

Unit 15 Study Guide

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15.1 Solve each equation by completing the square.

1) $m^2 - 4m - 42 = -2$

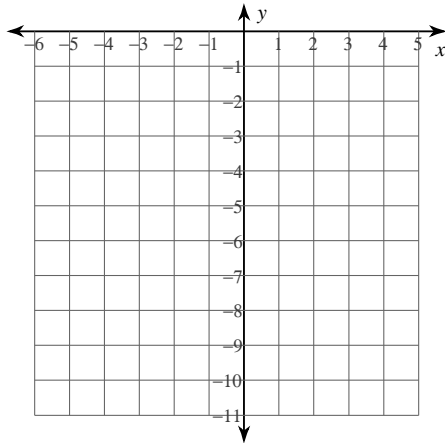
2) $4p^2 + 16p - 16 = 4$

3) $4n^2 + 11 = 16n$

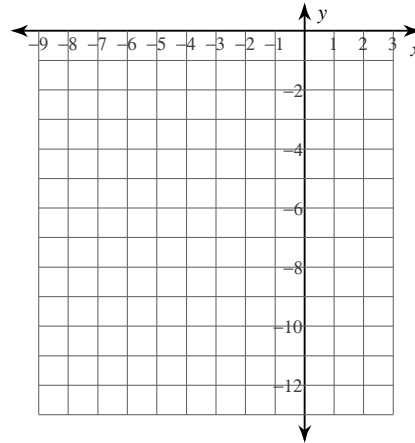
4) $x^2 - 8 = 4x$

15.1 Sketch the graph of each function.

5) $y < -2x^2 - 16x - 34$

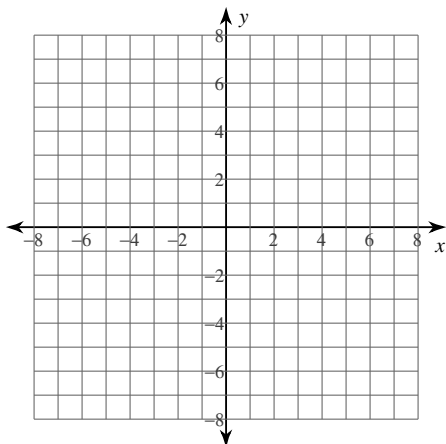


6) $y < -2x^2 - 12x - 22$

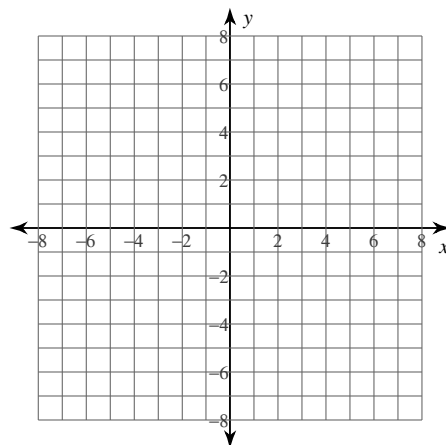


15.2 Identify the center and radius of each. Then sketch the graph.

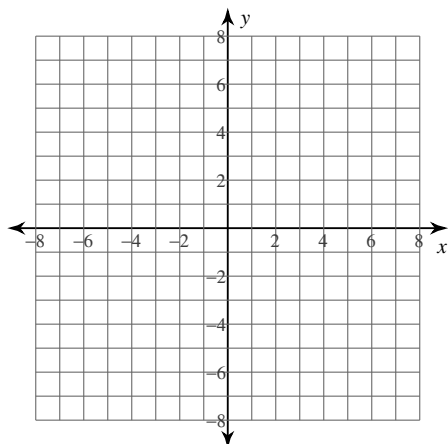
7) $(x - 2\sqrt{2})^2 + (y - 1)^2 = 4$



