Name: ________________________ Class: ___________________ Date: __________ ID: A

Algebra II Practice Test 10

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Graph $16x^2 + 4y^2 = 64$ on a graphing calculator. Identify the conic section. Then, describe the center and intercepts.
a. Hyperbola with center (0, 0) and intercepts (2, 0) and (–2 0).
b. Ellipse with center (0, 0) and intercepts (4, 0), (–4, 0), (0, 8), and (0, –8).
c. Circle with center (0, 0) and intercepts (8, 0), (–8, 0), (0, 8), and (0, –8).
d. Ellipse with center (0, 0) and intercepts (2, 0), (–2, 0), (0, 4), and (0, –4).

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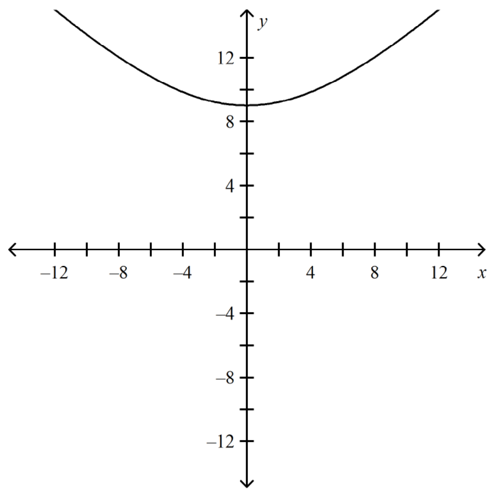
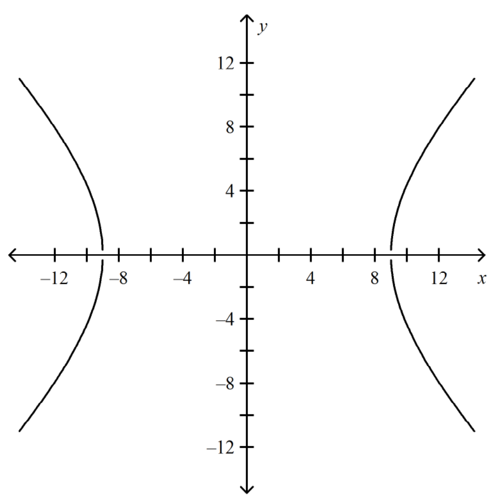
____ 2. Graph $y^2 - x^2 = 81$ on a graphing calculator. Identify the conic section. Then, find the vertex or vertices and the direction the graph opens.

a.



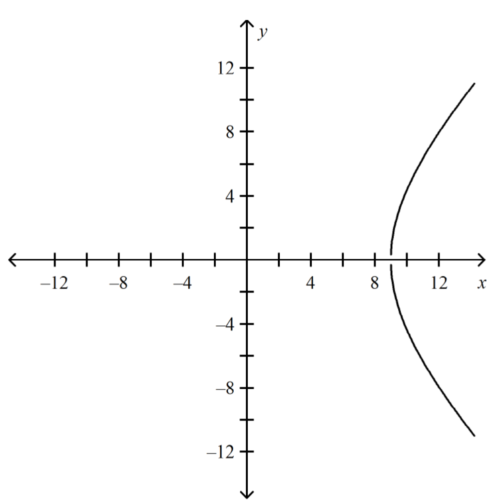
The graph is a parabola that opens vertically with a vertex at (0,9).

b.

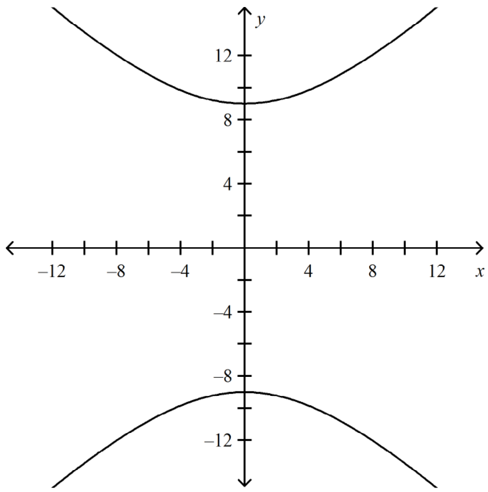


The graph is a hyperbola that opens horizontally with vertices at (9,0) and (–9,0).

c.



The graph is a parabola that opens horizontally with a vertex at (9,0).

d. 

The graph is a hyperbola that opens vertically with vertices at $(0, 9)$ and $(0, -9)$.

____ 3. Find the center and radius of a circle that has a diameter with endpoints $(-9, -6)$ and $(-1, 0)$.

a. center $(4, 3)$; radius 5
b. center $(8, 6)$; radius 10
c. center $(-5, -3)$; radius 5
d. center $(-10, -6)$; radius 10

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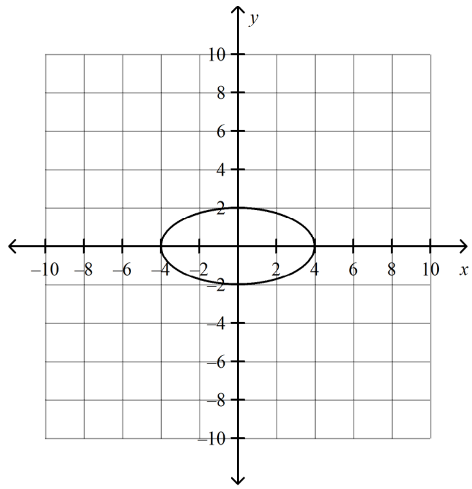
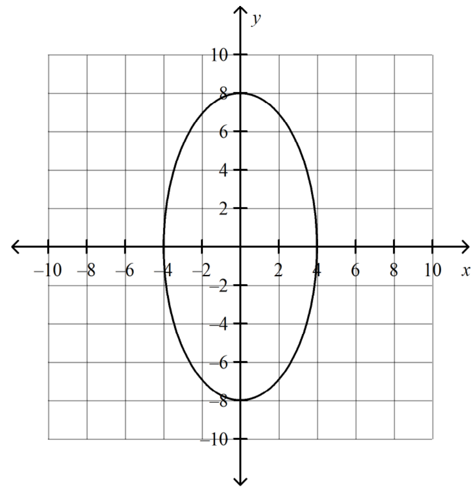
____ 4. Graph the equation $4x^2 + 16y^2 = 64$.

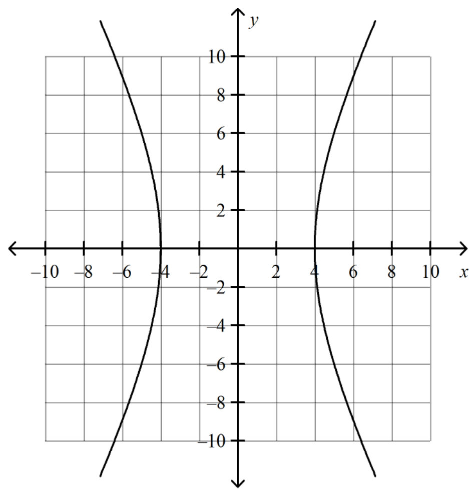
a.



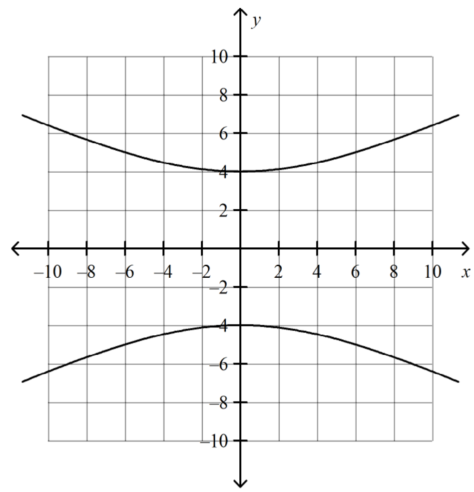
c.



b.



d.



