Warm-Up

40. Verify that $2\sec^2 x = \dfrac{1}{1+\sin x} + \dfrac{1}{1-\sin x}$ is an identity. *(Lesson 7-2)*

41. A circle has a radius of 12 inches. Find the degree measure of the central angle subtended by an arc 11.5 inches long. *(Lesson 6-1)*

42. Find sin 390°. *(Lesson 5-3)*

43. Solve $z^2 - 8z = -14$ by completing the square. *(Lesson 4-2)*

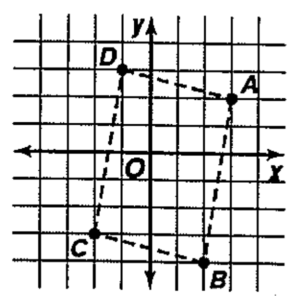
Notes

Distance Formula for Two Points	The distance, d units, between two points with coordinates (x_1, y_1) and (x_2, y_2) is given by $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Guided Practice

Example 1: Find the distance between points at (-3, 7) and (2, -5).

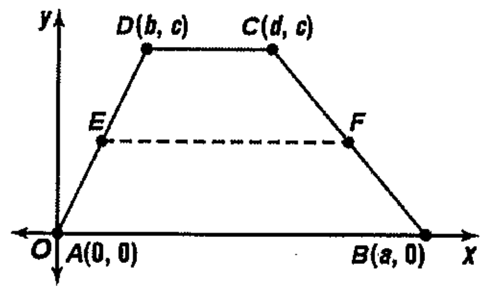
Example 2: Determine whether quadrilateral ABCD with vertices A(3, 2), B(2, -4), C(-2, -3), and D(-1, 3) is a parallelogram.



Midpoint of a Line Segment	If the coordinates of P_1 and P_2 are (x_1, y_1) and (x_2, y_2), respectively, then the midpoint of $\overline{P_1P_2}$ has coordinates $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$.

Example 3: Find the coordinates of the midpoint of the segment that has endpoints at (-2, 4) and (6, -5).

Example 4: Prove that the measure of the median of a trapezoid is equal to one half of the sum of the measures of the two bases.



Class work

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

12. $(-1, 1), (4, 13)$ **13.** $(1, 3), (-1, -3)$ **14.** $(8, 0), (0, 8)$

15. $(-1, -6), (5, -3)$ **16.** $\left(3\sqrt{2}, -5\right), \left(7\sqrt{2}, -1\right)$ **17.** $(a, 7), (a, -9)$

18. $(6 + r, s), (r - 2, s)$ **19.** $(c, d), (c + 2, d - 1)$ **20.** $(w - 2, w), (w, 4w)$

21. Find all values of a so that the distance between points at $(a, -9)$ and $(-2a, 7)$ is 20 units.

22. If $M\left(-3, \frac{5}{2}\right)$ is the midpoint of $\overline{CD}$ and C has coordinates $(4, -1)$, find the coordinates of D.

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

23. $(-2, 3), (-3, -2), (2, -3), (3, 2)$ **24.** $(4, 11), (8, 14), (4, 19), (0, 15)$

25. Collinear points lie on the same line. Find the value of k for which the points $(15, 1), (-3, -8)$, and $(3, k)$ are collinear.

Warm-Up

50. Find the distance between points at (4, −3) and (−2, 6). *(Lesson 10-1)*

51. Simplify $(2 + i)(3 - 4i)(1 + 2i)$. *(Lesson 9-5)*

52. **Sports** Patrick kicked a football with an initial velocity of 60 ft/s at an angle of 60° to the horizontal. After 0.5 seconds, how far has the ball traveled horizontally and vertically. *(Lesson 8-7)*

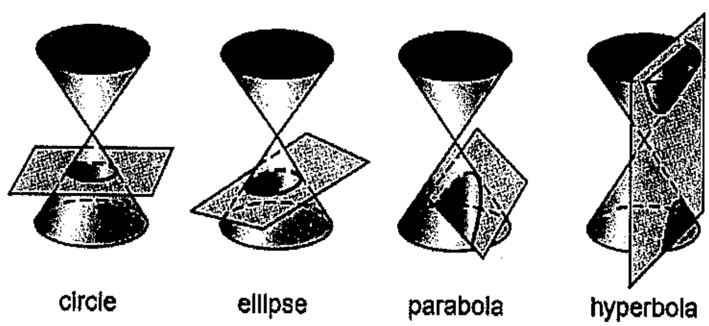
53. **Toys** A toy boat floats on the water bobbing up and down. The distance between its highest and lowest point is 5 centimeters. It moves from its highest point down to its lowest point and back up to its highest point every 20 seconds. Write a cosine function that models the movement of the boat in relationship to the equilibrium point. *(Lesson 6-6)*

54. Find the area to the nearest square unit of $\triangle ABC$ if $a = 15$, $b = 25$, and $c = 35$. *(Lesson 5-8)*

Notes

A circle is one type of **conic section.** Conic sections, which include circles, parabolas, ellipses and hyperbolas, were first studied in ancient Greece sometime between 600 and 300 B.C. The Greeks were largely concerned with the properties, not the applications, of conics. In the seventeenth century, applications of conics became prominent in the development of calculus.

