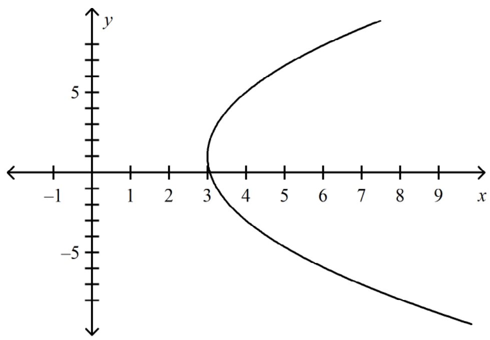
Name: _________________________ **Class:** ___________________ **Date:** __________ **ID: A**

Algebra II Practice Quiz 10.5 - 10.6

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

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

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

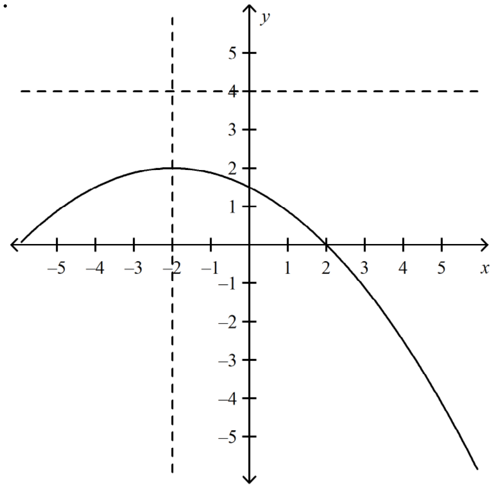
c. $x = 56y^2$

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

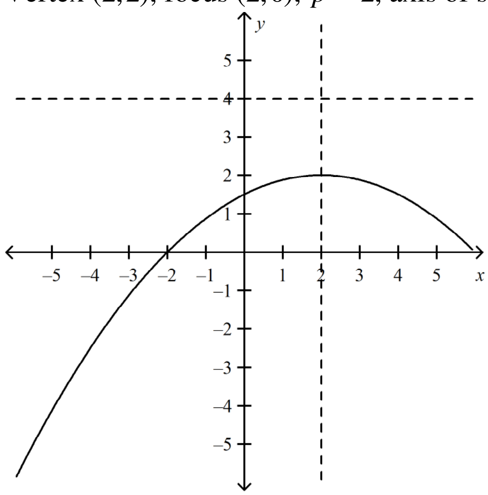
Name: ________________________ **ID: A**

____ 3. 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.

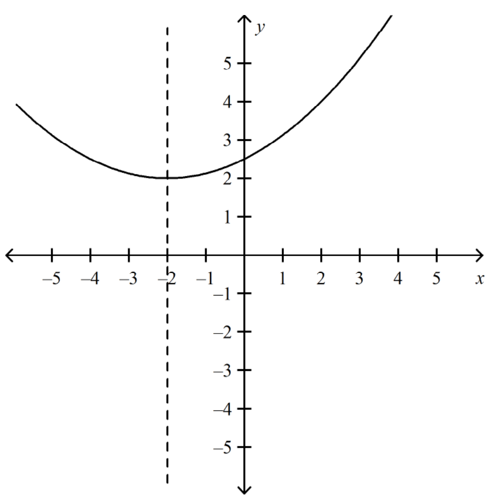
a. Vertex $(-2,2)$, focus $(-2,0)$, $p=-2$, axis of symmetry $x=-2$, and directrix $y=4$.



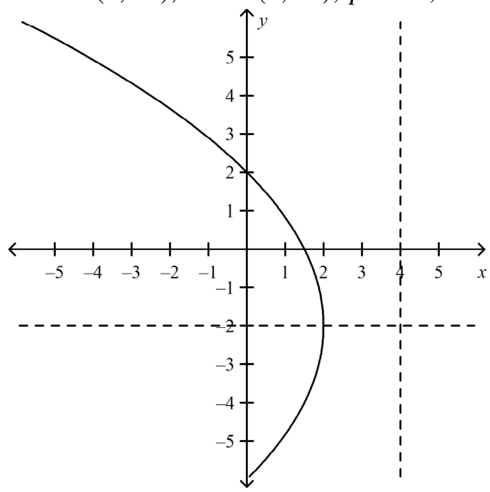
b. Vertex $(2,2)$, focus $(2,0)$, $p=2$, axis of symmetry $x=2$, and directrix $y=4$.



