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

Algebra II Practice Quiz: 10.3 - 10.4

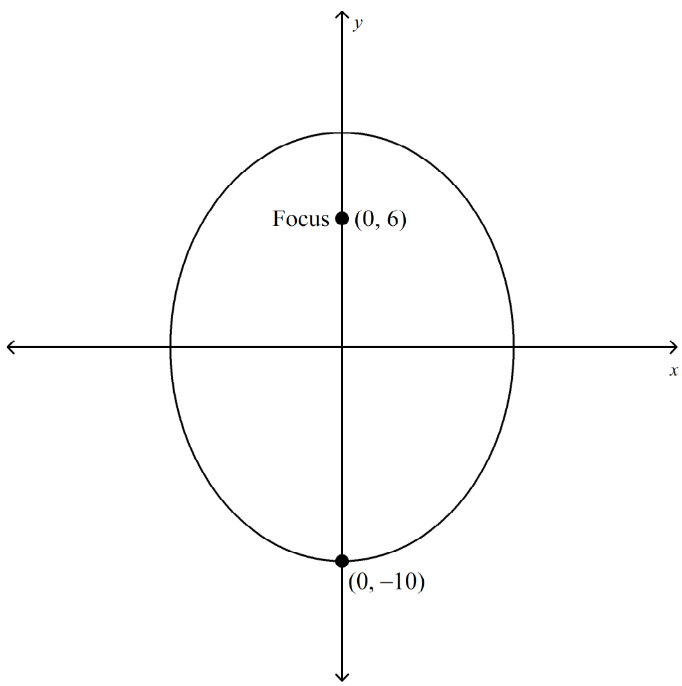
Multiple Choice

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

____ 1. 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

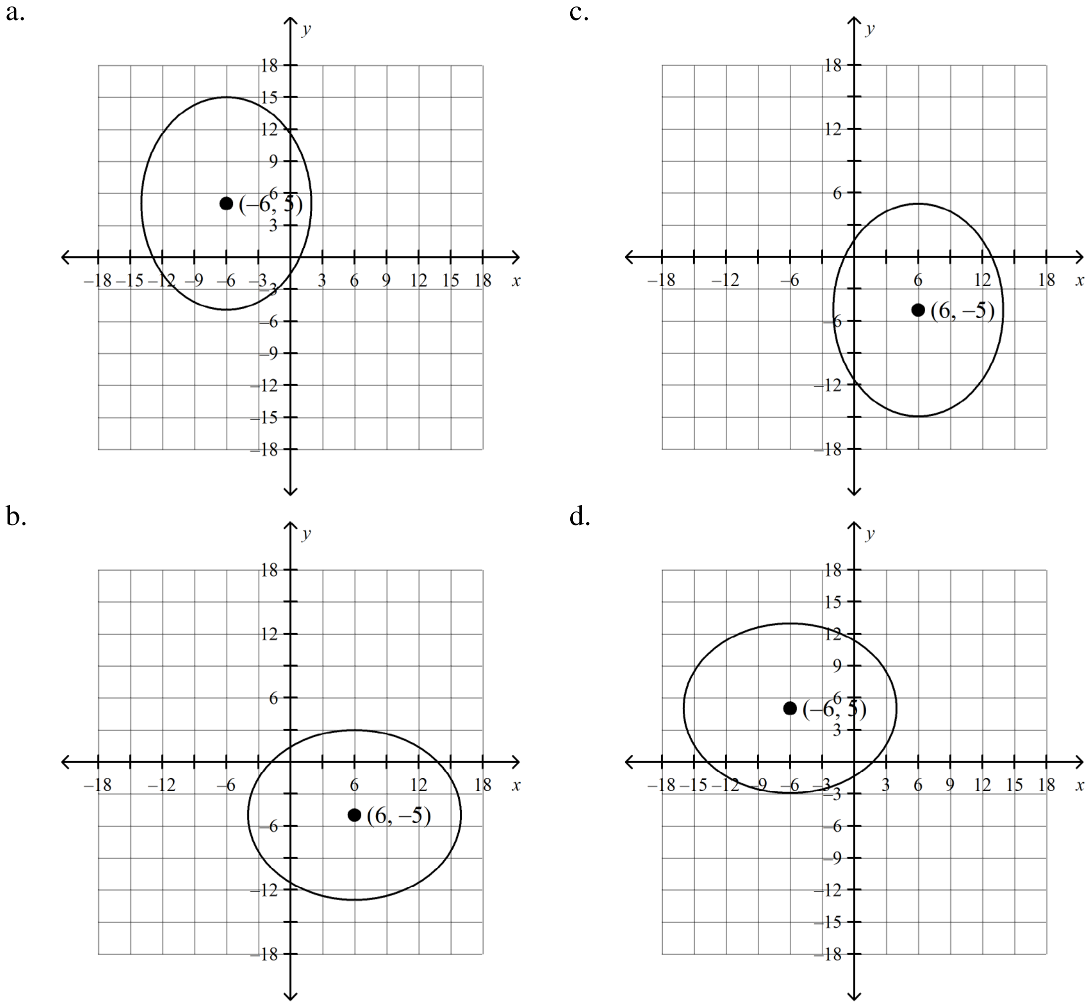
____ 2. Write an equation in standard form for the ellipse shown with center (0, 0).