Conic sections are used to describe all of the possible ways a plane and a double right cone can intersect. In forming the four basic conics, the plane does not pass through the vertex of the cone.



Standard Form of the Equation of a Circle

The standard form of the equation of a circle with radius r and center at (h, k) is

$$(x - h)^2 + (y - k)^2 = r^2.$$

Guided Practice

Example 1: Write the standard form of the equation of a circle that is tangent to the x-axis and has its center at (3, -2). Then graph the equation.

Example 2: Portable autonomous digital seismographs (PADSs) are used to investigate the strong ground motions produced by the aftershocks of large earthquakes. Suppose a PADS is deployed 2 miles west and 3.5 miles south of downtown Olympia, Washington, to record the aftershocks of a recent earthquake. While there, the PADS detects and records the seismic activity of another quake located 24 miles away. What are all the possible locations of this earthquake's epicenter? Write an equation for the set of points representing all possible locations of the earthquake's epicenter. Let downtown Olympia, Washington, be located at the origin. Graph the equation found.

General Form of the Equation of a Circle	The general form of the equation of a circle is $$x^2 + y^2 + Dx + Ey + F = 0,$$ where D, E, and F are constants.

Example 3: The equation of a circle is $2x^2 + 2y^2 - 4x + 12y - 18 = 0$

(a) Write the standard form of the equation

(b) Find the radius and the coordinates of the center

(c) Graph the equation

Example 4: Write the standard form of the equation of the circle that passes through the points at (5, 3), (-2, 2) and (-1, -5). **(Using Matrices and rref)** Then identify the center and radius of the circle.

Class work

EXERCISES

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

15. center at (0, 0), radius 5

16. center at $(-4, 7)$, radius $\sqrt{3}$

17. center at $(-1, -3)$, radius $\frac{\sqrt{2}}{2}$

18. center at $(-5, 0)$, radius $\frac{9}{2}$

19. center at (6, 1), tangent to the y-axis

20. center at $(3, -2)$, tangent to $y = 2$

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

21. $36 - x^2 = y^2$

22. $x^2 + y^2 + y = \frac{3}{4}$

23. $x^2 + y^2 - 4x + 12y + 30 = 0$

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

25. $6x^2 - 12x + 6y^2 + 36y = 36$

26. $16x^2 + 16y^2 - 8x - 32y = 127$

27. Write $x^2 + y^2 + 14x + 24y + 157 = 0$ in standard form. Then graph the equation.

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.

28. $(0, -1), (-3, -2), (-6, -1)$

29. $(7, -1), (11, -5), (3, -5)$

30. $(-2, 7), (-9, 0), (-10, -5)$

31. $(-2, 3), (6, -5), (0, 7)$

32. $(4, 5), (-2, 3), (-4, -3)$

33. $(1, 4), (2, -1), (-3, 0)$

34. Write the standard form of the equation of the circle that passes through the origin and points at $(2.8, 0)$ and $(5, 2)$.

Write the equation of the circle that satisfies each set of conditions.

35. The circle passes through the origin and has its center at $(-4, 3)$.

36. The circle passes through the point $(5, 6)$ and has its center at $(2, 3)$.

37. The endpoints of a diameter are at $(2, 3)$ and at $(-6, -5)$.

38. The points at $(-3, 4)$ and $(2, 1)$ are the endpoints of a diameter.

39. The circle is tangent to the line with equation $x + 3y = -2$ and has its center at $(5, 1)$.

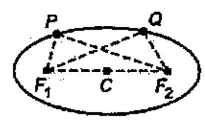
40. The center of the circle is on the x-axis, its radius is 1, and it passes through the point at $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$.

Warm-Up

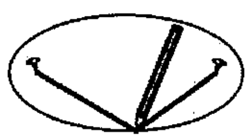
56. If $\sin\theta = \frac{7}{8}$ and the terminal side of θ is in the first quadrant, find $\cos 2\theta$. *(Lesson 7-4)*
57. Write an equation of the cosine function with an amplitude of 4, a period of 180°, and a phase shift of 20°. *(Lesson 6-5)*
58. Solve $\triangle ABC$ if $C = 121°32'$, $B = 42°5'$, and $a = 4.1$. Round angle measures to the nearest minute and side measures to the nearest tenth. *(Lesson 5-6)*
59. Use the Remainder Theorem to find the remainder for the quotient $(x^4 - 4x^3 - 2x^2 - 1) \div (x - 5)$. Then, state whether the binomial is a factor of the polynomial. *(Lesson 4-3)*
60. Determine whether the point at $(-2, -16)$ is the location of a *minimum*, a *maximum*, or a *point of inflection* for the function $x^2 + 4x - 12$. *(Lesson 3-6)*
61. Sketch the graph of $g(x) = |x - 2|$. *(Lesson 3-2)*

Notes

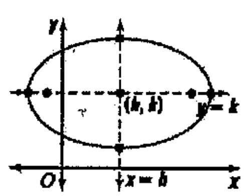
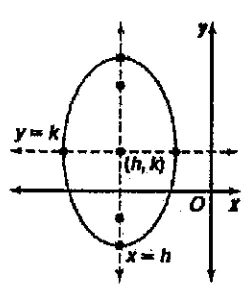
An **ellipse** is the set of all points in the plane, the sum of whose distances from two fixed points, called **foci**, is constant. In the figure at the right, F_1 and F_2 are the foci, and the midpoint C of the line segment joining the foci is called the **center** of the ellipse. P and Q are any two points on the ellipse. By definition, $PF_1 + PF_2 = QF_1 + QF_2$.



