Name: _____ **Precalculus Unit 11, Lesson 2**

Aim: The Parabola as a Conic Section

I. Do Now: Recall the definition and equations below.
Definition: A parabola is the set of all points (x, y) that are equidistant from a fixed line (called the *directrix*) and a fixed point (called the *focus*) not on the line.

Equation for Vertical Parabola: $(x-h)^2 = 4p(y-k)$

Equation for Horizontal Parabola: $(y-k)^2 = 4p(x-h)$

1. Write an equation for a parabola with the given conditions. Make a sketch for each case.
   (a) vertex at (0, 0) focus at (0, 4)
   (b) vertex at (0, 0) focus at $(-4, 0)$
   (c) focus at $(-3, 5)$ directrix: $y = 1$
   (d) focus at $(-3, 5)$ directrix: $x = 1$

II. Applications:

2. Find the equation of the parabola with its vertex at $(-2, 4)$ and with directrix $y = 7$.

3. Find the equation of the parabola with its focus at $(2, -1)$ and with directrix $x = -2$.

4. Find the vertex, focus, and directrix of the parabola whose equation is $x^2 + 12y = 0$.

5. Find the vertex, focus, and directrix of the parabola whose equation is $x^2 - 4x - 8y + 28 = 0$.

6. Find the vertex, focus, and directrix of the parabola whose equation is $x = -2y^2 + 4y + 1$.

7. Write an equation for the parabola whose vertex is $(0, 2)$ and which passes through the points $(-2, 0)$ and $(-2, 4)$. State the coordinates of the focus and the equation of the directrix.

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- p. 644: 54, 55, 57, 59, 63, 67, 69, 70, 85, 86, 89
- p. 460: 122