

Sketch the graph and find the necessary coordinates/equations of the characteristics that go with the conic type you graphed.

1) $16(x+2) = (y-4)^2$ Parabola

$(y-4)^2 = 16(x+2)$

$4p = 16$
 $p = 4$

Center N/A

Vert. $(-2, 4)$

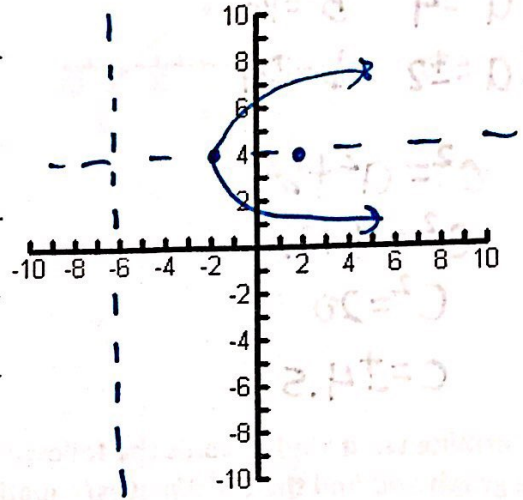
CV's N/A

$(-2+4, 4)$ Foci $(2, 4)$

Radius N/A

$x = -2 - 4$ Directrix $x = -6$

AOS $y = 4$



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

$a^2 = 25$ $b^2 = 9$
 $a = \pm 5$ $b = \pm 3$

$c^2 = a^2 - b^2$
 $c^2 = 25 - 9$
 $c^2 = 16$
 $c = \pm 4$

Center $(1, 0)$

Vert. $(6, 0)$ $(-4, 0)$

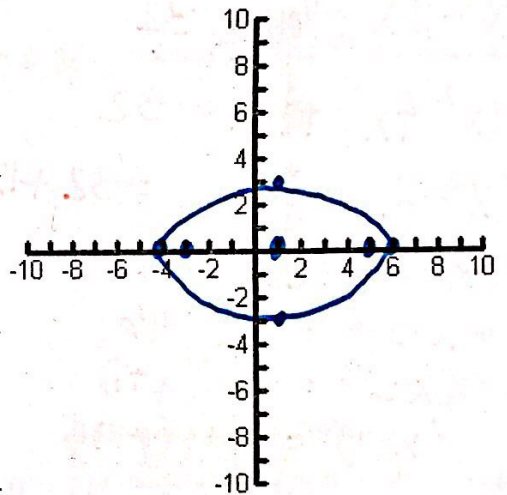
CV's $(1, 3)$ $(1, -3)$

Foci $(5, 0)$ $(-3, 0)$

Radius N/A

Directrix N/A

AOS N/A



3) $(x+3)^2 + (y+6)^2 = 36$ Circle

$r^2 = 36$
 $r = \pm 6$

Center $(-3, -6)$

Vert. N/A

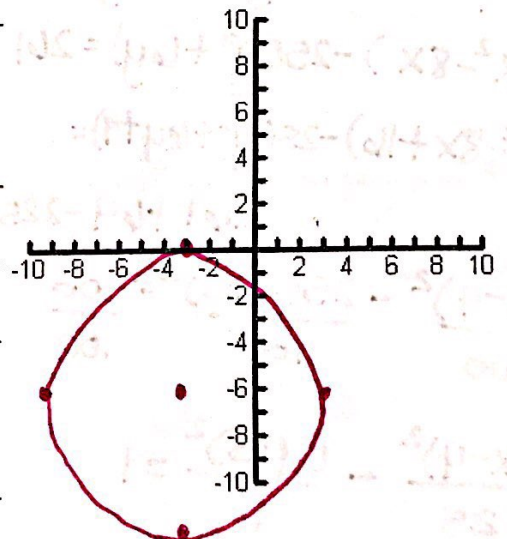
CV's N/A

Foci N/A

Radius 6

Directrix N/A

AOS N/A



4) $\frac{(y+2)^2}{4} - \frac{(x-5)^2}{16} = 1$ Hyperbola

$a^2=4$ $b^2=16$

$a=\pm 2$ $b=\pm 4$

$c^2=a^2+b^2$

$c^2=4+16$

$c^2=20$

$c=\pm 4.5$

Center (5, -2)

Vert. (5, 0)(5, -4)

CV's N/A

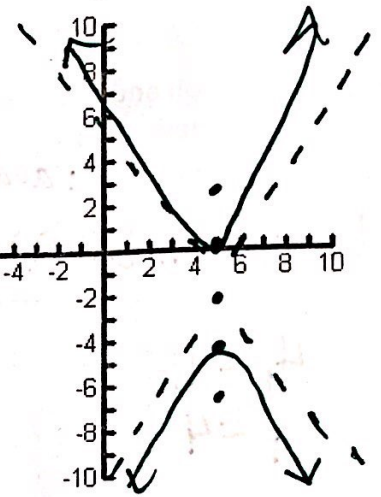
Foci (5, 2.5)(5, -6.5)