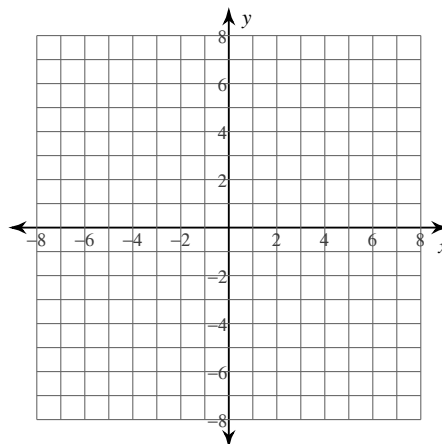
8) $(x - 2)^2 + (y - 1)^2 = 9$



9) $2x^2 + 2y^2 - 6x - 2y - 3 = 0$

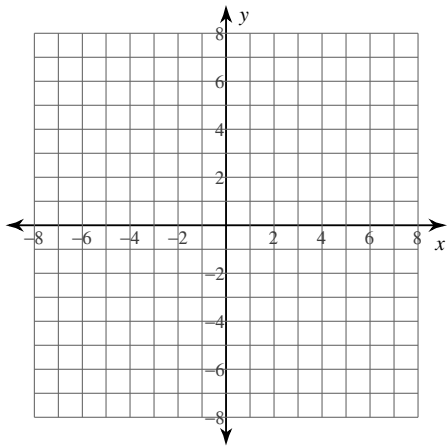


10) $x^2 + y^2 + 8x - 4y + 17 = 0$

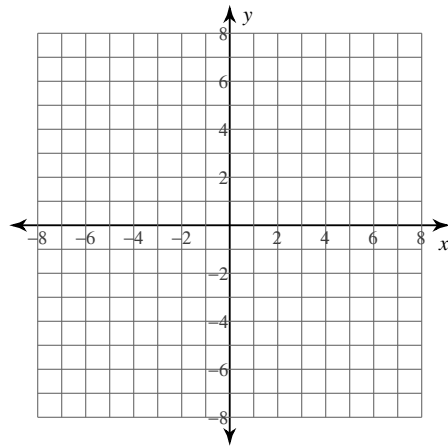


15.3 Identify the vertex and axis of symmetry of each. Then sketch the graph.

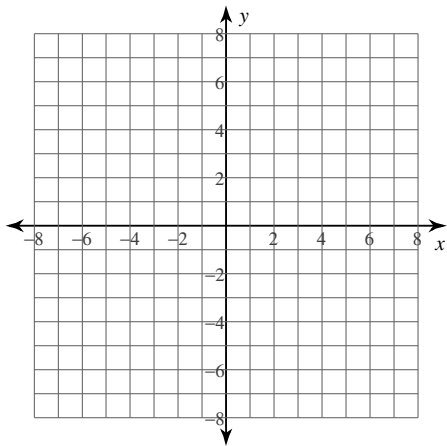
11) $-x^2 - 2x + y + 2 = 0$



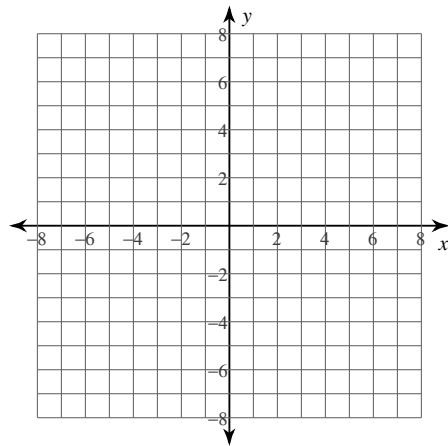
12) $x^2 - 8x + 4y + 32 = 0$



13) $-x^2 - 2x + 4y + 19 = 0$



14) $-2x^2 + 16x + y - 27 = 0$

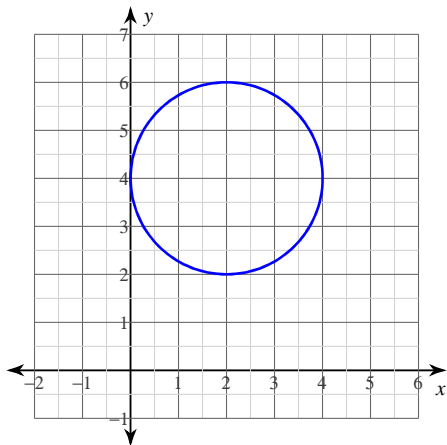


15.4 Identify the center and radius of each.

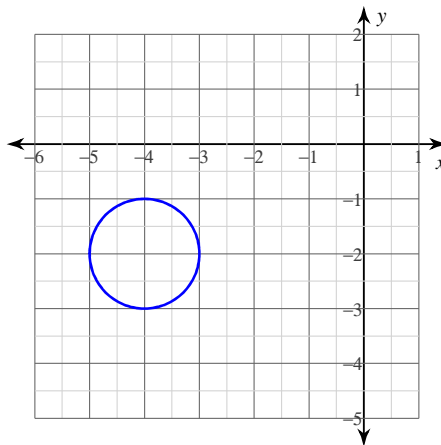
