

# Quadratics Quiz Practice Problems

Name

Answers

1) Answer these questions in writing:

What makes an equation quadratic? What are the four methods we've used to solve a quadratic equation? Why can't we factor every quadratic equation? Why can't we just use our graphing calculator to solve every quadratic equation? What method(s) **can** solve every quadratic equation?

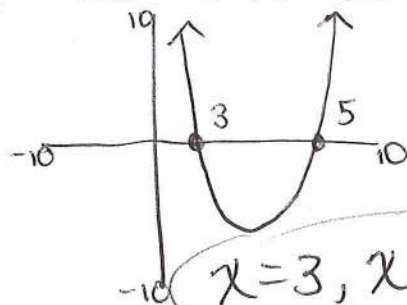
- A 2<sup>nd</sup> degree eq. is quadratic ( $x^2$  is biggest exponent)
- factor, quad. formula, complete square, graphing
- not all quads have rational roots  $\therefore$  they're not factorable or "solvable" by graphing
- quad. formula + complete sq. solve all quadratics

Solve the quadratic equation below using four methods: graphing, factoring, completing the square, and the quadratic formula.

2)  $x^2 - 8x + 15 = 0$

Graphing (Show  $y_1 =$  and make sketch)

$$y_1 = x^2 - 8x + 15$$



Factoring

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

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

$$x-5=0, x-3=0$$

$$x=5, x=3$$

Completing the Square

$$x^2 - 8x + 16 = -15 + 16$$

$$\sqrt{(x-4)^2} = \sqrt{1}$$

$$x-4 = \pm 1$$

$$-4 = 1 \quad x-4 = -1$$

$$x=5, x=3$$

Quadratic Formula

$$a=1, b=-8, c=15$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(15)}}{2(1)}$$

$$= \frac{8 \pm \sqrt{4}}{2}$$

$$= \frac{8 \pm 2}{2}$$

$$x = \frac{8+2}{2}$$

$$x = \frac{8-2}{2}$$

$$x=5, x=3$$

Solve using the quadratic formula. Leave answers in simplest form.

3)  $x^2 - 8 = 0$      $a = 1, b = 0, c = -8$

$$x = \frac{-0 \pm \sqrt{0^2 - 4(1)(-8)}}{2(1)} = \frac{\pm 4\sqrt{2}}{2}$$

$$= \pm \frac{\sqrt{32}}{2} = \pm \frac{\sqrt{16}\sqrt{2}}{2}$$

$$x = \pm 2\sqrt{2}$$

Other method:

$$\sqrt{x^2} = \sqrt{8}$$

$$x = \pm \sqrt{8}$$

$$x = \pm 2\sqrt{2}$$

4)  $5x^2 = -10x - 1$

$$5x^2 + 10x + 1 = 0$$

$a = 5$

$b = 10$

$c = 1$

$$x = \frac{-10 \pm \sqrt{(10)^2 - 4(5)(1)}}{2(5)}$$

$$= \frac{-10 \pm \sqrt{80}}{10}$$

$$= \frac{-10 \pm \sqrt{16}\sqrt{5}}{10}$$

$$x = \frac{-10 \pm 4\sqrt{5}}{10}$$

$$= \frac{-10}{10} \pm \frac{4\sqrt{5}}{10}$$

$$x = -1 \pm \frac{2\sqrt{5}}{5}$$

or write as  $x = \frac{-5 \pm 2\sqrt{5}}{5}$

5)  $4x^2 - 3x - 1 = x^2$

$$3x^2 - 3x - 1 = 0$$

$$x = \frac{3 \pm \sqrt{9 - 4(3)(-1)}}{2(3)}$$

$$x = \frac{3 \pm \sqrt{21}}{6}$$

Answer may be written as 1 term or as 2 terms. Both are simplified.

$$x = \frac{3 \pm \sqrt{21}}{6}$$

or write  $x = \frac{1}{2} \pm \frac{\sqrt{21}}{6}$

Solve the following quadratic inequalities. State solution set and graph solution on a number line.

