

## Review for Chapter 11 Test

Find the a) length of the segment and b) midpoint of the segment with the given endpoints.

1. (3, -4) and (-5, 6)    a)  $d = \sqrt{(-5-3)^2 + (6+4)^2}$   
 $= \sqrt{64 + 100} = \sqrt{164} = \sqrt{4 \cdot 41} = 2\sqrt{41}$     b)  $\frac{3+(-5)}{2}, \frac{-4+6}{2} = (-1, 1)$

2.  $(5, \sqrt{5})$  and  $(3, -\sqrt{5})$   
 a)  $d = \sqrt{(5-3)^2 + (\sqrt{5} + \sqrt{5})^2} = \sqrt{4 + (2\sqrt{5})^2} = \sqrt{4 + 20} = \sqrt{24} = 2\sqrt{6}$     b)  $\frac{5+3}{2}, \frac{\sqrt{5} + (-\sqrt{5})}{2} = (4, 0)$

3. Find the equation of the circle with the center (4, -3) and radius  $3\sqrt{7}$ .  
 $(x-4)^2 + (y+3)^2 = (3\sqrt{7})^2$      $(x-4)^2 + (y+3)^2 = 63$

4. Find the equation of the circle with the diameter with endpoints of (3, 5) and (-7, 11)  
 $C: \left(\frac{3+(-7)}{2}, \frac{5+11}{2}\right) = (-2, 8)$      $d = \sqrt{(-2-3)^2 + (8-5)^2} = \sqrt{25+9} = \sqrt{34}$      $(x-(-2))^2 + (y-8)^2 = (\sqrt{34})^2$   
 $(x+2)^2 + (y-8)^2 = 34$

5. Find the radius and center of the circle with the equation:  $x^2 + y^2 - 8x + 2y + 11 = 0$   
 $x^2 - 8x + 16 + y^2 + 2y + 1 = -11 + 16 + 1$   
 $(x-4)^2 + (y+1)^2 = 6$      $C: (4, -1) \quad r: \sqrt{6}$

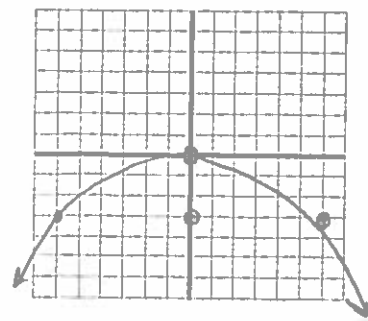
6. Find the standard form equation of the parabola with the focus (2, 0) and the vertex (2, -2). *y changes y parabola*  
 focus  $(h, k+p)$      $k+p=0$   
 $-2+p=0$      $p=2$      $h=2, k=-2$   
 $y = \frac{1}{8}(x-2)^2 - 2$

7. Find the standard form equation of the parabola with the focus (-3, -3) and directrix  $x=3$ . *x parabola*  
 f.  $(h+p, k)$      $h+p=-3$      $0+p=-3$      $k=-3, h=0, p=-3$   
 d.  $x=h-p$      $h-p=3$   
 $2h=0 \quad h=0$      $x = -\frac{1}{12}(y+3)^2$

8. Graph the parabola  $x^2 = -12y$ . Find the vertex, axis of symmetry, focus, and directrix.

$-\frac{1}{12}x^2 = y$      $h=0, k=0, p=-3$

V: (0, 0)  
 f: (0, -3)    axis:  $x=0$   
 d:  $y=3$     fd: 12



9. Graph and find the vertex, focus, directrix, and focal diameter for the parabola with the equation  $x^2 + 10x + 16y - 7 = 0$ .

