

Unit 15 Study Guide

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15.1 Solve each equation by completing the square.

1) $n^2 + 4n - 37 = 8$

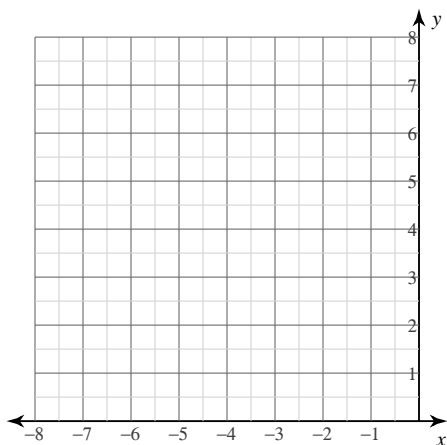
2) $5a^2 + 10a - 77 = 10$

3) $k^2 - 80 = -2k$

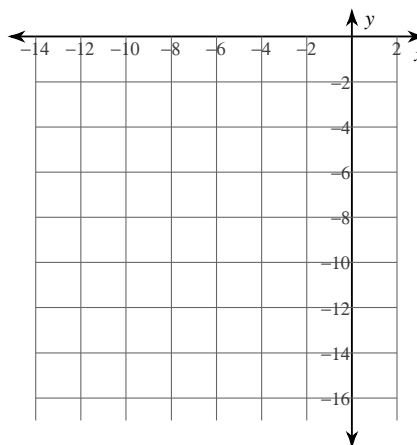
4) $5x^2 - 75 = 10x$

15.1 Sketch the graph of each function.

5) $y \geq x^2 + 4x + 7$

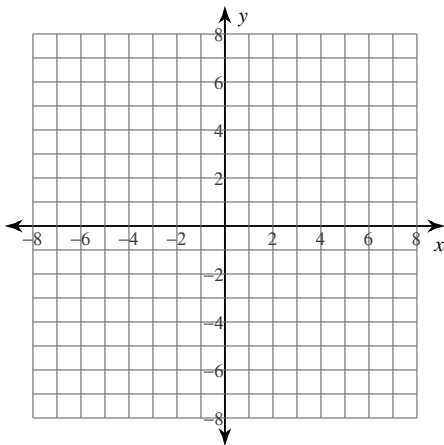


6) $y \leq -3x^2 - 12x - 16$

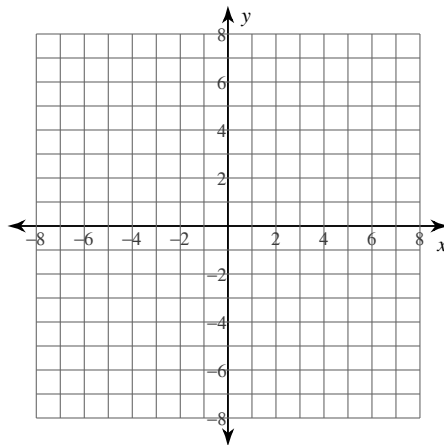


15.2 Identify the center and radius of each. Then sketch the graph.

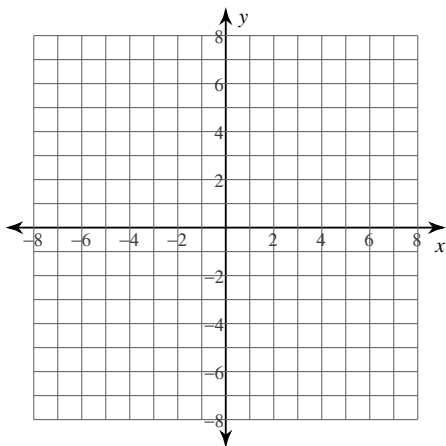
7) $(x + 4)^2 + (y + 2)^2 = 1$



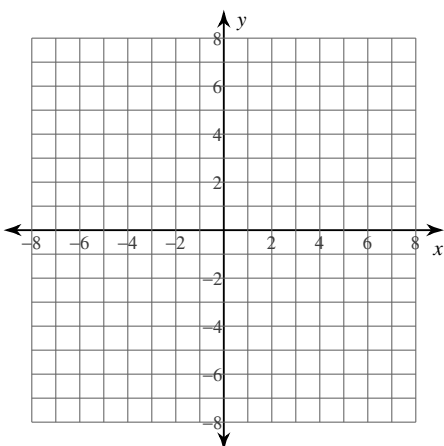
