10-1

NAME ______________________ DATE ______________ PERIOD ________

Practice

Introduction to Analytic Geometry

Find the distance between each pair of points with the given coordinates. Then find the midpoint of the segment that has endpoints at the given coordinates.

1. $(-2, 1), (3, 4)$

2. $(1, 1), (9, 7)$

3. $(3, -4),(5, 2)$

4. $(-1, 2), (5, 4)$

5. $(-7, -4), (2, 8)$

6. $(-4, 10), (4, -5)$

Determine whether the quadrilateral having vertices with the given coordinates is a parallelogram.

7. $(4, 4), (2, -2), (-5, -1), (-3, 5)$

8. $(3, 5), (-1, 1), (-6, 2), (-3, 7)$

9. $(4, -1), (2, -5), (-3, -3), (-1, 1)$

10. $(2, 6), (1, 2), (-4, 4), (-3, 9)$

11. ***Hiking*** Jenna and Maria are hiking to a campsite located at (2, 1) on a map grid, where each side of a square represents 2.5 miles. If they start their hike at $(-3, 1)$, how far must they hike to reach the campsite?

SOLUTIONS

NAME ______________ DATE ______________ PERIOD ________

10-1

Practice

Introduction to Analytic Geometry

Find the distance between each pair of points with the given coordinates. Then find the midpoint of the segment that has endpoints at the given coordinates.

1. $(-2, 1), (3, 4)$
$\sqrt{34}$; (0.5, 2.5)

2. $(1, 1), (9, 7)$
10; (5, 4)

3. $(3, -4), (5, 2)$
$2\sqrt{10}$; (4, −1)

4. $(-1, 2), (5, 4)$
$2\sqrt{10}$; (2, 3)

5. $(-7, -4), (2, 8)$
15; (−2.5, 2)

6. $(-4, 10), (4, -5)$
17; (0, 2.5)

Determine whether the quadrilateral having vertices with the given coordinates is a parallelogram.

7. $(4, 4), (2, -2), (-5, -1), (-3, 5)$
yes

8. $(3, 5), (-1, 1), (-6, 2), (-3, 7)$
no

9. $(4, -1), (2, -5), (-3, -3), (-1, 1)$
yes

10. $(2, 6), (1, 2), (-4, 4), (-3, 9)$
no

11. ***Hiking*** Jenna and Maria are hiking to a campsite located at $(2, 1)$ on a map grid, where each side of a square represents 2.5 miles. If they start their hike at $(-3, 1)$, how far must they hike to reach the campsite?
12.5 mi

NAME ______________________ DATE ____________ PERIOD ________

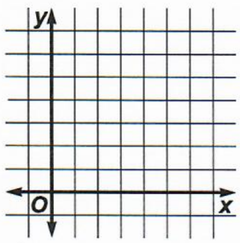
10-2

Practice

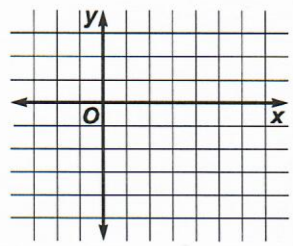
Circles

Write the standard form of the equation of each circle described. Then graph the equation.

1. center at (3, 3) tangent to the x-axis

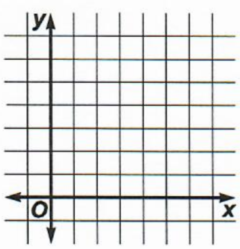


2. center at (2, −1), radius 4

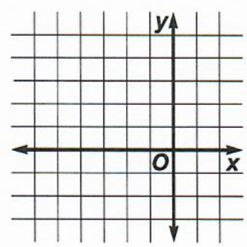


Write the standard form of each equation. Then graph the equation.

3. $x^2 + y^2 - 8x - 6y + 21 = 0$



4. $4x^2 + 4y^2 + 16x - 8y - 5 = 0$



Write the standard form of the equation of the circle that passes through the points with the given coordinates. Then identify the center and radius.

5. (−3, −2), (−2, −3), (−4, −3)

6. (0, −1), (2, −3), (4, −1)

7. ***Geometry*** A square inscribed in a circle and centered at the origin has points at (2, 2), (−2, 2), (2, −2) and (−2, −2). What is the equation of the circle that circumscribes the square?