15) $x^2 + y^2 + 30x - 10y + 241 = 0$

16) $x^2 + y^2 - 14x + 4y - 11 = 0$

17)



18)



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

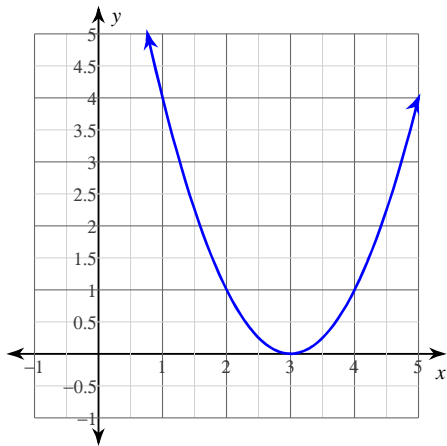
19) $-x^2 - 20x + y - 109 = 0$

20) $x^2 + 16x + 2y + 68 = 0$

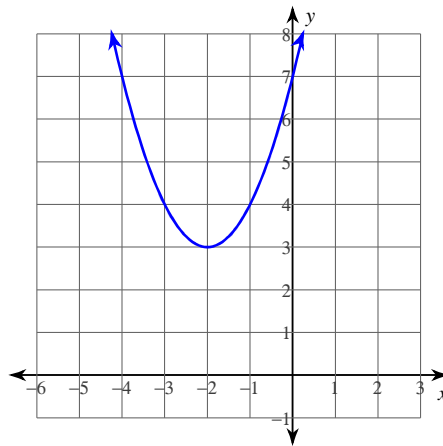
21) $y = -(x + 10)(x + 9)$

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

23)



24)



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

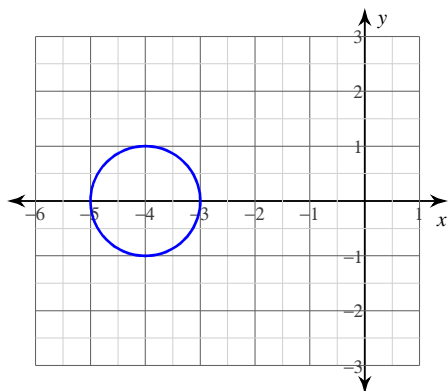
25) Center: $(-9, 2)$
Radius: 5

26) Center: $(4, 10)$
Circumference: 16π

27) Center: $(15, 16)$
Area: π

28) Center: $(17, 2)$
Point on Circle: $(15, 2)$

29)



