

Honors Algebra  
Chapter 10 Study Guide

Name: *Key*  
Period:

**10.1-10.2**

Find the axis of symmetry and the vertex of the graph of the function.

1.  $y = x^2 - 6x + 11$

$$X = \frac{-b}{2a} = \frac{6}{2(1)} = 3$$

$$y = (3)^2 - 6(3) + 11$$

$$y = 9 - 18 + 11$$

$$y = 2$$

vertex: (3, 2)  
A of S: X=3

2.  $y = -3x^2 + 24x - 22$

$$X = \frac{-b}{2a} = \frac{-24}{2(-3)} = \frac{-24}{-6} = 4$$

$$y = -3(4)^2 + 24(4) - 22$$

$$y = -3(16) + 96 - 22$$

$$y = -48 + 96 - 22$$

$$y = 26$$

vertex: (4, 26)  
a of S: X=4

3.  $y = 4x^2 + 7$

$$X = \frac{-b}{2a} = \frac{0}{2(4)} = \frac{0}{8} = 0$$

$$y = 4(0)^2 + 7$$

$$y = 4(0) + 7$$

$$y = 0 + 7$$

$$y = 7$$

vertex: (0, 7)  
A of S: X=0

Sketch a graph of the function.

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

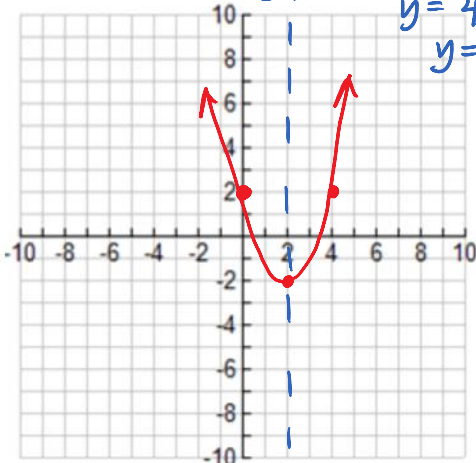
$$x = \frac{-b}{2a} = 2$$

$$y = (2)^2 - 4(2) + 2$$

$$y = 4 - 8 + 2$$

$$y = -2$$

vertex: (2, -2)



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

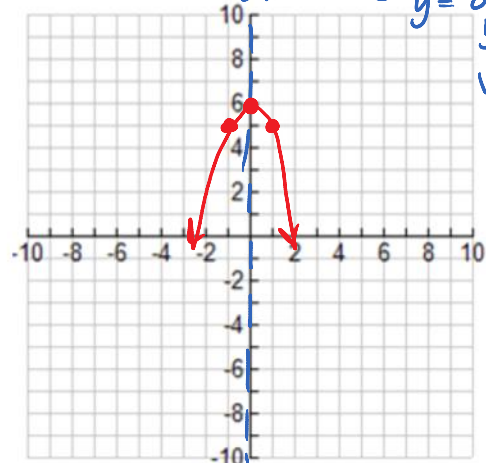
$$X = \frac{0}{2(-1)} = 0$$

$$y = -(0)^2 + 6$$

$$y = 0 + 6$$

$$y = 6$$

vertex: (0, 6)



x	y
-1	$-(-1)^2 + 6 = -1 + 6 = 5$
0	6
1	$-(-1)^2 + 6 = -1 + 6 = 5$

**Pg. 641 Extension**

Graph the quadratic function. Label the vertex, axis of symmetry and x-intercepts.