SOLUTIONS

NAME ______________________ DATE ______________ PERIOD ________

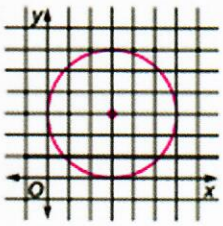
10-2 Practice

Circles

Write the standard form of the equation of each circle described. Then graph the equation.

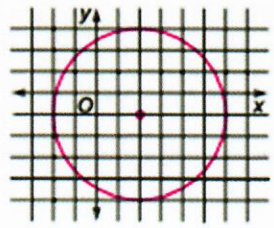
1. center at (3, 3) tangent to the x-axis

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



2. center at (2, −1), radius 4

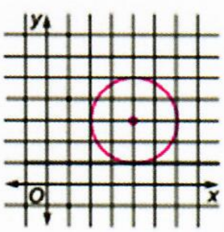
$(x - 2)^2 + (y + 1)^2 = 16$



Write the standard form of each equation. Then graph the equation.

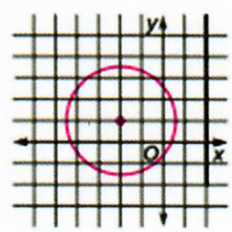
3. $x^2 + y^2 - 8x - 6y + 21 = 0$

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



4. $4x^2 + 4y^2 + 16x - 8y - 5 = 0$

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



Write the standard form of the equation of the circle that passes through the points with the given coordinates. Then identify the center and radius.

5. (−3, −2), (−2, −3), (−4, −3)

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

(−3, −3); 1

6. (0, −1), (2, −3), (4, −1)

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

(2, −1); 2

7. ***Geometry*** A square inscribed in a circle and centered at the origin has points at (2, 2), (−2, 2), (2, −2) and (−2, −2). What is the equation of the circle that circumscribes the square?

$x^2 + y^2 = 8$

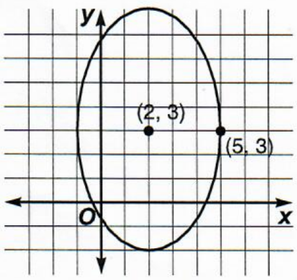
NAME ______________________ DATE ______________ PERIOD ________

Practice

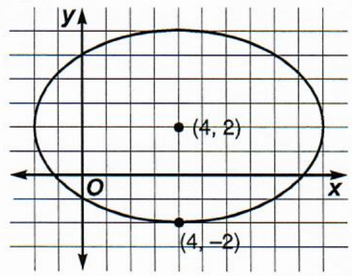
Ellipses

Write the equation of each ellipse in standard form. Then find the coordinates of its foci.

1.

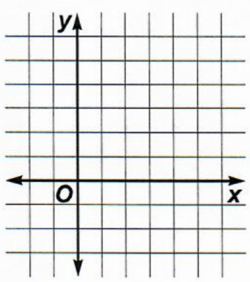


2.

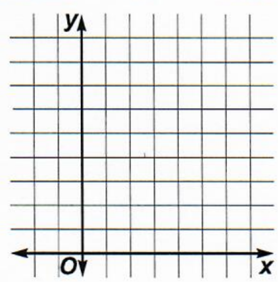


For the equation of each ellipse, find the coordinates of the center, foci, and vertices. Then graph the equation.

3. $4x^2 + 9y^2 - 8x - 36y + 4 = 0$



4. $25x^2 + 9y^2 - 50x - 90y + 25 = 0$



Write the equation of the ellipse that meets each set of conditions.

5. The center is at $(1, 3)$, the major axis is parallel to the y-axis, and one vertex is at $(1, 8)$, and $b = 3$.

6. The foci are at $(-2, 1)$ and $(-2, -7)$, and $a = 5$.

7. ***Construction*** A semi elliptical arch is used to design a headboard for a bed frame. The headboard will have a height of 2 feet at the center and a width of 5 feet at the base. Where should the craftsman place the foci in order to sketch the arch?

SOLUTIONS

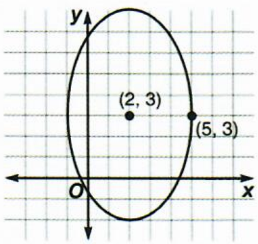
10-3 Practice

NAME ________________ DATE ________ PERIOD ______

Ellipses

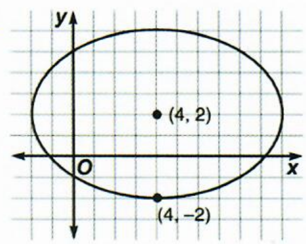
Write the equation of each ellipse in standard form. Then find the coordinates of its foci.

