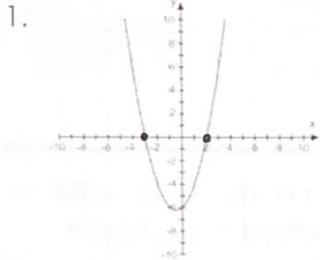


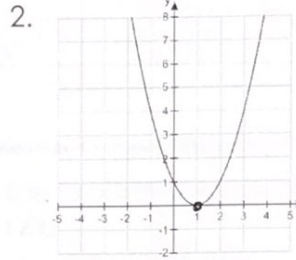
Name: _____ Date: _____

Unit 4 Review

Solve each quadratic **Graphically**.



$x = -3$
 $x = 2$



$x = 1$

Solve each quadratic equation by **Factoring**: (Must be = to 0)

3. $3x^2 - 17x - 6 = 0$
 $(x - 6)(3x + 1) = 0$

$x - 6 = 0$ $3x + 1 = 0$
 $+6 +6$ $-1 -1$
 $x = 6$ $x = -\frac{1}{3}$

4. $x^2 + 4x - 5 = 0$
 $(x + 5)(x - 1) = 0$

$x + 5 = 0$ $x - 1 = 0$
 $-5 -5$ $+1 +1$
 $x = -5$ $x = 1$

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

$2x^2 - 3x - 2 = 0$
 $(x - 2)(2x + 1) = 0$

$x - 2 = 0$ $2x + 1 = 0$
 $+2 +2$ $-1 -1$
 $x = 2$ $\frac{2x = -1}{\frac{2}{2}} = -\frac{1}{2}$ $x = -\frac{1}{2}$

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

6. $\frac{2}{5}x^2 - 63 = 13$
 $+63 +63$
 $\frac{2}{5}x^2 = 76 \cdot \frac{5}{2}$

$\sqrt{x^2} = \sqrt{190}$
 $x = \pm\sqrt{190}$

7. $(x + 2)^2 - 49 = 9$
 $+49 +49$

$\sqrt{(x + 2)^2} = \sqrt{149}$
 $x + 2 = \pm 7$

$x + 2 = 7$ $x + 2 = -7$
 $-2 -2$ $-2 -2$
 $x = 5$ $x = -9$

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

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

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

$x = 3 \pm \sqrt{7}$

Solve each quadratic equation by **Completing the Square**:

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

$\sqrt{(x + 2)^2} = \sqrt{16}$
 $x + 2 = \pm 4$

$x + 2 = 4$ $x + 2 = -4$
 $-2 -2$ $-2 -2$
 $x = 2$ $x = -6$

10. $x^2 - 10x + 14 = 0$
 $-14 -14$
 $x^2 - 10x + 25 = -14 + 25$

$\sqrt{(x - 5)^2} = \sqrt{11}$
 $x - 5 = \pm\sqrt{11}$
 $+5 +5$

$x = 5 \pm \sqrt{11}$

11. $x^2 + 8x + 4 = 0$
 $-4 -4$
 $x^2 + 8x + 16 = -4 + 16$

$\sqrt{(x + 4)^2} = \sqrt{12}$
 $x + 4 = \pm 2\sqrt{3}$
 $-4 -4$

$x = -4 \pm 2\sqrt{3}$

$(\frac{4}{2})^2 = 4$

Solve each quadratic equation by the **Quadratic Formula**: *Must be = 0

12. $x^2 + 3x + 1 = 0$
 $a=1$ $b=3$ $c=1$

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

13. $2x^2 - 28x = 4$
 $2x^2 - 28x - 4 = 0$ $a=2$ $b=-28$ $c=-4$

$$\frac{28 \pm \sqrt{(-28)^2 - 4(2)(-4)}}{2(2)} = \frac{28 \pm 4\sqrt{51}}{4} = 7 \pm \sqrt{51}$$

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 second? $h(3) = -16(3)^2 + 144(3) = 288 \text{ ft}$

b. Find the number of seconds the ball is in the air when it reaches a height of 224 feet.
 $224 = -16t^2 + 144t$
 $-16t^2 + 144t - 224 = 0$
 $\frac{-144 \pm \sqrt{144^2 - 4(-16)(-224)}}{2(-16)}$
 $t^2 - 9t + 14 = 0$
 $(t-2)(t-7) = 0$
 $t = 2, t = 7$
 The ball will reach 224 at 2 seconds and 7 seconds.

You could have also used quadratic formula on this one

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

$0 = -16t^2 + 144t$
 $0 = -16t(t-9)$
 $-16t = 0$ $t-9 = 0$
 $t = 0$ $t = 9$
 The ball rebounded at 9 seconds

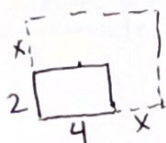
15. A rock is dropped from the top of a tall building, 382 feet high. The path, in feet, is given by $h(t) = -16t^2 + 382$. How long after the rock is thrown is it on the ground?