____ 5. Write the equation of a circle with center (8, 7) and radius $r = 6$.

a. $36 = (x-8)^2 + (y-7)^2$

b. $6 = (x-8)^2 + (y-7)^2$

c. $6 = (x-8) + (y-7)$

d. $36 = (x-7)^2 + (y-8)^2$

____ 6. Write the equation of the circle with center (2, 4) and containing the point (–2, 1).

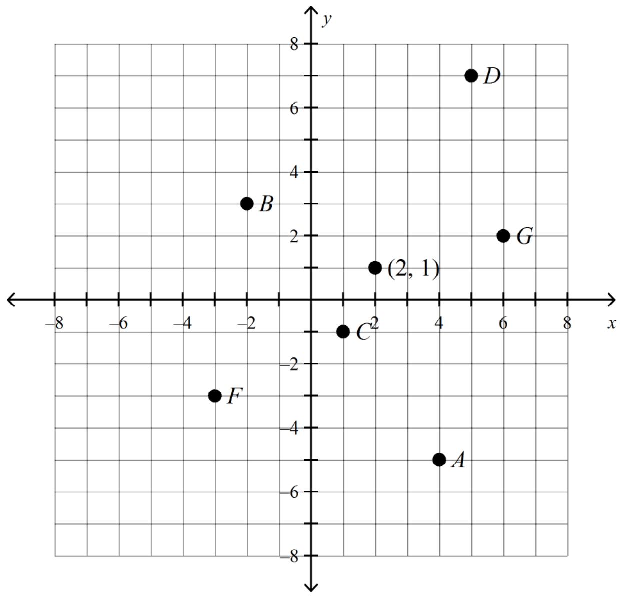
a. $(x+2)^2 + (y-1)^2 = 25$

b. $(x-2)^2 + (y-4)^2 = 25$

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

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

____ 7. Sandra and her friends want to walk to the store. They only visit stores that are less than 500 yards away from Sandra's house. Sandra's house is at the point (2, 1), the letters represent all of the local stores, and each unit represents 100 yards. Use the equation of a circle to find the number of stores that are within 500 yards of Sandra's house.



a. 2 stores
b. 3 stores
c. 4 stores
d. 5 stores

____ 8. Write the equation of the line that is tangent to the circle $25 = x^2 + y^2$ at the point (3,4).

a. $\dfrac{x}{3} + \dfrac{y}{4} = 25$
b. $y = \dfrac{3}{4}x + \dfrac{25}{4}$
c. $y = -\dfrac{3}{4}x + \dfrac{25}{4}$
d. $(3y)(4x) = 5$

____ 9. The lines $y = -2x + 1$ and $y = 5x + 22$ each contain diameters of a particular circle. If the point (5,11) is on the circle, find the equation of the circle.

a. $(x-5)^2 + (y-11)^2 = 146$
b. $(x-3)^2 + (y+7)^2 = 328$
c. $(x-3)^2 + (y-23)^2 = 148$
d. $(x+3)^2 + (y-7)^2 = 80$

____ 10. Find the constant sum for an ellipse with foci F_1 (0, –3) and F_2 (0, 3) and the point on the ellipse P(10, 0).

a. $2\sqrt{109}$
b. 218
c. $\sqrt{109}$
d. 109

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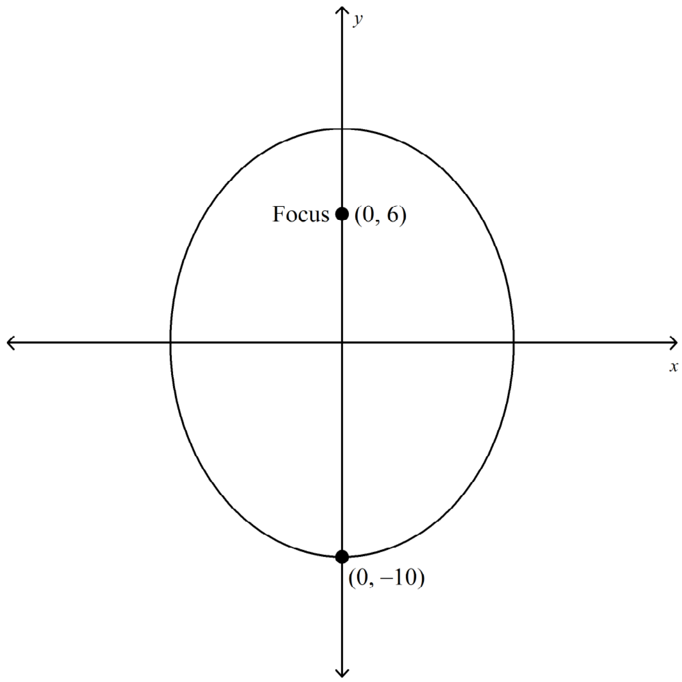
____ 11. Write an equation in standard form for the ellipse shown with center (0, 0).



a. $\dfrac{x^2}{10}+\dfrac{y^2}{8}=1$

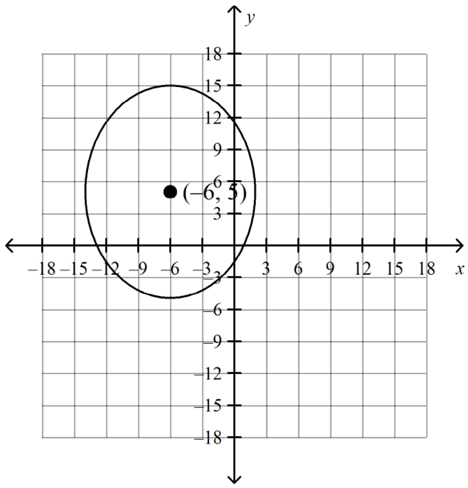
b. $\dfrac{y^2}{10}+\dfrac{x^2}{8}=1$

c. $\dfrac{x^2}{100}+\dfrac{y^2}{64}=1$

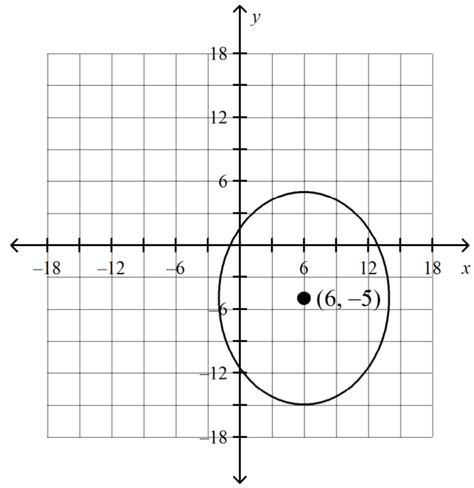
d. $\dfrac{y^2}{100}+\dfrac{x^2}{64}=1$

____ 12. Graph the ellipse $\dfrac{(x-6)^2}{100}+\dfrac{(y+5)^2}{64}=1$.

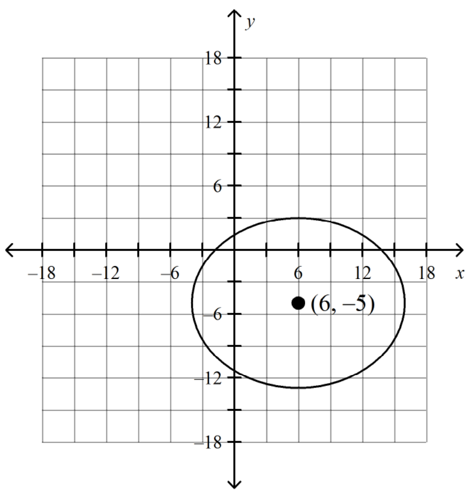
a.



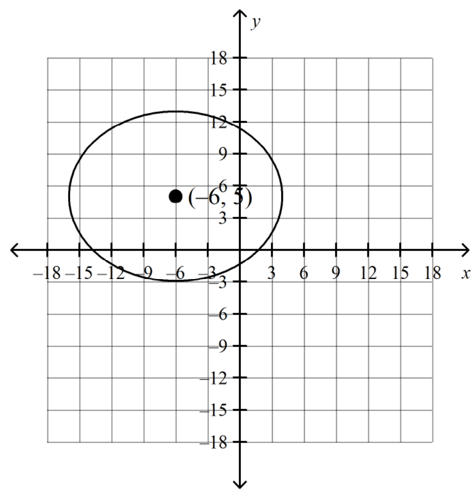
c.



b.



d.



