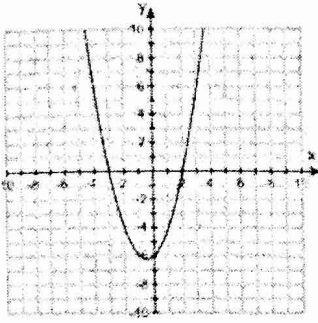
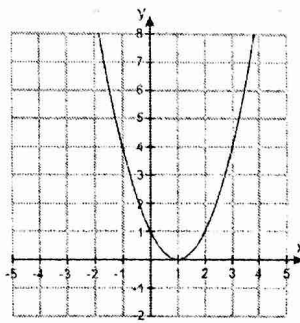


Unit 3 Review

Solve each quadratic **Graphically**.



1. $2 + -3$



2. 1

Solve each quadratic equation by **Factoring**:

3. $3x^2 - 17x - 6 = 0$

~~17~~ $3x^2 - 18x + 1x - 6$
 $3x(x-6) + 1(x-6)$
 $(3x+1)(x-6) = 0$
 $x = -\frac{1}{3} \quad x = 6$

4. $x^2 + 4x - 5 = 0$

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

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

~~4~~
~~3~~
 $2x^2 - 3x - 2 = 0$
 $2x^2 - 4x + 1x - 2 = 0$
 $2x(x-2) + 1(x-2) = 0$
 $2x+1=0 \quad x = -\frac{1}{2}$
 $x-2=0 \quad x = 2$

Solve each quadratic equation by **Square Roots**:

6. $\frac{2}{5}x^2 - 63 = 13$

$\frac{5}{2} \cdot \frac{2}{5}x^2 = 76 \cdot \frac{5}{2}$
 $\sqrt{x^2} = \sqrt{190}$
 $x = \pm \sqrt{190}$

7. $(x+2)^2 - 40 = 9$

$(x+2)^2 = 49$
 $x+2 = \pm 7$
 -2
 $x = -9, 5$

8. $2(x-3)^2 + 10 = 24$

$\frac{2(x-3)^2}{2} = \frac{14}{2}$
 $\sqrt{(x-3)^2} = \sqrt{7}$
 $x-3 = \pm \sqrt{7}$
 $x = 3 \pm \sqrt{7}$

Solve each quadratic equation.

9. $x^2 + 4x - 12 = 0$

$a=1 \quad b=+4 \quad c=-12$
 $\frac{4 \pm \sqrt{4^2 - 4(1)(-12)}}{2(1)}$
 $\frac{4 \pm 8}{2} - \frac{-12}{2} = -4$
 $\frac{4}{2} = 2$

10. $x^2 - 10x + 14 = 0$

$a=1 \quad b=-10 \quad c=14$
 $\frac{10 \pm \sqrt{(-10)^2 - 4(1)(14)}}{2(1)}$
 $\frac{10 \pm \sqrt{44}}{2} \quad \frac{10 \pm 2\sqrt{11}}{2}$
 $5 \pm \sqrt{11}$

11. $x^2 + 8x + 4 = 0$

$a=1 \quad b=8 \quad c=4$
 $\frac{-8 \pm \sqrt{8^2 - 4(1)(4)}}{2(1)}$
 $\frac{-8 \pm \sqrt{64-16}}{2} = \frac{-8 \pm 4\sqrt{3}}{2}$
 $-4 \pm 2\sqrt{3}$

Solve each quadratic equation by the Quadratic Formula:

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12. $x^2 + 3x + 1 = 0$

$a = 1 \quad b = 3 \quad c = 1$

$$\frac{-3 \pm \sqrt{9 - 4(1)(1)}}{2(1)} = \frac{-3 \pm \sqrt{5}}{2}$$

13. $2x^2 - 28x = 4$

$2x^2 - 28x - 4 = 0$

$a = 2 \quad b = -28 \quad c = -4$

$$\frac{28 \pm \sqrt{(-28)^2 - 4(2)(-4)}}{2(2)}$$

$$\frac{28 \pm \sqrt{816}}{4} = \frac{28 \pm 4\sqrt{51}}{4} = \boxed{7 \pm \sqrt{51}}$$

