**QUADRATIC FUNCTIONS**

 **WORKSHEET I**

**\*\*Use graph paper for all graphing problems.\*\***

**For the 1 - 4, give (a) the equation of the axis of symmetry, (b) the coordinates of the vertex, and (c) the *y*-intercept.**

 A B C

1.  $x=0$ $\left(0, 8\right)$ 8

2.  $x=-3$ $\left(-3, -13\right)$ - 4

3.  $x=\frac{5}{8}$ $\left(0.625, 9.375\right)$ 0

4.  $x=-2$ $\left(-2, 4\right)$ - 10

**For 5 - 12, graph each relation. Label the axis of symmetry and the vertex.**

For these graphs, I have provided the equation for the axis of symmetry, the coordinates of the vertex, the y-intercept, and one other point. Points can be reflected over the axis of symmetry to form both sides of the parabola.

5. $y=3x^{2}$ Axis of Symmetry: $x=0$

 Vertex: $\left(0, 0\right)$

 *y*-intercept: 0

 Other point(s): $\left(1, 2\right), \left(3, 12\right)$

6. $y=-\frac{1}{2}x^{2}-1$ Axis of Symmetry: $x=0$

 Vertex: $\left(0, -1\right)$

 *y*-intercept: -1

 Other point(s): $\left(1, 2\right), \left(-1\frac{1}{2}, -3\right)$

7. $y=-x^{2}-2$ Axis of Symmetry: $x=0$

 Vertex: $\left(0, -2\right)$

 *y*-intercept: -2

 Other point(s): $\left(1, 2\right), \left(-3, -6\right)$

8. $y=x^{2}-6x+4$ Axis of Symmetry: $x=3$

 Vertex: $\left(3, -5\right)$

 *y*-intercept: 4

 Other point(s): $\left(1, -1\right)$

9. $y=-3x^{2}+6x+1$ Axis of Symmetry: $x=1$

 Vertex: $\left(1, 4\right)$

 *y*-intercept: 1

 Other point(s): $\left(-1, -8\right)$

10. $y=-x^{2}+4x+2$ Axis of Symmetry: $x=2$

 Vertex: $\left(2, 6\right)$

 *y*-intercept: 2

 Other point(s): $\left(1, 5\right)$

11. $y=-\frac{1}{4}x^{2}-2x-6$ Axis of Symmetry: $x=-4$

 Vertex: $\left(-4, -2\right)$

 *y*-intercept: - 6

 Other point(s): $\left(-3, -2.25\right)$

12. $y=-3.5x^{2}-2x+3$ Axis of Symmetry: $x=-\frac{2}{7}$

 Vertex: $\left(-\frac{2}{7}, 3\frac{2}{7}\right)$

 *y*-intercept: 3

 Other point(s): $\left(1, -2.5\right)$

13. The total profit made by an engineering firm is given by the function  where *x* stands for the number of years, and *p* stands for the profit made.

a. How long does it take for the engineering firm to

 make its maximum profit?

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

$x=\frac{25}{2}$ = 12.5 years

b. What is the maximum profit made by the firm?

$$p=x^{2}-25x+5000$$

$$p=\left(12.5\right)^{2}+25\left(12.5\right)+5000$$

$$p=\$4843.75$$

14. You are placing a circular drawing on a square piece of poster board. The poster board is 15 in. wide. The part of the poster board not covered by the drawing will be painted blue. If the radius of the drawing is *r*, the function  gives the area to be painted blue.

Rewrite this function so that it is in the standard form of: $A=-3.14r^{2}+225$

a. Graph the function. Axis of Symmetry: $x=0$

 Vertex: $\left(0, 225\right)$

 *y*-intercept: 225

 Other point(s): $\left(5, 146.5\right), \left(3, 196.74\right)$

b. What *r*-values make sense for the domain? Explain why.

Only positive values for *r* make sense since the *r* is the radius, and radius is a type of measurement.

**For #’s 15 – 22, solve by finding square roots. If the equation has no real solution, write NO SOLUTION. If the value is irrational, round to the nearest tenth.**

15. $x^{2}=289$ $x=\pm 17$

16. $3x^{2}-27=0$ $x=\pm 3$

17. $x^{2}=12$ $x=\pm 3.5$

18. $4x^{2}-8=20$ No Solution

19. $81x^{2}-10=15$ $x=\pm 0.5$

20. $3x^{2}+1=54$ $x=\pm 4.2$

21. $2x^{2}-1400=0$ $x=\pm 26.5$

22. $2x^{2}+50=0$ No Solution

23. During the construction of a skyscraper, a bolt fell from 400 ft. What was the speed of the bolt when it hit the ground? Use  where *V* is the velocity and *s* is the distance the bolt fell.

$$V^{2}=64(400)$$

$$V^{2}=25,600$$

$$V=160 ft/s$$