1.



$\frac{(y-3)^2}{25} + \frac{(x-2)^2}{9} = 1$;
$(2, -1), (2, 7)$

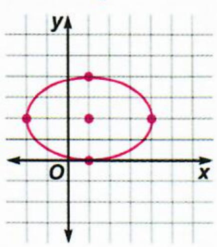
2.



$\frac{(x-4)^2}{36} + \frac{(y-2)^2}{16} = 1$;
$(4 - 2\sqrt{5}, 2), (4 + 2\sqrt{5}, 2)$

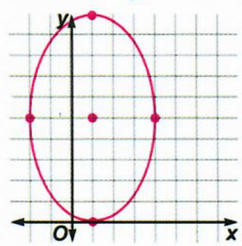
For the equation of each ellipse, find the coordinates of the center, foci, and vertices. Then graph the equation.

3. $4x^2 + 9y^2 - 8x - 36y + 4 = 0$



center: $(1, 2)$;
foci: $(1 \pm \sqrt{5}, 2)$
vertices:
$(-2, 2), (1, 4), (4, 2), (1, 0)$

4. $25x^2 + 9y^2 - 50x - 90y + 25 = 0$



center: $(1, 5)$;
foci: $(1, 9), (1, 1)$
vertices:
$(1, 10), (1, 0), (4, 5), (-2, 5)$

Write the equation of the ellipse that meets each set of conditions.

5. The center is at $(1, 3)$, the major axis is parallel to the y-axis, and one vertex is at $(1, 8)$, and $b = 3$.
$\frac{(y-3)^2}{25} + \frac{(x-1)^2}{9} = 1$

6. The foci are at $(-2, 1)$ and $(-2, -7)$, and $a = 5$.
$\frac{(y+3)^2}{25} + \frac{(x+2)^2}{9} = 1$

7. ***Construction*** A semi elliptical arch is used to design a headboard for a bed frame. The headboard will have a height of 2 feet at the center and a width of 5 feet at the base. Where should the craftsman place the foci in order to sketch the arch?
1.5 ft from the center

NAME ______________________ DATE ______________ PERIOD ________

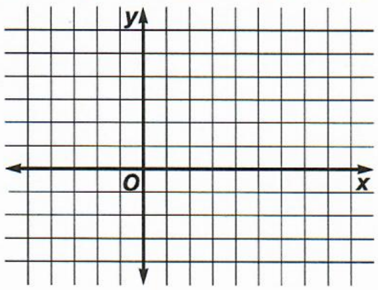
10-4

Practice

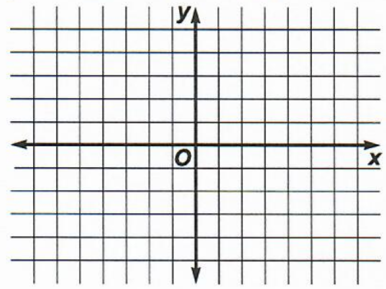
Hyperbolas

For each equation, find the coordinates of the center, foci, and vertices, and the equations of the asymptotes of its graph. Then graph the equation.

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

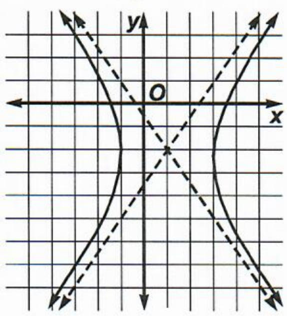


2. $y^2 - 4x^2 + 8x = 20$

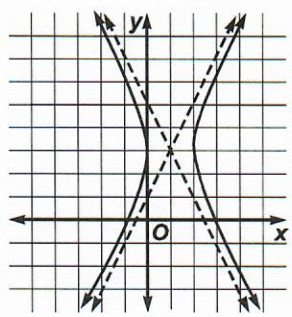


Write the equation of each hyperbola.

3.



4.



5. Write an equation of the hyperbola for which the length of the transverse axis is 8 units, and the foci are at (6, 0) and (−4, 0).

6. ***Environmental Noise*** Two neighbors who live one mile apart hear an explosion while they are talking on the telephone. One neighbor hears the explosion two seconds before the other. If sound travels at 1100 feet per second, determine the equation of the hyperbola on which the explosion was located.

