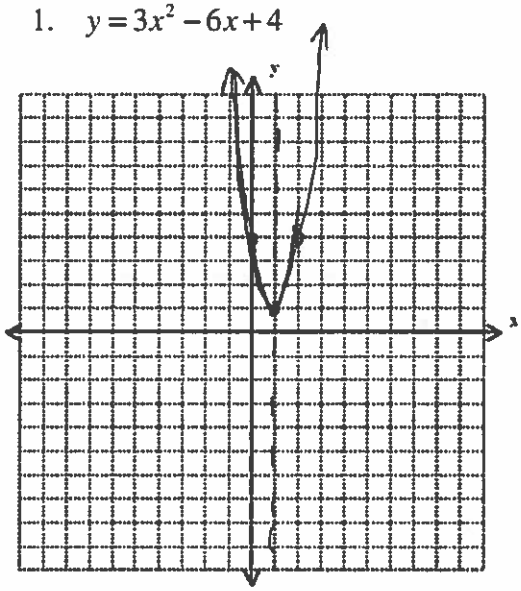
Advanced Algebra
Chapter 3 Test Review

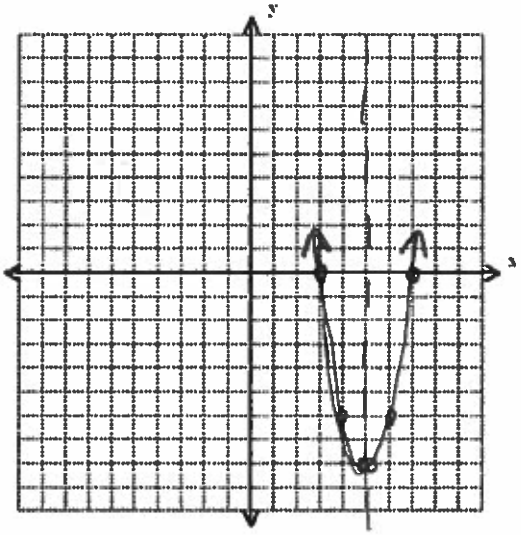
Name: key
Hour: 4

1. $y = 3x^2 - 6x + 4$



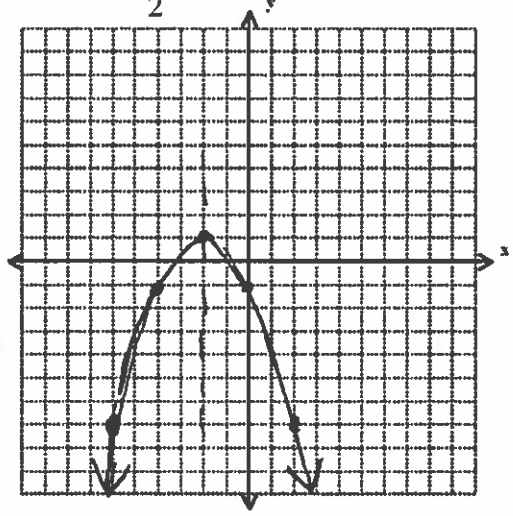
Opens: Up
Axis of Symmetry: $x = 1$
Vertex: $(1, 1)$
Y-intercept: $(0, 4)$
Min or Max: Min
Max/Min Value: $y = 1$
Domain: All Reals
Range: $y \geq 1$

2. $y = 2(x-3)(x-7)$



Opens: Up
Axis of Symmetry: $x = 5$
Vertex: $(5, -8)$
X-intercepts: $(3,0)$ & $(7,0)$
Y-intercept: $(0, 42)$
Min or Max: Min
Max/Min Value: $y = -8$
Domain: All Reals
Range: $y \geq -8$

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



Opens: Down
Axis of Symmetry: $x = -2$
Vertex: $(-2, 1)$
Y-intercept: $(0, -1)$
Min or Max: Max
Max/Min Value: $y = 1$
Domain: All Real's
Range: $y \leq 1$

3. Convert $y = 2(x - 3)(x - 7)$ to standard form. SHOW WORK

$y = 2x^2 - 20x + 42$

4. The equation $h = 0.019\ s^2$ gives the height h (in feet) of the largest ocean waves when the wind speed is in knots. Find the wind speed needed to generate 18 foot waves. SHOW WORK