14. After t seconds, a ball tossed in the air from the ground level reaches a height of h feet given by the equation $h(t) = -16t^2 + 144t$.a. What is the height of the ball at 3 seconds? $h(3) = 288 \text{ ft}$ b. Find the number of seconds the ball is in the air when it reaches a height of 224 feet. $224 = -16t^2 + 144t$

$$-16t^2 + 144t - 224 = 0$$

$$-16(t^2 - 9t + 14) = 0$$

$$(t - 7)(t - 2) \quad 7 + 2 \text{ secs.}$$

c. After how many seconds will the ball hit the ground before rebound?

$$0 = -16t^2 + 144t$$

$$-16t(t - 9)$$

$$t = 9 \text{ secs.}$$

15. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by $h(t) = -16t^2 + 64t + 80$.a. How long will it take for the rocket to hit 128 feet? $128 = -16t^2 + 64t + 80$

$$-16t^2 + 64t - 48$$

$$(t - 3)(t - 1)$$

-128

$$-16(t - 3)(t - 1)$$

$$t = 3, 1$$

b. After how many seconds after it is launched will the rocket hit the lake?

$$0 = -16t^2 + 64t + 80$$

$$-16(t^2 - 4t - 5)$$

$$(t - 5)(t + 1)$$

$$t = 5 \text{ secs.}$$

16. A rock is dropped from the top of a tall building, 382 feet high. The path, in feet, is given by $h(t) = -16t^2 + 382$. How long after the rock is thrown is it on the ground? $0 = -16t^2 + 382$

$$-382 = -16t^2$$

$$\frac{-382}{-16} = \frac{-16t^2}{-16}$$

$$\sqrt{23.875} = \sqrt{t^2}$$

$$t = \pm 4.886$$

$$\boxed{4.886 \text{ sec}}$$

Unit 3 Review Solving Quadratics

You need to know & be able to do	Things to Remember	Example Problem	Example Problem
Solve a Quadratic by Factoring	Get in Standard form. Factor Set each factor equal to zero and solve.	$4x^2 - 9 = 0$ $(2x-3)(2x+3) = 0$ $2x-3=0$ $2x+3=0$ $x = \pm \frac{3}{2}$	$2x^2 + x = 6$ $2x^2 + x - 6 = 0$ $2x^2 + 4x - 3x - 6 = 0$ $2x(x+2) - 3(x+2) = 0$ $2x-3=0$ $x+2=0$ $x = \frac{3}{2}$ $x = -2$
	6 10 4	$-4x^2 = -4x - 15$ $0 = 4x^2 - 4x - 15$ $4x^2 + 6x - 10x - 15$ $2x(2x+3) - 5(2x+3)$ $(2x-5)(2x+3) = 0$ $x = \frac{5}{2}, -\frac{3}{2}$	$5x^2 + x = 4$ $5x^2 + x - 4 = 0$ $5x^2 + 5x - 4x - 4 = 0$ $5x(x+1) - 4(x+1) = 0$ $(5x-4)(x+1) = 0$ $x = \frac{4}{5}, -1$
Solve a Quadratic by taking Square Roots	Isolate the square. Take the Square Root of both sides Don't forget the \pm Get the variable by itself	$x^2 + 13 = 0$ $x^2 = -13$ 2 non real sol.	$-3(x^2 - 1) = 27$ $x^2 - 1 = -9$ $+1$ $x^2 = -8$ 2 non real
		$2(x-1)^2 + 4 = 16$ $2(x-1)^2 = 12$ $(x-1)^2 = 6$ $x-1 = \pm\sqrt{6}$ $x = 1 \pm\sqrt{6}$	$(x+4)^2 = 121$ $x+4 = \pm 11$ $x = 7, -15$
Solve a Quadratic by Quadratic Formula	Put it in standard form. Identify a, b, and c Use the Formula. (See Formula Sheet)	$x^2 + 4x - 2 = 0$ $a=1$ $b=4$ $c=-1$ $\frac{-4 \pm \sqrt{16 - 4(1)(-2)}}{2(1)}$ $\frac{-4 \pm \sqrt{24}}{2} = \frac{-4 \pm 2\sqrt{6}}{2} = -2 \pm \sqrt{6}$	$x^2 + 4x - 1 = 0$ $a=1$ $b=4$ $c=-1$ $\frac{-4 \pm \sqrt{4^2 - 4(1)(-1)}}{2}$ $\frac{-4 \pm \sqrt{20}}{2} = \frac{-4 \pm 2\sqrt{5}}{2} = -2 \pm \sqrt{5}$
		$6x^2 - 3x = -2$ $6x^2 - 3x + 2 = 0$ $a=6$ $b=-3$ $c=2$ $\frac{3 \pm \sqrt{(-3)^2 - 4(6)(2)}}{2(6)}$	$2x^2 + 2x = 4x - 1$ $2x^2 - 2x + 1 = 0$ $a=2$ $b=-2$ $c=1$ $\frac{2 \pm \sqrt{4 - 4(2)(1)}}{2(2)}$
		$\frac{3 \pm \sqrt{-39}}{12}$ 2 non real sol.	$\frac{2 \pm \sqrt{-4}}{4} = 2$ non real sol.

