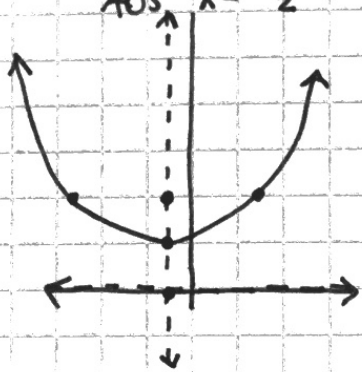


# 7.4 More Circles and Parabolas

1.  $(x + \frac{1}{2})^2 = 4(y - 1)$

parabola  
opens up  
vertex  $(-\frac{1}{2}, 1)$   
latus rectum 4  
 $p = 1$   
focus  $(-\frac{1}{2}, 2)$   
directrix  $y = 0$   
AOS  $x = -\frac{1}{2}$



3.  $x^2 - 2x + y^2 + 16y + 40 = 0$

$$\begin{aligned} x^2 - 2x &+ y^2 + 16y &= -40 \\ x^2 - 2x + 1 &+ y^2 + 16y + 64 &= -40 + 1 + 64 \end{aligned}$$

$$(x - 1)^2 + (y + 8)^2 = 25$$

circle  
center  $(1, -8)$   
radius 5

4.  $x^2 + 8x + y^2 - 18 = 0$

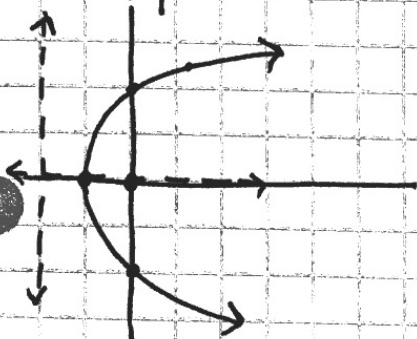
$$\begin{aligned} x^2 + 8x &+ y^2 &= 18 \\ x^2 + 8x + 16 &+ y^2 &= 18 + 16 \\ (x + 4)^2 &+ y^2 &= 34 \end{aligned}$$

circle  
center  $(-4, 0)$   
radius  $\sqrt{34} \approx 5.831$

2.  $y^2 - 4x - 4 = 0$

$$\begin{aligned} y^2 &= 4x + 4 \\ y^2 &= 4(x + 1) \end{aligned}$$

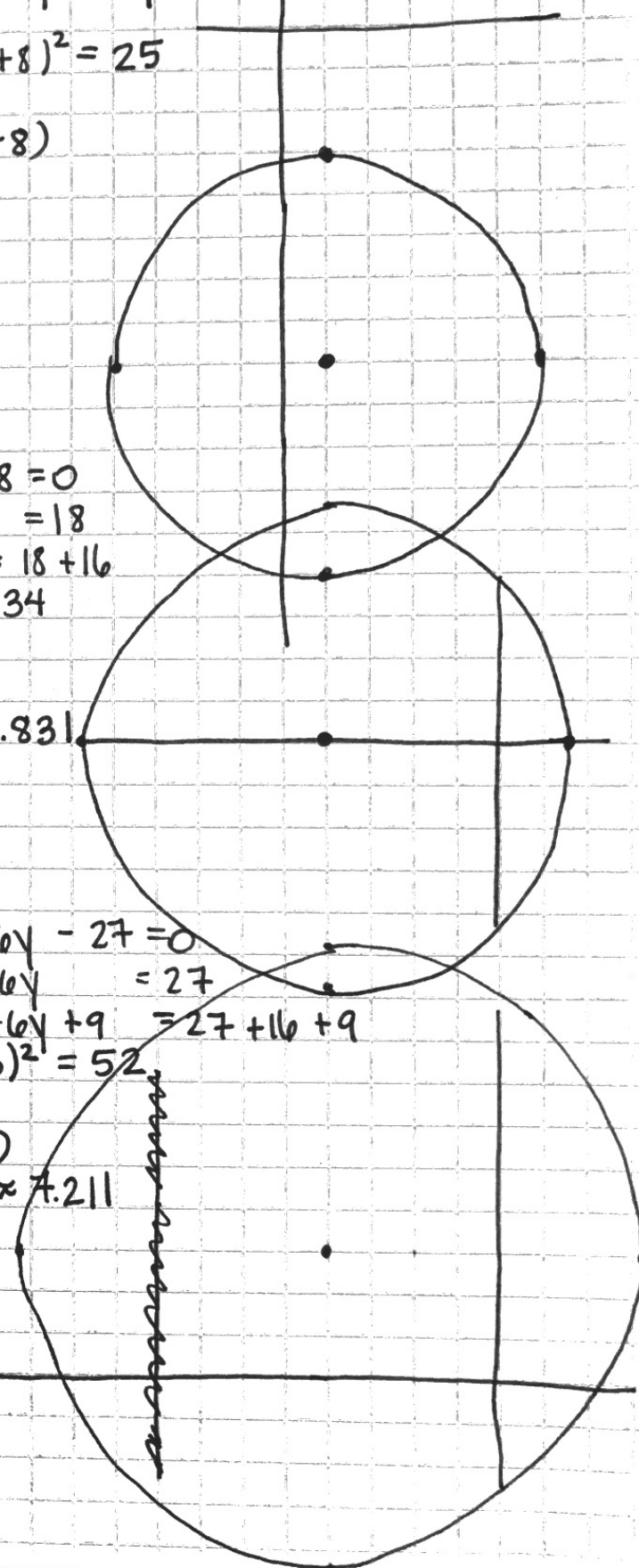
parabola  
opens right  
vertex  $(-1, 0)$   
latus rectum 4  
 $p = 1$   
focus  $(0, 0)$   
directrix  $x = -2$   
AOS  $y = 0$



5.  $x^2 + 8x + y^2 - 6y - 27 = 0$

$$\begin{aligned} x^2 + 8x &+ y^2 - 6y &= 27 \\ x^2 + 8x + 16 &+ y^2 - 6y + 9 &= 27 + 16 + 9 \\ (x + 4)^2 &+ (y - 3)^2 &= 52 \end{aligned}$$

circle  
center  $(-4, 3)$   
radius  $\sqrt{52} \approx 7.211$



1. parabola vertex  $(3, -3)$   
focus  $(3, -9/4)$

must open up ...  $x^2$  and pos.

$$F \cdot v \cdot p$$

$$(x-3)^2 = 4p(y+3)$$

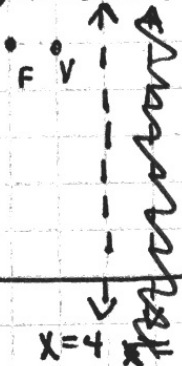
~~$p = \frac{3}{4}$~~

$$(x-3)^2 = 4\left(\frac{3}{4}\right)(y+3)$$

$$p = \frac{-9}{4} - (-3) = \frac{3}{4}$$

$$\boxed{(x-3)^2 = 3(y+3)}$$

2. focus  $(2, 5)$  directrix  $x=4$



vertex  $(3, 5)$

$$(y-5)^2 = -4p(x-3)$$

$p=1$   
opens left  
so  $y^2$   
and neg

$$\boxed{(y-5)^2 = -4(x-3)}$$

3. center  $(3, 7)$   
point  $(1, -3)$

$$(x-3)^2 + (y-7)^2 = r^2$$

$$\boxed{(x-3)^2 + (y-7)^2 = 104}$$

$$(1-3)^2 + (-3-7)^2 = r^2$$

$$4 + 100 = r^2$$

$$104 = r^2$$

$$r = \sqrt{104}$$