6.  $y = -(x-5)(x+1)$

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

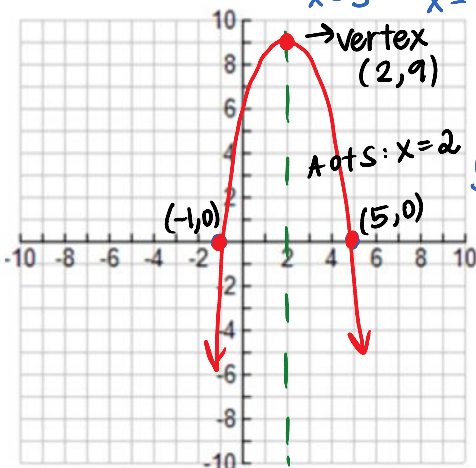
$$x=5 \quad x=-1$$

$$\frac{-1+5}{2} = \frac{4}{2} = 2$$

$$y = -(2-5)(2+1)$$

$$y = -(-3)(3)$$

$$y = 9$$



7.  $y = (x-2)(x+2)$

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

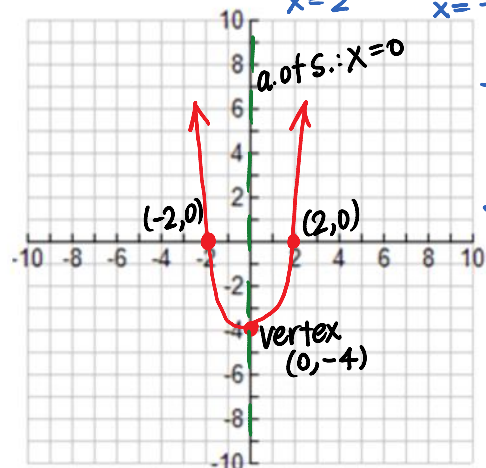
$$x=2 \quad x=-2$$

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

$$y = (0-2)(0+2)$$

$$y = (-2)(2)$$

$$y = -4$$



**10.3**Solve the quadratic equation by graphing. **\*\*Calculator OK\*\***

8.  $y = x^2 - 5x + 3$

$x \approx 0.697, 4.3$

9.  $y = -x^2 - x - 2$

no real solutions

10.  $y = -3x^2 + 8x - 2$

$x \approx 0.28, 2.39$

**11.2**

Simplify the following radicals.

11.  $\sqrt{32}$

$\sqrt{16 \cdot 2}$   
 $\pm 4\sqrt{2}$

12.  $\sqrt{4} \cdot \sqrt{4}$

$\sqrt{16}$   
 $\pm 4$

13.  $\sqrt{\frac{72}{5}}$

$= \frac{\sqrt{72}}{\sqrt{5}}$   
 $= \frac{\sqrt{2 \cdot 36}}{\sqrt{5}} = \frac{\pm 6\sqrt{2} \cdot \sqrt{5}}{\sqrt{5} \cdot \sqrt{5}}$

14.  $\sqrt{\frac{7}{81}} = \frac{\sqrt{7}}{\sqrt{81}} = \frac{\pm \sqrt{7}}{9}$

**10.4**

Solve the equation using the square root method.

11.  $3x^2 - 3 = 0$

$\frac{3x^2 - 3}{3} = \frac{0}{3}$   
 $\frac{3x^2}{3} = \frac{3}{3}$   
 $\sqrt{x^2} = \sqrt{1}$   
 $x = \pm 1$

16.  $\sqrt{(x-7)^2} = \sqrt{6}$

$x-7 = \pm \sqrt{6}$   
 $+7 \quad +7$   
 $x = 7 \pm \sqrt{6}$   
 $x \approx 4.55, 9.45$

17.  $\frac{21}{3} = 3(z+14)^2$

$\sqrt{7} = \sqrt{(z+14)^2}$   
 $\pm \sqrt{7} = z+14$   
 $-14 \quad -14$   
 $-14 \pm \sqrt{7} = z$   
 $-16.65, -11.35 = z$

**10.5**

Solve the quadratic equation by completing the square.

18.  $x^2 + 2x = 3$       $\frac{2}{2} = 1^2 = 1$

$x^2 + 2x + 1 = 3 + 1$   
 $\sqrt{(x+1)^2} = \sqrt{4}$   
 $x+1 = \pm 2$   
 $-1 \quad -1$   
 $x = -1 \pm 2$   
 $x = -3, 1$

19.  $x^2 + 4x - 21 = 0$       $\frac{4}{2} = 2^2 = 4$

$x^2 + 4x + 4 = 21 + 4$   
 $\sqrt{(x+2)^2} = \sqrt{25}$   
 $x+2 = \pm 5$   
 $-2 \quad -2$   
 $x = -2 \pm 5$   
 $x = -7, 3$

20.  $2x^2 + 24x + 10 = 0$

$\frac{2x^2 + 24x + 10}{2} = \frac{0}{2}$   
 $x^2 + 12x + 5 = 0$   
 $\frac{12}{2} = 6^2 = 36$   
 $x^2 + 12x + 36 = -5 + 36$   
 $\sqrt{(x+6)^2} = \sqrt{31}$   
 $x+6 = \pm \sqrt{31}$   
 $-6 \quad -6$   
 $x = -6 \pm \sqrt{31}$   
 $x \approx -11.57, -4.43$

**Pg. 669 Extension**Convert the following equations to ~~standard~~ vertex form. Then graph the function.

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

$y+4 = (x^2 + 4x + 4) - 1$   
 $y+4 = (x+2)^2 - 1$   
 $-4 \quad -4$

22.  $y = (x^2 + 8x) - 15$

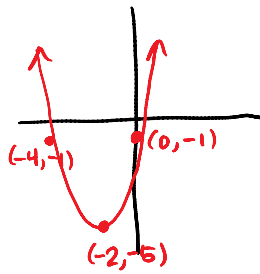
$y = -(x^2 - 8x) - 15$   
 $y-16 = -(x^2 - 8x + 16) - 15$   
 $-8 \quad -8$   
 $y-16 = -(x-4)^2 - 15$   
 $(4, 1)$

$$y+4 = (x^2+4x+4) - 1$$

$$y+4 = (x+2)^2 - 1$$

$$-4 \quad -4$$

$$y = (x+2)^2 - 5$$

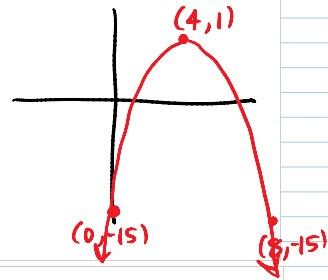


$$y-16 = -(x^2-8x+16) - 15$$

$$y-16 = -(x-4)^2 - 15$$

$$+16 \quad +16$$

$$y = -(x-4)^2 + 1$$



### 10.6

Solve the quadratic equation using the Quadratic Formula.

