

## Unit 2 Review Package

### Quadratics

*Includes chapter 4, 5, &6 from the textbook*

**What you need to know:**

<b>Text book section</b>	<b>Topic</b>	<b>Completed</b>
4.3 & 4.4	Vertex Form	
4.5	Factored Form	
5.1, 5.2	Multiply Polynomials	
5.3	Common Factoring	
5.4,5.5,6.2	Solving by Factoring	
6.4	Quadratic Formula	
6.5	Applications	

## Section 1: Vertex Form

1. Complete the following charts:

a)

Property	$y = (x - 5)^2 + 4$
Vertex	
axis of symmetry	
stretch or compression (a value)	
direction of opening	
values that x may take	
values that y may take	

c)

Property	$y = -3(x + 1)^2 - 3$
Vertex	
axis of symmetry	
stretch or compression (a value)	
direction of opening	
values that x may take	
values that y may take	

b)

Property	$y = \frac{1}{3}(x + 1)^2 - 4$
Vertex	
axis of symmetry	
stretch or compression (a value)	
direction of opening	
values that x may take	
values that y may take	

d)

Property	$y = 4x^2 - 2$
Vertex	
axis of symmetry	
stretch or compression (a value)	
direction of opening	
values that x may take	
values that y may take	

2. Describe the transformations to the graphs of the following quadratic relations compared to the graph of  $y=x^2$

a)  $y = -\frac{1}{4}(x + 3)^2 - 4$

b)  $y = 7(x - 7)^2 + 2$

3. The graph of  $y=x^2$  is compressed vertically by a factor of  $1/2$ , reflected in the x-axis, and then translated 2 units down and 2 units right.

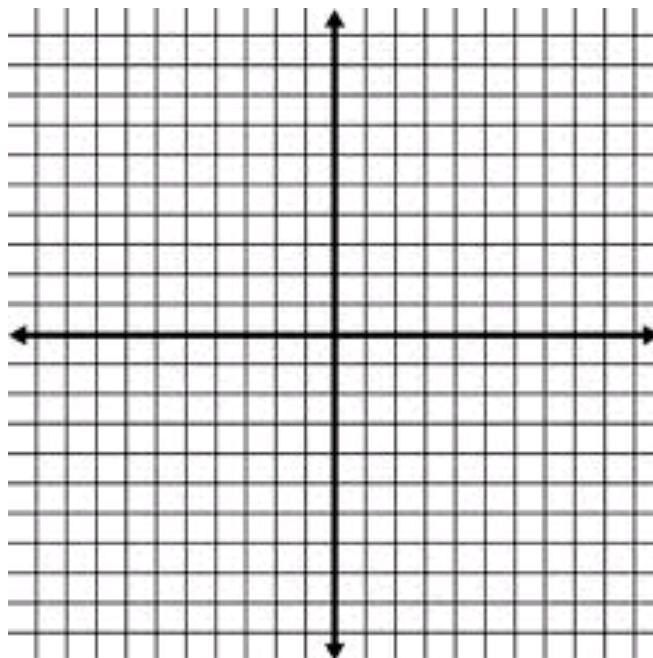
a) Write the equation of the parabola in vertex form:

b) State the vertex:

c) State the axis of symmetry:

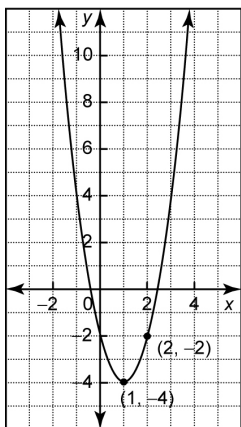
d) Graph the parabola by finding points to the left and right of the vertex (label the vertex)

x	y



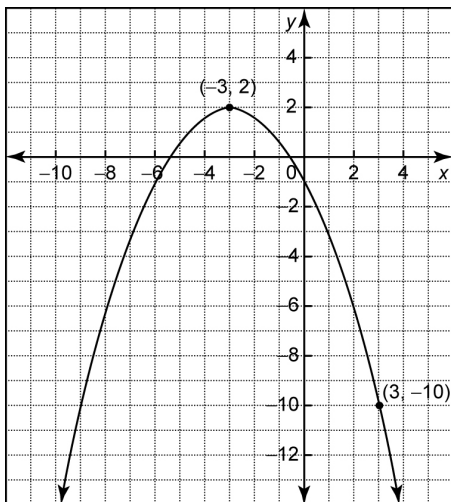
4. Write the equation of each of the following parabolas in vertex form,  $y=a(x-h)^2+k$

a)