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

30) Vertex: $(-1, 0)$, Focus: $(-1, \frac{3}{4})$

31) Vertex: $(-7, -4)$, Focus: $(-7, -\frac{15}{4})$

32) Opens up or down, and passes through $(-7, 8)$, $(-6, 15)$, and $(-10, -1)$

33) Opens up or down, and passes through $(1, 3)$, $(4, -15)$, and $(2, 1)$

34) Vertex: $(-2, 6)$, y-intercept: 22

35) Vertex: $(5, 9)$, y-intercept: $\frac{31}{4}$

36) Opens up or down, Vertex: $(8, 9)$, Passes through: $(7, 11)$

37) Opens up or down, Vertex: $(-3, 5)$, Passes through: $(-4, 6)$

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

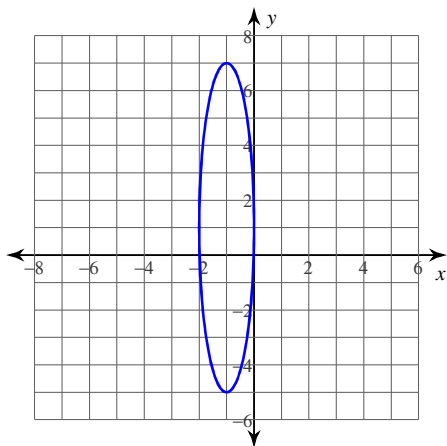
38) Vertices: $\left(\frac{1}{2}, -\frac{9}{2}\right), \left(-\frac{27}{2}, -\frac{9}{2}\right)$
Foci: $\left(\frac{2\sqrt{13}-13}{2}, -\frac{9}{2}\right), \left(\frac{-2\sqrt{13}-13}{2}, -\frac{9}{2}\right)$

39) Vertices: $(9, 6), (-7, 6)$
Foci: $(1 + 2\sqrt{15}, 6), (1 - 2\sqrt{15}, 6)$

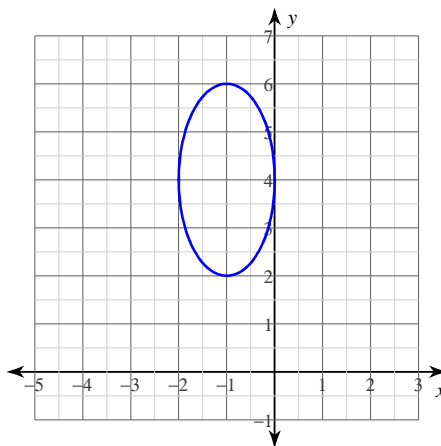
40) Center: $(4, -3)$
Focus: $(4, 3)$
Width: 16

41) Center: $(5, 9)$
Focus: $(5 + 6\sqrt{2}, 9)$
Height: 14

42)



43)



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

44) Vertices: $(2, -7 + 3\sqrt{10})$, $(2, -7 - 3\sqrt{10})$
 Endpoints of Conjugate Axis: $(2 + 3\sqrt{10}, -7)$
 $(2 - 3\sqrt{10}, -7)$

45) Vertices: $(6, 13)$, $(6, -13)$
 Endpoints of Conjugate Axis: $(11, 0)$
 $(1, 0)$

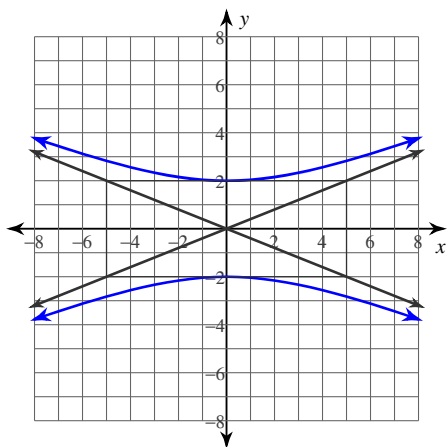
46) Vertices: $(-2, 4)$, $(-2, -8)$
 Foci: $(-2, -2 + 2\sqrt{58})$, $(-2, -2 - 2\sqrt{58})$

47) Vertices: $(10, 16)$, $(10, -8)$
 Foci: $(10, 19)$, $(10, -11)$

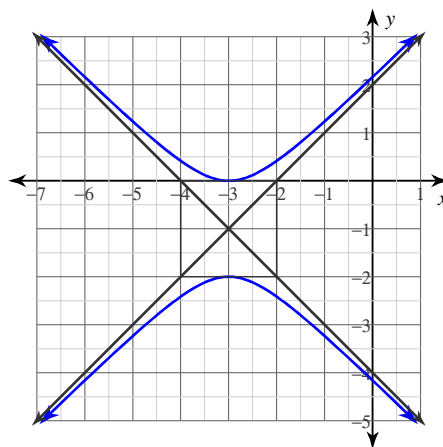
48) Center at $(2, 1)$
 Focus at $(2, 1 - \sqrt{202})$
 Eccentricity = $\frac{\sqrt{202}}{9}$