$$x^2 + 10x + 25 = -16y + 7 + 25$$

$$(x+5)^2 = -16y + 32 = -16(y-2)$$

$$-\frac{1}{16}(x+5)^2 = y-2$$

$$-\frac{1}{16}(x+5)^2 + 2 = y$$

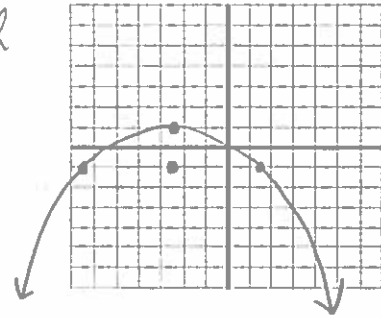
$$p = -4 \quad h = -5 \quad k = 2$$

$$V: (-5, 2)$$

$$F: (-5, -2)$$

$$D: y = 6$$

$$fd: 16$$



10. Graph the parabola  $x-1 = \frac{1}{8}(y+3)^2$ . Find the vertex, focus, directrix and focal diameter.

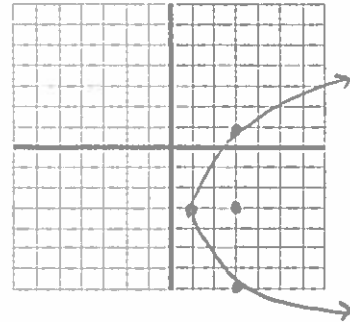
$$x = \frac{1}{8}(y+3)^2 + 1 \quad p = 2 \quad k = -3 \quad h = 1$$

$$V: (1, -3)$$

$$F: (3, -3)$$

$$d: x = -1$$

$$fd: 8$$



11. Graph and find the vertex, focus, directrix, and focal diameter for the parabola with the equation  $x - y^2 + 4y - 2 = 0$ .

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

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

$$x + 2 = (y-2)^2$$

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

$$k = 2 \quad h = -2 \quad p = 1/4$$

$$l = \frac{1}{4p}$$

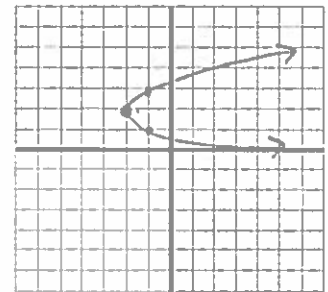
$$4p = 1$$

$$V: (-2, 2)$$

$$F: (-13/4, 2)$$

$$d: x = -2 1/4$$

$$fd: 1$$



12. Find the equation of the ellipse with the foci  $(-2, -3)$  and  $(6, -3)$ , and the major axis is 10.

$$C: (2, -3) \quad c = 4$$

x changing  $\leftrightarrow$

$$c = \sqrt{a^2 - b^2} \quad 4 = \sqrt{25 - b^2} \quad 2a = 10$$

$$16 = 25 - b^2 \quad a = 5$$

$$b^2 = 25 - 16 = 9$$

$$\frac{(x-2)^2}{25} + \frac{(y+3)^2}{9} = 1$$

13. Find the equation of the ellipse with Vertices:  $(2, 0)$ ,  $(2, 8)$  and the minor axis is 4.  $= 2a$

y changing  $\updownarrow$   $C: (2, 4) \quad b = 4 \quad a = 2$

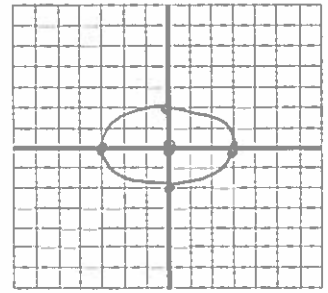
$$\frac{(x-2)^2}{4} + \frac{(y-4)^2}{16} = 1$$

14. Graph the ellipse  $\frac{4x^2}{36} + \frac{9y^2}{36} = \frac{36}{36}$ . Find the all the stuff.  $\longleftrightarrow$

$$\frac{x^2}{9} + \frac{y^2}{4} = 1$$

$$a=3 \quad b=2 \quad c=\sqrt{5}$$

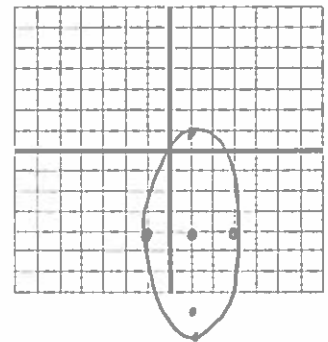
$$\begin{aligned} C: & (0,0) \\ V: & (\pm 3,0) \\ F: & (\pm\sqrt{5},0) \\ M: & 6 \quad m:4 \end{aligned}$$



15. Graph the ellipse  $\frac{(x-1)^2}{4} + \frac{(y+4)^2}{25} = 1$  and find all the stuff.  $\updownarrow$

$$h=1, k=-4, a=2, b=5, c=\sqrt{21}$$

$$\begin{aligned} C: & (1,-4) \\ V: & (1,-4\pm 5) \rightarrow (1,-9) \text{ and } (1,1) \\ F: & (1,-4\pm\sqrt{21}) \\ M: & 10 \quad m:4 \end{aligned}$$