SOLUTIONS

10-4

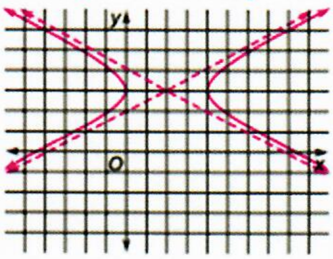
NAME ______________________ DATE ______________ PERIOD ________

Practice

Hyperbolas

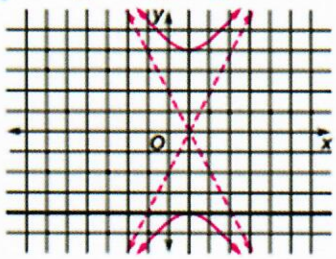
For each equation, find the coordinates of the center, foci, and vertices, and the equations of the asymptotes of its graph. Then graph the equation.

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



center: (2, 3); foci $(2 \pm \sqrt{5}, 3)$;
vertices: (0, 3), (4, 3);
asymptotes: $y - 3 = \pm\frac{1}{2}(x - 2)$

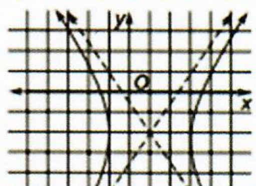
2. $y^2 - 4x^2 + 8x = 20$



center: (1, 0); foci: $(1, \pm 2\sqrt{5})$;
vertices: (1, ±4)
asymptotes: $y = \pm 2(x - 1)$

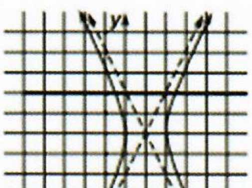
Write the equation of each hyperbola.

3.



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

4.



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

5. Write an equation of the hyperbola for which the length of the transverse axis is 8 units, and the foci are at (6, 0) and (−4, 0).

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

6. ***Environmental Noise*** Two neighbors who live one mile apart hear an explosion while they are talking on the telephone. One neighbor hears the explosion two seconds before the other. If sound travels at 1100 feet per second, determine the equation of the hyperbola on which the explosion was located.

$\frac{x^2}{1{,}210{,}000} - \frac{y^2}{5{,}759{,}600} = 1$

NAME ______________________ DATE ______________ PERIOD ________

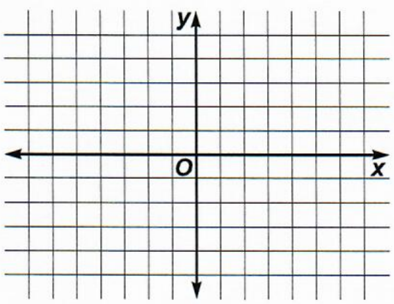
10-5

Practice

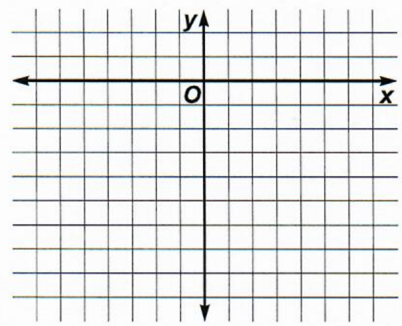
Parabolas

For the equation of each parabola, find the coordinates of the vertex and focus, and the equations of the directrix and axis of symmetry. Then graph the equation.

1. $x^2 - 2x - 8y + 17 = 0$

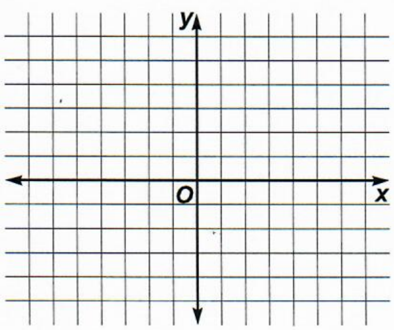


2. $y^2 + 6y + 9 = 12 - 12x$

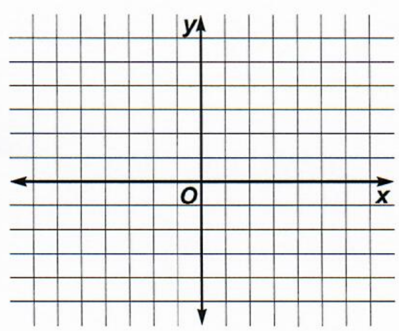


Write the equation of the parabola that meets each set of conditions. Then graph the equation.