8) $(x + 3)^2 + (y + 1)^2 = 1$



9) $x^2 + y^2 + 4x - 6y + 5 = 0$

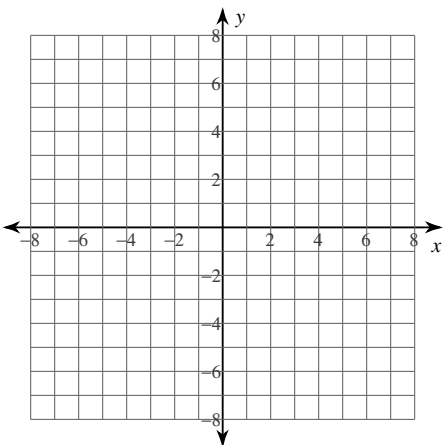


10) $4x^2 + 4y^2 + 12x - 24y - 19 = 0$

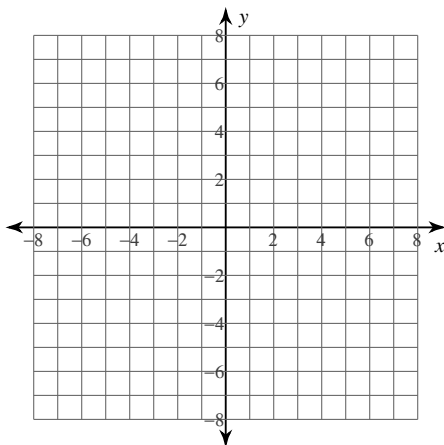


15.3 Identify the vertex and axis of symmetry of each. Then sketch the graph.

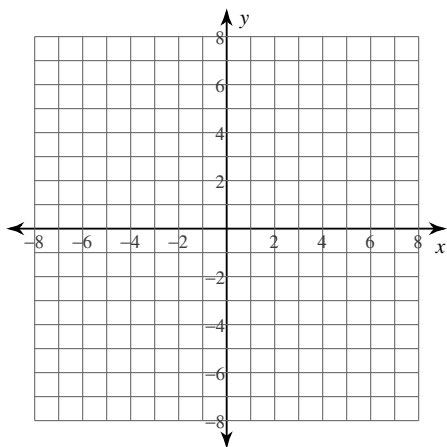
11) $x^2 - 4x + y + 10 = 0$



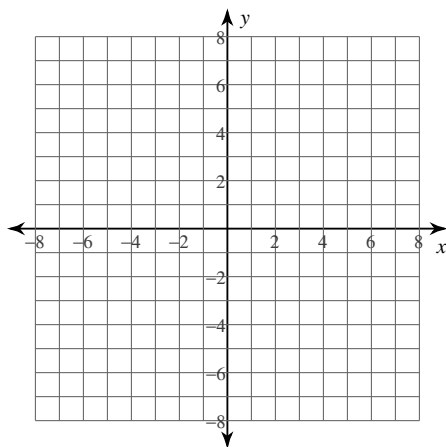
12) $x^2 + 8x + y + 15 = 0$



13) $x^2 - 2x + y + 3 = 0$



14) $-2x^2 + 16x + y - 30 = 0$

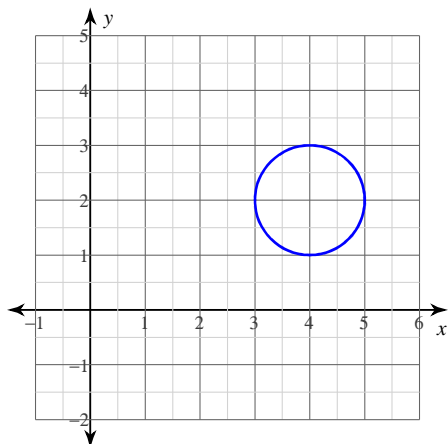


15.4 Identify the center and radius of each.

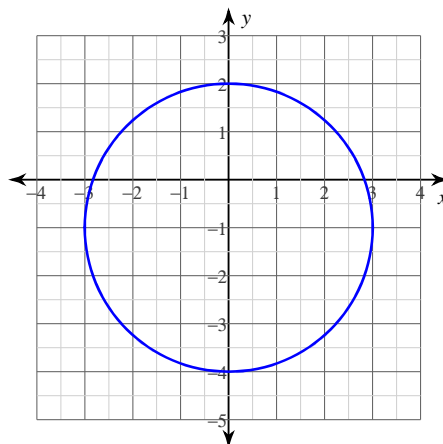
15) $x^2 + y^2 + 32x + 6y + 261 = 0$

16) $x^2 + y^2 + 8x - 6y + 21 = 0$

17)