16. Graph the ellipse  $2x^2 + y^2 = 2 + 4x - 4y$ . Find the all the stuff.

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

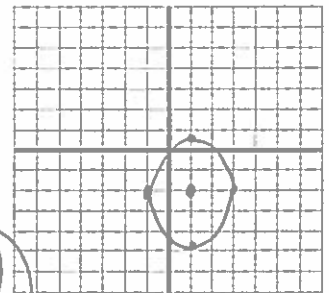
$$2(x^2 - 2x + 1) + (y^2 + 4y + 4) = 2 + 2 + 4$$

$$\frac{2(x-1)^2}{8} + \frac{(y+2)^2}{8} = \frac{8}{8}$$

$$h=1, k=-2, a=2, b=2\sqrt{2}, c=2$$

$$\begin{aligned} C: & (1,-2) \\ V: & (1,-2\pm 2) \rightarrow (1,-4) \text{ and } (1,0) \\ F: & (1,-2\pm 2\sqrt{2}) \\ M: & 4\sqrt{2} \quad m:4 \end{aligned}$$

$$\frac{(x-1)^2}{4} + \frac{(y+2)^2}{8} = 1$$



17. Graph the ellipse  $16x^2 + 36y^2 - 96x + 36y + 9 = 0$ . Find the all the stuff.  $\longleftrightarrow$

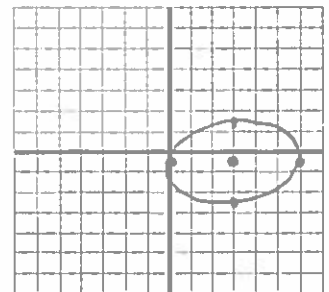
$$16x^2 - 96x + 36y^2 + 36y = -9$$

$$16(x^2 - 6x + \frac{9}{4}) + 36(y^2 + y + \frac{1}{4}) = -9 + 144 + 9$$

$$16(x-3)^2 + 36(y+\frac{1}{2})^2 = 144$$

$$\frac{(x-3)^2}{9} + \frac{(y+\frac{1}{2})^2}{4} = 1$$

$$h=3, k=-\frac{1}{2}, a=3, b=2, c=\sqrt{5}$$



$$\begin{aligned} C: & (3, -\frac{1}{2}) \\ V: & (3\pm 3, -\frac{1}{2}) \rightarrow (6, -\frac{1}{2}) \text{ and } (0, -\frac{1}{2}) \\ F: & (3\pm\sqrt{5}, -\frac{1}{2}) \\ M: & 6 \quad m:4 \end{aligned}$$

18. Find the equation of the hyperbola with the foci  $(0, \sqrt{13})$  and  $(0, -\sqrt{13})$  and the distance between the vertices is 6.  $2b=6$   $b=3$