Foci (FOH sigh) is the plural of focus.

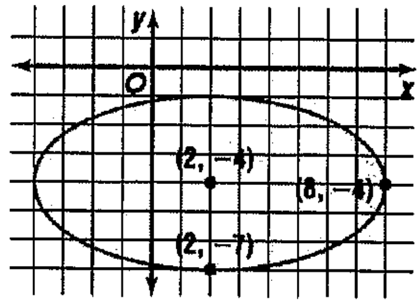


To help visualize this definition, imagine tacking two ends of a string at the foci and using a pencil to trace a curve as it is held tight against the string. The curve which results will be an ellipse since the sum of the distances to the foci, the total length of the string, remains constant.

Standard Form of the Equation of an Ellipse	Orientation	Description
$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$, where $c^2 = a^2 - b^2$		Center: (h, k) Foci: $(h \pm c, k)$ Major axis: $y = k$ Major axis vertices: $(h \pm a, k)$ Minor axis: $x = h$ Minor axis vertices: $(h, k \pm b)$
$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$, where $c^2 = a^2 - b^2$		Center: (h, k) Foci: $(h, k \pm c)$ Major axis: $x = h$ Major axis vertices: $(h, k \pm a)$ Minor axis: $y = k$ Minor axis vertices: $(h \pm b, k)$

Guided Practice

Example 1: Consider the ellipse graphed below.



(a) Write the equation of the ellipse in standard form

(b) Find the coordinates of the foci

Example 2:

For the equation $\frac{(y-3)^2}{25} + \frac{(x+4)^2}{9} = 1$, find the coordinates of the center, foci, and vertices of the ellipse. Then graph the equation.

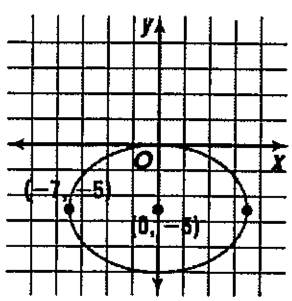
Example 3:

Find the coordinates of the center, the foci, and the vertices of the ellipse with the equation $4x^2 + 9y^2 - 40x + 36y + 100 = 0$. Then graph the equation.

Class work

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

16.



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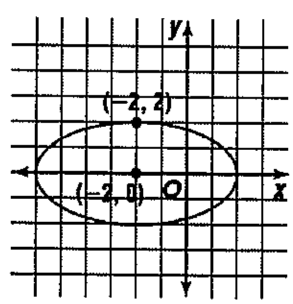

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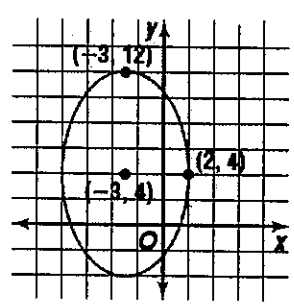


For the equation of each ellipse, find the coordinates of the center, foci, and vertices. Then graph the equation.

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

20. $\frac{(x-6)^2}{100} + \frac{(y-7)^2}{121} = 1$

21. $\frac{(x-4)^2}{16} + \frac{(y+6)^2}{9} = 1$

22. $\frac{x^2}{4} + \frac{y^2}{9} = 1$

23. $4x^2 + y^2 - 8x + 6y + 9 = 0$

24. $16x^2 + 25y^2 - 96x - 200y = -144$

25. $3x^2 + y^2 + 18x - 2y + 4 = 0$

26. $6x^2 - 12x + 6y^2 + 36y = 36$

27. $18y^2 + 12x^2 - 144y - 48x = -120$

28. $4y^2 - 8y + 9x^2 - 54x + 49 = 0$

29. $49x^2 + 16y^2 + 160y - 384 = 0$

30. $9y^2 + 108y + 4x^2 - 56x = -484$

Warm-Up

50. Write $x^2 + y^2 - 4x + 14y - 28 = 0$ in standard form. Then graph the equation. *(Lesson 10-2)*

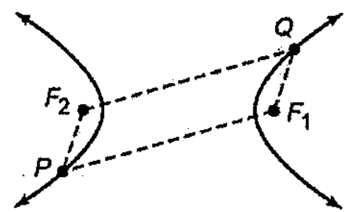
51. Show that the points with coordinates $(-1, 3)$, $(3, 6)$, $(6, 2)$, and $(2, -1)$ are the vertices of a square. *(Lesson 10-1)*

55. Aviation An airplane flying at an altitude of 9000 meters passes directly overhead. Fifteen seconds later, the angle of elevation to the plane is 60°. How fast is the airplane flying? *(Lesson 5-4)*

