

Math 12 – Workshop #23

1. Graph the following and determine if the discriminant is positive, negative or zero.

(a) $f(x) = 3 - x^2$

(b) $g(x) = (x - 2)^2$

(c) $h(x) = (x - 2)^2 + 2$

2. A parabola written as $f(x) = a(x - h)^2 + k$ is said to be in *vertex form*. Complete the square to write the following parabolas in vertex form.

(a) $f(x) = x^2 + 6x - 1$

(c) $h(x) = 7x - x^2 + 3$

(b) $g(x) = 2x^2 + 8x$

(d) $k(x) = -3x^2 + 6x + 3$

3. Find the vertex and axis of symmetry of each parabola from the previous problem.

4. Find the vertex of the parabola $y = -2(x + 1)^2 - 7$. Is this vertex a maximum or minimum?

5. Let x be the side of a rectangle with a 70 inch perimeter.

(a) Construct an expression in terms of the variable x which gives the area of the rectangle.

(b) Graph the parabola you constructed in part (a).

(c) Looking at the graph, which x value would give the largest possible area for the rectangle?

(d) What dimensions would the rectangle have to be to achieve the maximum possible area.

6. The revenue for selling x action figures is given by

$$R(x) = -\frac{x^2}{324} + 3x$$

how many units need to be sold to maximize the revenue?

7. Graph the inequalities

(a) $y < x^2$

(b) $y \geq x^2 + 1$

(c) $y < 4 - x^2$