18)



15.5 Identify the vertex, focus, axis of symmetry, and directrix of each.

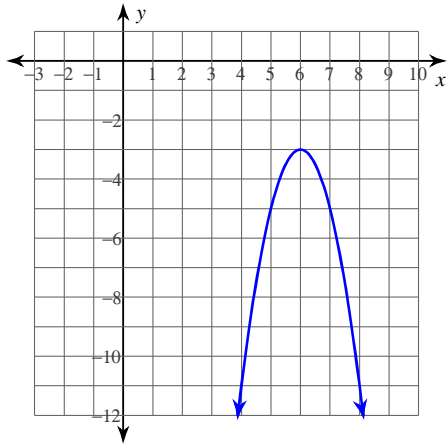
19) $x^2 - 2x + y - 5 = 0$

20) $-x^2 + 16x + 11y + 46 = 0$

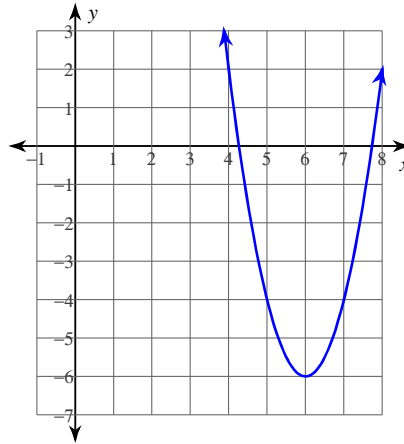
21) $y = -2(x - 9)(x - 7)$

22) $y = -(x - 8)(x - 6)$

23)



24)



15.6 Use the information provided to write the standard form equation of each circle.

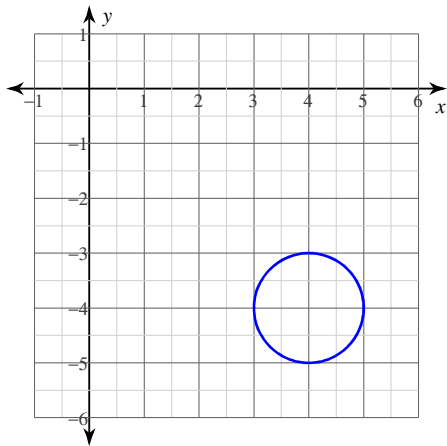
25) Center: $(3, 1)$
 Radius: $2\sqrt{33}$

26) Center: $(14, 9)$
 Circumference: 8π

27) Center: $(-7, 16)$
 Area: 9π

28) Center: $(4, 4)$
 Point on Circle: $(-3, -8)$

29)



15.7 Use the information provided to write the vertex form equation of each parabola.

30) Vertex: $(-8, 1)$, Focus: $(-8, \frac{3}{4})$

31) Vertex: $(-3, 10)$, Focus: $(-3, \frac{165}{16})$

32) Opens up or down, and passes through $(10, 3)$, $(6, -29)$, and $(13, -15)$

33) Opens up or down, and passes through $(-4, 36)$, $(-1, 0)$, and $(3, 64)$

34) Vertex: $(-1, -1)$, y-intercept: -2

35) Vertex: $(3, 9)$, y-intercept: $\frac{9}{2}$

36) Opens up or down, Vertex: $(-4, 2)$, Passes through: $(-3, 1)$

37) Opens up or down, Vertex: $(7, 6)$, Passes through: $(9, 14)$

15.8 Use the information provided to write the standard form equation of each ellipse.

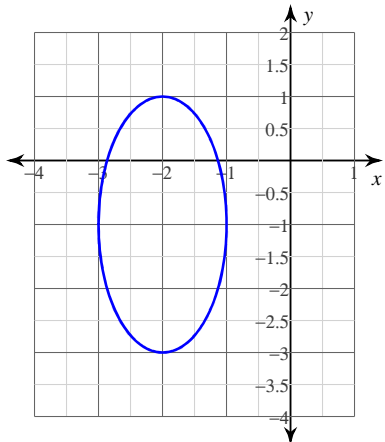
38) Vertices: $(3, -3)$, $(-13, -3)$
Foci: $(-5 + \sqrt{15}, -3)$, $(-5 - \sqrt{15}, -3)$

