Set the Right Bound for the zero you desire to find
6. Tell the calculator where you guess the zero is located

Directions: Solve the following using a graphing calculator

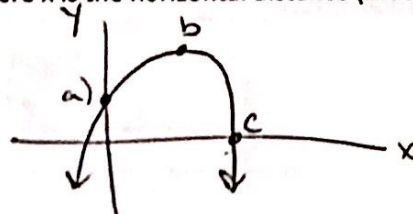
<p>7. $\frac{1}{2}x^2 - x = 6$ $x = -2.606, 4.606$</p>	<p>8. $2x^2 - 5 = 0$ $x = -1.581, 1.581$</p>
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9. The height in feet of a ball thrown by a child is $f(x) = -\frac{1}{2}x^2 + 2x + 3$, where x is the horizontal distance (in feet) when the ball is thrown.

a. How high is the ball when it leaves the child's hand?

$$x = 0$$

$$-\frac{1}{2}(0)^2 + 2(0) + 3 = \boxed{3 \text{ ft}}$$



b. What is the maximum height of the ball?

$$\frac{-a}{2(-\frac{1}{2})} = 2$$

$$-\frac{1}{2}(2)^2 + 2(2) + 3 = \boxed{5 \text{ ft}}$$

$$-\frac{1}{2}(4) + 4 + 3$$

$$-2 + 7 = 5$$

c. How far from the child does the ball strike the ground?

Zero on calculator

$$5.162 \text{ ft}$$

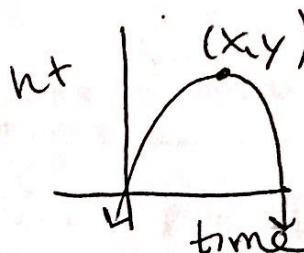
10. When serving in tennis, a player tosses the tennis ball vertically in the air. The height h of the ball after t seconds is given by the quadratic function $h(t) = 7t - 5t^2$ (the height is measured in meters from the point of the toss).

a. How high in the air does the ball go?

$$\frac{-7}{2(-5)} = 0.7$$

$$-5(0.7)^2 + 7(0.7)$$

$$\boxed{2.45 \text{ m}}$$



b. Assume that the player hits the ball on its way down when it is $\frac{0.6 \text{ m}}{ht}$ above the point of the toss. For how many seconds is the ball in the air between the toss and the serve?

$$0.6 = 7t - 5t^2$$

$$-5t^2 + 7t - 0.6 = 0$$

use calculator to find the zero

$$x = 1.308 \text{ seconds}$$

