

## In Parabolas:

**a** is the coefficient in the equation.

**c** is the distance from:  
Vertex to Focus  
and  
Vertex to Directrix

Relationship  
between  
a & c:

$$|a| = \frac{1}{4c}$$

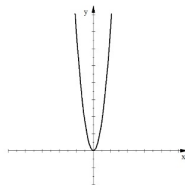
which can be rewritten into:

$$c = \frac{1}{4|a|}$$

$$y = ax^2$$

Eq:  $y = 7x^2$

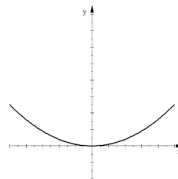
Graph:



When **a** is large the  
parabola is **Narrower**

Eq:  $y = 0.1x^2$

Graph:



When **a** is small the  
parabola is **Wider**

$$c = \frac{1}{4|a|}$$

The Wider the parabola the **FARTHER** from  
the Vertex the Focus is

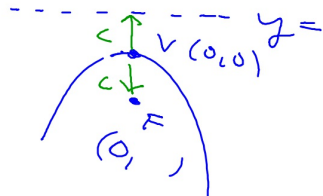
The Narrower the parabola the **CLOSER** to  
the Vertex the Focus is

For each of the following problems use the given equation find the coordinates of the focus and the equation of the directrix. The vertex is the origin.

1.  $y = -12x^2$

Focus:  $(0, -1/48)$

Directrix:  $y = 1/48$



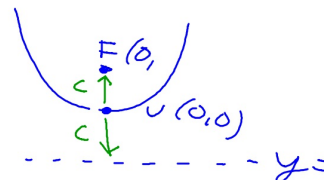
$$c = \frac{1}{4|a|}$$

$$c = \frac{1}{4(12)} = \frac{1}{48}$$

2.  $y = \frac{2}{3}x^2$

Focus:  $(0, 3/8)$

Directrix:  $y = -3/8$



$$c = \frac{1}{4|a|}$$

$$c = \frac{1}{4(2/3)}$$

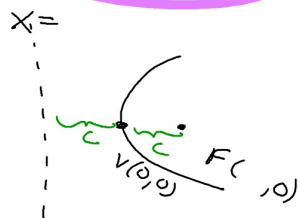
$$c = \frac{1}{8/3}$$

$$c = \frac{3}{8}$$

3.  $x = \frac{1}{24}y^2$

Focus:  $(6, 0)$

Directrix:  $x = -6$



$$c = \frac{1}{4|a|}$$

$$c = \frac{1}{4(1/24)}$$

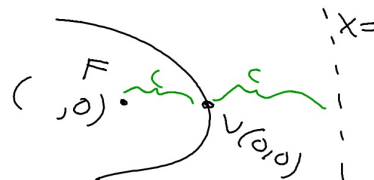
$$c = \frac{1}{1/6}$$

$$c = 6$$

4.  $x = -\frac{5}{8}y^2$

Focus:  $(-2/5, 0)$

Directrix:  $x = 2/5$



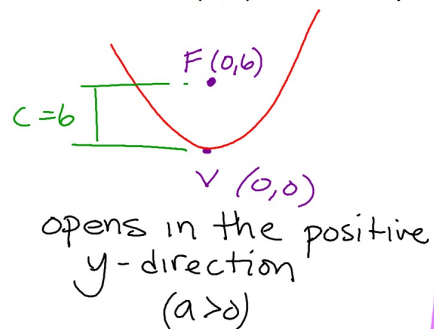
$$c = \frac{1}{4|a|}$$

$$c = \frac{1}{4(5/8)}$$

$$c = \frac{1}{5/2}$$

$$c = 2/5$$

5. Given the vertex of a parabola is (0,0) and the coordinates of the focus is (0,6) find the equation for the parabola.



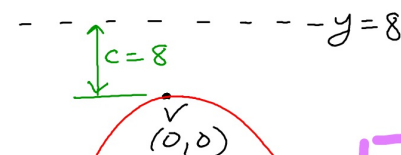
$$|a| = \frac{1}{4c}$$

$$|a| = \frac{1}{4(6)}$$

$$|a| = \frac{1}{24}$$

$$y = \frac{1}{24} x^2$$

6. Given the vertex of a parabola is (0,0) and the directrix is the line  $y=8$  find the equation of the parabola.



opens in the negative  $y$  direction ( $a < 0$ )

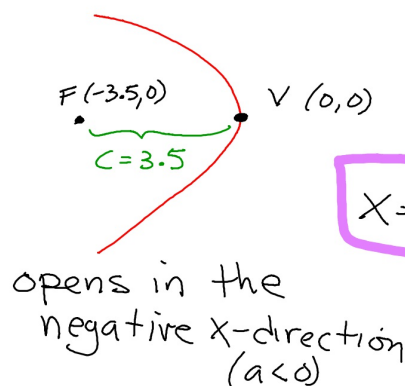
$$y = -\frac{1}{32} x^2$$

$$|a| = \frac{1}{4c}$$

$$|a| = \frac{1}{4(8)}$$

$$|a| = \frac{1}{32}$$

7. Given the vertex of a parabola is (0,0) and the focus is (-3.5,0) write the equation of the parabola



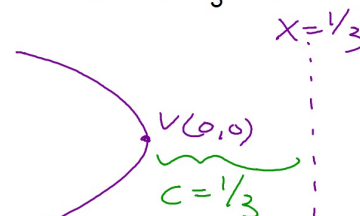
$$|a| = \frac{1}{4c}$$

$$|a| = \frac{1}{4(3.5)}$$

$$|a| = \frac{1}{14}$$

$$x = -\frac{1}{14} y^2$$

8. Given the vertex of a parabola is (0,0) and the equation of the directrix is  $x = \frac{1}{3}$  write the equation of the parabola.



opens in the negative  $x$  direction ( $a < 0$ )

$$x = -\frac{3}{4} y^2$$

$$|a| = \frac{1}{4c}$$

$$|a| = \frac{1}{4(\frac{1}{3})}$$

$$|a| = \frac{\frac{1}{3}}{4}$$

$$|a| = \frac{3}{4}$$

You can now finish Hwk #27

Practice Sheet: Sec 10-2 Parabolas

Equations for Translated Parabolas:

Vertex is at (h,k):

$$y = a(x - h)^2 + k \quad \text{which is the same as} \quad y - k = a(x - h)^2$$

$$x = a(y - k)^2 + h \quad \text{which is the same as} \quad x - h = a(y - k)^2$$