56. Approximate the real zeros of the function $f(x) = 4x^4 + 5x^3 - x^2 + 1$ to the nearest tenth. *(Lesson 4-5)*

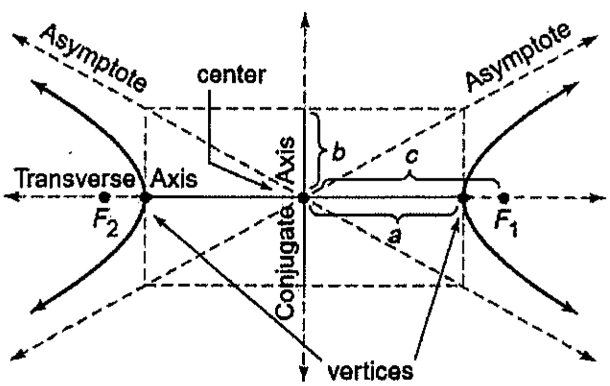
Notes

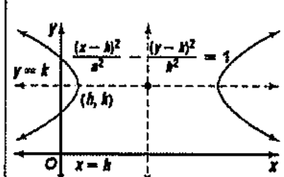
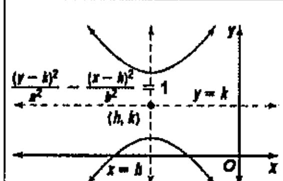
A **hyperbola** is the set of all points in the plane in which the difference of the distances from two distinct fixed points, called **foci**, is constant. That is, if F_1 and F_2 are the foci of a hyperbola and P and Q are any two points on the hyperbola, $|PF_1 - PF_2| = |QF_1 - QF_2|$.



The **center** of a hyperbola is the midpoint of the line segment whose endpoints are the foci. The point on each branch of the hyperbola that is nearest the center is called a **vertex.**

The **asymptotes** of a hyperbola are lines that the curve approaches as it recedes from the center. As you move farther out along the branches, the distance between points on the hyperbola and the asymptotes approaches zero.



Standard Form of the Equation of a Hyperbola	Orientation	Description
$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$, where $b^2 = c^2 - a^2$		center: (h, k) foci: $(h \pm c, k)$ vertices: $(h \pm a, k)$ equation of transverse axis: $y = k$ *(parallel to x-axis)*
$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$, where $b^2 = c^2 - a^2$		center: (h, k) foci: $(h, k \pm c)$ vertices: $(h, k \pm a)$ equation of transverse axis: $x = h$ *(parallel to y-axis)*

Guided Practice

Example 1: Find the equation of the hyperbola with foci at (7, 1) and (-3, 1) whose transverse axis is 8 units long.

Example 2: Find the coordinates of the center, foci, and vertices of the graph of $\frac{(y+4)^2}{36}-\frac{(x-2)^2}{25}=1$. Then graph the equation.

Example 3: Find the coordinates of the center, foci, and vertices of the graph of $9x^2-4y^2-54x-40y-55=0$. Then graph the equation.

Class work **For the equation of each hyperbola, find the coordinates of the center, the foci, and the vertices**

15. $\frac{x^2}{100}-\frac{y^2}{16}=1$

16. $\frac{x^2}{9}-\frac{(y-5)^2}{81}=1$

17. $\frac{x^2}{4}-\frac{y^2}{49}=1$

18. $\frac{(y-7)^2}{64}-\frac{(x+1)^2}{4}=1$

19. $x^2-4y^2+6x-8y=11$

20. $-4x^2+9y^2-24x-90y+153=0$

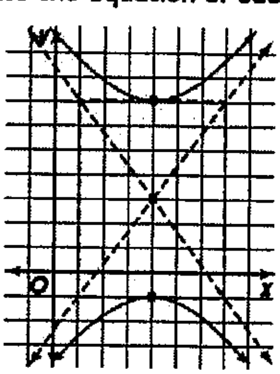
21. $16y^2-25x^2-96y+100x-356=0$

22. $36x^2-49y^2-72x-294y=2169$

23. Graph the equation $25y^2-9x^2-100y-72x-269=0$. Label the center, foci and the equations of the asymptotes.

Write the equation of each hyperbola.

24.



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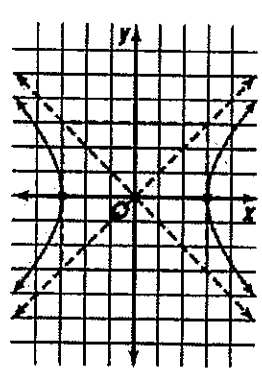

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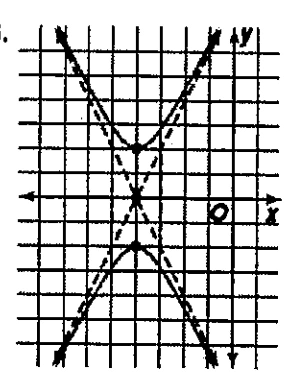


Warm-Up

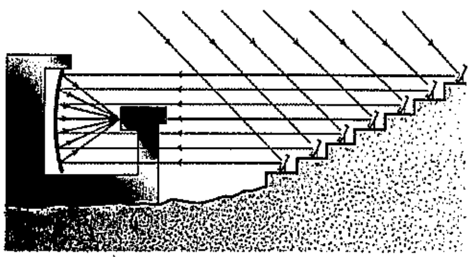
39. Find the coordinates of the center, foci, and vertices, and the equations of the asymptotes of the graph of $\frac{(y-3)^2}{25} - \frac{(x-2)^2}{16} = 1$. Then graph the equation. *(Lesson 10-4)*

