

## WARM UP

- 1) find the distance between  $(-12, 2)$  &  $(5, -9)$
- 2) write the circle equation in standard form
  - a.  $x^2 + 10x + y^2 - 4y = 10$
  - b.  $x^2 + 2y = -y^2 + 7x + 12$
- 3) write the equation of the circle in standard form
  - a. center  $(4, -3)$   $A = 64\pi$
  - b. center  $(-9, 0)$   $C = 12\pi$

$$1) D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$D = \sqrt{(5 + 12)^2 + (-9 - 2)^2}$$
$$= \sqrt{17^2 + (-11)^2} = \sqrt{410}$$

$$2) a. x^2 + 10x + \frac{25}{4} + y^2 - 4y + \frac{4}{4} = 10 + \frac{25}{4} + \frac{4}{4}$$

$$\boxed{(x+5)^2 + (y-2)^2 = 39}$$

$$b. x^2 - 7x + y^2 + 2y = 12$$

$$x^2 - 7x + \frac{49}{4} + y^2 + 2y + \frac{1}{4} = 12 + \frac{49}{4} + \frac{1}{4}$$

$$\boxed{(x - 7/2)^2 + (y + 1)^2 = 101/4}$$

$$3. a. r = 8 \quad (x - 4)^2 + (y + 3)^2 = 64$$


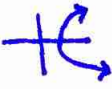
$$b. 12\pi = 2\pi r \quad (x + 9)^2 + y^2 = 36$$

$w = r$

$$A = \pi r^2 \quad C = 2\pi r$$

## 8.3 parabolas

### Vertex form

- $y = a(x-h)^2 + k$  regular 
- $x = a(y-h)^2 + k$  sideways 

rearrange with ~~algebra~~ algebra to get to conic form

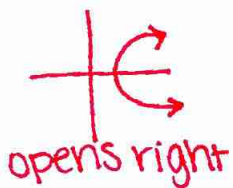
### Conic form

- $4p(y-k) = (x-h)^2$  regular  
vertex  $(h, k)$
- $4p(x-k) = (y-h)^2$  sideways  
vertex  $(k, h)$

\* notice  $\frac{1}{a} = 4p$

### options

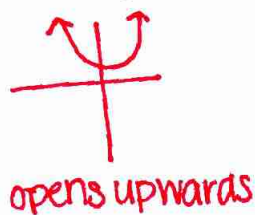
• if  $y^2 \in p \oplus$



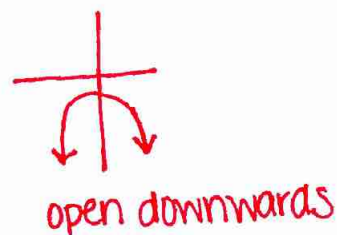
• if  $y^2 \in p \ominus$



• if  $x^2 \in p \oplus$



• if  $x^2 \in p \ominus$



### vocab

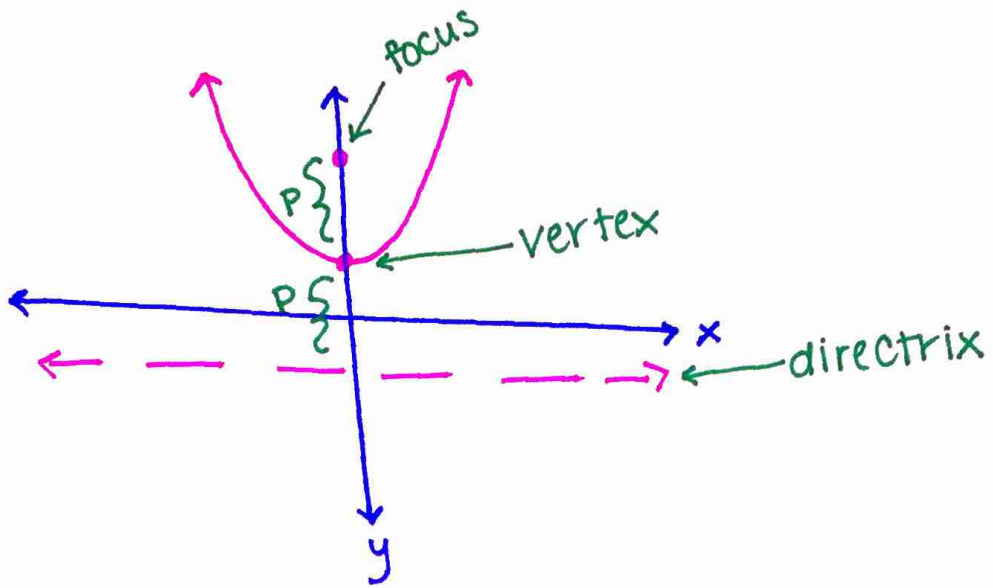
- focus: a point in the parabola
- directrix: a line outside of the parabola, that's either horizontal or vertical