Radius N/A

Directrix N/A

AOS N/A

Asy: $y = \pm \frac{4}{2}(x-5) - 2$



Determine what kind of conic the following equations are and write them in standard form. Then sketch the graph and find the coordinates/equations of the characteristics listed

5) $4x^2 - 16x + 16y + 32 = 0$ Parabola

$4x^2 - 16x + 16y = -32$

$4(x^2 - 4x) + 16y = -32$

$4(x^2 - 4x + 4) + 16y = -32 + 16$

$4(x-2)^2 + 16y = -16$

$4(x-2)^2 = -16y - 16$

$4(x-2)^2 = -16(y+1)$

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

Center N/A

Vert. (2, -1)

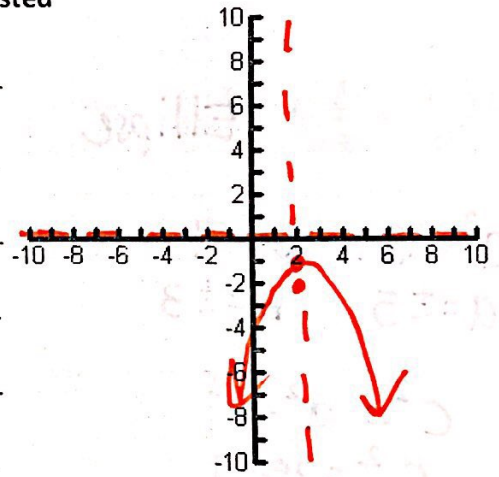
CV's N/A

Foci (2, -2)

Radius N/A

Directrix y=0

AOS: $x=2$



6) $4x^2 - 25y^2 - 32x - 150y - 261 = 0$ Hyperbola

$4x^2 - 32x - 25y^2 - 150y = 261$

$4(x^2 - 8x) - 25(y^2 + 6y) = 261$

$4(x^2 - 8x + 16) - 25(y^2 + 6y + 9) =$

$261 + 64 - 225$

$\frac{4(x-4)^2}{100} - \frac{25(y+3)^2}{100} = \frac{100}{100}$

$\frac{(x-4)^2}{25} - \frac{(y+3)^2}{4} = 1$

Center (4, -3)

Vert. (9, -3)(-1, -3)

CV's N/A

Foci (9.4, -3)(-1.4, -3)