39) Vertices: $(23, -5)$, $(-7, -5)$
Foci: $(8 + 5\sqrt{5}, -5)$, $(8 - 5\sqrt{5}, -5)$

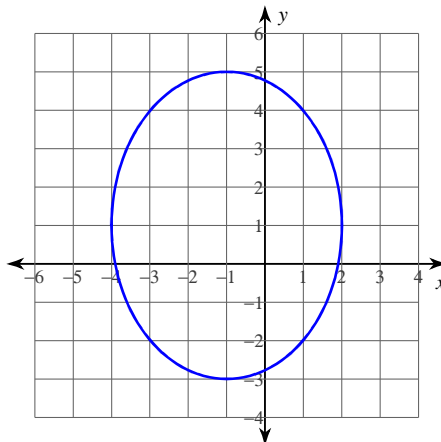
- 40) Center: $(0, 0)$
 Focus: $(4\sqrt{2}, 0)$
 Height: 14

- 41) Center: $(-7, -10)$
 Focus: $(-7, -10 + 2\sqrt{5})$
 Width: 8

42)



43)



15.9 Use the information provided to write the standard form equation of each hyperbola.

- 44) Vertices: $(9, 7), (9, 1)$
 Endpoints of Conjugate Axis: $(15, 4)$
 $(3, 4)$

- 45) Vertices: $(-4, 19), (-4, -5)$
 Endpoints of Conjugate Axis: $(4, 7)$
 $(-12, 7)$

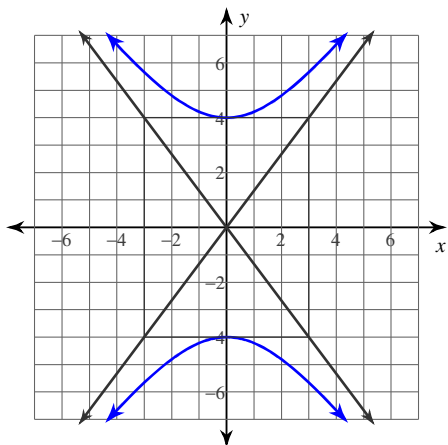
- 46) Vertices: $(0, 21), (0, -1)$
 Foci: $(0, 10 + \sqrt{185}), (0, 10 - \sqrt{185})$

- 47) Vertices: $(-8, 13), (-8, 3)$
 Foci: $(-8, 8 + 5\sqrt{2}), (-8, 8 - 5\sqrt{2})$

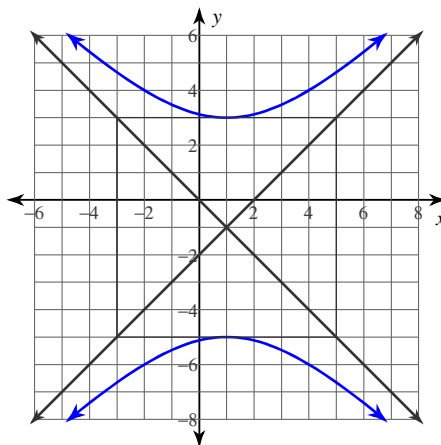
48) Center at $\left(-\frac{7}{2}, \frac{19}{2}\right)$
 Focus at $\left(-\frac{7}{2}, \frac{2\sqrt{73} + 19}{2}\right)$
 Eccentricity = $\frac{\sqrt{73}}{3}$

49) Center at $(5, -8)$
 Focus at $(5, -8 - \sqrt{221})$
 Eccentricity = $\frac{\sqrt{221}}{11}$

50)



51)



15.10 Classify each conic section.

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

53) $y = 2(x - 2)^2 - 1$

54) $x = (y + 2)^2 + 4$

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

56) $\left(x - \frac{7}{2}\right)^2 + \frac{\left(y - \frac{5}{2}\right)^2}{4} = 1$