23.  $x^2 - 5x = 14$

$$\frac{-14 \quad -14}{x^2 - 5x - 14 = 0}$$

$$X = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-14)}}{2(1)}$$

$$X = \frac{5 \pm \sqrt{25 + 56}}{2}$$

$$X = \frac{5 \pm \sqrt{81}}{2} \Rightarrow \frac{5 \pm 9}{2} \Rightarrow \boxed{-2, 7}$$

24.  $-10 = x^2 - 10x + 12$

$$\frac{+10 \quad +10}{0 = x^2 - 10x + 22}$$

$$X = \frac{10 \pm \sqrt{(-10)^2 - 4(1)(22)}}{2(1)}$$

$$X = \frac{10 \pm \sqrt{100 - 88}}{2}$$

$$X = \frac{10 \pm \sqrt{12}}{2}$$

$$X = \boxed{3.27, 6.73}$$

25.  $10x^2 - 3x - 1 = 0$

$$X = \frac{3 \pm \sqrt{(-3)^2 - 4(10)(-1)}}{2(10)}$$

$$X = \frac{3 \pm \sqrt{9 + 40}}{20}$$

$$X = \frac{3 \pm \sqrt{49}}{20}$$

$$X = \frac{3 \pm 7}{20} = \boxed{\frac{1}{2}, -\frac{1}{5}}$$

Solve using any method. Note: you may use each method only once. State the method you chose.

26.  $2x^2 + 3 = 75$

$$\frac{-3 \quad -3}{2x^2 = 72}$$

$$\frac{2x^2}{2} = \frac{72}{2}$$

$$\sqrt{x^2} = \sqrt{36}$$

$$X = \pm 6$$

SQUARE  
ROOT  
METHOD

27.  $3x^2 - x + 5 = 0$

GRAPHING

no  
SOLUTIONS

28.  $6x^2 + 24x = -12$

$$\frac{6(x^2+4x) = -12}{6 \quad 6}$$

$$x^2 + 4x = -2 \quad \frac{4}{2} = 2^2 = 4$$

$$x^2 + 4x + 4 = -2 + 4$$

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

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

$$\frac{-2 \quad -2}{x = -2 \pm \sqrt{2}}$$

$$X \approx \boxed{-3.41, -0.59}$$

COMPLETING  
THE SQUARE

29.  $x^2 - 3x - 4 = 0$

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

$$x-4=0 \quad x+1=0$$

$$+4 \quad +4 \quad -1 \quad -1$$

$$X = 4 \quad X = -1$$

FACTORED

30. You are playing tennis with a friend. The path of the tennis ball after you hit the ball can be modeled by the graph of the equation  $y = -0.005x^2 + 0.17x + 3$  where  $x$  is the horizontal distance (in feet) from where you hit the ball and  $y$  is the height of the ball (in feet) above the court.

a. What is the maximum height reached by the tennis ball? Round your answer to the nearest tenth of a foot.

$$(17, 4.445)$$

vertex

$$\boxed{4 \text{ ft}}$$

b. Suppose you are standing 30 feet from the net, which has a height of 3 feet. Will the ball clear the net?

Explain!  $x = 30$

$$y = -0.005(30)^2 + 0.17(30) + 3$$

$$y = 3.6 > 3$$

so  $\boxed{\text{yes}} \Rightarrow$  @ 30ft, the height of the ball is 3.6ft so it will clear the net

c. If your friend does not hit the ball back to you, how far from you does the ball strike the ground?

$$y = 0 \text{ (x-intercept)}$$

$$\boxed{46.82 \text{ ft}}$$

$y=0$  (x-intercept) $46.82\text{ft}$ **10.7**

Find the value of the discriminant. State whether the equation has two solutions (and what kind – rational, irrational), one solution or no solutions.

31.  $2x^2 - 5x - 6 = 0$

$$b^2 - 4ac$$

$$(-5)^2 - 4(2)(-6)$$

$$25 + 12$$

$$37$$

 $2$  irrational solutions

32.  $2x^2 + 3 = 4x$

$$\begin{array}{r} -4x \quad -4x \\ 2x^2 - 4x + 3 = 0 \end{array}$$

$$b^2 - 4ac$$

$$(-4)^2 - 4(2)(3)$$

$$16 - 24$$

$$-8$$

no solutions

33.  $8x^2 + 9 = 4x^2 - 4x + 8$

$$\begin{array}{r} -8x^2 - 9 \quad -8x^2 \quad -9 \\ 0 = -4x^2 - 4x - 1 \end{array}$$

$$b^2 - 4ac$$

$$(-4)^2 - 4(-4)(-1)$$

$$16 - 16$$

$$0$$

one solution