30.78 knots

5. Simplify. SHOW WORK

a. $\sqrt{175}$ $5\sqrt{7}$

b. $\sqrt{5}\sqrt{50}$ $5\sqrt{10}$

c. $\frac{4}{\sqrt{7}}$ $\frac{4\sqrt{7}}{7}$

d. $\frac{3}{2+\sqrt{5}}$ $-6+3\sqrt{5}$

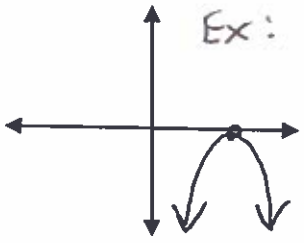
e. $\frac{10 \pm \sqrt{80}}{12}$ $\frac{5 \pm 2\sqrt{5}}{6}$

6. Find the **Discriminant** and describe the types of solutions for: $2x^2 - 2x + 4 = 0$

Discriminant: -28

Number of real roots: 0 real roots

7. Sketch a graph that is in the form $y = ax^2 + bx + c$ with a Discriminant = 0 and a < 0.



Explain your sketch: D=0 means 1 real root (1 x-intercept)
a<0 opens down

8. Solve the following in simplified radical form if necessary (SHOW WORK):

a) $3x^2 - 10 = 50$

$X = \pm 2\sqrt{5}$

b) $5x(x + 2000) = 0$

$X = 0, -2000$

c) $\frac{x^2}{4} - 3 = 8$

$X = \pm 2\sqrt{11}$

d) $x^2 + 6x - 16 = 0$

$X = -8, 2$

e) $x^2 - 6x + 4 = 0$

$X = 3 \pm \sqrt{5}$

$X = 3 + \sqrt{5}, 3 - \sqrt{5}$

f) $2(x-3)^2 + 4 = 166$

$X = 12, -6$

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

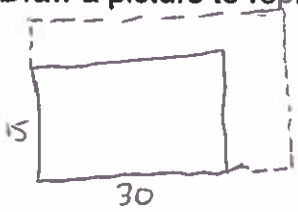
$X = 1, \frac{-2}{3}$

h) $15x^2 + 6 = 5x + 6$

$X = 0, \frac{1}{3}$

9. The dimensions of the old stage at the concert hall were 30 feet wide and 15 feet deep. The new stage has a total area of 1000 square feet. The dimensions of the new stage were created by adding the same distance "x" to the width and the depth of the old stage dimensions.

a. Draw a picture to represent the problem. Write an equation to represent the problem.

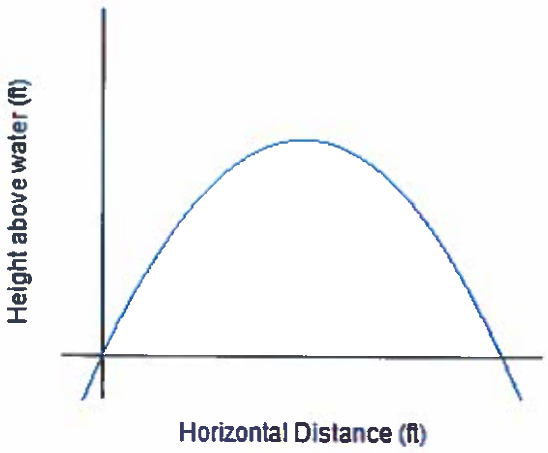


$(15+x)(30+x) = 1000$

b. What is the value of "x"? Find the new stage dimensions.

$X = 10$ New Dimensions: 25 feet by 40 feet

10. The path of a jump of a dolphin is modeled by the function $y = -0.18x(x-10)$, where x is the horizontal distance (in feet) and y is the height (in feet) above the water of the dolphin.



a. How far does the dolphin jump horizontally? Explain why your answer seems reasonable based on the equation and the situation.

10 feet

b. What is the dolphin's maximum height above the water? (Show your work.)

4.5 feet

11. The height, h (in feet), of a lobbed tennis ball t seconds after it is hit is modeled by the equation $h = -16t^2 + 47t + 3$.

a. How high off the ground is the ball when it is hit?

3 feet

b. What is the maximum height the ball reaches? At what time does that happen?

37.5 feet at 1.5 seconds

c. When does the ball hit the ground?

$0 = -16t^2 + 47t + 3$ 3 seconds

$t = \frac{-47 \pm \sqrt{47^2 - 4(-16)(3)}}{-32}$