57) $y = -(x + 4)^2 - 5$

58) $(x + 2)^2 + (y - 2)^2 = 9$

59) $(x + 2)^2 + (y + 3)^2 = 9$

$$60) \frac{(x-1)^2}{16} - \frac{y^2}{16} = 1$$

$$61) \frac{(x+3)^2}{9} + \frac{y^2}{49} = 1$$

Answers to Unit 15 Study Guide (ID: 1)

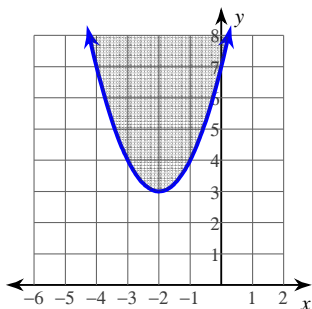
1) $\{5, -9\}$

2) $\left\{ \frac{-5 + 2\sqrt{115}}{5}, \frac{-5 - 2\sqrt{115}}{5} \right\}$

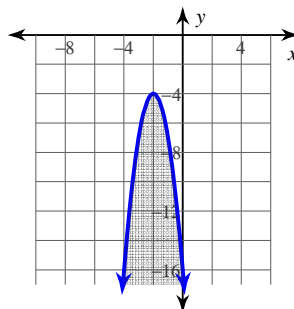
3) $\{8, -10\}$

4) $\{5, -3\}$

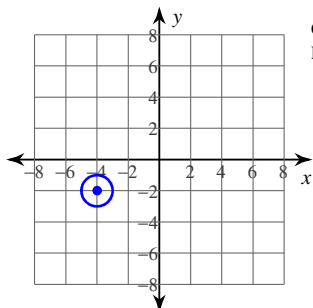
5)



6)

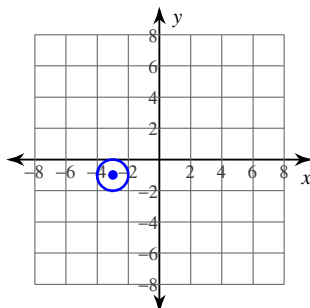


7)



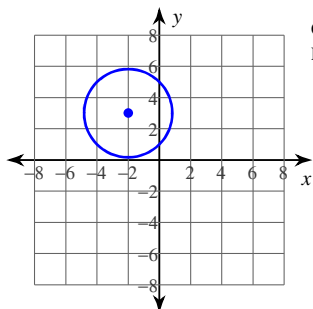
Center: $(-4, -2)$
Radius: 1

8)



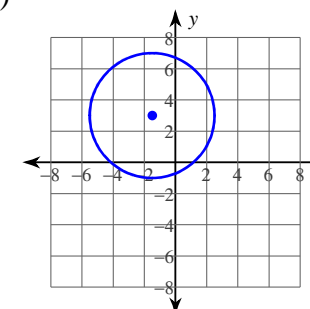
Center: $(-3, -1)$
Radius: 1

9)



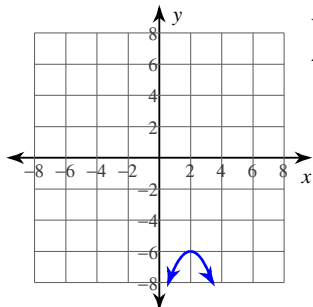
Center: $(-2, 3)$
Radius: $2\sqrt{2}$

10)



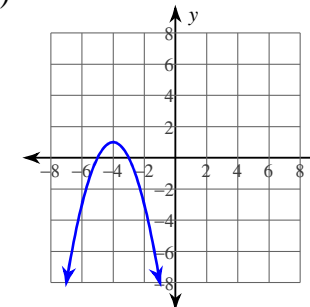
Center: $(-\frac{3}{2}, 3)$
Radius: 4

11)



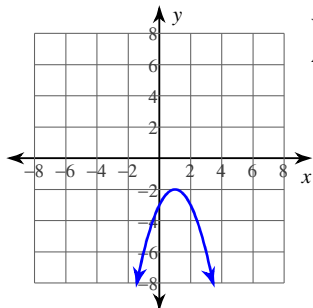
Vertex: $(2, -6)$
Axis of Sym.: $x = 2$

12)