____ 13. Engineers are building semi-elliptical pedestrian bridges across two highways. The larger bridge will be 1.5 times as wide and twice as tall as the smaller bridge. The equation for the bridge over the smaller highway is $\frac{x^2}{196} + \frac{y^2}{100} = 1$, measured in feet. Find the dimensions of the larger bridge. Then, find an equation for the design of the larger bridge.

a. The width of the larger bridge is 42 feet and the height is 20 feet.
$\frac{x^2}{441} + \frac{y^2}{400} = 1$

b. The width of the larger bridge is 56 feet and the height is 15 feet.
$\frac{x^2}{784} + \frac{y^2}{225} = 1$

c. The width of the larger bridge is 21 feet and the height is 20 feet.
$\frac{x^2}{441} + \frac{y^2}{400} = 1$

d. The width of the larger bridge is 30 feet and the height is 28 feet.
$\frac{x^2}{225} + \frac{y^2}{784} = 1$

____ 14. The path that a satellite travels around Earth is an ellipse with Earth at one focus. The length of the major axis is about 16,000 km, and the length of the minor axis is about 12,000 km. Write an equation for the satellite's orbit.

a. $\frac{x^2}{6000^2} + \frac{y^2}{8000^2} = 1$
b. $\frac{x^2}{8000^2} + \frac{y^2}{6000^2} = 1$
c. $\frac{x^2}{16000^2} - \frac{y^2}{12000^2} = 1$
d. $\frac{x^2}{8000^2} - \frac{y^2}{6000^2} = 1$

____ 15. Find the constant difference for a hyperbola with foci $F_1(-5, 0)$ and $F_2(5, 0)$ and the point on the hyperbola (1, 0).

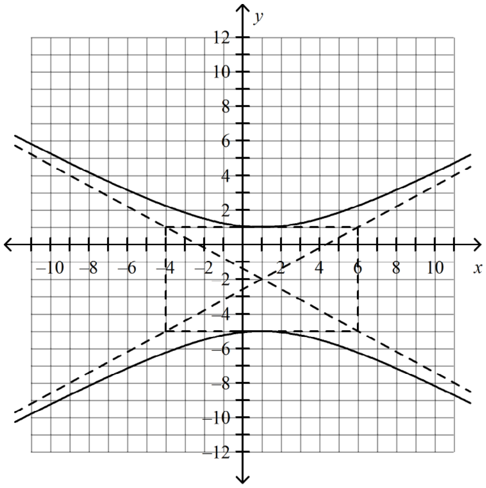
a. –10
b. 10
c. –2
d. 2

____ 16. Write an equation in standard form for the hyperbola with center (0, 0), vertex (0, 6), and focus (0, 8).

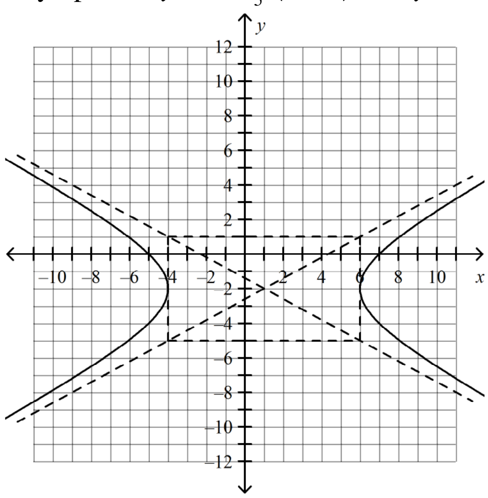
a. $\frac{x^2}{64} - \frac{y^2}{36} = 1$
b. $\frac{y^2}{36} - \frac{x^2}{28} = 1$
c. $\frac{x^2}{28} - \frac{y^2}{36} = 1$
d. $\frac{y^2}{36} - \frac{x^2}{64} = 1$

____ 17. Find the vertices, co-vertices, and asymptotes of the hyperbola $\dfrac{(y-1)^2}{25} - \dfrac{(x+2)^2}{9} = 1$, and then graph.

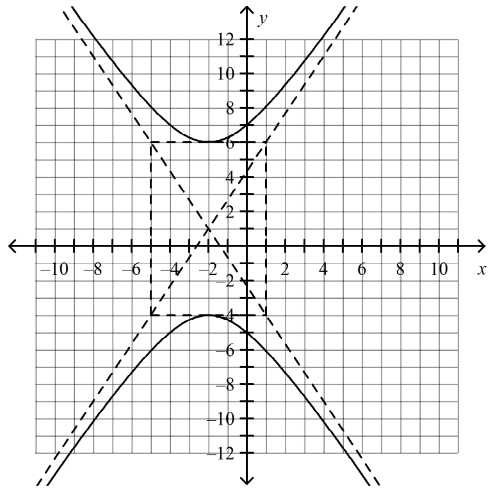
a. Vertices: (1, 1) and (1, -5)
Co-vertices: (–4, -2) and (6, -2)
Asymptotes: $y+2=\frac{3}{5}(x-1)$ and $y+2=-\frac{3}{5}(x-1)$



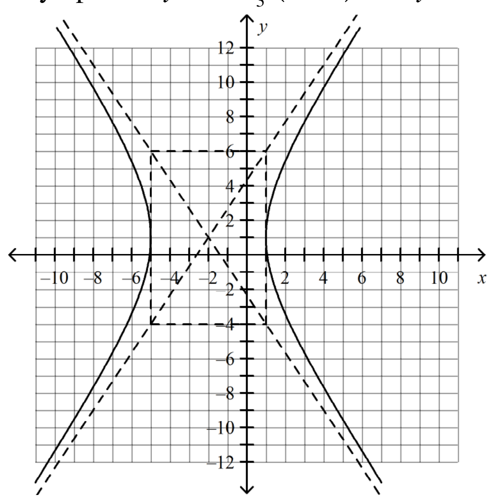
b. Vertices: (–4, -2) and (6, -2)
Co-vertices: (1, 1) and (1, -5)
Asymptotes: $y+2=\frac{3}{5}(x-1)$ and $y+2=-\frac{3}{5}(x-1)$



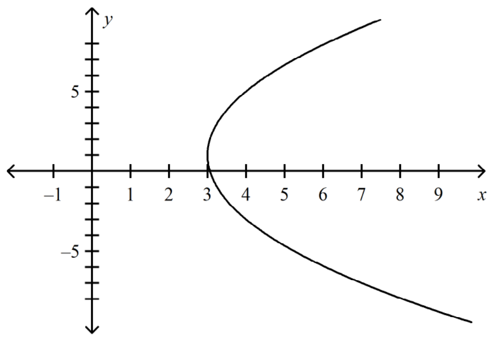
c. Vertices: $(-2, 6)$ and $(-2, -4)$
Co-vertices: $(1, 1)$ and $(-5, 1)$
Asymptotes: $y-1=\frac{5}{3}(x+2)$ and $y-1=-\frac{5}{3}(x+2)$



d. Vertices: $(1, 1)$ and $(-5, 1)$
Co-vertices: $(-2, 6)$ and $(-2, -4)$
Asymptotes: $y-1=\frac{5}{3}(x+2)$ and $y-1=-\frac{5}{3}(x+2)$