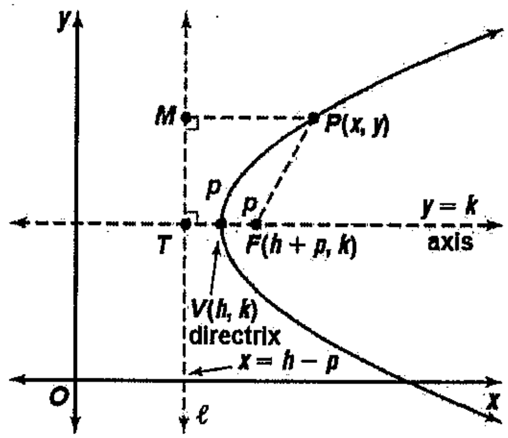
40. Find the coordinates of the center, foci, and vertices of the ellipse whose equation is $4x^2 + 25y^2 + 250y + 525 = 0$. Then graph the ellipse. *(Lesson 10-3)*

Notes

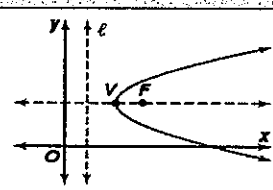
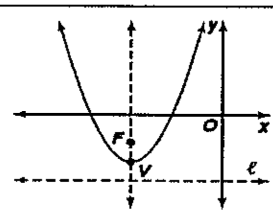
Real World Application

ENERGY The Odeillo Solar Furnace, located in southern France, uses a series of 63 flat mirrors, arranged on terraces on a hillside, to reflect the sun's rays on to a large parabolic mirror. These computer-controlled mirrors tilt to track the sun and ensure that its rays are always reflected to the central parabolic mirror.





In Chapter 4, you learned that the graphs of quadratic equations like $x = y^2$ or $y = x^2$ are called *parabolas*. A parabola is defined as the set of all points in a plane that are the same distance from a given point, called the **focus,** and a given line, called the **directrix.** *Remember that the distance from a point to a line is the length of the segment from the point perpendicular to the line.*

Vertex Form	Orientation when $p > 0$	Description
$x = a(y-k)^2 + h$		vertex: (h, k) focus: $(h + p, k)$ axis of symmetry: $y = k$ directrix: $x = h - p$ opening: Right if $a > 0$, Left if $a < 0$
$y = a(x-h)^2 + k$		vertex: (h, k) focus: $(h, k + p)$ axis of symmetry: $x = h$ directrix: $y = k - p$ opening: Up if $a > 0$, Down if $a < 0$

$$p = \frac{1}{4a}$$

Guided Practice

Example 1: Consider the equation $y^2 = 8x + 48$

(a) Write the equation in Vertex Form

(b) Find the coordinates of the focus and the vertex and the equations of the directrix and axis of symmetry.

(c) Graph the equation of the parabola.

Example 2: Consider the equation $2x^2 - 8x + y + 6 = 0$

(a) Write the equation in Vertex Form

(b) Find the coordinates of the vertex and focus and the equations for the directrix and the axis of symmetry.

(c) Graph the equation of the parabola.

Class work

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.

17. $y - 2 = x^2 - 4x$

18. $x^2 + 10x + 25 = -8y + 24$

19. $y^2 - 2x + 14y = -41$

20. $y^2 - 2y - 12x + 13 = 0$

21. $2x^2 - 12y - 16x + 20 = 0$

22. $3x^2 - 30y - 18x + 87 = 0$

23. Consider the equation $2y^2 + 16y + 16x + 64 = 0$. Identify the coordinates of the vertex and focus and the equations of the directrix and axis of symmetry. Then graph the equation.

OBJECTIVES AND EXAMPLES

Lesson 10-1 Find the distance and midpoint between two points on a coordinate plane.

- Find the distance between points at (3, 8) and (−5, 10).

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(-5 - 3)^2 + (10 - 8)^2}$$
$$= \sqrt{68} \text{ or } 2\sqrt{17}$$

REVIEW EXERCISES

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.

11. (1, −6), (−3, −4)

12. (a, b) ...

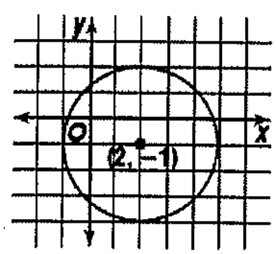
~~Determ... whether the ...~~ s $A(-5, -2)$, ~~(3, 4), C(10, 3) ... D(...)~~ are the ~~v... of a parall...~~gram. Justify your answer.

Lesson 10-2 Determine the standard form of the equation of a circle and graph it.

- Write $x^2 + y^2 - 4x + 2y - 4 = 0$ in standard form. Then graph the equation.

$$x^2 + y^2 - 4x + 2y - 4 = 0$$
$$x^2 - 4x + ? + y^2 + 2y + ? = 4$$
$$x^2 - 4x + 4 + y^2 + 2y + 1 = 4 + 4 + 1$$
$$(x - 2)^2 + (y + 1)^2 = 9$$

The center of the circle is located at (2, −1), and the radius is 3.



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

14. center at (0, 0), radius $3\sqrt{3}$

15. ~~... tangent to the ...~~

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

~~16. $x^2 + y^2 ... 6y$~~

17. $x^2 + 14x + y^2 + 6y = 23$

18. $3x^2 + 3y^2 + 6x + 12y - 60 = 0$

19. Write the standard form of the equation of the circle that passes through points at (1, 1), (−2, 2), and (−5, 1). Then identify the center and radius.