Radius N/A

Directrix N/A

Asy: $y = \pm \frac{2}{5}(x-4) + 3$

$a^2=25$

$b^2=4$

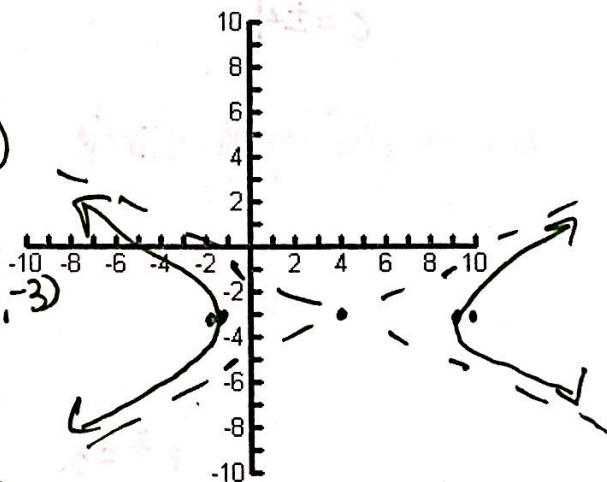
$c^2=25+4$

$a=\pm 5$

$b=\pm 2$

$c^2=29$

$c=\pm 5.4$



7) $x^2 + 4y + 8x + y^2 - 4 = 0$ Circle Center $(-4, -2)$

$x^2 + 8x + y^2 + 4y = 4$ Vert. N/A

$(x^2 + 8x + 16) + (y^2 + 4y + 4) = 4 + 16 + 4$ CV's N/A
 Foci N/A

$(x+4)^2 + (y+2)^2 = 24$ Radius 4.9
 Directrix N/A

$r^2 = 24$
 $r = 4.9$

8) $4x^2 + y^2 + 8x - 4y + 4 = 0$ Ellipse Center $(-1, 2)$

$4x^2 + 8x + y^2 - 4y = -4$ Vert. $(-1, 4)$ $(-1, 0)$

$4(x^2 + 2x) + (y^2 - 4y) = -4$ CV's $(0, 2)$ $(-2, 2)$

$4(x^2 + 2x + 1) + (y^2 - 4y + 4) = -4 + 4 + 4$ Foci $(-1, 3.7)$ $(-1, 0.3)$

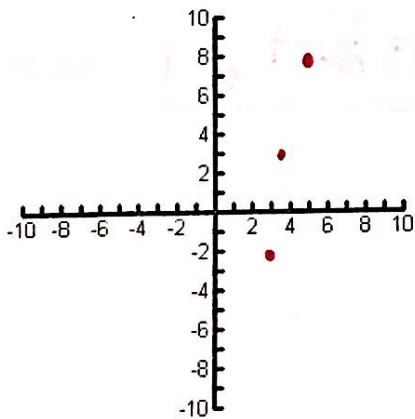
$\frac{4(x+1)^2}{4} + \frac{(y-2)^2}{4} = \frac{4}{4}$ Radius N/A
 Directrix N/A

$\frac{(x+1)^2}{1} + \frac{(y-2)^2}{4} = 1$ AOS N/A

$a^2 = 4$ $a = \pm 2$ $b^2 = 1$ $b = \pm 1$ $c^2 = 4 - 1$ $c^2 = 3$ $c = \pm 1.7$

Write the equation of the conic with the following conditions.

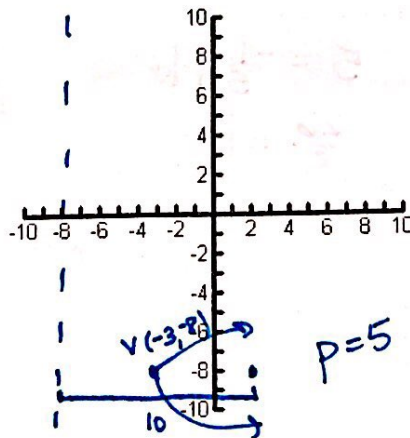
- 9) Diameter with endpoints $(3, -2)$ and $(5, 8)$
 Center: $(4, 3)$



$(x-4)^2 + (y-3)^2 = 26$

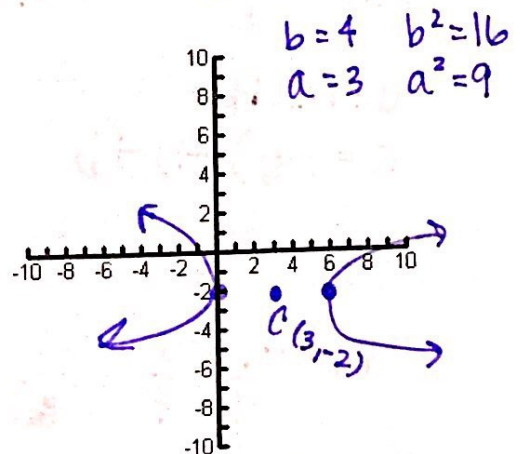
$D = \sqrt{(4-3)^2 + (-2-3)^2}$ $M = (\frac{3+5}{2}, \frac{-2+8}{2})$
 $D = \sqrt{26}$ $M = (4, 3)$
 $r^2 = 26$

- 10) Focus at $(2, -8)$
 Directrix: $x = -8$

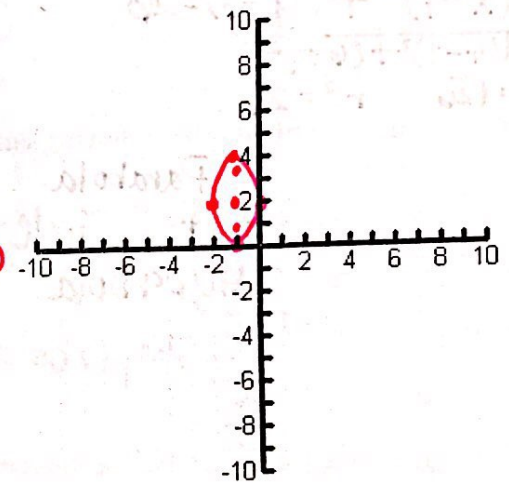
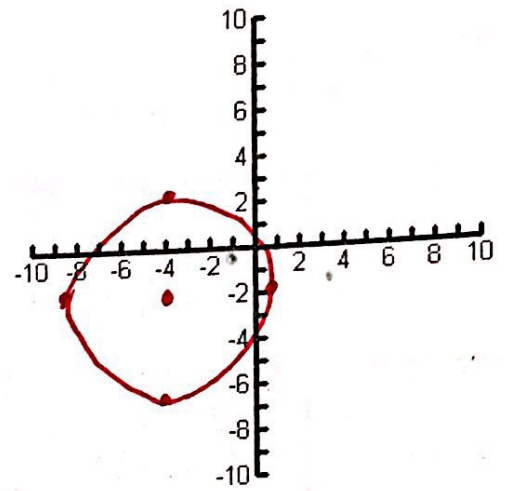