Equation in vertex form: \_\_\_\_\_

b)



Equation in vertex form: \_\_\_\_\_

5. Rewrite each equation in vertex form by completing the square:

a)  $y = x^2 + 6x + 13$

vertex: \_\_\_\_\_ Max or min? \_\_\_\_\_

b)  $y = 2x^2 - 24x + 5$

vertex: \_\_\_\_\_ Max or min? \_\_\_\_\_

c)  $y = -4x^2 - 8x + 1$

vertex: \_\_\_\_\_ Max or min? \_\_\_\_\_

## Section 2: Factored Form

6. State the x-intercepts of the following

a)  $y = (x+3)(x+2)$

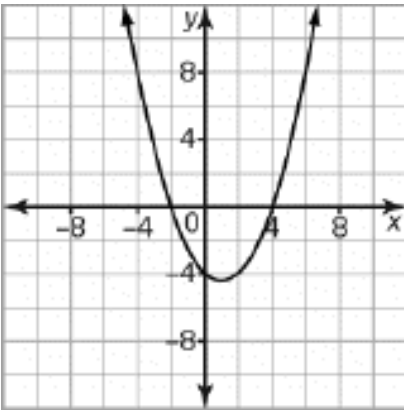
$x = \underline{\hspace{2cm}}$      $x = \underline{\hspace{2cm}}$

b)  $y = \frac{1}{2}(2x+1)(x-30)$

$x = \underline{\hspace{2cm}}$      $x = \underline{\hspace{2cm}}$

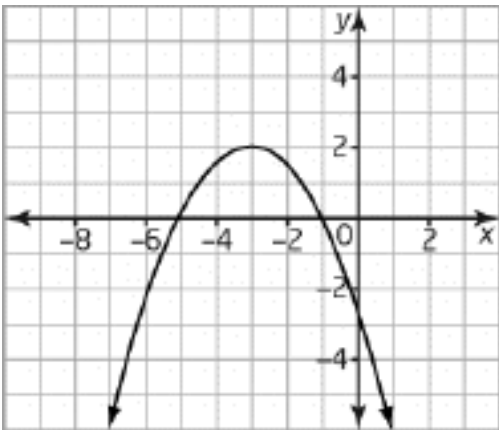
7. Write the equation of each parabola in factored form,  $y=a(x-r)(x-s)$

a) Use x-intercepts and point (0,-4)



Equation in Factored Form: \_\_\_\_\_

b) Use the x-intercepts and point (-3,2)



Equation in Factored Form: \_\_\_\_\_

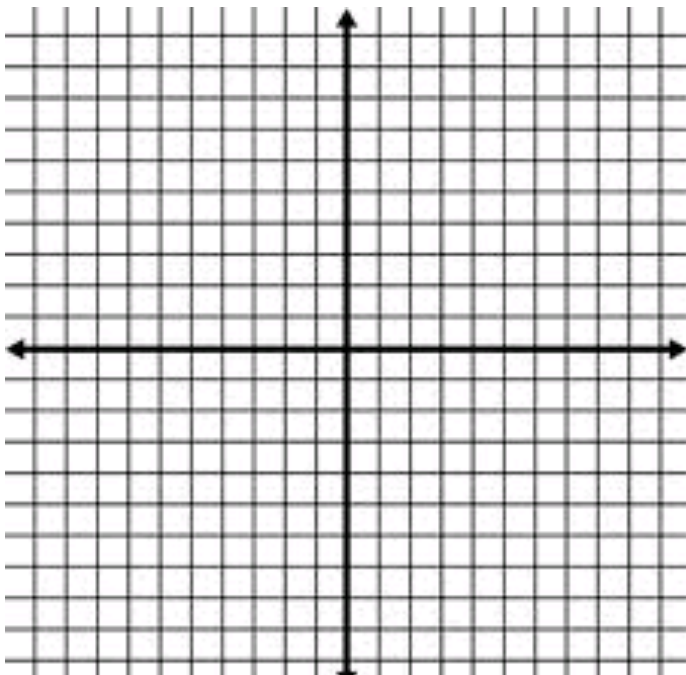
8. For the quadratic relation  $y = 2(x+4)(x-2)$  :

a. What are the x-intercepts?

b. What is the axis of symmetry?

c. What is the vertex?

d. Sketch the graph  
(label the vertex and x-intercepts)