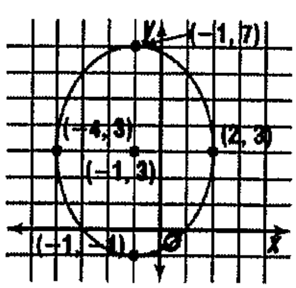
Lesson 10-3 Determine the standard form of the equation of an ellipse and graph it.

- For the equation, $\frac{(x + 1)^2}{9} + \frac{(y - 3)^2}{16} = 1$, find the coordinates of the center, foci, and vertices of the ellipse. Then graph the equation.

center: (−1, 3)

foci: $\left(-1, 3 + \sqrt{7}\right)$, $\left(-1, 3 - \sqrt{7}\right)$

vertices: (2, 3), (−4, 3), (−1, −1), (−1, 7)



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

20. $\frac{(x - 5)^2}{16} + \frac{(y - 2)^2}{36} = 1$

21. $4x^2 + 25y^2 - 24x + 50y = 39$

22. $6x^2 + 4y^2 + 24x - 32y + 64 = 0$

23. $x^2 + 4y^2 + 124 = 8x + 48y$

24. ~~W... equation of an ellipse ... ered at (..., 1) with a ver... semi-major a... un... and a semi-minor ...~~ ...its long.

Lesson 10-4 Determine the standard and general forms of the equation of a hyperbola and graph it.

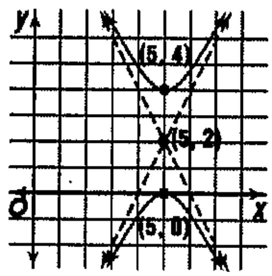
- Find the coordinates of the center, foci, and vertices, and the equations of the asymptotes of the graph of $\frac{(y-2)^2}{4} - (x-5)^2 = 1$. Then graph the equation.

  center: (5, 2)

  foci: $\left(5, 2 + \sqrt{5}\right)$, $\left(5, 2 - \sqrt{5}\right)$

  vertices: (5, 4), (5, 0)

  asymptotes: $y - 2 = \pm 2(x - 5)$



For the equation of each hyperbola, find the coordinates of the center, the foci, and the vertices

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

26. $\frac{(y+5)^2}{36} - \frac{(x-1)^2}{9} = 1$

27. $x^2 - 4y^2 - 16y = 20$

28. $9x^2 - 16y^2 - 36x - 96y + 36 = 0$

Lesson 10-5 Determine the standard and general forms of the equation of a parabola and graph it.

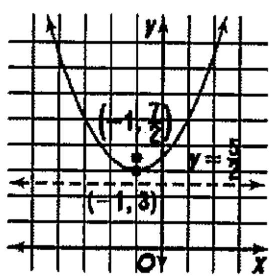
- For the equation $(x+1)^2 = 2(y-3)$, find the coordinates of the vertex and focus, and the equations of the directrix and axis of symmetry. Then graph the equation.

  vertex: (−1, 3)

  focus: $\left(-1, \frac{7}{2}\right)$

  directrix: $y = \frac{5}{2}$

  axis of symmetry: $x = -1$



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

34. $y^2 + 6y - 4x = -25$

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

Lesson 10-6 Recognize conic sections in their rectangular form by their equations.

- Identify the conic section represented by the equation $2x^2 - 3x - y + 4 = 0$.

  the conic is a parabola.

Identify the conic section represented by each equation.

38. $5x^2 - 7x + 2y^2 = 10$

40. $2x^2 + 4x + 2y^2 - 6y + 16 = 0$

41. $4y^2 + 6x - 5y = 20$

Accelerated Pre-Calculus Name________________ ID: 1

Test 7 - Calculator Allowed - Form A

Date________________ Period____

1) Find the distance between the pair of points with the given coordinates.
(-1, 1), (4, 13)

A) 13 B) $\sqrt{153}$ C) $\sqrt{119}$ D) $\sqrt{13}$

Use a double-angle identity to find the exact value of each expression.

2) $\cos\theta = -\frac{4}{5}$ and $90° < \theta < 180°$
Find $\sin 2\theta$

A) $-\frac{24}{25}$ B) $-\frac{12\sqrt{13}}{49}$ C) $\frac{12\sqrt{13}}{49}$ D) $\frac{24}{25}$

Using the Law of Cosines, find the measurement indicated. Round your answers to the nearest tenth.

3) $m\angle C = 91°$, $b = 17$ m, $a = 28$ m
Find c

A) 33 m B) 30 m C) 38 m D) 32 m

Use a half-angle identity to find the exact value of each expression.

4) $\cos\theta = -\frac{1}{2}$ and $180° < \theta < 270°$
Find $\cos\frac{\theta}{2}$

A) $\frac{1}{2}$ B) $\frac{2\sqrt{3}}{3}$ C) 2 D) $\frac{\sqrt{3}}{2}$

Identify the vertices and foci of the following ellipse.