$$c = \sqrt{a^2 + b^2}$$

$$\sqrt{13} = \sqrt{9 + a^2}$$

$$13 = 9 + a^2 \quad a^2 = 4$$

Center  $(0,0)$   $c = \sqrt{13}$

$$\frac{y^2}{9} - \frac{x^2}{4} = 1$$

19. Find the equation of the hyperbola with the Vertices:  $(\pm 4, 2)$  and foci:  $(\pm 5, 2)$ .

$x$  changing  $\leftrightarrow$  Center:  $(0, 2)$   $a=4$   $c=5$

$$5 = \sqrt{16 + b^2}$$

$$25 = 16 + b^2$$

$$9 = b^2$$

$$\frac{x^2}{16} - \frac{(y-2)^2}{9} = 1$$

20. Graph the hyperbola  $\frac{y^2}{4} - \frac{4x^2}{4} = 4$ . Find all the stuff.

$$\frac{y^2}{4} - \frac{x^2}{1} = 1$$

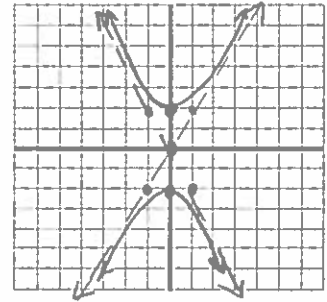
$$h=0, k=0, b=2, a=1, c=\sqrt{5}$$

$$C(0,0)$$

$$V(0, \pm 2)$$

$$F(0, \pm \sqrt{5})$$

$$\text{Slope: } \pm \frac{2}{1}$$



21. Graph the hyperbola  $\frac{x^2}{25} - \frac{(y+1)^2}{9} = 1$ . Find all the stuff.

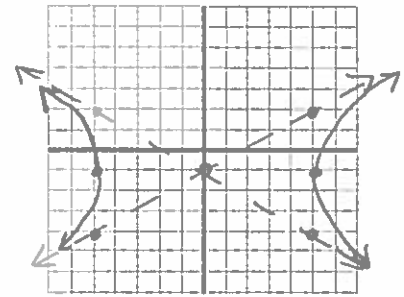
$$h=0, k=-1, a=5, b=3, c=\sqrt{34}$$

$$C(0, -1)$$

$$V(\pm 5, -1)$$

$$F(\pm \sqrt{34}, -1)$$

$$\text{Slope: } \pm \frac{3}{5}$$



22. Graph the hyperbola  $9y^2 + 18y = x^2 + 6x + 18$ . Find all the stuff.

$$9y^2 + 18y - x^2 + 6x = 18$$

$$9(y^2 + 2y + 1) - 1(x^2 + 6x + 9) = 18 + 9 + -9$$

$$\frac{9(y+1)^2}{18} - \frac{1(x+3)^2}{18} = \frac{18}{18}$$

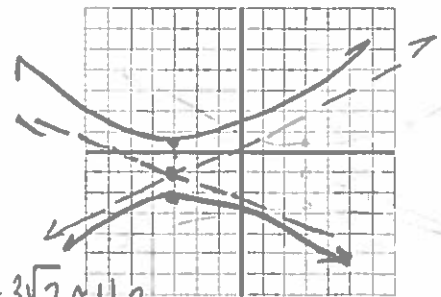
$$\frac{(y+1)^2}{2} - \frac{(x+3)^2}{18} = 1$$

$$k=-1, h=3, a=\sqrt{18}=3\sqrt{2} \approx 4.2$$

$$b=\sqrt{2} \quad c=\sqrt{20}=2\sqrt{5}$$

$$C:(-3, -1) \quad F:(-3, -1 \pm 2\sqrt{5})$$

$$\text{slope: } \pm \frac{\sqrt{2}}{\sqrt{18}} = \pm \frac{1}{3}$$



23. Graph the hyperbola  $9x^2 - 8y^2 + 36x + 64y = 164$ . Find all the stuff.

$$9x^2 + 36x - 8y^2 + 64y = 164$$

$$9(x^2 + 4x + 4) - 8(y^2 - 8y + 16) = 164 + 36 - 128$$

$$9(x+2)^2 - 8(y-4)^2 = 72$$

$$\longleftrightarrow \frac{(x+2)^2}{8} - \frac{(y-4)^2}{9} = 1$$

$$h = -2, k = 4, a = 2\sqrt{2}, b = 3, c = \sqrt{17}$$

Determine the type of conic.

24.  $x^2 - 4y^2 - 4x - 8y - 4 = 0$

$$x^2 - 4y^2 - 4x - 8y = 4$$

hyperbola

25.  $x^2 + y^2 + 8x - 8y + 7 = 0$

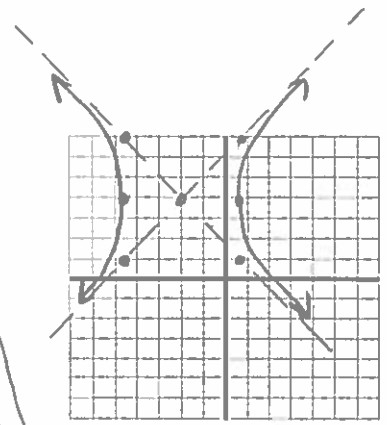
same coeff on quad terms  
= circle

26.  $5x^2 + 9y^2 + 40x - 18y + 44 = 0$

ellipse

27.  $4x^2 + 24x - y + 39 = 0$

No y quad  
parabola



$C(-2, 4)$   
 $V(-2 \pm 2\sqrt{2}, 4)$   
 $F(-2 \pm \sqrt{17}, 4)$   
 slope:  $\pm \frac{3}{2\sqrt{2}} \approx 2.8$