

Part 1 - Solving Quadratics

Close to Proficient (2.5)

Solve with the Zero Product Property.

1. $(x - 4)(x + 7) = 0$

$x - 4 = 0$ $x + 7 = 0$
 $+4 +4$ $-7 -7$

$x = 4$ or $x = -7$

2. $3x(x - 9) = 0$

$3x = 0$ $x - 9 = 0$
 $\frac{3x}{3} = 0$ $+9 +9$

$x = 0$ or $x = 9$

Solve by first factoring, then using the Zero Product Property.

3. $x^2 + 6x + 8 = 0$

	x	$+2$
x	x^2	$2x$
$+$	$4x$	8

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

$x + 4 = 0$ $x + 2 = 0$
 $-4 -4$ $-2 -2$

$x = -4$ or $x = -2$

4. $x^2 - 10x + 16 = 0$

	x	-8
x	x^2	$-8x$
-2	$-2x$	16

$(x - 2)(x - 8) = 0$

$x - 2 = 0$ $x - 8 = 0$
 $+2 +2$ $+8 +8$

$x = 2$ or $x = 8$

Solve by first factoring out a GCF, then using the Zero Product Property.

5. $3x^2 - 12x = 0$

$3x(x - 4) = 0$

$3x = 0$ or $x - 4 = 0$
 $\frac{3x}{3} = 0$ $+4 +4$

$x = 0$ or $x = 4$

6. $6x^2 + 8x = 0$

$2x(3x + 4) = 0$

$2x = 0$ $3x + 4 = 0$
 $\frac{2x}{2} = 0$ $-4 -4$
 $\frac{3x}{3} = -4$

$x = 0$ or $x = -\frac{4}{3}$

Proficient (3) and Highly Proficient (4)

Solve by factoring.

7. $3p^2 - 2p - 5 = 0$

	$3p$	-5
p	$3p^2$	$-5p$
$+$	$3p$	-5

$p = -1$ or $\frac{5}{3}$

$(p + 1)(3p - 5) = 0$
 $p + 1 = 0$ $3p - 5 = 0$
 $-1 -1$ $+5 +5$
 $\frac{3p}{3} = 5$

8. $4x^2 - 15x - 25 = 0$

	$4x$	$+5$
x	$4x^2$	$5x$
-5	$-20x$	-25

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

$x - 5 = 0$ $4x + 5 = 0$
 $+5 +5$ $-5 -5$
 $x = 5$ $4x = -5$
 $\frac{4x}{4} = -\frac{5}{4}$

$x = 5$ or $x = -\frac{5}{4}$

9. Solve with the quadratic formula:

$$4x^2 + 8x + 3 = 0$$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(4)(3)}}{2(4)}$$

$$x = \frac{-8 \pm \sqrt{64 - 48}}{8}$$

a b c

$$x = \frac{-8 \pm \sqrt{16}}{8}$$

$$x = \frac{-8 + \sqrt{16}}{8} = -\frac{1}{2}$$

$$x = \frac{-8 - \sqrt{16}}{8} = -\frac{3}{2}$$

Solve using any method.

10. $4x^2 = 64$ Solve with $\sqrt{\quad}$

$$\sqrt{x^2} = \sqrt{16}$$

$$x = 4 \text{ or } -4$$

11. $x^2 - 7x = 18$ Factoring

$$x^2 - 7x - 18 = 0 \quad (x-9)(x+2) = 0$$

x^2	$-9x$
$+2x$	-18

$$x-9=0 \quad x+2=0$$

$$x = 9 \text{ or } x = -2$$

STOP!

Rate yourself on your solving skills. Check your answers and then circle one:

DP (2)

CP (2.5)

P (3)

HP (4)

* Part 2 - Changing Forms/Writing Equations

Close to Proficient (2.5)

Change from factored to standard form by multiplying. (Area Model or EWE)

1. $y = (x+3)(x-7)$

	$x+3$	
x	x^2	$3x$
-7	$-7x$	-21

$$y = x^2 - 4x - 21$$

2. $y = 3x(x-5)$

$$y = 3x^2 - 15x$$

3. $y = (x+3)^2$ Expand!

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

$$y = x^2 + 3x + 3x + 9$$

$$y = x^2 + 6x + 9$$

Proficient (3) and Highly Proficient (4)

Change to standard form.

4. $y = -4(x-5)^2 + 6$ Expand + multiply

$$y = -4(x-5)(x-5) + 6$$

$$y = -4(x^2 - 5x - 5x + 25) + 6$$

$$y = -4(x^2 - 10x + 25) + 6$$

$$y = -4x^2 + 40x - 100 + 6$$

$$y = -4x^2 + 40x - 94$$

Change to standard form by completing the square.