$0 = -16t^2 + 382$
 $-382 = -16t^2$
 $\frac{-382}{-16} = \frac{-16t^2}{-16}$
 $23.875 = t^2$
 $t \approx 4.9 \text{ seconds}$

16. The length of a rectangle is 5 cm more than the width. The area is 50 cm². Find the dimensions of the rectangle.

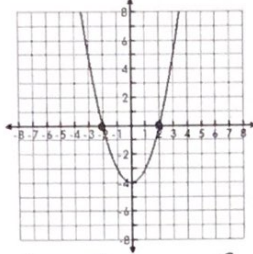
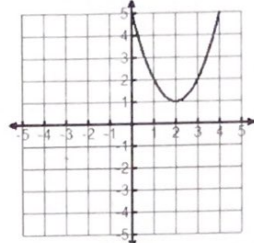
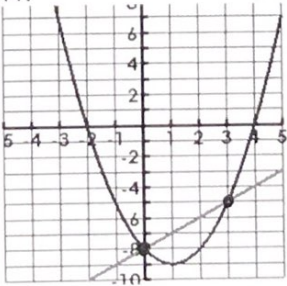
$x(x+5) = 50$
 $x^2 + 5x - 50 = 0$
 $(x+10)(x-5) = 0$
 $x+10 = 0$ $x-5 = 0$
 $x = -10$ $x = 5$
 Length: 10cm
 Width: 5cm

17. The dimensions of a rectangular garden were 2 m by 4 m. Each dimension was increased by the same amount. The garden then had an area of 48 m². Find the dimensions of the new garden. (Hint: Let x be the amount of increase.)



$(x+2)(x+4) = 48$
 $x^2 + 6x + 8 = 48$
 $x^2 + 6x - 40 = 0$
 $(x+10)(x-4) = 0$
 $x+10 = 0$ $x-4 = 0$
 $x = -10$ $x = 4$
 $2+4 = 6$
 $4+4 = 8$
 6m by 8m

Name: _____ Date: _____

You need to know & be able to do	Things to remember	Example Problems	
Solve a Quadratic by Graphing	Identify where the graph crosses the x-axis.	1.  $x = -2$ $x = 2$	2.  No real solutions!
Solve a Quadratic by Factoring	Get in standard form. Factor. Set each factor equal to zero and solve.	3. $4x^2 - 9 = 0$ DOTS → $(2x+3)(2x-3) = 0$ $2x+3=0$ $2x-3=0$ or ± 1.5 $\frac{2x}{2} = \frac{-3}{2}$ $\frac{2x}{2} = \frac{3}{2}$ $x = \pm \frac{3}{2}$ $x = -1.5$ $x = 1.5$ 5. $-4x^2 = -4x - 15$ $+4x^2 + 4x^2$ $0 = 4x^2 - 4x - 15$ $0 = (2x-5)(2x+3)$ $2x-5=0$ $2x+3=0$ $x = 5/2$ $x = -3/2$	4. $2x^2 + x - 6 = 0$ $-6 - 6$ $2x^2 + x - 6 = 0$ $(x+2)(2x-3) = 0$ $x+2=0$ $2x-3=0$ $x = -2$ $x = 3/2$ 6. $5x^2 + x - 4 = 0$ $-4 - 4$ $5x^2 + x - 4 = 0$ $(x+1)(5x-4) = 0$ $x+1=0$ $5x-4=0$ $x = -1$ $5x = 4$ $x = 4/5$
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.	7. $x^2 - 13 = 0$ $+13 +13$ $\sqrt{x^2} = \sqrt{13}$ $x = \pm\sqrt{13}$ 9. $2(x-1)^2 + 4 = 16$ $-4 -4$ $2(x-1)^2 = 12$ $x-1 = \pm\sqrt{6}$ $\frac{2}{2} \frac{(x-1)^2}{2} = \frac{12}{2}$ $+1 +1$ $\sqrt{(x-1)^2} = \sqrt{6}$ $x = 1 \pm \sqrt{6}$	8. $3(x^2 - 1) = 27$ $\frac{3}{3}$ You may have distributed 1st, and on this one, that's perfectly ok! You should get the same answer. $x^2 - 1 = 9$ $+1 +1$ $\sqrt{x^2} = \sqrt{10}$ $x = \pm\sqrt{10}$ 10. $\sqrt{(x+4)^2} = \sqrt{121}$ $x+4 = \pm 11$ $x+4 = 11$ $x+4 = -11$ $-4 -4$ $-4 -4$ $x = 7$ $x = -15$
Solve a System with a Quadratic and Linear Equation.	Graphically: See where the two intersect and list as ordered pairs. Algebraically: Set the equations equal to each other and solve for x. Substitute each x back in and solve for y. List as ordered pairs.	11.  $(0, -8)$ $(3, -5)$	12. $y = x^2 - x - 6$ $y = 2x - 2$ $x^2 - x - 6 = 2x - 2$ $-2x + 2 - 2x + 2$ $x^2 - 3x - 4 = 0$ $(x-4)(x+1) = 0$ $x-4=0$ $x+1=0$ $x = 4$ $x = -1$ $2(4) - 2 = 6$ $2(-1) - 2 = -4$ $(4, 6)$ $(-1, -4)$