____ 18. Use the Distance Formula to find the equation of a parabola with focus $F(4,0)$ and directrix $x = -3$.



a. $x = \frac{1}{14}y^2 - \frac{25}{14}$

b. $x = -\frac{1}{2}y^2 - \frac{7}{2}$

c. $y = \frac{1}{14}x^2 + \frac{1}{2}$

d. $x = \frac{1}{14}y^2 + \frac{1}{2}$

____ 19. Write the equation in standard form for the parabola with vertex $(0,0)$ and the directrix $y = -14$.

a. $y = \dfrac{1}{56}x^2$

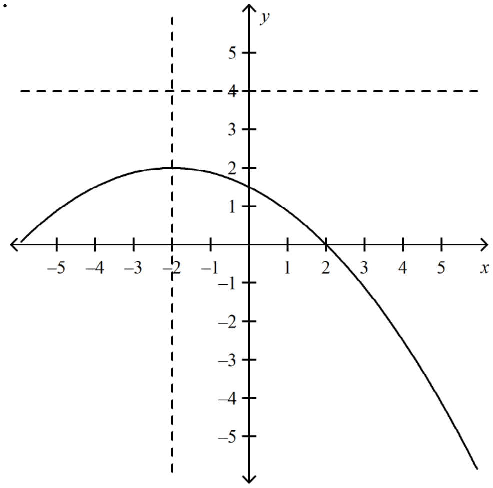
b. $x = \dfrac{1}{56}y^2$

c. $x = 56y^2$

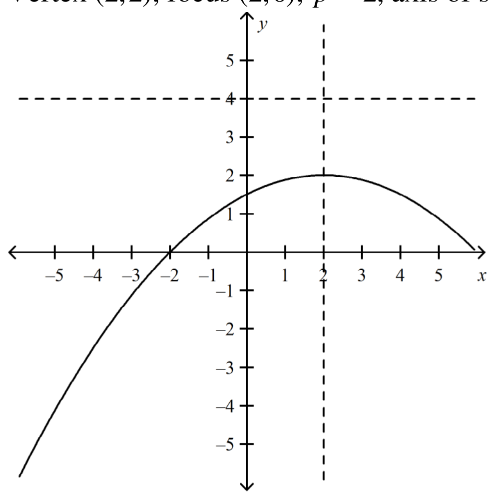
d. $y = -\dfrac{1}{56}x^2$

____ 20. Find the vertex, value of *p*, axis of symmetry, focus, and directrix of the parabola $y-2=-\frac{1}{8}(x+2)^2$. Then, graph the parabola.

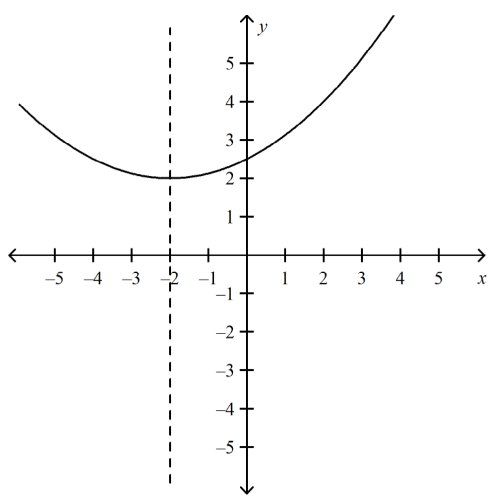
a. Vertex $(-2,2)$, focus $(-2,0)$, $p = -2$, axis of symmetry $x = -2$, and directrix $y = 4$.



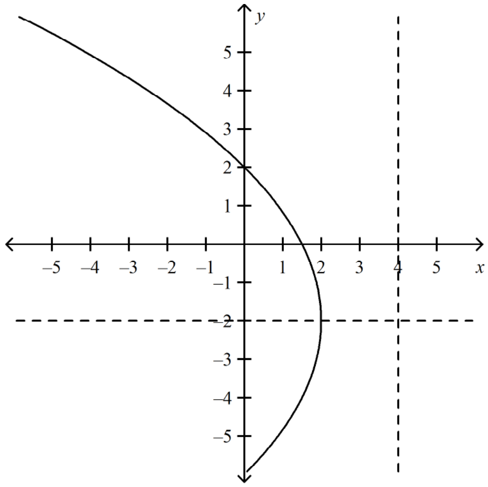
b. Vertex $(2,2)$, focus $(2,0)$, $p = 2$, axis of symmetry $x = 2$, and directrix $y = 4$.



c. Vertex $(-2,2)$, focus $(-2,4)$, $p = 2$, axis of symmetry $x = -2$, and directrix $y = 0$.



d. Vertex $(2,-2)$, focus $(0,-2)$, $p = -2$, axis of symmetry $x = 4$, and directrix $y = -2$.



____ 21. A reflector is designed so that its cross section is a parabola. The equation for a cross section of the parabola is $x = \frac{1}{36}y^2$. How far is the parabola's focus from its vertex?

a. 4
b. 9
c. 16
d. 36

____ 22. Identify the conic section the equation $\frac{(x-2)^2}{3^2} + \frac{(y-4)^2}{7^2} = 1$ represents.

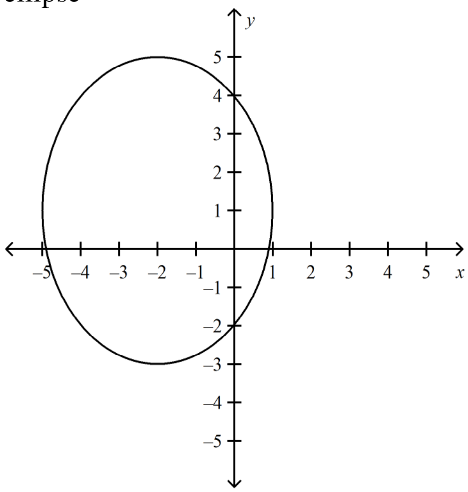
a. parabola
b. ellipse
c. circle
d. hyperbola

____ 23. Identify the conic section that the equation $4x^2 - 5xy - 5y^2 - 3x + 2y + 9 = 0$ represents.

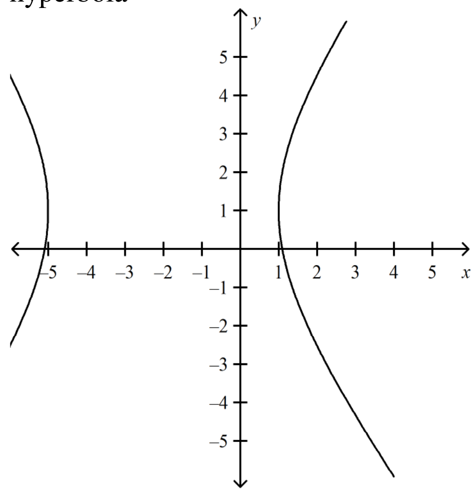
a. circle
b. hyperbola
c. ellipse
d. parabola

____ 24. Find the standard form of the equation $16x^2 + 9y^2 + 64x - 18y - 71 = 0$ by completing the square. Then, identify and graph the conic section.

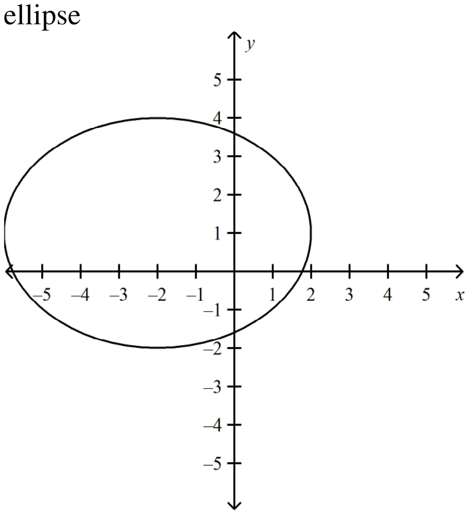
a. ellipse



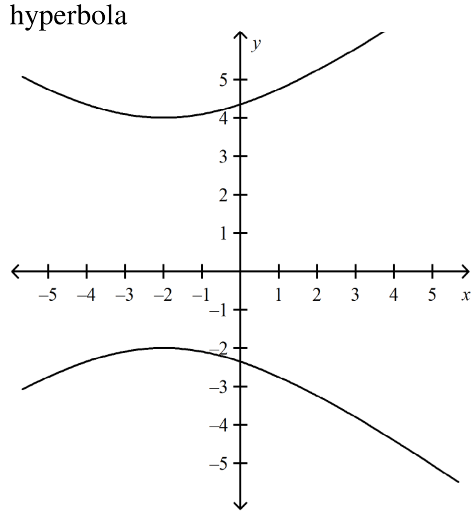
c. hyperbola



b. ellipse



d. hyperbola



____ 25. An airplane makes a dive that can be modeled by the equation $-9x^2 + 25y^2 - 54x + 50y - 236 = 0$, measured in hundreds of feet, with the ground represented by the x-axis. How close to the ground does the airplane pass?

