Classifying Conic Sections

Classify each conic section.

1) $x^2 + y^2 = 30$

2) $x^2 + y^2 = 36$

3) $\dfrac{x^2}{9} + \dfrac{y^2}{16} = 1$

4) $x = y^2$

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

6) $\dfrac{y^2}{25} - \dfrac{x^2}{25} = 1$

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

8) $(x - 1)^2 + \dfrac{y^2}{25} = 1$

Classify each conic section and write its equation in standard form.

9) $-x^2 + 10x + y - 21 = 0$

10) $-2y^2 + x - 20y - 49 = 0$

11) $x^2 + 2x + y - 1 = 0$

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

13) $x^2 - y^2 - 2x - 8 = 0$

14) $3x^2 + 30x + y + 79 = 0$

15) $-9x^2 + y^2 - 72x - 153 = 0$

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

Answers

Classify each conic section.

1) $x^2 + y^2 = 30$

    Circle

2) $x^2 + y^2 = 36$

    Circle

3) $\dfrac{x^2}{9} + \dfrac{y^2}{16} = 1$

    Ellipse

4) $x = y^2$

    Parabola

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

    Parabola

6) $\dfrac{y^2}{25} - \dfrac{x^2}{25} = 1$

    Hyperbola

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

    Parabola

8) $(x - 1)^2 + \dfrac{y^2}{25} = 1$

    Ellipse

Classify each conic section and write its equation in standard form.

9) $-x^2 + 10x + y - 21 = 0$

    Parabola
    $y = (x - 5)^2 - 4$

10) $-2y^2 + x - 20y - 49 = 0$

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

11) $x^2 + 2x + y - 1 = 0$

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

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

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

13) $x^2 - y^2 - 2x - 8 = 0$

    Hyperbola
    $\dfrac{(x - 1)^2}{9} - \dfrac{y^2}{9} = 1$

14) $3x^2 + 30x + y + 79 = 0$

    Parabola
    $y = -3(x + 5)^2 - 4$

15) $-9x^2 + y^2 - 72x - 153 = 0$

    Hyperbola
    $\dfrac{y^2}{9} - (x + 4)^2 = 1$
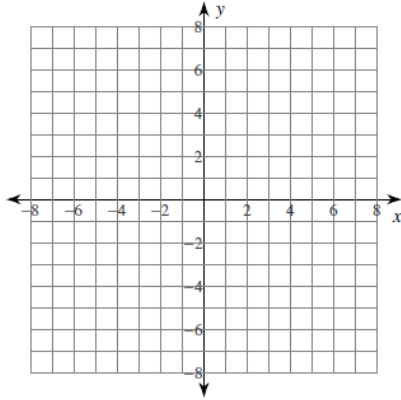
16) $-y^2 + x + 8y - 17 = 0$
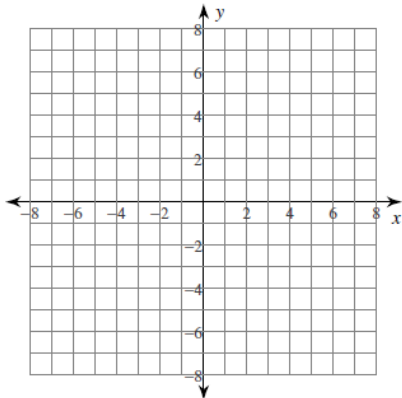
    Parabola
    $x = (y - 4)^2 + 1$

Classify each conic section, write its equation in standard form, and sketch its graph. For parabolas, identify the vertex and focus. For circles, identify the center and radius. For ellipses and hyperbolas identify the center, vertices, and foci.
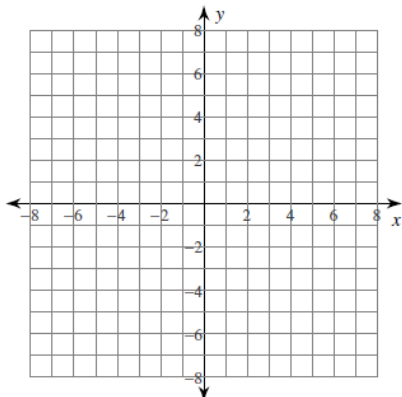
17) $-2y^2 + x - 4y + 1 = 0$

18) $-25x^2 + y^2 - 100x - 125 = 0$
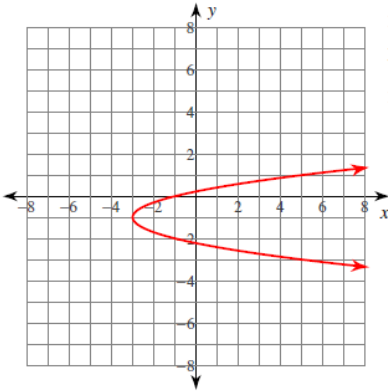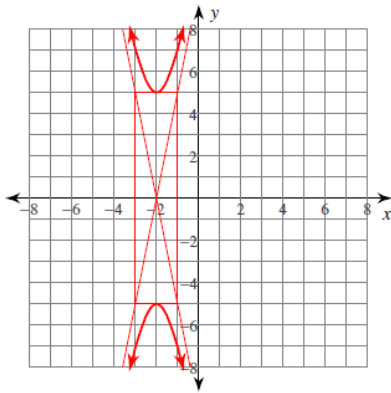