3. The vertex is at $(-2, 4)$ and the focus is at $(-2, 3)$.



4. The focus is at $(2, 1)$, and the equation of the directrix is $x = -2$.



5. ***Satellite Dish*** Suppose the receiver in a parabolic dish antenna is 2 feet from the vertex and is located at the focus. Assume that the vertex is at the origin and that the dish is pointed upward. Find an equation that models a cross section of the dish.

SOLUTIONS

NAME ______________________ DATE ______________ PERIOD ________

10-5

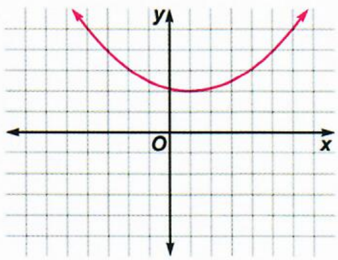
Practice

Parabolas

For the equation of each parabola, find the coordinates of the vertex and focus, and the equations of the directrix and axis of symmetry. Then graph the equation.

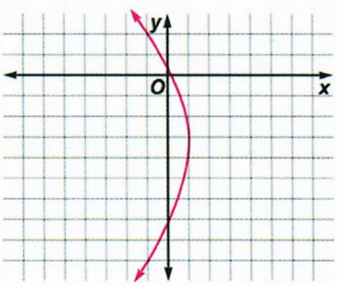
1. $x^2 - 2x - 8y + 17 = 0$

vertex: (1, 2); focus: (1, 4);
directrix: $y = 0$;
axis of symmetry: $x = 1$



2. $y^2 + 6y + 9 = 12 - 12x$

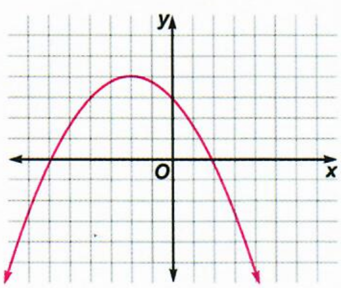
vertex: (1, −3); focus: (−2, −3)
directrix: $x = 4$;
axis of symmetry: $y = -3$



Write the equation of the parabola that meets each set of conditions. Then graph the equation.

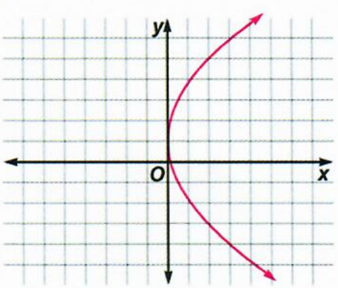
3. The vertex is at (−2, 4) and the focus is at (−2, 3).

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



4. The focus is at (2, 1), and the equation of the directrix is $x = -2$.

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



5. ***Satellite Dish*** Suppose the receiver in a parabolic dish antenna is 2 feet from the vertex and is located at the focus. Assume that the vertex is at the origin and that the dish is pointed upward. Find an equation that models a cross section of the dish.

$x^2 = 8y$

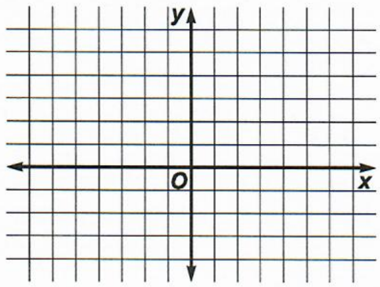
NAME ______________________________ DATE ________________ PERIOD ________

Practice

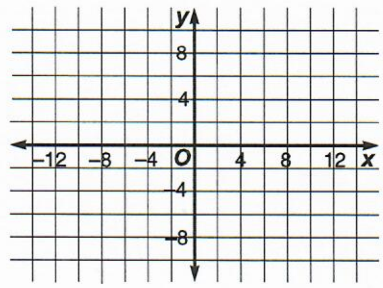
Rectangular and Parametric Forms of Conic Sections

Identify the conic section represented by each equation. Then write the equation in standard form and graph the equation.