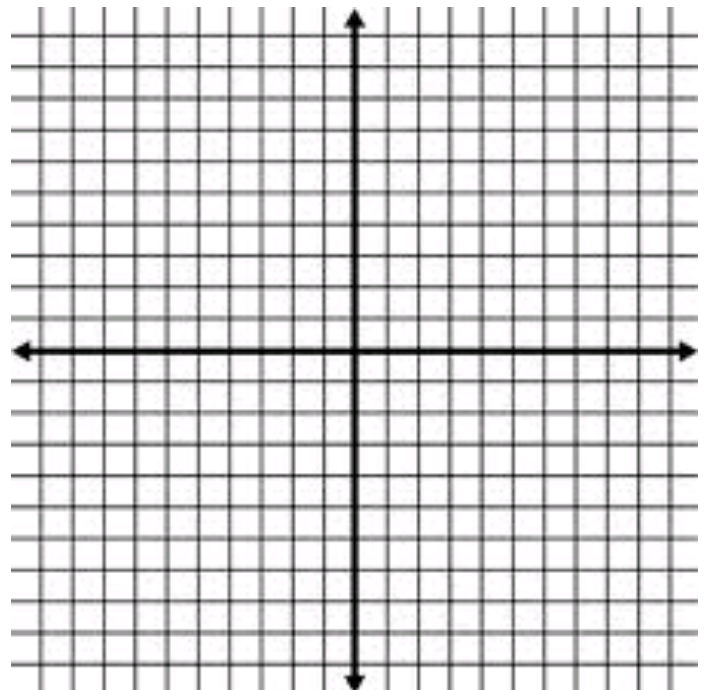
9. For the quadratic relation  $y = 2(x+5)(x+1)$

a. What are the x-intercepts?

b. What is the axis of symmetry?

c. What is the vertex?

d. Sketch the graph  
(label the x-intercepts and vertex)



## Section 3: Multiply Polynomials

10. Use the FOIL method to multiply the following polynomials

a)  $(x - 2)(x + 4)$

e)  $2(2x + 1)(x - 3)$

b)  $(x + 6)(x + 7)$

f)  $(x - 5)(x + 5)$

c)  $3(x + 4)(x - 1)$

g)  $(x + 4)^2$

d)  $(x - 10)(x - 6)$



## Section 4: Common Factoring

11. Factor each of the following

a)  $5x - 35y$

c)  $4x^2y^3 - 16x^3y^3 + 8xy^5$

b)  $4x^2 - 20x$

d)  $5x(x+7) - 3(x+7)$

## Section 5: Solve by Factoring

12. Solve each of the following quadratics by factoring

a)  $x^2 - x - 12$

b)  $x^2 + 3x - 18$

c)  $x^2 + 11x + 24$

d)  $2x^2 - 2x - 60$

e)  $x^2 - 81$

f)  $2x^2 + 7x + 3$

g)  $6x^2 + 11x + 4$

h)  $6x^2 + 10x - 4$

## Section 6: Quadratic Formula

13. Use the quadratic formula to solve the following quadratic equations

a)  $x^2 - x - 4 = 0$

b)  $7x^2 - 2x - 2 = 0$

c)  $2x^2 + 8x = 3$

e)  $5x^2 + 2x + 6 = 0$

d)  $-3x^2 + 4x = -1$

f)  $9x^2 - 24x + 16 = 0$

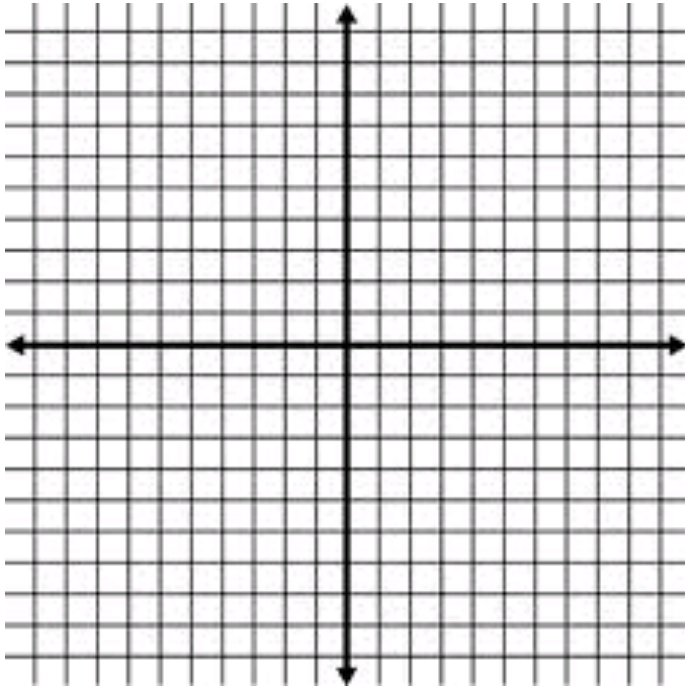
**14. For the quadratic  $2x^2 - 11x - 6 = 0$  :**