49) Center at $(-6, 7)$
 Focus at $(-6, 7 + 3\sqrt{10})$
 Eccentricity = $\sqrt{10}$

50)



51)



15.10 Classify each conic section.

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

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

54) $y = -(x - 6)^2 + 3$

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

$$56) (x+4)^2 + (y+3)^2 = 1$$

$$57) y = 2(x+6)^2$$

$$58) \frac{\left(y - \frac{1}{2}\right)^2}{4} - \frac{\left(x - \frac{1}{2}\right)^2}{16} = 1$$

$$59) \frac{(x+1)^2}{36} + (y-1)^2 = 1$$

$$60) \frac{(y-1)^2}{10} - \frac{(x-1)^2}{5} = 1$$

$$61) x = (y-5)^2 - 3$$

Answers to Unit 15 Study Guide (ID: 1)

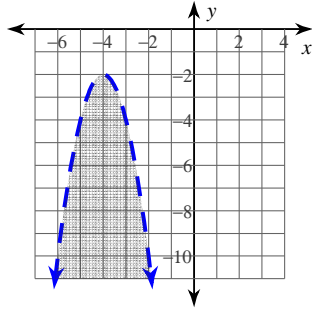
1) $\{2 + 2\sqrt{11}, 2 - 2\sqrt{11}\}$

2) $\{1, -5\}$

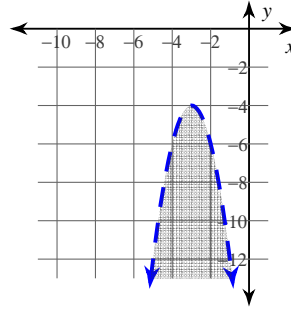
3) $\left\{\frac{4 + \sqrt{5}}{2}, \frac{4 - \sqrt{5}}{2}\right\}$

4) $\{2 + 2\sqrt{3}, 2 - 2\sqrt{3}\}$

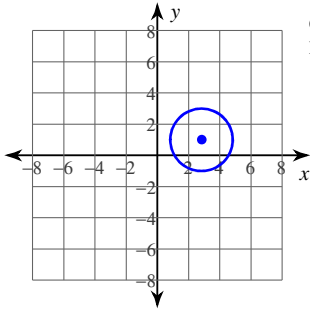
5)



6)

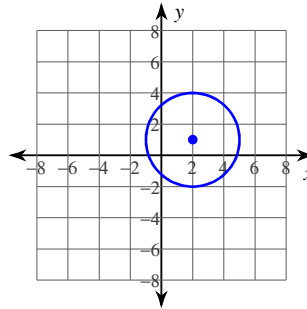


7)



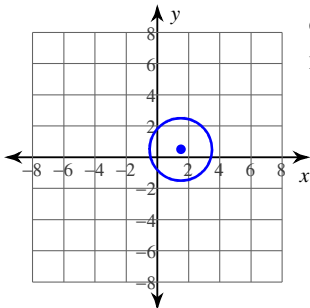
Center: $(2\sqrt{2}, 1)$
Radius: 2

8)



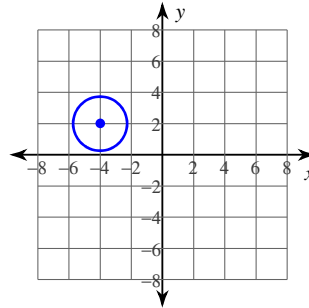
Center: $(2, 1)$
Radius: 3

9)



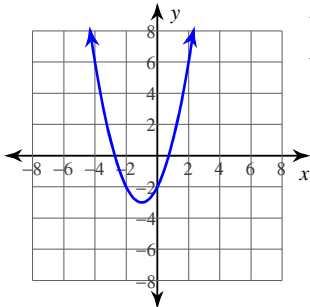
Center: $(\frac{3}{2}, \frac{1}{2})$
Radius: 2

10)