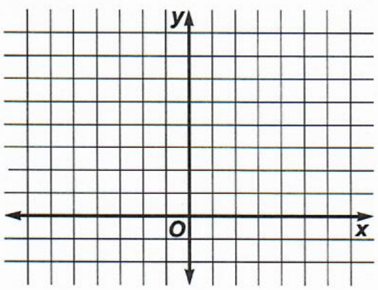
1. $x^2 - 4y + 4 = 0$



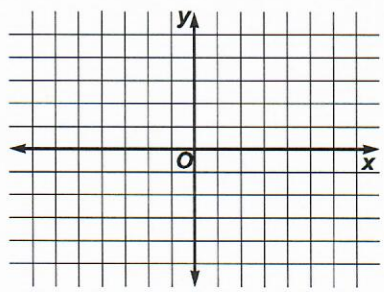
2. $x^2 + y^2 - 6x - 6y - 18 = 0$



3. $4x^2 - y^2 - 8x + 6y = 9$

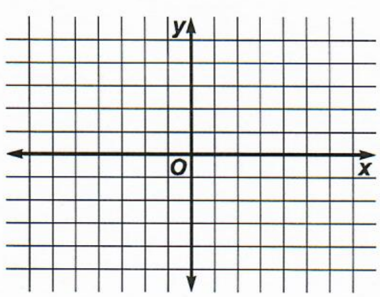


4. $9x^2 + 5y^2 + 18x = 36$

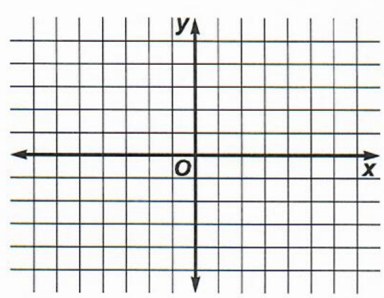


Find the rectangular equation of the curve whose parametric equations are given. Then graph the equation using arrows to indicate orientation.

5. $x = 3 \cos t, y = 3 \sin t, 0 \leq t \leq 2\pi$



6. $x = -4 \cos t, y = 5 \sin t, 0 \leq t \leq 2\pi$



SOLUTIONS

NAME ______________ DATE ______________ PERIOD ______________

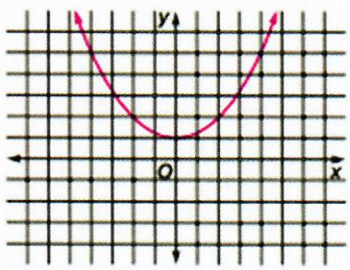
Practice

Rectangular and Parametric Forms of Conic Sections

Identify the conic section represented by each equation. Then write the equation in standard form and graph the equation.

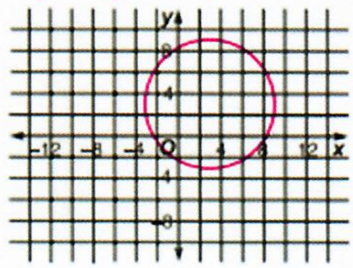
1. $x^2 - 4y + 4 = 0$

parabola; $x^2 = 4(y - 1)$



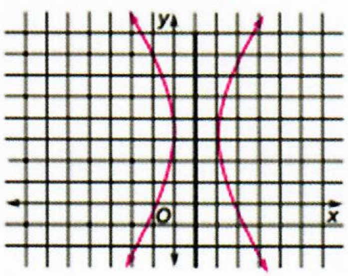
2. $x^2 + y^2 - 6x - 6y - 18 = 0$

circle;
$(x - 3)^2 + (y - 3)^2 = 36$



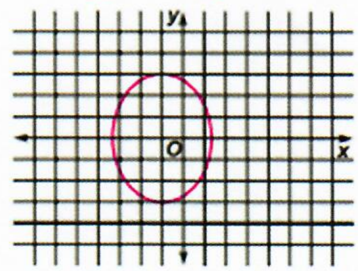
3. $4x^2 - y^2 - 8x + 6y = 9$

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



4. $9x^2 + 5y^2 + 18x = 36$

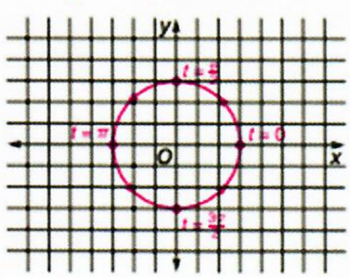
ellipse; $\frac{(x+1)^2}{5} + \frac{y^2}{9} = 1$



Find the rectangular equation of the curve whose parametric equations are given. Then graph the equation using arrows to indicate orientation.

5. $x = 3 \cos t, y = 3 \sin t, 0 \leq t \leq 2\pi$

$x^2 + y^2 = 9$



6. $x = -4 \cos t, y = 5 \sin t, 0 \leq t \leq 2\pi$

$\frac{x^2}{16} + \frac{y^2}{25} = 1$