5)  $x^2 - 3x > 0$

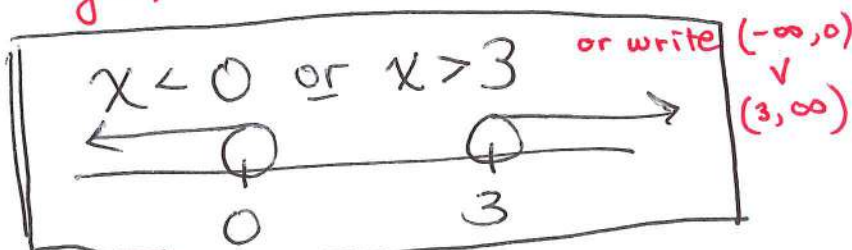
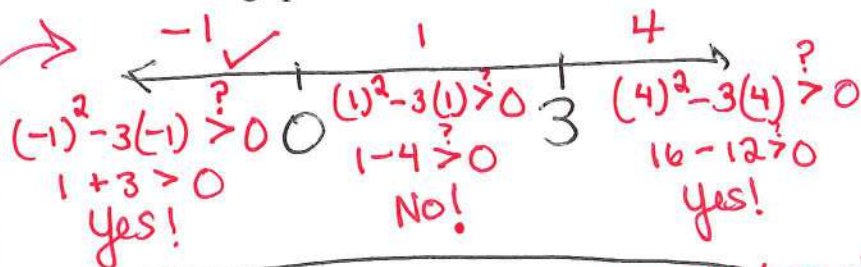
Solve equation first.

$$x^2 - 3x = 0$$

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

$$x = 0, x = 3$$

Then test values





Solve for x:

$$6) |x^2| = 5x - 6$$

$$x^2 = 5x - 6$$

$$x^2 - 5x + 6 = 0$$

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

$$x = 2, 3$$

$$x^2 = -5x + 6$$

$$x^2 + 5x - 6 = 0$$

$$(x-1)(x+6) = 0$$

$$x = 1, x = -6$$

↑  
fails check

$$x = 2, x = 3$$

7) A ball is thrown straight upward where its height  $h$  meters above the ground after  $t$  seconds is given by  $h(t) = 100t - 4.9t^2$ . Answer the questions below. Show and/or describe all your work.

**Round all times to the nearest tenth of a second and all heights to the nearest tenth of a meter.**

a) When does the ball hit the ground?

$$0 = 100t - 4.9t^2$$

$$0 = t(100 - 4.9t)$$

$$t = 0 \text{ or } 100 - 4.9t = 0$$

$$t = 0 \text{ or } \frac{100}{4.9} = \frac{4.9t}{4.9}$$

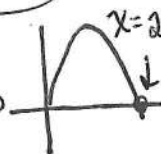
$$t = 20.4$$

or solve graphically

$$y_1 = 100x - 4.9x^2$$

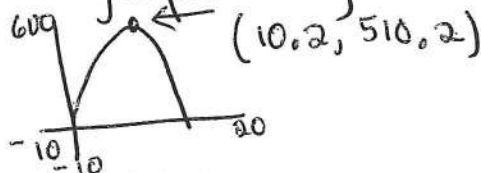
$$x_{\min} -10 \quad y_{\min} -10$$

$$x_{\max} 20 \quad y_{\max} 600$$



b) At what time does the ball reach its maximum height? What is its maximum height?

Solve graphically or using  $x = \frac{-b}{2a}$



$$x = \frac{-100}{2(-4.9)}$$

$$x = 10.20408...$$

$$y = 100(10.20408...) - 4.9(10.20408...)^2$$

$$y = 510.2$$

At 10.2 sec, max is 510.2 meter

c) Find the time interval when the ball is at least 300 meters above the ground

Solve graphically

$$y_1 = 100x - 4.9x^2$$

$$y_2 = 300$$



or solve algebraically

$$100x - 4.9x^2 \geq 300$$

$$x = 3.6543647, x = 16.753791$$

$$3.7 \leq x \leq 16.8$$