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 $y = -2$.



____ 4. 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

____ 5. 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

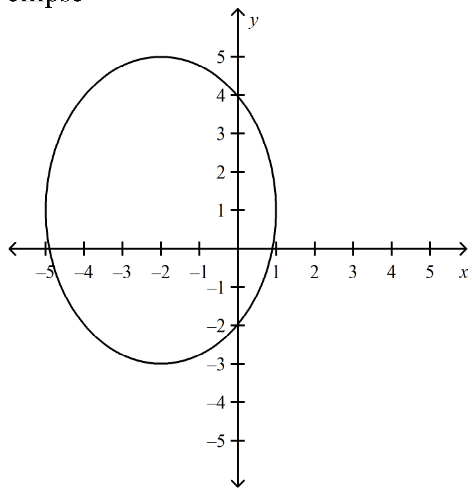
____ 6. Identify the conic section that the equation $4x^2 - 5xy - 5y^2 - 3x + 2y + 9 = 0$ represents.

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

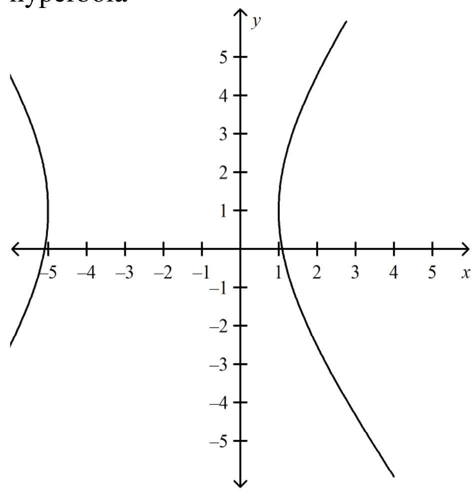
Name: ________________________ **ID: A**