$(y+8)^2 = 20(x+3)$

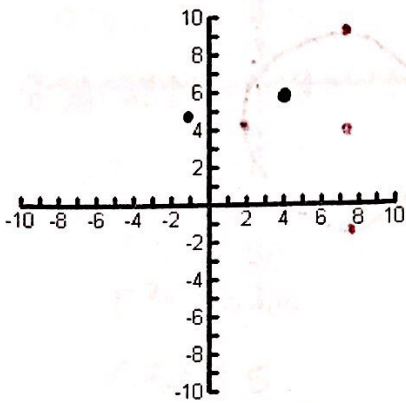
- 11) Vertices: $(0, -2)$, $(6, -2)$
 Asy: $y = \frac{b}{a}x - 6$



$\frac{(x-3)^2}{9} - \frac{(y+2)^2}{16} = 1$



12) Circle with Center at (4, 6) going through the point (-1, 5)



$$(x-4)^2 + (y-6)^2 = 26$$

$$D = \sqrt{(4-(-1))^2 + (6-5)^2}$$

$$D = \sqrt{26} \quad r^2 = 26$$

What type of conic do the following equations represent?

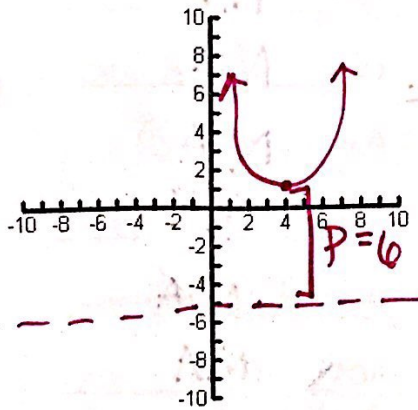
15) $y - 3 = (x - 2)^2$ Parabola

16) $25 = (x - 6)^2 + (y + 2)^2$ Circle

17) $\frac{(x-4)^2}{16} - \frac{y^2}{12} = 1$ Hyperbola

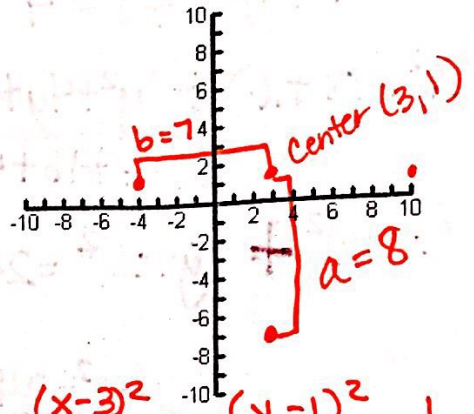
18) $\frac{(y+1)^2}{5} - \frac{(x-2)^2}{36} = 1$ Hyperbola

13) Vertex at (4, 1) Directrix: $y = -5$



$$(x-4)^2 = 24(y-1)$$

14) co-vertices (-4, 1) and (10, 1) and major axis length 16
Ellipse



$$\frac{(x-3)^2}{49} + \frac{(y-1)^2}{64} = 1$$

$$a = 8 \quad b = 7$$

$$a^2 = 64 \quad b^2 = 49$$

19) $4(x-3)^2 + 4(y-4)^2 = 36$ Circle

20) $(x-3)^2 + 4(y-4)^2 = 36$ Ellipse

21) $(x-3)^2 - 4(y-4)^2 = 3$ Hyperbola

22) $\frac{(x-6)^2}{25} + \frac{(y+3)^2}{5} = 1$ Ellipse

23) Write the equation of the line tangent to the circle $x^2 + y^2 = 26$ and through the point (-1, 5) (0, 0) ← center

$$m = \frac{0-5}{0-(-1)} = \frac{-5}{1} = -5$$

$$\perp m = \frac{1}{5}, \quad (-1, 5)$$

$$y = mx + b$$

$$5 = \left(\frac{1}{5}\right)(-1) + b$$

$$5 = -\frac{1}{5} + b$$

$$\frac{26}{5} = b$$

$$y = \frac{1}{5}x + \frac{26}{5}$$

24) Write the equation of the line tangent to the circle $(x+1)^2 + (y+1)^2 = 13$ and through the point (-4, -3) (-1, -1) center

$$m = \frac{-1-(-3)}{-1-(-4)} = \frac{2}{3}$$

$$\perp m = -\frac{3}{2}, \quad (-4, -3)$$

$$y = mx + b$$

$$-3 = -\frac{3}{2}(-4) + b$$

$$-3 = 6 + b$$

$$-9 = b$$

$$y = -\frac{3}{2}x - 9$$