a. 200 feet
b. 2 feet
c. 400 feet
d. 300 feet

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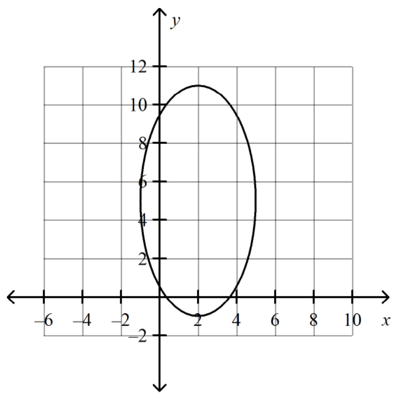
____ 26. Which of the following is the equation for the graph shown?



a. $4x^2 - 16x = -y^2 + 10y - 40$

b. $-16x + 4x^2 = y^2 - 10y + 40$

c. $4x^2 + 16x + y^2 + 10y + 40 = 0$

d. $x^2 - 4x + 4y^2 - 40y = -100$

Algebra II Practice Test 10
Answer Section

MULTIPLE CHOICE

1. ANS: D

Step 1 Solve for y so the expression can be used in a graphing calculator.

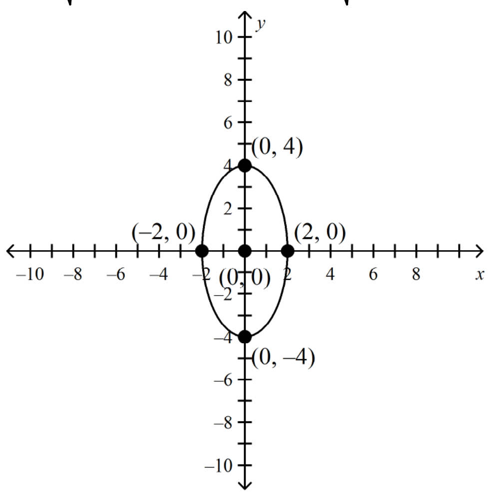
$4y^2 = 64 - 16x^2$ Subtract $16x^2$ from both sides.

$y^2 = \dfrac{64-16x^2}{4}$ Divide both sides by 4.

$y = \pm\sqrt{\dfrac{64-16x^2}{4}}$ Take the square root of both sides.

Step 2 Use two equations to see the complete graph.

$y = \sqrt{\dfrac{64-16x^2}{4}}$ and $y = -\sqrt{\dfrac{64-16x^2}{4}}$



The graphs meet to form a complete ellipse, even though it may not appear that way on a graphing calculator.

The graph is an ellipse with center (0, 0) and intercepts (2, 0), (–2 0), (0, 4), and (0, –4).

	Feedback
A	Check the equation you used to graph the conic section.
B	Check the y-intercepts on the graph. What are the values of y when $x = 0$?
C	Check the intercepts on the graph. What are the values of y when $x = 0$? What are the values of x when $y = 0$?
D	Correct!

PTS: 1 DIF: Average REF: Page 722
OBJ: 10-1.1 Graphing Circles and Ellipses on a Calculator TOP: 10-1 Introduction to Conic Sections

2. ANS: D

Step 1 Solve for *y*.

$y^2 = x^2 + 81$

$y = \pm\sqrt{x^2 + 81}$

Step 2 Use two equations to see the complete graph.

$y_1 = \sqrt{x^2 + 81}$ and $y_2 = -\sqrt{x^2 + 81}$

	Feedback
A	Both variables are squared, so this is not a parabola.
B	Solve for *y*, then graph.
C	Both variables are squared, so this is not a parabola.
D	Correct!

PTS: 1 DIF: Average REF: Page 723
OBJ: 10-1.2 Graphing Parabolas and Hyperbolas on a Calculator
TOP: 10-1 Introduction to Conic Sections

3. ANS: C

Step 1 Use the midpoint formula to find the center.

$\left(\dfrac{-9+-1}{2}, \dfrac{-6+0}{2}\right) = (-5,\ -3)$

The center is $(-5,\ -3)$.

Step 2 Use the Distance Formula with $(-5,\ -3)$ and $(-9,\ -6)$ to find the radius.

$r = \sqrt{(-5-(-9))^2 + (-3-(-6))^2} = 5$

The radius is 5.

	Feedback
A	The center is the midpoint between the given endpoints.
B	To find the center, add the *x*-values and divide by 2, and add the *y*-values and divide by 2.
C	Correct!
D	To find the center, add the *x*-values and divide by 2, and add the *y*-values and divide by 2.

PTS: 1 DIF: Basic REF: Page 725
OBJ: 10-1.3 Finding the Center and Radius of a Circle TOP: 10-1 Introduction to Conic Sections

4. ANS: A
Use a graphing calculator to graph the equation. Use a square window on your graphing calculator for an accurate graph. The graph is an ellipse with center (0, 0) and intercepts (–4, 0), (4, 0), (0, –2), and (0, 2).

	Feedback
A	Correct!
B	Use a graphing calculator to graph the equation.
C	Use a graphing calculator to graph the equation.
D	Use a graphing calculator to graph the equation.

PTS: 1 DIF: Advanced TOP: 10-1 Introduction to Conic Sections

5. ANS: A
Use the Distance Formula with $(x_2, y_2) = (x, y)$, $(x_1, y_1) = (8, 7)$, and distance equal to the radius, 6.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Use the Distance Formula.

$6 = \sqrt{(x_2 - 8)^2 + (y_2 - 7)^2}$ Substitute.

$6^2 = (x_2 - 8)^2 + (y_2 - 7)^2$ Square both sides.

$36 = (x_2 - 8)^2 + (y_2 - 7)^2$

	Feedback
A	Correct!
B	Square both sides.
C	Square both sides. Also, when you square an expression that is a square root, the result is the radicand.
D	You reversed the values of *x* and *y*.

PTS: 1 DIF: Basic REF: Page 729
OBJ: 10-2.1 Using the Distance Formula to Write the Equation of a Circle
TOP: 10-2 Circles

6. ANS: B

$r = \sqrt{(-2-2)^2 + (1-4)^2}$

$r = \sqrt{(-4)^2 + (-3)^2} = \sqrt{25} = 5$

Use the Distance Formula to find the radius.

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

$(x-2)^2 + (y-4)^2 = 25$

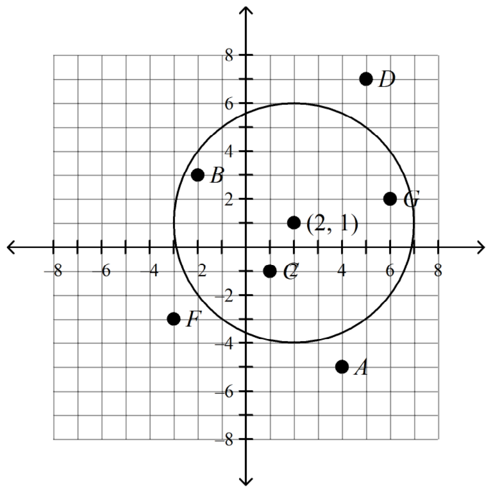
Substitute the values into the equation of a circle.

	Feedback
A	The equation of a circle is $(x-h)$^2 + $(y-k)$^2 = r^2, where (h, k) is the center of the circle.
B	Correct!
C	The equation of a circle is $(x-h)$^2 + $(y-k)$^2 = r^2 is the square of the radius.
D	The equation of a circle is $(x-h)$^2 + $(y-k)$^2 = r^2, where (h, k) is the center of the circle and r^2 is square of the radius.

PTS: 1 DIF: Average REF: Page 730
OBJ: 10-2.2 Writing the Equation of a Circle TOP: 10-2 Circles

7. ANS: B

The circle has center (2, 1) with a radius of 5. The points inside the circle will satisfy the inequality $(x-2)^2+(y-1)^2<5^2$



Points *B*, *C*, and *G* are within the 500-yard boundary.