Solve using any method		$x^2 + 2x - 4 = 0$ $a=1 \ b=2 \ c=-4$ $\frac{-2 \pm \sqrt{4 - 4(1)(-4)}}{2(1)}$ $\frac{-2 \pm 2\sqrt{5}}{2} = -2 \pm \sqrt{5}$	$x^2 + 8x + 4 = 0$ $a=1 \ b=8 \ c=4$ $\frac{-8 \pm \sqrt{64 - 4(1)(4)}}{2(1)}$ $\frac{-8 \pm \sqrt{48}}{2} = \frac{-8 \pm 4\sqrt{3}}{2} = -4 \pm 2\sqrt{3}$
		$2x^2 - 32 = 0$ $x^2 = 16$ $x = \pm 4$	$3x^2 + 12x - 6 = 0$ $3(x^2 + 4x - 2) = 0$ $a=1 \ b=4 \ c=-2$ $\frac{-4 \pm \sqrt{16 - 4(1)(-2)}}{2(1)}$ $= \frac{-4 \pm 2\sqrt{2}}{2} = -2 \pm \sqrt{2}$
Find the Discriminant and Determine the type of Roots	Put in standard form. Identify a, b, and c. Use $b^2 - 4ac$. <ul style="list-style-type: none"> Positive answer, 2 real roots. Zero, one real root. Negative answer, 2 imaginary roots.	$x^2 + 8x + 16 = 0$ $8^2 - 4(1)(16)$ 0 1 real sol	$2x^2 + 5x - 3 = 0$ $a=2 \ b=5 \ c=-3$ $25 - 4(2)(-3)$ 49 2 real
		$x^2 + 5x + 9 = 0$ $25 - 4(1)(9)$ 2 non real sol.	$2x^2 + 5x + 7 = 0$ $25 - 4(2)(7)$ 2 non real sol.

23. After t seconds, a ball tossed in the air from the ground level reaches a height of h feet given by the equation $h(t) = -16t^2 + 144t$.

- What is the height of the ball after 3 second? 288
- What is the maximum height the ball will reach? $\frac{-144}{2(-16)} = 4.5$ 4.5 secs.
- Find the number of seconds the ball is in the air when it reaches a height of 224 feet. $7+2$
- After how many seconds will the ball hit the ground before rebound? 9 sec

24. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by $h(t) = -16t^2 + 64t + 80$.

- Is the rocket going up or down at 1.5 sec? up
- What is the maximum height reached by the rocket? $\frac{-64}{2(-16)} = 2 \text{ sec}$
- How long will it take for the rocket to hit 128 feet? $3 + 1 \text{ sec}$
- After how many seconds after it is launched will the rocket hit the lake? 5 sec