5) $\frac{(x+2)^2}{100} + \frac{(y-3)^2}{9} = 1$

A) Vertices: $(12, 3), (-8, 3)$
Foci: $(2+\sqrt{91}, 3), (2-\sqrt{91}, 3)$

B) Vertices: $(8, 3), (-12, 3)$
Foci: $(-2+\sqrt{91}, 3), (-2-\sqrt{91}, 3)$

C) Vertices: $(-2, 13), (-2, -7)$
Foci: $(-2, 3+\sqrt{91}), (-2, 3-\sqrt{91})$

D) Vertices: $(8, 3), (-12, 3)$
Foci: $(-2+3\sqrt{11}, 3), (-2-3\sqrt{11}, 3)$

Use the information provided to write the standard form equation of the following conic section.

6) $x^2 + y^2 + 4x + 32y + 251 = 0$

A) $(x+2)^2 + (y+16)^2 = 9$
B) $(x-16)^2 + (y-2)^2 = 9$
C) $(x-2)^2 + (y+16)^2 = 81$
D) $(x+16)^2 + (y-2)^2 = 9$

7) $11x^2 + 7y^2 - 132x - 84y - 122 = 0$

A) $\frac{(x-6)^2}{70} + \frac{(y-6)^2}{9} = 1$
B) $\frac{(x-6)^2}{70} + \frac{(y-6)^2}{110} = 1$
C) $\frac{(x-6)^2}{110} + \frac{(y-6)^2}{70} = 1$
D) $\frac{(x+6)^2}{70} + \frac{(y-6)^2}{110} = 1$

8) $-4x^2 + 9y^2 - 64x - 54y - 211 = 0$

A) $\frac{(y-3)^2}{4} - \frac{(x+8)^2}{9} = 1$
B) $\frac{(x+8)^2}{4} - \frac{(y-3)^2}{9} = 1$
C) $\frac{(x+3)^2}{9} - \frac{(y-8)^2}{4} = 1$
D) $\frac{(x+8)^2}{9} - \frac{(y-3)^2}{4} = 1$

9) $x = 2y^2 - 20y + 53$

A) $x = 2(2y-5)^2 + 3$
B) $x = 2(y-5)^2 + 3$
C) $x = (y-5)^2 + 3$
D) $x = -2(y+3)^2 - 5$

Identify the vertices, foci, and direction of opening of the following hyperbola.

10) $\frac{(y-4)^2}{16} - \frac{(x+1)^2}{49} = 1$

A) Vertices: $(-1, 8), (-1, 0)$
Foci: $(-1, 4+\sqrt{65}), (-1, 4-\sqrt{65})$
Opens up/down

B) Vertices: $(6, 4), (-8, 4)$
Foci: $(-1+\sqrt{65}, 4), (-1-\sqrt{65}, 4)$
Opens left/right

C) Vertices: $(-1, 11), (-1, -3)$
Foci: $(-1, 4+\sqrt{65}), (-1, 4-\sqrt{65})$
Opens up/down

D) Vertices: $(1, 8), (1, 0)$
Foci: $(1, 4+\sqrt{65}), (1, 4-\sqrt{65})$
Opens up/down

Accelerated Pre-Calculus

Name________________________ ID: 1

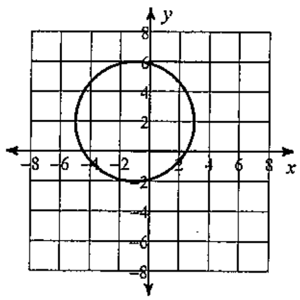
Test 7 - No Calculator - Form A

Date________________ Period____

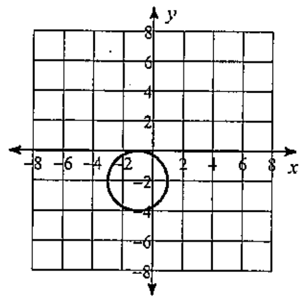
Graph each equation.

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

A)



B)



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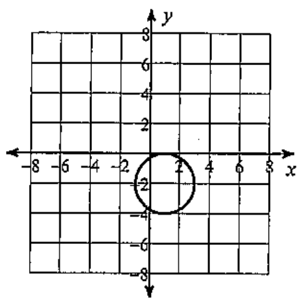
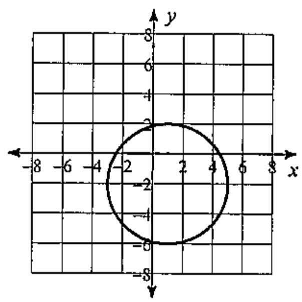
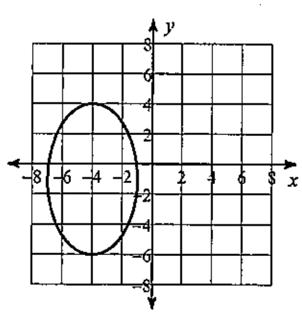


D)

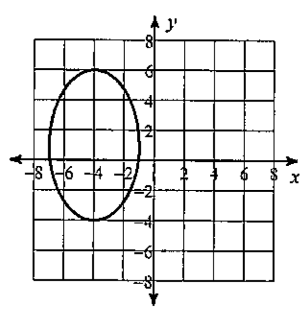


2) $\frac{(x+4)^2}{9}+\frac{(y+1)^2}{25}=1$

A)



B)