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

Name: ________________________ **ID: A**

____ 3. Graph the ellipse $\dfrac{(x-6)^2}{100}+\dfrac{(y+5)^2}{64}=1$.



Name: ________________________ **ID: A**

____ 4. 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.
$\frac{x^2}{225}+\frac{y^2}{784}=1$

____ 5. 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. $\frac{x^2}{6000^2}+\frac{y^2}{8000^2}=1$
c. $\frac{x^2}{16000^2}-\frac{y^2}{12000^2}=1$
b. $\frac{x^2}{8000^2}+\frac{y^2}{6000^2}=1$
d. $\frac{x^2}{8000^2}-\frac{y^2}{6000^2}=1$

____ 6. 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
c. –2
b. 10
d. 2

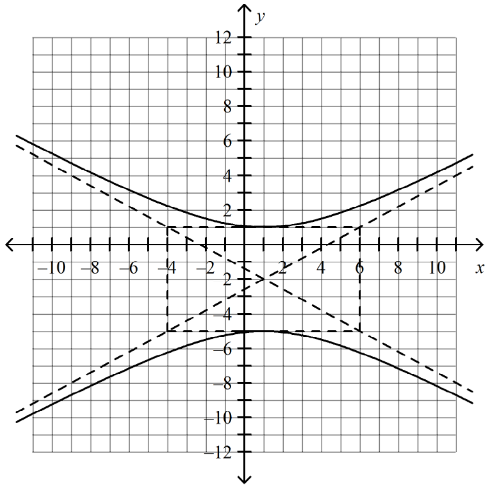
____ 7. Write an equation in standard form for the hyperbola with center (0, 0), vertex (0, 6), and focus (0, 8).

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

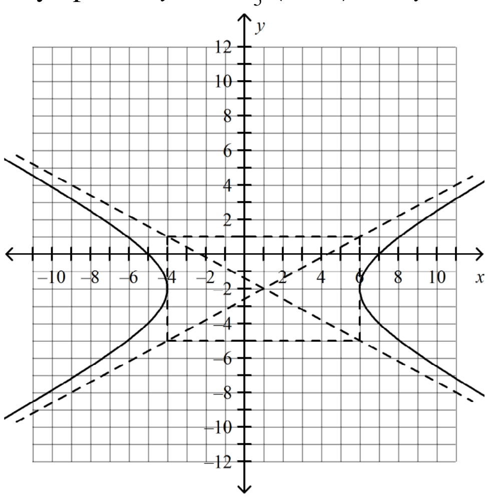
____ 8. Find the vertices, co-vertices, and asymptotes of the hyperbola $\frac{(y-1)^2}{25} - \frac{(x+2)^2}{9} = 1$, and then graph.