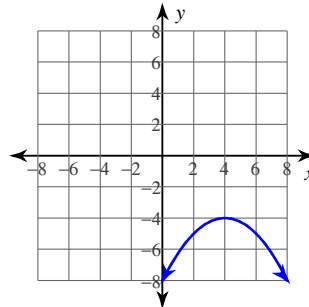
Center: $(-4, 2)$
Radius: $\sqrt{3}$

11)



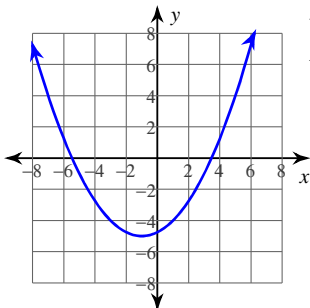
Vertex: $(-1, -3)$
Axis of Sym.: $x = -1$

12)



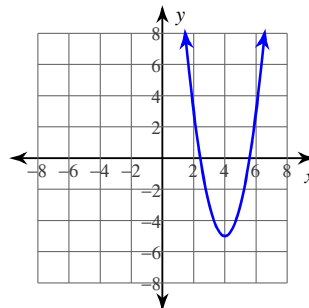
Vertex: $(4, -4)$
Axis of Sym.: $x = 4$

13)



Vertex: $(-1, -5)$
Axis of Sym.: $x = -1$

14)



Vertex: $(4, -5)$
Axis of Sym.: $x = 4$

15) Center: $(-15, 5)$
Radius: 3

16) Center: $(7, -2)$
Radius: 8

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

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

19) Vertex: $(-10, 9)$

Focus: $(-10, \frac{37}{4})$

Axis of Sym.: $x = -10$

Directrix: $y = \frac{35}{4}$

20) Vertex: $(-8, -2)$

Focus: $(-8, -\frac{5}{2})$

Axis of Sym.: $x = -8$

Directrix: $y = -\frac{3}{2}$

21) Vertex: $(-\frac{19}{2}, \frac{1}{4})$

Focus: $(-\frac{19}{2}, 0)$

Axis of Sym.: $x = -\frac{19}{2}$

Directrix: $y = \frac{1}{2}$

22) Vertex: $(3, \frac{25}{2})$

Focus: $(3, 12)$

Axis of Sym.: $x = 3$

Directrix: $y = 13$

23) $y = (x-3)^2$

24) $y = (x+2)^2 + 3$

25) $(x+9)^2 + (y-2)^2 = 25$

26) $(x-4)^2 + (y-10)^2 = 64$

27) $(x-15)^2 + (y-16)^2 = 1$

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

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

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

31) $y = (x+7)^2 - 4$

32) $y = (x+10)^2 - 1$

33) $y = -2(x-1)^2 + 3$

34) $y = 4(x+2)^2 + 6$

35) $y = -\frac{1}{20}(x-5)^2 + 9$

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

37) $y = (x+3)^2 + 5$

38) $\frac{(x+\frac{13}{2})^2}{49} + \frac{(y+\frac{9}{2})^2}{36} = 1$

39) $\frac{(x-1)^2}{64} + \frac{(y-6)^2}{4} = 1$

40) $\frac{(x-4)^2}{64} + \frac{(y+3)^2}{100} = 1$

41) $\frac{(x-5)^2}{121} + \frac{(y-9)^2}{49} = 1$

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

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

44) $\frac{(y+7)^2}{90} - \frac{(x-2)^2}{90} = 1$

45) $\frac{y^2}{169} - \frac{(x-6)^2}{25} = 1$

46) $\frac{(y+2)^2}{36} - \frac{(x+2)^2}{196} = 1$

47) $\frac{(y-4)^2}{144} - \frac{(x-10)^2}{81} = 1$

48) $\frac{(y-1)^2}{81} - \frac{(x-2)^2}{121} = 1$

49) $\frac{(y-7)^2}{9} - \frac{(x+6)^2}{81} = 1$

50) $\frac{y^2}{4} - \frac{x^2}{25} = 1$

51) $(y+1)^2 - (x+3)^2 = 1$

52) Circle

53) Circle

54) Parabola

55) Ellipse

56) Circle

57) Parabola

58) Hyperbola

59) Ellipse

60) Hyperbola

61) Parabola