**a)** Solve using any method (find the x-intercepts):

**b)** Find the axis of symmetry (x- coordinate of vertex)

c) Find the vertex

d) graph (label x-intercepts and vertex)



## Section 7: Applications

15. The path of a rocket is given by the relation  $h = -5(x - 2)(x - 12)$ , where  $x$  represents the horizontal distance, in metres, the rocket travels and  $h$  represents the height, in metres, above the ground of the rocket at this horizontal distance.

a) At what horizontal distance does the rocket reach its maximum height?

b) What is the maximum height of the rocket?

c) At what horizontal distance does the rocket hit the ground?

16. The path of a rocket can be modeled by the equation  $h = -4.9t^2 + 60t + 3$  where 'h' is the height of the rocket in meters, and 't' is the time in seconds after the rocket is launched.

a) When does the rocket land? (solve using the quadratic formula)

**b)** At what time does the rocket reach its maximum height? (axis of symmetry)

**c)** What is the maximum height?

**17. The flight of a firework is modeled by the relation  $h = -5(t-5)^2 + 127$ , where 'h' is the height in meters, and 't' is the time, in seconds, since the firework was fired.**

**a)** What is the maximum height reached by the firework?

**b)** How many seconds after it was fired does the firework reach its maximum height.

## Answers

- a)** (5,4) , x=5, none, up, any real #,  $y > \text{ or } = 4$  **b)** (-1,-4) , x=-1, compressed by  $\frac{1}{3}$ , up, any real #,  $y > \text{ or } = -4$

**c)** (-1,-3) , x=-1, stretched by 3, down, any real #,  $y < \text{ or } = -3$  **d)** (0,-2) , x=0, stretched by 4, up, any real #,  $y > \text{ or } = -2$
- a)** compressed by  $\frac{1}{4}$ , reflected in x-axis, left 3, down 4 **b)** stretch by 7, right 7, up 2
- a)**  $y = -\frac{1}{2}(x-2)^2 - 2$  **b)** (2,-2) **c)**  $x = 2$
- a)**  $y = 2(x-1)^2 - 4$  **b)**  $y = -\frac{1}{3}(x+3)^2 + 2$
- a)** (-3,4) min **b)** (6,-67) min **c)** (-1,5) max
- a)** -3 and -2 **b)**  $-\frac{1}{2}$  and 30
- a)**  $y = \frac{1}{2}(x+2)(x-4)$  **b)**  $y = -\frac{1}{2}(x+1)(x+5)$
- a)** -4 and 2 **b)**  $x = -1$  **c)** (-1,-18)
- a)** -5 and -1 **b)**  $x = -3$  **c)** (-3,-8)
- a)**  $x^2 + 2x - 8$  **b)**  $x^2 + 13x + 42$  **c)**  $3x^2 + 9x - 12$  **d)**  $x^2 - 16x + 60$  **e)**  $4x^2 - 10x - 6$  **f)**  $x^2 - 25$  **g)**  $x^2 + 8x + 16$
- a)**  $5(x-7y)$  **b)**  $4x(x-5)$  **c)**  $4xy^3(x-4x^2+2y^2)$  **d)**  $(x+7)(5x-3)$
- a)** 4 and -3 **b)** -6 and 3 **c)** -8 and -3 **d)** 6 and -5 **e)** 9 and -9 **f)** -3 and  $-\frac{1}{2}$  **g)**  $-\frac{4}{3}$  and  $-\frac{1}{2}$  **h)** -2 and  $\frac{1}{3}$
- a)** 2.6 and -1.6 **b)** 0.7 and -0.4 **c)** 0.3 and -4.3 **d)** -0.2 and 1.5 **e)** none **f)**  $\frac{4}{3}$
- a)** 6 and -0.5 **b)**  $x = 2.75$  **c)** (2.75,-21.1)
- a)** 7 meters **b)** 125 meters **c)** 12 meters
- a)** 12.3 seconds **b)** 6.1 seconds **c)** 186.7 meters
- a)** 127 meters **b)** 5 seconds