Name: ________________________ ID: A

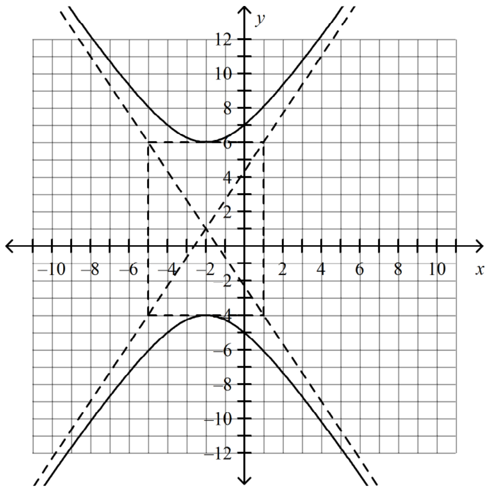
a. Vertices: (1, 1) and (1, -5)
Co-vertices: (-4, -2) and (6, -2)
Asymptotes: $y + 2 = \frac{3}{5}(x - 1)$ and $y + 2 = -\frac{3}{5}(x - 1)$



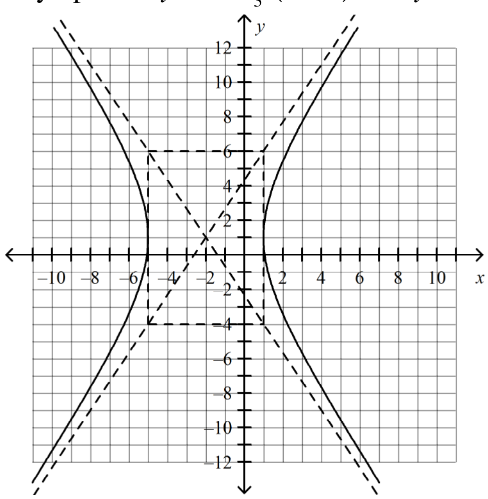
b. Vertices: (-4, -2) and (6, -2)
Co-vertices: (1, 1) and (1, -5)
Asymptotes: $y + 2 = \frac{3}{5}(x - 1)$ and $y + 2 = -\frac{3}{5}(x - 1)$



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



Algebra II Practice Quiz: 10.3 - 10.4
Answer Section

MULTIPLE CHOICE

1. 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

2. ANS: D

Step 1 Choose the appropriate form of the equation.

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

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

	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

3. ANS: B

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

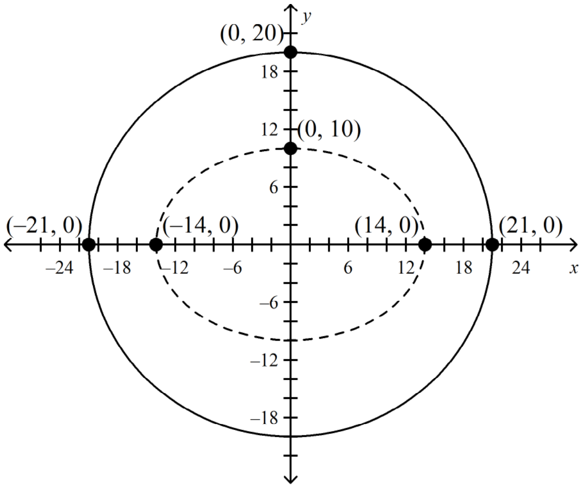
Step 2 Identify the values of h, k, a, and b.
$h = 6$ and $k = -5$, so the center is $(6, -5)$.
$a = 10$ and $b = 8$; because $10 > 8$ the major axis is horizontal.

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

4. 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 $\dfrac{x^2}{21^2} + \dfrac{y^2}{20^2} = 1$, or $\dfrac{x^2}{441} + \dfrac{y^2}{400} = 1$.

	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

5. ANS: B

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

$\dfrac{x^2}{8000^2}+\dfrac{y^2}{6000^2}=1$ 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

6. 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

7. 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

8. ANS: C

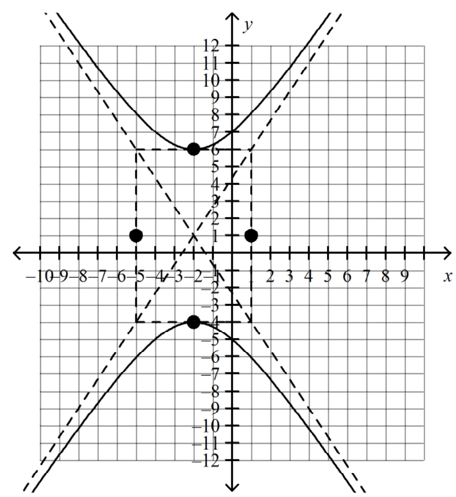
Step 1 The equation is of the form $\dfrac{(y-k)^2}{a^2} - \dfrac{(x-h)^2}{b^2} = 1$, so the transverse axis is vertical with center (–2, 1).

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