19) $4x^2 + 4y^2 - 20x - 32y + 81 = 0$

Answers

Classify each conic section, write its equation in standard form, and sketch its graph. For parabolas, identify the vertex and focus. For circles, identify the center and radius. For ellipses and hyperbolas identify the center, vertices, and foci.
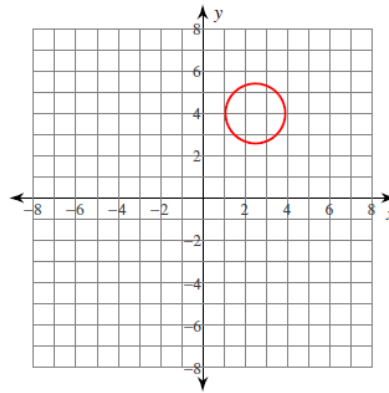
17) $-2y^2 + x - 4y + 1 = 0$

Parabola
$x = 2(y+1)^2 - 3$
Vertex: $(-3, -1)$
Focus: $\left(-\dfrac{23}{8}, -1\right)$

18) $-25x^2 + y^2 - 100x - 125 = 0$

Hyperbola
$\dfrac{y^2}{25} - (x+2)^2 = 1$
Center: $(-2, 0)$
Vertices: $(-2, 5), (-2, -5)$
Foci: $(-2, \sqrt{26}), (-2, -\sqrt{26})$
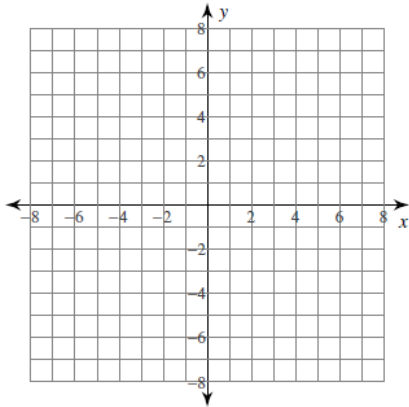
19) $4x^2 + 4y^2 - 20x - 32y + 81 = 0$

Circle
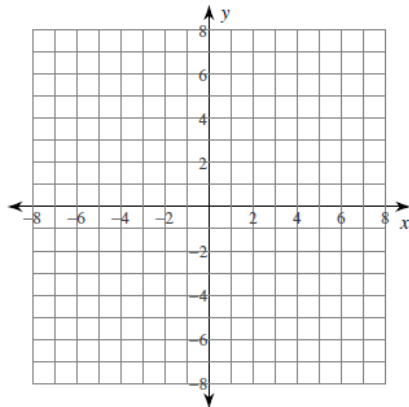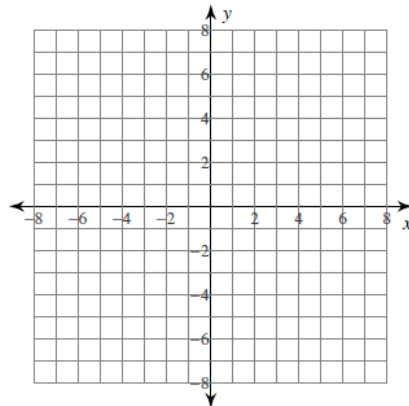$\left(x - \dfrac{5}{2}\right)^2 + (y-4)^2 = 2$
Center: $\left(\dfrac{5}{2}, 4\right)$
Radius: $\sqrt{2}$

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20) $9x^2 + 4y^2 - 54x - 8y - 59 = 0$

21) $-9x^2 + 25y^2 - 100y - 125 = 0$

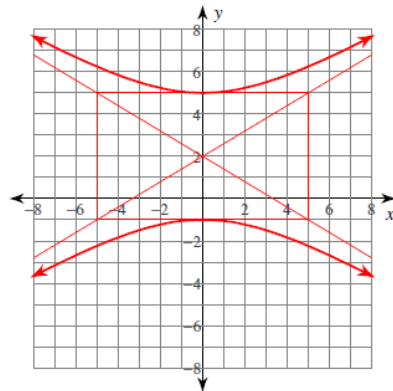22) $y^2 + x + 10y + 26 = 0$

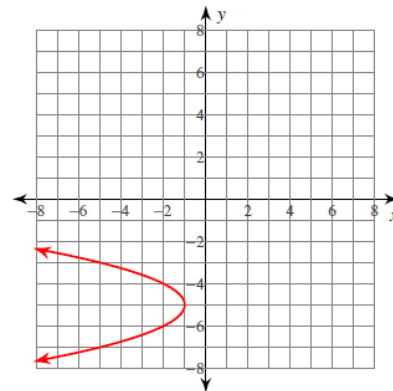# Answers

20) $9x^2 + 4y^2 - 54x - 8y - 59 = 0$
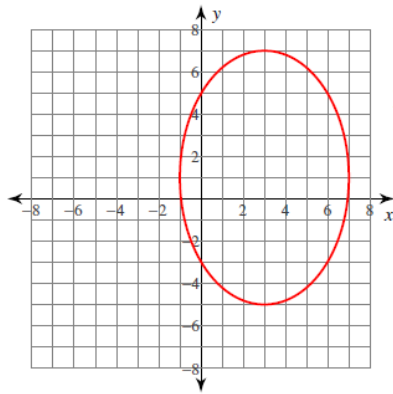
Ellipse
$$\frac{(x-3)^2}{16} + \frac{(y-1)^2}{36} = 1$$
Center: $(3, 1)$
Vertices: $(3, 7)$, $(3, -5)$
Foci: $(3, 1 + 2\sqrt{5})$, $(3, 1 - 2\sqrt{5})$

21) $-9x^2 + 25y^2 - 100y - 125 = 0$

Hyperbola
$$\frac{(y-2)^2}{9} - \frac{x^2}{25} = 1$$
Center: $(0, 2)$
Vertices: $(0, 5)$, $(0, -1)$
Foci: $(0, 2 + \sqrt{34})$, $(0, 2 - \sqrt{34})$

22) $y^2 + x + 10y + 26 = 0$

Parabola
$x = -(y + 5)^2 - 1$
Vertex: $(-1, -5)$
Focus: $\left(-\frac{5}{4}, -5\right)$