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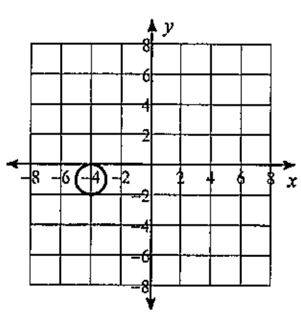

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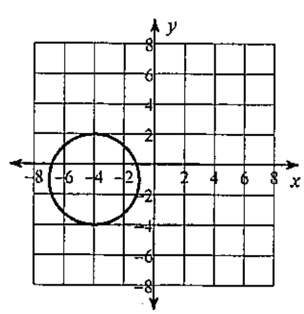
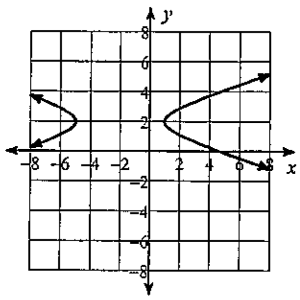


3) $\frac{(x+2)^2}{9} - \frac{(y-2)^2}{4} = 1$

A)



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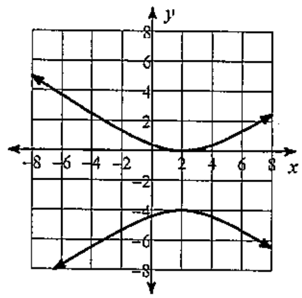

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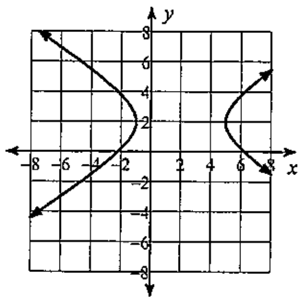

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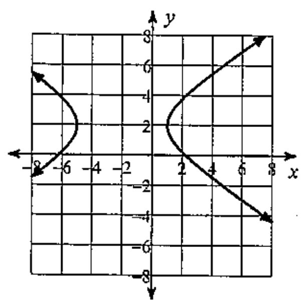
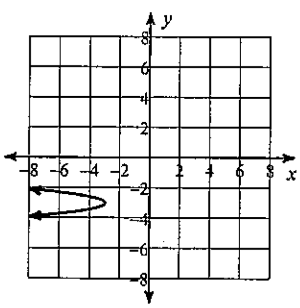
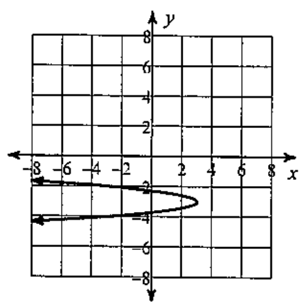


4) $x = -6y^2 - 36y - 51$

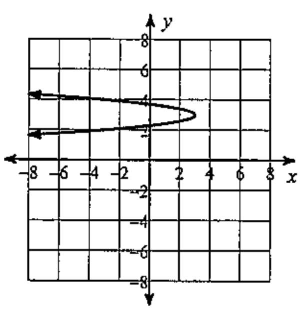
A)



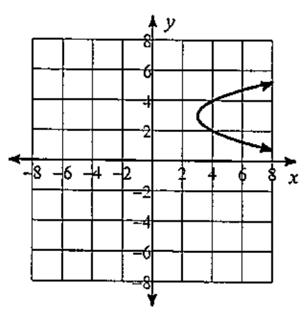
B)



C)



D)



Classify each conic section.

5) $-50y = -25y^2 + 9x^2 + 200$

A) Ellipse B) Circle C) Parabola D) Hyperbola

Write a polynomial function of least degree with integral coefficients that has the given zeros.

6) $5,\ -2i,\ 2i$

A) $f(x) = x^3 - 5x^2 + 4x - 20$
B) $f(x) = x^3 - 5x^2 + 4x - 24$
C) $f(x) = x^3 - 5x^2 + 4x - 14$
D) $f(x) = x^3 - 5x^2 + 4x - 25$

Solve the following quadratic equation by completing the square.

7) $k^2 + 2k + 2 = -8$

A) $\{-4 + 2i\sqrt{17}, -4 - 2i\sqrt{17}\}$
B) $\{3 + i\sqrt{26}, 3 - i\sqrt{26}\}$
C) $\{-1 + 3i, -1 - 3i\}$
D) $\{-2 + i\sqrt{6}, -2 - i\sqrt{6}\}$

Using radians, find the period of each function.

8) $y = 8\sin\left(5\theta - \frac{\pi}{2}\right)$

A) 5 B) $\frac{\pi}{2}$ C) 5π D) $\frac{2\pi}{5}$

Use the angle sum identity to find the exact value of each.

9) sin 105°

A) $\frac{\sqrt{6} - \sqrt{2}}{4}$ B) $\frac{\sqrt{2} - \sqrt{6}}{4}$ C) $\frac{\sqrt{6} + \sqrt{2}}{4}$ D) $\frac{-\sqrt{6} - \sqrt{2}}{4}$

Perform the indicated operation.

10) $f(t) = t^2 - 4t$
$g(t) = -3t - 3$
Find $(f \circ g)(t)$

A) $-3t^2 - 12t - 3$ B) $-3t^2 + 12t - 3$ C) $3t^2 - 14$ D) $9t^2 + 30t + 21$