	Feedback
A	Draw a circle of radius 5 and center (2, 1), and see how many stores are inside the circle.
B	Correct!
C	Draw a circle of radius 5 and center (2, 1), and see how many stores are inside the circle.
D	Draw a circle of radius 5 and center (2, 1), and see how many stores are inside the circle.

PTS: 1 DIF: Average OBJ: 10-2.3 Application
TOP: 10-2 Circles

8. ANS: C

Step 1 Identify center and radius of the circle.
From the equation $25 = x^2 + y^2$, the circle has center $(0,0)$ and radius 5.

Step 2 Find the slope of the radius at the point of tangency and the slope of the tangent.

$m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{+4-0}{3-0}$ Use the slope formula.

$m = \dfrac{4}{3}$ The slope of the radius is $\dfrac{4}{3}$.

The tangent is perpendicular to the radius. Because the slopes of perpendicular lines are negative reciprocals, the slope of the tangent is $-\dfrac{3}{4}$.

Step 3 Find the slope-intercept equation of the tangent by using the point $(3,4)$ and the slope $-\dfrac{3}{4}$.

$y - y_1 = m(x - x_1)$ Use the point-slope formula.

$(y-(4)) = -\dfrac{3}{4}(x-(3))$

$y = -\dfrac{3}{4}x + \dfrac{25}{4}$ Rewrite in slope-intercept form.

	Feedback
A	The slope of the radius is perpendicular to the slope of the tangent. Find the slope of the tangent and use the point-slope formula to find its equation.
B	Perpendicular slopes are negative reciprocals.
C	Correct!
D	The slope of the radius is perpendicular to the slope of the tangent. Find the slope of the tangent and use the point-slope formula to find its equation.

PTS: 1 DIF: Average REF: Page 731
OBJ: 10-2.4 Writing the Equation of a Tangent TOP: 10-2 Circles

9. ANS: D

If two different lines contain the diameters of the circle, they intersect at the circle's center. Solve the system to find the point of intersection.

$-2x+1=5x+22$	Set the two equations equal to each other, as they both are equal to y.
$7x=-21$	Solve for x.
$x=-3$	
$y=-2(-3)+1=7$	Substitute for x in one equation.

The center of the circle is $(-3,7)$.

$(x+3)^2+(y-7)^2=r^2$	Equation of the circle with center $(-3,7)$ and radius r
$(5+3)^2+(11-7)^2=r^2$	Substitute $(5,11)$ for (x,y).
$80=r^2$	Simplify.
$(x+3)^2+(y-7)^2=80$	Substitute r^2 into the equation of the circle.

	Feedback
A	The point (5,11) is on the circumference; it is not the center of the circle.
B	In the equation of the circle, use the difference of the coordinates squared, not the sum squared.
C	Solve for the intersection of the two lines to determine the center of the circle.
D	Correct!

PTS: 1 DIF: Advanced TOP: 10-2 Circles

10. ANS: A

$d = PF_1 + PF_2$ Use the definition of constant sum of an ellipse.

Let the coordinates for the foci and point on the ellipse be $F_1(x_1, y_1)$, $F_2(x_2, y_2)$, and $P(x_3, y_3)$.

$d = \sqrt{(x_1 - x_3)^2 + (y_1 - y_3)^2} + \sqrt{(x_2 - x_3)^2 + (y_2 - y_3)^2}$ Apply the Distance Formula.

$d = \sqrt{(0-(10))^2 + (-3-(0))^2} + \sqrt{(0-(10))^2 + (3-(0))^2}$ Substitute the coordinates into the Distance Formula.

$d = \sqrt{109} + \sqrt{109}$ Simplify.

$d = 2\sqrt{109}$

The constant sum is $2\sqrt{109}$.

	Feedback
A	Correct!
B	The constant sum is the sum of the distances from *P* to each focus. Take the square roots of the distances before adding them.
C	The constant sum is the sum of the distances from *P* to BOTH focus points.
D	The constant sum is the sum of the distances from *P* to each focus. Take the square root of the squares of the differences when finding the distance.

PTS: 1 DIF: Average REF: Page 736
OBJ: 10-3.1 Using the Distance Formula to Find the Constant Sum of an Ellipse
TOP: 10-3 Ellipses

11. ANS: D

Step 1 Choose the appropriate form of the equation.

$\dfrac{y^2}{a^2}+\dfrac{x^2}{b^2}=1$. Because the vertical axis is longer.

Step 2 Identify the values of a and c.
$a = 10$; The vertex (0, –10) gives the value of a.
$c = 6$; The focus (0, 6) gives the value of c.

Step 3 Use the equation $c^2 = a^2 - b^2$ to find the value of b^2.
$6^2 = 10^2 - b^2$
$64 = b^2$

Step 4 Write the equation

$\dfrac{y^2}{100}+\dfrac{x^2}{64}=1$

	Feedback
A	Check if the major axis is horizontal or vertical. Also, make sure that you square the values of a and b in the equation.
B	Make sure that you square the values of a and b in the equation.
C	Check if the major axis is horizontal or vertical.
D	Correct!

PTS: 1 DIF: Average REF: Page 737
OBJ: 10-3.2 Using Standard Form to Write an Equation for an Ellipse
TOP: 10-3 Ellipses

12. ANS: B

Step 1 Rewrite the equation as $\dfrac{(x-6)^2}{10^2}+\dfrac{(y+5)^2}{8^2}=1$

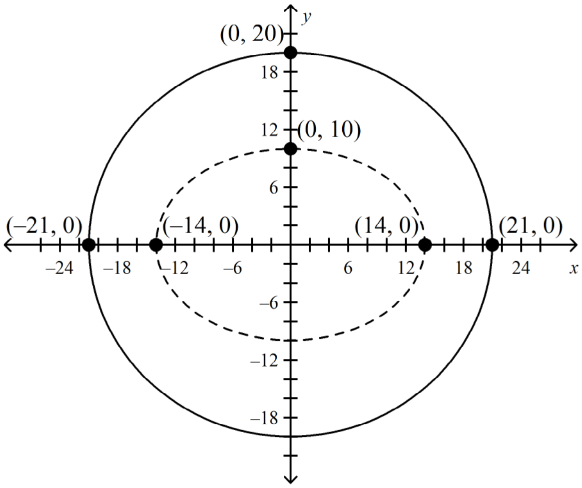
Step 2 Identify the values of h, k, a, and b.
$h = 6$ and $k = -5$, so the center is $(6, -5)$.
$a = 10$ and $b = 8$; because $10 > 8$ the major axis is horizontal.

Step 3 The vertices are $(6 \pm 10, -5)$, or $(16, -5)$ and $(-4, -5)$,
and the co-vertices are $(6, -5 \pm 8)$, or $(6, 3)$ and $(6, -13)$.

	Feedback
A	Check the values for the center of your ellipse; also determine if the major axis is horizontal or vertical.
B	Correct!
C	Check if the major axis is horizontal or vertical.
D	Check the values for the center of your ellipse.

PTS: 1 DIF: Basic REF: Page 738 OBJ: 10-3.3 Graphing Ellipses
TOP: 10-3 Ellipses

13. ANS: A



Step 1 Find the dimensions of the smaller bridge.
Because 196 > 100, the major axis of the bridge is horizontal.
$a^2 = 196$, so $a = 14$ and the width of the bridge is $2a = 28$ ft.
$b^2 = 100$, so $b = 10$ and the height of the bridge is 10 ft.

Step 2 Find the dimensions of the larger bridge.
The width of the larger bridge is 1.5(28) = 42 ft.
The height of the larger bridge is 2(10) = 20 ft.

Step 3 Write an equation for the design of the larger bridge.
For the larger bridge, $a = 21$ and $b = 20$.

The equation in standard form for the larger bridge is $\frac{x^2}{21^2} + \frac{y^2}{20^2} = 1$, or $\frac{x^2}{441} + \frac{y^2}{400} = 1$.

	Feedback
A	Correct!
B	The larger highway is 1.5 times as wide and twice as tall as the smaller highway; not the reverse.
C	The width of the bridge is twice the value of '*a*' in the ellipse formula.
D	You reversed the values of a and b in the original ellipse formula. Use $a = 14$ and $b = 10$.