\* both on the axis of symmetry with the vertex <sup>(vertex in line w/ focus)</sup>

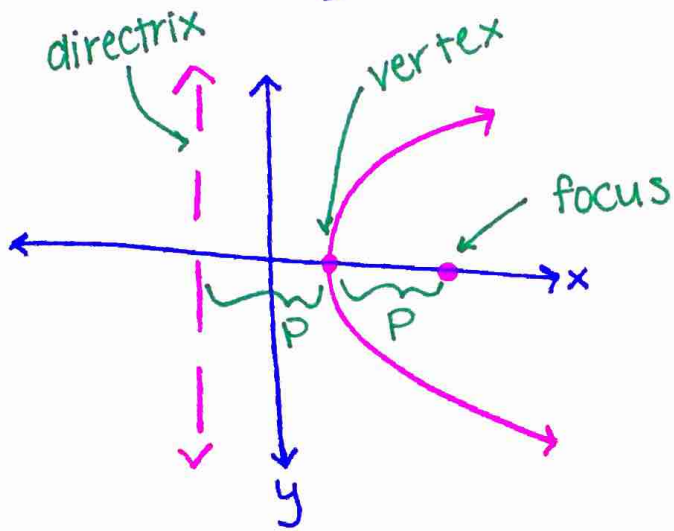
\*  $p$  is the distance between the focus & vertex & directrix

Visual

when  $x^2$  :

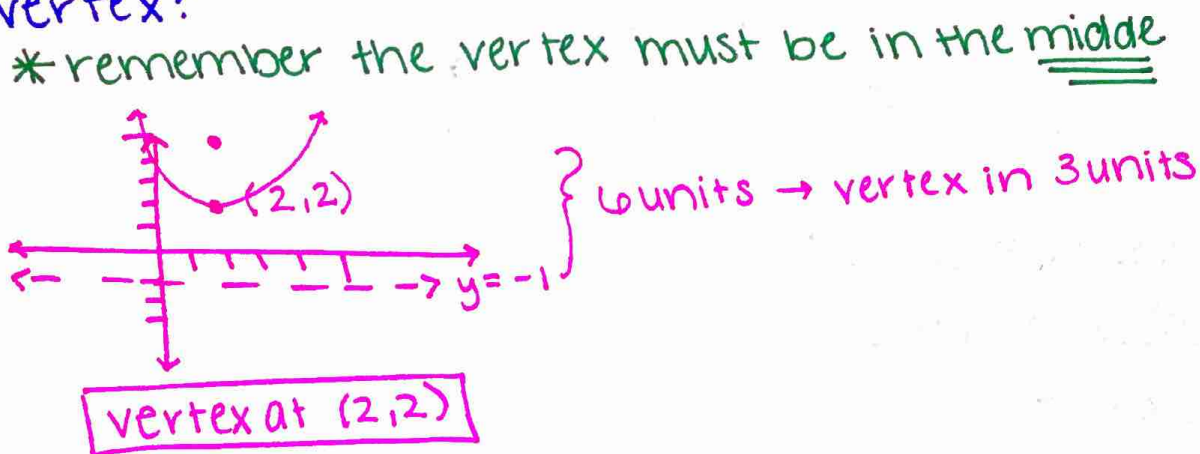


when  $y^2$  :