<p>Solve a Quadratic by Completing the Square</p>	<p>Put terms with an x on the left.</p> <p>Make sure a = 1.</p> <p>Find the number that completes the square.</p> <p>Add it to both sides.</p> <p>Factor the left. Simplify the right.</p> <p>Take the square root of each side.</p> <p>Solve for x.</p>	<p>13. $x^2 + 2x - 4 = 0$</p> $\frac{x^2 + 2x + 1}{+1 + 1} = \frac{-4 + 1}{+1 + 1}$ $\sqrt{(x+1)^2} = \sqrt{5}$ $x+1 = \pm\sqrt{5}$ $x = -1 \pm \sqrt{5}$	<p>14. $x^2 + 8x + 4 = 0$</p> $\frac{x^2 + 8x + 16}{-4 - 4} = \frac{-4 + 16}{-4 - 4}$ $\sqrt{(x+4)^2} = \sqrt{12}$ $x+4 = \pm 2\sqrt{3}$ $x = -4 \pm 2\sqrt{3}$
	<p>15. $x^2 - 8x - 36 = 0$</p> $\frac{x^2 - 8x + 16}{+36 + 36} = \frac{-36 + 16}{+36 + 36}$ $\sqrt{(x-4)^2} = \sqrt{52}$ $x-4 = \pm 2\sqrt{13}$ $x = 4 \pm 2\sqrt{13}$	<p>16. $\frac{3x^2 + 12x - 6}{3} = 0$</p> $\frac{x^2 + 4x - 2}{+2 + 2} = 0$ $\frac{x^2 + 4x + 4}{+2 + 2} = \frac{2 + 4}{+2 + 2}$ $\sqrt{(x+2)^2} = \sqrt{6}$ $x+2 = \pm\sqrt{6}$ $x = -2 \pm \sqrt{6}$	
<p>Solve a Quadratic by Quadratic Formula</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	<p>Put it in standard form.</p> <p>Identify a, b, and c.</p> <p>Use the formula.</p>	<p>17. $x^2 + 4x - 2 = 0$</p> <p>a=1 b=4 c=-2</p> $\frac{-4 \pm \sqrt{(4)^2 - 4(1)(-2)}}{2(1)}$ $\frac{-4 \pm 2\sqrt{6}}{2} = -2 \pm \sqrt{6}$	<p>18. $x^2 + 4x - 1 = 0$</p> <p>a=1 b=4 c=-1</p> $\frac{-4 \pm \sqrt{(4)^2 - 4(1)(-1)}}{2(1)}$ $\frac{-4 \pm 2\sqrt{5}}{2} = -2 \pm \sqrt{5}$
	<p>19. $x^2 - 3x = -2$</p> $\frac{x^2 - 3x + 2}{+2 + 2} = 0$ <p>a=1 b=-3 c=2</p> $\frac{3 \pm \sqrt{(-3)^2 - 4(1)(2)}}{2(1)} = \frac{3 \pm 1}{2}$ $\frac{3+1}{2} = 2 \quad \frac{3-1}{2} = 1$	<p>20. $2x^2 + 2x = 12x - 1$</p> $\frac{2x^2 - 10x + 1}{-12x - 12x} = 0$ <p>a=2 b=-10 c=1</p> $\frac{10 \pm \sqrt{(-10)^2 - 4(2)(1)}}{2(2)} = \frac{10 \pm 2\sqrt{23}}{4}$ $\frac{5 \pm \sqrt{23}}{2}$	
<p>Applications</p>	<p>A ball is thrown into the air from a height of 256 feet at time t = 0. The function that models this situation is $h(t) = -16t^2 + 96t + 256$, where t is in seconds and h is the height in feet.</p> <p>21. What is the height of the ball at 2 seconds?</p> $h(2) = -16(2)^2 + 96(2) + 256 = 384 \text{ ft}$ <p>22. When will the ball reach a height of 144 feet?</p> $\frac{-144}{-16} = \frac{-16t^2 + 96t + 256}{-16}$ $0 = -16t^2 + 96t - 112$ $0 = (-7)(+1)$ $t = 7$ <p>7 seconds</p> <p>23. When will the ball hit the ground?</p> $0 = -16t^2 + 96t + 256$ $0 = (-8)(+2)$ $t = 8$ <p>After 8 seconds</p>		