PTS: 1 DIF: Average REF: Page 739 OBJ: 10-3.4 Application
TOP: 10-3 Ellipses

14. ANS: B

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$ Equation of an ellipse, with a horizontal major axis

$$\frac{x^2}{8000^2}+\frac{y^2}{6000^2}=1$$ Substitute 8000 for *a* and 6000 for *b*.

	Feedback
A	The major axis is the horizontal axis, not the vertical axis.
B	Correct!
C	Divide the major and minor axes lengths by 2 before using them in the ellipse equation.
D	Use the equation of an ellipse.

PTS: 1 DIF: Advanced TOP: 10-3 Ellipses

15. ANS: D

$$d=\left|PF_1-PF_2\right|$$ Definition of the constant difference of a hyperbola

$$d=\left|\sqrt{(x_1-x_3)^2+(y_1-y_3)^2}-\sqrt{(x_2-x_3)^2+(y_2-y_3)^2}\right|$$ Distance Formula

$$d=\left|\sqrt{(-5-1)^2+(0-0)^2}-\sqrt{(5-1)^2+(0-0)^2}\right|$$ Substitute the coordinates into the Distance Formula.

$$d=\left|\sqrt{36}-\sqrt{16}\right|$$ Simplify.

$$d=2$$

The constant difference is 2.

	Feedback
A	Can the constant difference be a negative number? Subtract the square roots, and then find the absolute value.
B	Subtract the square roots; don't add them.
C	Can the constant difference be a negative number?
D	Correct!

PTS: 1 DIF: Basic REF: Page 744
OBJ: 10-4.1 Using the Distance Formula to Find the Constant Difference of a Hyperbola
TOP: 10-4 Hyperbolas

16. ANS: B

Step 1 The vertex and focus are on the vertical axis so the equation will be of the form:

$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1.$

Step 2 The vertex is (0, 6) and the focus is (0, 8), so $a = 6$ and $c = 8$. Use $c^2 = a^2 + b^2$ to solve for b^2.

$8^2 = 6^2 + b^2$

$28 = b^2$

Step 3 The equation of the hyperbola is $\frac{y^2}{36} - \frac{x^2}{28} = 1.$

	Feedback
A	You are given the vertex and the focus, not the vertex and the co-vertex. Use c^2 = a^2 + b^2 to solve for b^2.
B	Correct!
C	Is the vertex on the horizontal or vertical axis?
D	You are given the vertex and the focus, not the vertex and the co-vertex. Use c^2 = a^2 + b^2 to solve for b^2.

PTS: 1 DIF: Average REF: Page 745
OBJ: 10-4.2 Writing Equations of Hyperbolas TOP: 10-4 Hyperbolas

17. ANS: C

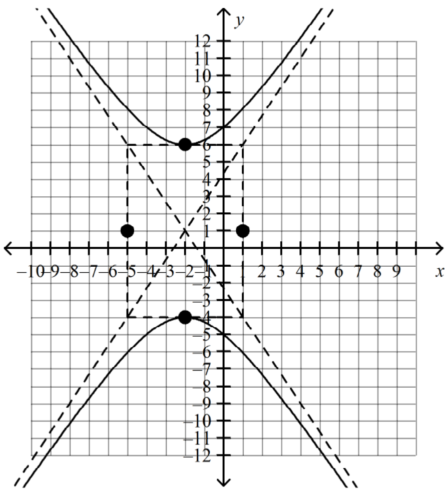
Step 1 The equation is of the form $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$, so the transverse axis is vertical with center (–2, 1).

Step 2 Because $a = 5$ and $b = 3$, the vertices are (–2, 6) and (–2, -4) and the co-vertices are (1, 1) and (–5, 1).

Step 3 The equations of the asymptotes are $y - 1 = \frac{5}{3}(x + 2)$ and $y - 1 = -\frac{5}{3}(x + 2)$.

Step 4 Draw a box using the vertices and co-vertices.Draw the asymptotes through the corners of the box.

Step 5 Draw the hyperbola using the vertices and the asymptotes.



	Feedback
A	The equation is of the form $(y-k)$^2 / a^2 – $(x-h)$^2 / b^2 = 1.
B	The equation is of the form $(y-k)$^2 / a^2 – $(x-h)$^2 / b^2 = 1.
C	Correct!
D	Is the transverse axis horizontal or vertical?

PTS: 1 DIF: Average REF: Page 746 OBJ: 10-4.3 Graphing a Hyperbola
TOP: 10-4 Hyperbolas

18. ANS: D

By definition, any point $P(x, y)$ on a parabola is equidistant from the focus $F(4,0)$ and the directrix $x = -3$.

$PF = PD$	Definition of a parabola
$\sqrt{(x-x_1)^2+(y-y_1)^2} = \sqrt{(x-x_2)^2+(y-y_2)^2}$	Distance Formula
$\sqrt{(x-4)^2+(y-0)^2} = \sqrt{(x-(-3))^2+(y-y)^2}$	Substitute (4, 0) for (x_1, y_1) and $(-3, y)$ for (x_2, y_2).
$\sqrt{x^2-8x+16+y^2} = \sqrt{x^2+6x+9}$	Simplify.
$x^2-8x+16+y^2 = x^2+6x+9$	Square both sides.
$14x = y^2+7$ $x = \frac{1}{14}y^2+\frac{1}{2}$	Solve for the first-degree variable. In this instance, solve for x.

The equation of the parabola is $x = \frac{1}{14}y^2 + \frac{1}{2}$.

	Feedback
A	Check your calculations.
B	Check your calculations.
C	Draw directrix and focus to help you determine the coordinates of point D and point P in the equation $PF = PD$.
D	Correct!

PTS: 1 DIF: Average REF: Page 751
OBJ: 10-5.1 Using the Distance Formula to Write the Equation of a Parabola
TOP: 10-5 Parabolas

19. ANS: A

Step 1 Because the directrix is a horizontal line, the equation is in the form $y = \dfrac{1}{4p}x^2$. The vertex is above the directrix, so the graph will open upward.
Step 2 Because the directrix is $y = -14$, $p = 14$ and $4p = 56$.
Step 3 The equation of the parabola is $y = \dfrac{1}{56}x^2$.

	Feedback
A	Correct!
B	Graph the parabola to see whether it opens up, down, right or left.
C	Graph the parabola to see whether it opens up, down, right or left.
D	The vertex of the parabola is above the directrix.

PTS: 1 DIF: Average REF: Page 752
OBJ: 10-5.2 Writing Equations of Parabolas TOP: 10-5 Parabolas

20. ANS: A

The standard form for a parabola with a vertical axis of symmetry is $y-k=\frac{1}{4p}(x-h)^2$.

Step 1 The vertex is (h, k) or $(-2,2)$.

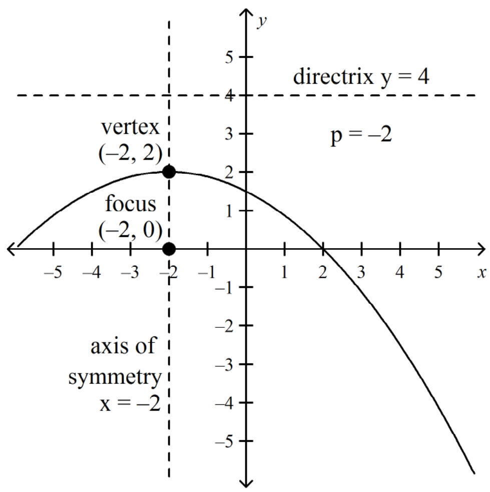
Step 2 $\frac{1}{4p}=-\frac{1}{8}$, so $4p=-8$ and $p=-2$.

Step 3 The graph has a vertical axis of symmetry, opens down, and $x=-2$.

Step 4 The focus is $(h, k+p)$. Substitute to get $(-2,2+(-2))$ or $(-2,0)$.

Step 5 The directrix is a horizontal line $y=k-p$. Substitute to get $y=2-(-2)$ or $y=4$.