5. $y = x^2 - 12x + 4$

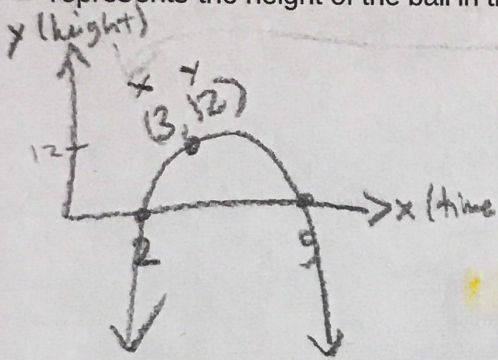
$$\left(\frac{-12}{2}\right)^2 \quad y = (x^2 - 12x + 36) + 4 - 36$$

$$= (-6)^2 = 36 \quad y = (x-6)(x-6) - 32$$

$$y = (x-6)^2 - 32$$

Write an equation to represent the situation.

6. For your project you kicked a soccer ball 2 seconds after the clock started, and it landed 5 seconds after the clock started. Your friend is recording you, and when played back you notice that at 3 seconds, the ball is at a height of 12 feet in the air. Write an exact equation in **factored form** to represent this, if x represents time and y represents the height of the ball in the air. Consider drawing a sketch to help you.



$$y = a(x-p)(x-q)$$

$$y = a(x-2)(x-5)$$

$$12 = a(3-2)(3-5)$$

$$12 = a(-1)(-2)$$

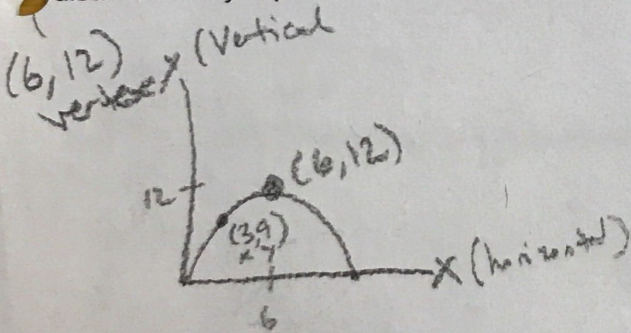
$$12 = a \cdot 2$$

$$\frac{12}{2} = \frac{a \cdot 2}{2}$$

$$6 = a$$

$$y = 6(x-2)(x-5)$$

7. A large kangaroo has an incredible jump. At a horizontal distance of 6 feet it reaches its **maximum** height of 12 feet in the air. When it is at a horizontal distance of 3 feet, it is 9 feet in the air. Let x represent the horizontal distance and y represent the vertical height. Write an exact equation in **vertex form** to represent this problem.



other points
(3, 9)

$$y = a(x-h)^2 + k$$

$$y = a(x-6)^2 + 12$$

$$9 = a(3-6)^2 + 12$$

$$9 = a(-3)^2 + 12$$

-12

$$\frac{-3 = a \cdot 9}{9} \quad \frac{-12}{9}$$

$$\frac{-1}{3} = a$$

$$y = -\frac{1}{3}(x-6)^2 + 12$$

STOP! Rate yourself on your changing form/writing equations skills. Check your answers and then circle one:

DP (2)

CP (2.5)

P (3)

HP (4)

Extra Practice

Identify what method to use, and then solve.

1. $5x^2 + 15x = 0$ Factor GCF

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

$$\begin{array}{l} 5x = 0 \\ 5 \quad 5 \end{array} \quad \begin{array}{l} x+3 = 0 \\ -3 \quad -3 \end{array}$$

$x = 0$ or -3

2. $8x^2 + 12x = 0$ Factor GCF

$$4x(x+3) = 0$$

$$\begin{array}{l} 4x = 0 \\ 4 \quad 4 \end{array} \quad \begin{array}{l} x+3 = 0 \\ -3 \quad -3 \end{array}$$

$x = 0$ or $x = -3$

$$\begin{array}{r} 2 \\ 36 \\ \hline x \cdot 4 \\ 144 \\ -36 \end{array}$$

3. $x^2 - 5x + 6 = 0$ Factor Trinomial

$$(x-2)(x-3) = 0$$

$$\begin{array}{l} x-2 = 0 \\ +2 \quad -2 \end{array} \quad \begin{array}{l} x-3 = 0 \\ -3 \quad -3 \end{array}$$

$x = 2$ or 3

4. $x^2 + 6x + 36 = 0$ can't factor

$$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(36)}}{2(1)}$$

- complete the \square
or
- Quadratic Formula

$x = \frac{-6 \pm \sqrt{-108}}{2}$ \leftarrow No Solutions

5. $2x^2 - 9x - 5 = 0$ Factor Trinomial

$$(2x+1)(x-5) = 0$$

	$2x + 1$	
x	$2x^2$	$1x$
-5	$-10x$	-5

$$\begin{array}{l} 2x+1 = 0 \\ -1 \quad -1 \\ 2x = -1 \\ \frac{-1}{2} \quad \frac{-1}{2} \end{array} \quad \begin{array}{l} x-5 = 0 \\ +5 \quad +5 \end{array}$$

$x = -\frac{1}{2}$ or 5

6. $3x^2 = -17$

$$3x^2 + 17 = 0$$

Quadratic Formula

$$\begin{array}{ccc} a & \wedge & c \\ & 6x & \\ & b & \end{array}$$

$x = \frac{-0 \pm \sqrt{0^2 - 4(3)(17)}}{2(3)}$ \leftarrow No Solutions