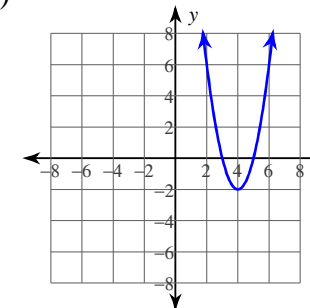
Vertex: $(-4, 1)$
Axis of Sym.: $x = -4$

13)



Vertex: $(1, -2)$
Axis of Sym.: $x = 1$

14)



Vertex: $(4, -2)$
Axis of Sym.: $x = 4$

15) Center: $(-16, -3)$
Radius: 2

16) Center: $(-4, 3)$
Radius: 2

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

- 18) $x^2 + (y + 1)^2 = 9$
- 19) Vertex: $(1, 6)$
Focus: $\left(1, \frac{23}{4}\right)$
Axis of Sym.: $x = 1$
Directrix: $y = \frac{25}{4}$
- 20) Vertex: $(8, -10)$
Focus: $\left(8, -\frac{29}{4}\right)$
Axis of Sym.: $x = 8$
Directrix: $y = -\frac{51}{4}$
- 21) Vertex: $(8, 2)$
Focus: $\left(8, \frac{15}{8}\right)$
Axis of Sym.: $x = 8$
Directrix: $y = \frac{17}{8}$
- 22) Vertex: $(7, 1)$
Focus: $\left(7, \frac{3}{4}\right)$
Axis of Sym.: $x = 7$
Directrix: $y = \frac{5}{4}$
- 23) $y = -2(x - 6)^2 - 3$
- 24) $y = 2(x - 6)^2 - 6$
- 25) $(x - 3)^2 + (y - 1)^2 = 132$
- 26) $(x - 14)^2 + (y - 9)^2 = 16$
- 27) $(x + 7)^2 + (y - 16)^2 = 9$
- 28) $(x - 4)^2 + (y - 4)^2 = 193$
- 29) $(x - 4)^2 + (y + 4)^2 = 1$
- 30) $y = -(x + 8)^2 + 1$
- 31) $y = \frac{4}{5}(x + 3)^2 + 10$
- 32) $y = -2(x - 10)^2 + 3$
- 33) $y = 4(x + 1)^2$
- 34) $y = -(x + 1)^2 - 1$
- 35) $y = -\frac{1}{2}(x - 3)^2 + 9$
- 36) $y = -(x + 4)^2 + 2$
- 37) $y = 2(x - 7)^2 + 6$
- 38) $\frac{(x + 5)^2}{64} + \frac{(y + 3)^2}{49} = 1$
- 39) $\frac{(x - 8)^2}{225} + \frac{(y + 5)^2}{100} = 1$
- 40) $\frac{x^2}{81} + \frac{y^2}{49} = 1$
- 41) $\frac{(x + 7)^2}{16} + \frac{(y + 10)^2}{36} = 1$
- 42) $(x + 2)^2 + \frac{(y + 1)^2}{4} = 1$
- 43) $\frac{(x + 1)^2}{9} + \frac{(y - 1)^2}{16} = 1$
- 44) $\frac{(y - 4)^2}{9} - \frac{(x - 9)^2}{36} = 1$
- 45) $\frac{(y - 7)^2}{144} - \frac{(x + 4)^2}{64} = 1$
- 46) $\frac{(y - 10)^2}{121} - \frac{x^2}{64} = 1$
- 47) $\frac{(y - 8)^2}{25} - \frac{(x + 8)^2}{25} = 1$
- 48) $\frac{\left(y - \frac{19}{2}\right)^2}{9} - \frac{\left(x + \frac{7}{2}\right)^2}{64} = 1$
- 49) $\frac{(y + 8)^2}{121} - \frac{(x - 5)^2}{100} = 1$
- 50) $\frac{y^2}{16} - \frac{x^2}{9} = 1$
- 51) $\frac{(y + 1)^2}{16} - \frac{(x - 1)^2}{16} = 1$
- 52) Circle
- 53) Parabola
- 54) Parabola
- 55) Hyperbola
- 56) Ellipse
- 57) Parabola
- 58) Circle
- 59) Circle
- 60) Hyperbola
- 61) Ellipse