

Classify each conic section as circle, ellipse, parabola, hyperbola or none of these.

circle 1. $x^2 + (y-3)^2 = 9$

hyperbola 2. $16x^2 - 9y^2 = 144$

parabola 3. $(x+2)^2 = -8(y-3)$

circle 4. $(x+4)^2 + (y-1)^2 = 7$

hyperbola 5. $\frac{(y-2)^2}{4} - \frac{(x+3)^2}{9} = 1$

circle 6. $x^2 - 4x + y^2 + 6y - 5 = 0$

hyperbola 7. $y^2 - 4x^2 + 32x - 6y + 1 = 80$

parabola 8. $y^2 + 2y + 2x - 1 = 0$

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

hyperbola 10. $\frac{(y-2)^2}{25} - \frac{(x+3)^2}{4} = 1$

circle 11. $x^2 + y^2 - 18x - 18y + 53 = 0$

ellipse 12. $4x^2 + 9y^2 + 24x - 90y = -225$

hyperbola 13. $x^2 - 4y^2 - 4x + 24y - 36 = 0$

circle 14. $3x^2 + 3y^2 + 18x - 6y + 3 = 0$

ellipse 15. $\frac{(x+3)^2}{9} + \frac{(y-5)^2}{4} = 1$

parabola 16. $(y+4)^2 = 12(x+1)$

hyperbola 17. $9x^2 - 4y^2 + 36x - 8y - 40 = 0$

ellipse 18. $9x^2 + 4y^2 + 36x - 8y + 4 = 0$

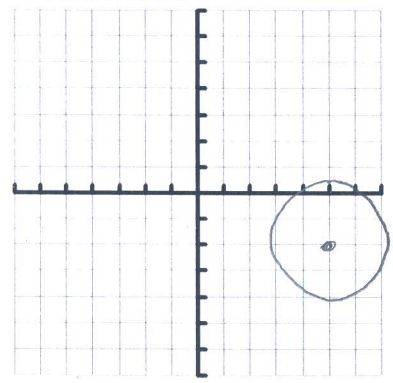
ellipse 19. $9x^2 - 8y - 40 = -4y^2 + 36x$

hyperbola 20. $x^2 - 18x + 53 = y^2 - 18y$

Graph and provide the requested information:

1. $(x-5)^2 + (y+2)^2 = 5$

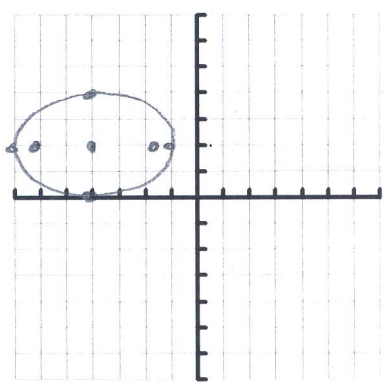
$c = (5, -2)$
 $r = \sqrt{5}$



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

$c = \sqrt{5}$

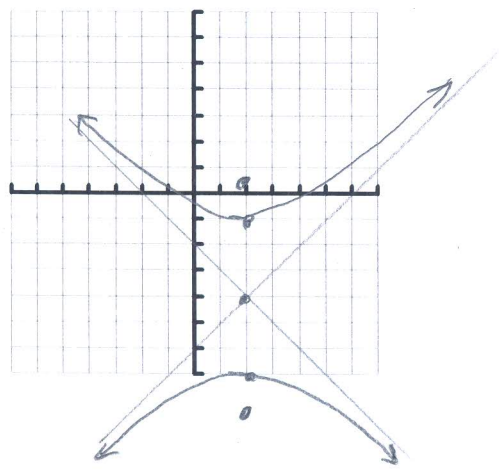
$c = (-4, 2)$
 $v = (-7, 2)$ $(-1, 2)$
 $cv = (-4, 4)$ $(-4, 0)$
 $f = (-4 \pm \sqrt{5}, 2)$
 major axis length = 6
 minor axis length = 4



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

$c = \sqrt{18}$
 $c = 3\sqrt{2}$

$c = (2, -4)$
 $v = (2, -7)$ $(2, -1)$
 $f = (2, -4 \pm 3\sqrt{2})$
 asymptotes = $y+4 = \pm 1(x-2)$
 length of transverse axis = 6



4. $y^2 = -4(x-3)$

$4p = -4$
 $p = -1$

$v = (3, 0)$
 $f = (2, 0)$
 directrix = $x = 4$
 length of LR = 4
 ends of LR = $(2, -2)$ $(2, 2)$