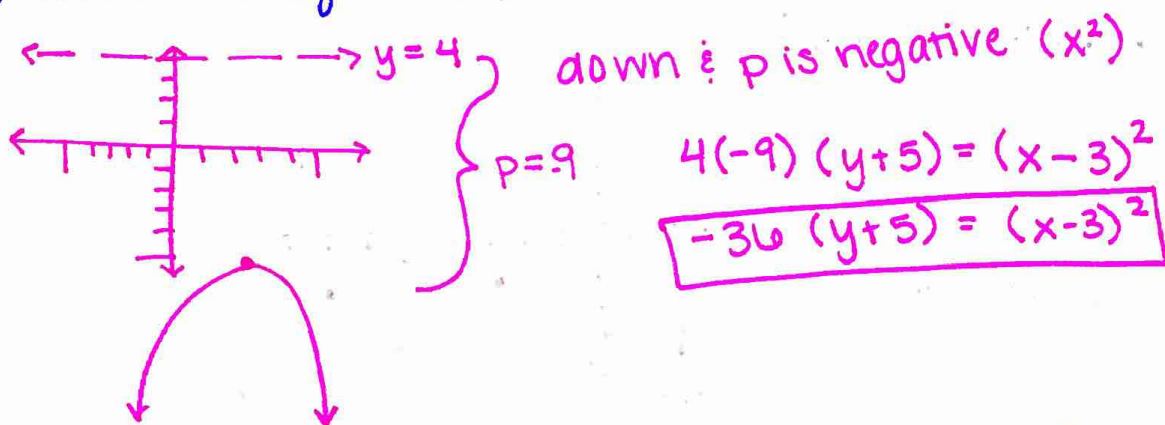


## examples

1) If the focus is  $(2, 5)$  & directrix is  $y = -1$ , what's the vertex?



2) write the eq. of a parabola w/ directrix  $y = 4$  & vertex  $(3, -5)$

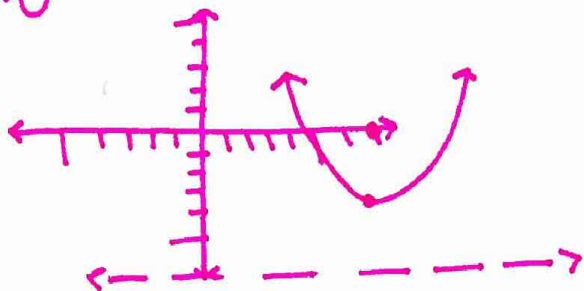


3) sketch  $12(y+3) = (x-7)^2$  \* must include focus, directrix & vertex/parabola

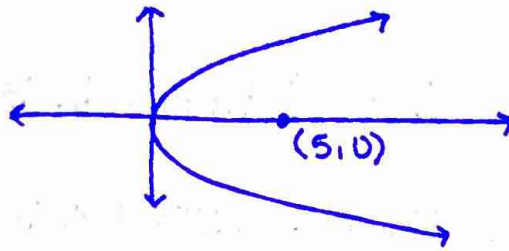
① find  $p$  :  $12 = 4p$   
 $3 = p \rightarrow$  distance

②  $p \oplus \curvearrowright$   
 $x^2$

③ vertex  $(7, -3)$



4) graph  $\rightarrow$  eq. given



write the equation.

① sideways, open right  
 $y^2 \hat{=} p \oplus$

② vertex (0,0)  
 $p=5$

$$4p(x-k) = (y-h)^2$$

$$4(5)(x-0) = (y-0)^2$$

$$\boxed{20x = y^2}$$

5) graph  $16(x-3) = (y+2)^2$

① vertex: (3,-2)

②  $p$ :  $16 = 4p$   
 $4 = p$

③  $y^2 \hat{=} p \oplus$  open right

