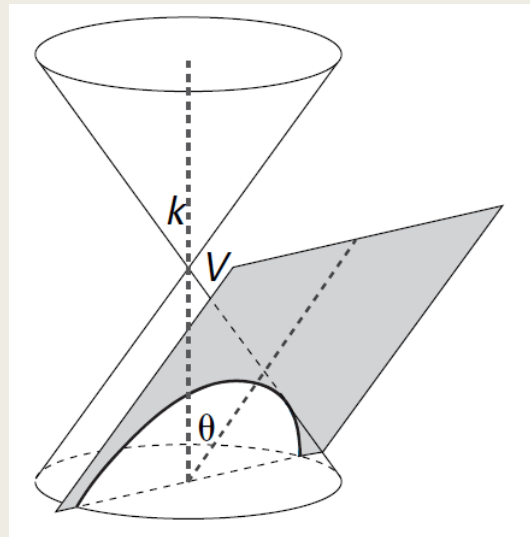


# 7-1: PARABOLAS

CP Precalculus  
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## Parabolas

- **Vertex form**

$$y = a(x-h)^2 + k \quad \text{or} \quad (y-k) = a(x-h)^2$$

- Vertex is  $(h, k)$
- Axis of Symmetry is  $x = h$ .
- If  $a$  is positive - **opens up.**
- If  $a$  is negative - **opens down.**

## Parabolas

- **Standard form**

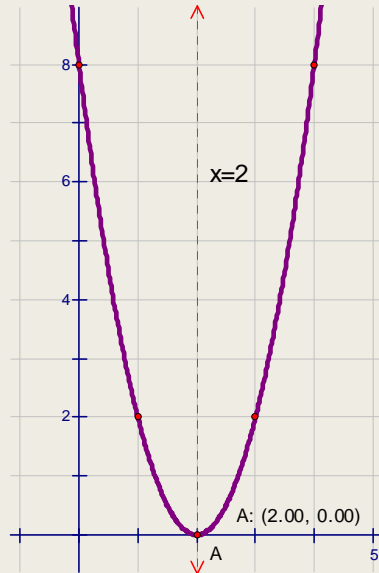
$$y = ax^2 + bx + c$$

- Vertex is  $\left(x = \frac{-b}{2a}, \text{ substitute in to find } y\right)$
- Axis of Symmetry is  $x = -\frac{b}{2a}$ .
- If  $a$  is positive - **opens up.**
- If  $a$  is negative - **opens down.**

Sketch the following. Label the axis of symmetry and the vertex.

a.  $y = 2(x - 2)^2$

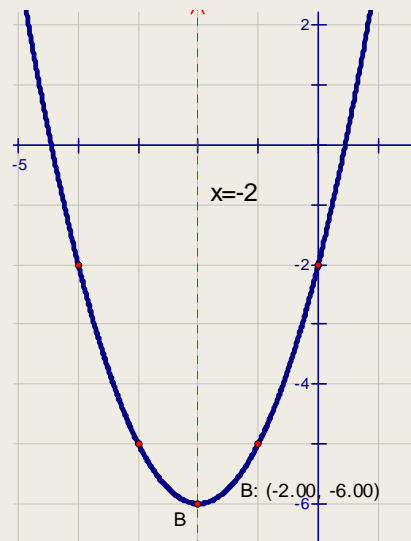
| x | y |
|---|---|
| 2 | 0 |
| 3 | 2 |
| 4 | 8 |



Sketch the following. Label the axis of symmetry and the vertex.

b.  $y = x^2 + 4x - 2$

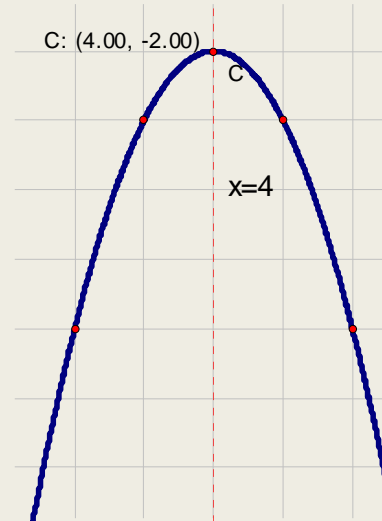
| x  | y  |
|----|----|
| -2 | -6 |
| -1 | -5 |
| 0  | -2 |



Sketch the following. Label the axis of symmetry and the vertex.

c.  $y + 2 = -(x - 4)^2$

| x | y  |
|---|----|
| 4 | -2 |
| 5 | -3 |
| 6 | -6 |



Give the equation in the form  $y = a(x - h)^2 + k$  with the vertex  $(4, -2)$  and passes through the point  $(6, 4)$ .

$$4 = a(6 - 4)^2 - 2 \quad y = \frac{3}{2}(x - 4)^2 - 2$$

$$6 = 4a$$

$$\frac{3}{2} = a$$

Give the equation in the form  $y = a(x - h)^2 + k$  with the vertex  $(-3, 4)$  and passes through the point  $(0, -14)$ .

$$-14 = a(0 + 3)^2 + 4 \quad y = -2(x + 3)^2 + 4$$

$$-18 = 9a$$

$$-2 = a$$

Given the equation for the parabola,

$$y = -2x^2 + 12x - 11$$

- What is the vertex?

$$x = -\frac{b}{2a} = -\frac{12}{2(-2)} \quad y = -2(3)^2 + 12(3) - 11 \quad (3, 7)$$

$$x = 3$$

$$y = 7$$

- What is the axis of symmetry?

$$x = 3$$

- How does it open?

Downward

Homework: 7-1 Parabolas Homework WS