Step 6 Use the information to sketch the graph.



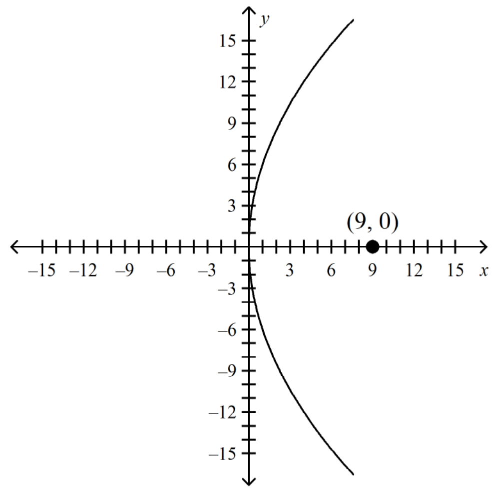
	Feedback
A	Correct!
B	Check the coordinates of the vertex and the value for *p*.
C	In which direction does the graph open?
D	In which direction does the graph open?

PTS: 1 DIF: Average REF: Page 753 OBJ: 10-5.3 Graphing Parabolas
TOP: 10-5 Parabolas

21. ANS: B

The equation for the cross section is in the form $x = \frac{1}{4p}y^2$, so $4p = 36$ and $p = 9$.

The focus should be 9 units from the vertex of the cross section.



	Feedback
A	Put the equation in standard form and then solve for *p*.
B	Correct!
C	Put the equation in standard form and then solve for *p*.
D	Put the equation in standard form and then solve for *p*.

PTS: 1 DIF: Average REF: Page 754
OBJ: 10-5.4 Using the Equation of a Parabola TOP: 10-5 Parabolas

22. ANS: B

The standard form of an ellipse, where $a > b$, can be written as

$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$, where the major axis is horizontal, or

$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$, where the major axis is vertical.

$\frac{(x-2)^2}{3^2} + \frac{(y-4)^2}{7^2} = 1$ is an ellipse with a vertical axis.

	Feedback
A	There would only be one square term if this were a parabola.
B	Correct!
C	The denominators would be equal if this equation were a circle.
D	The terms would be subtracted and not added if this were a hyperbola.

PTS: 1 DIF: Advanced REF: Page 760
OBJ: 10-6.1 Identifying Conic Sections in Standard Form TOP: 10-6 Identifying Conic Sections

23. ANS: B

The general form for a conic section is $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$.

$A = 4,\ B = -5,\ C = -5$	Identify the values for A, B, and C.
$B^2 - 4AC = (-5)^2 - 4(4)(-5)$	Substitute into $B^2 - 4AC$.
$B^2 - 4AC = 105$	Simplify.

Because $B^2 - 4AC > 0$, the equation represents a hyperbola.

	Feedback
A	Identify the values for *A*, *B*, and *C*. Use *B*^2 – 4*AC* to determine the type of conic section the equation represents.
B	Correct!
C	Identify the values for *A*, *B*, and *C*. Use *B*^2 – 4*AC* to determine the type of conic section the equation represents.
D	Identify the values for *A*, *B*, and *C*. Use *B*^2 – 4*AC* to determine the type of conic section the equation represents.

PTS: 1 DIF: Average REF: Page 761
OBJ: 10-6.2 Identifying Conic Sections in General Form TOP: 10-6 Identifying Conic Sections

24. ANS: A

Rearrange the terms to prepare for completing the square in *x* and *y*.
$16x^2 + 64x + 9y^2 - 18y = 71$

Factor 16 from the *x*-terms and 9 from the *y*-terms. Then complete both squares.
$16(x^2 + 4x + 4) + 9(y^2 - 2y + 1) = 71 + 16(4) + 9(1)$

Factor and simplify.
$16(x+2)^2 + 9(y-1)^2 = 144$

Divide both sides by 144.
$$\frac{(x+2)^2}{9} + \frac{(y-1)^2}{16} = 1$$

This is an ellipse with center (2, –1) with a vertical major axis of length 8 and a minor axis length of 6.

	Feedback
A	Correct!
B	The major axis is with the fraction with the largest denominator.
C	There is no *xy* term and both squared terms are positive, so this isn't a hyperbola.
D	There is no *xy* term and both squared terms are positive, so this isn't a hyperbola.

PTS: 1 DIF: Average REF: Page 762
OBJ: 10-6.3 Finding the Standard Form of the Equation for a Conic Section
TOP: 10-6 Identifying Conic Sections

25. ANS: A

$$-9x^2 - 54x + [\quad] + 25y^2 + 50y + [\quad] = 236 + [\quad] + [\quad]$$

Rearrange to complete the square in x and y.

$$-9\left(x^2 + 6x + [\quad]\right) + 25\left(y^2 + 2y + [\quad]\right) = 236 + [\quad] + [\quad]$$

Factor –9 from the x-terms and 25 from the y-terms.

$$-9\left(x^2 + 6x + \left(\tfrac{6}{3}\right)^2\right) + 25\left(y^2 + 2y + \left(\tfrac{2}{2}\right)^2\right) = 236 - 9\left(\tfrac{6}{3}\right)^2 + 25\left(\tfrac{2}{2}\right)^2$$

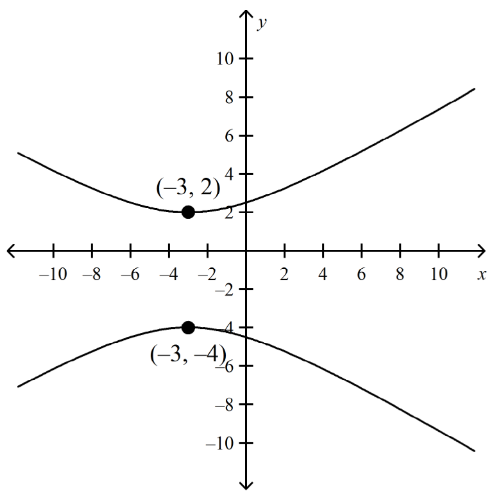
Complete both squares.

$$25\left(y+1\right)^2 - 9(x+2)^2 = 225$$

Simplify.

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

Divide both sides by 225.



Because the conic is of the form $\dfrac{(y-k)^2}{a^2} - \dfrac{(x-h)^2}{b^2} = 1$, it is a hyperbola with vertical transverse axis. The vertices are (–3, 2) and (–3, –4). The airplane will be on the upper branch of the hyperbola because distance above ground is always positive. The relevant vertex is (–3, 2) with y-coordinate 2. The minimum height of the airplane is 200 feet.

	Feedback
A	Correct!
B	The equation is measured in hundreds of feet.
C	Check the vertices of the hyperbola. Make sure you substitute the correct values for h and k.
D	When the center of the hyperbola is at (h, k), the vertices are (h, $k + a$) and (h, $k - a$).

PTS: 1 DIF: Average REF: Page 763 OBJ: 10-6.4 Application
TOP: 10-6 Identifying Conic Sections

26. ANS: A

The figure is an ellipse. The formula for an ellipse is $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$, where (h,k) is the center, and a and b are each half of the minor and major axes lengths. As seen in the graph, the center is at $(2,5)$, the minor axis length is 6, and the major axis length is 12. Therefore, the equation of the ellipse is $\frac{(x-2)^2}{3^2}+\frac{(y-5)^2}{6^2}=1$. This can be simplified into a polynomial as shown.

$\frac{(x-2)^2}{3^2}+\frac{(y-5)^2}{6^2}=1$	Equation of the ellipse
$4(x-2)^2+(y-5)^2=1$	
$4(x^2-4x+4)+(y^2-10y+25)=1$	Expand the binomials.
$4x^2-16x+16+y^2-10y+25=1$	Distribute.
$4x^2-16x=-y^2+10y-40$	Simplify.

	Feedback
A	Correct!
B	Check your calculations.
C	In the equation of an ellipse, use the difference of coordinates squared, not the sum squared.
D	Find the equation that represents an ellipse.

PTS: 1 DIF: Advanced TOP: 10-6 Identifying Conic Sections