____ 7. 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.

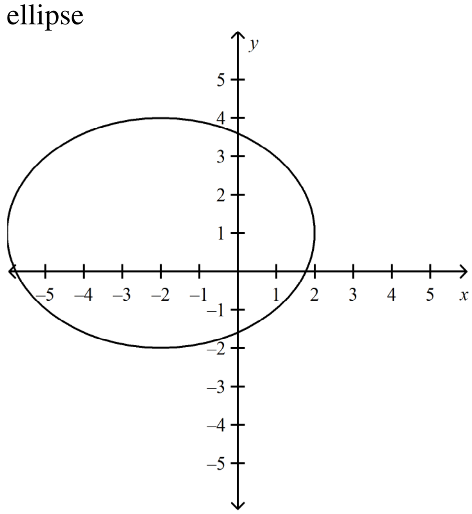
a. ellipse



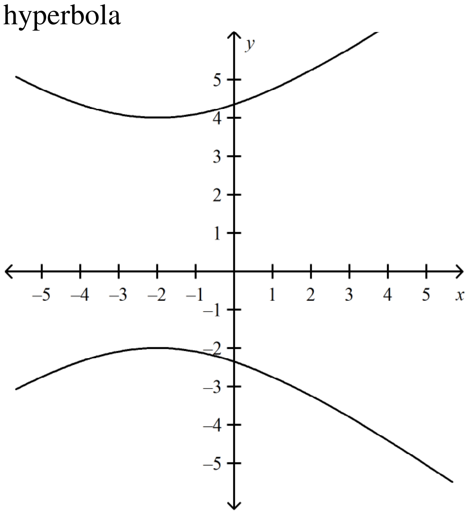
c. hyperbola



b. ellipse



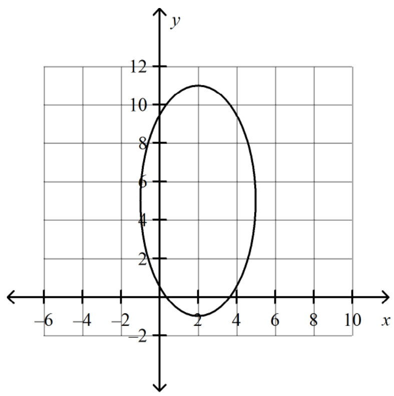
d. hyperbola



____ 8. 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
c. 400 feet
b. 2 feet
d. 300 feet

____ 9. 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. $x^2 - 4x + 4y^2 - 40y = -100$

Numeric Response

10. The latus rectum of a parabola is the line segment perpendicular to the axis of symmetry through the focus, with endpoints on the parabola. Find the length of the latus rectum of the parabola $y = \frac{1}{12}x^2$.

Algebra II Practice Quiz 10.5 - 10.6
Answer Section

MULTIPLE CHOICE

1. 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.
$14x = y^2+7$	Solve for the first-degree variable. In this instance, solve for x.
$x = \frac{1}{14}y^2+\frac{1}{2}$	

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

2. ANS: A

Step 1 Because the directrix is a horizontal line, the equation is in the form $y = \frac{1}{4p}x^2$. 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 $y = \frac{1}{56}x^2$.

	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

3. 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 $(-2,2)$.

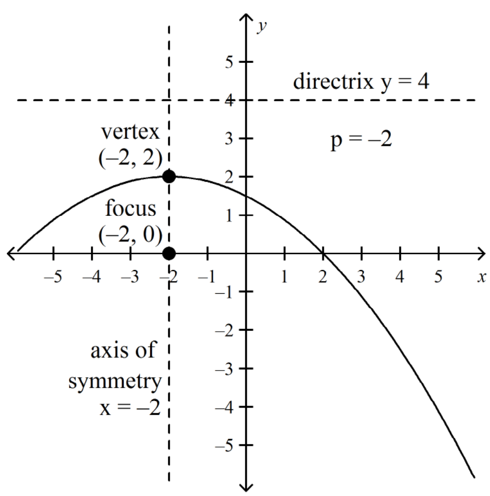
Step 2 $\frac{1}{4p} = -\frac{1}{8}$, so $4p = -8$ and $p = -2$.

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.



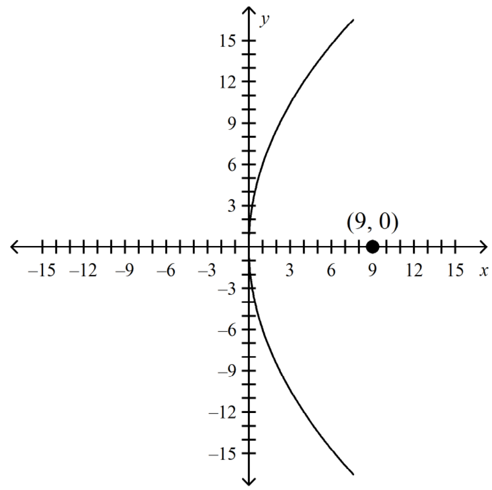
	Feedback
A	Correct!
B	Check the coordinates of the vertex and the value for p.
C	In which direction does the graph open?
D	In which direction does the graph open?

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

4. 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

5. 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

6. 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

7. 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.

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

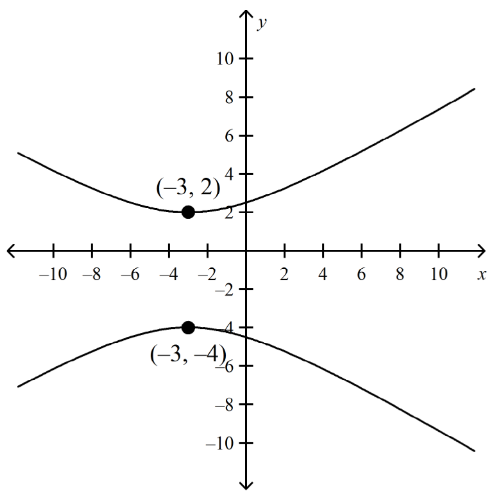
This is an ellipse with center (2, –1) with a vertical major axis of length 8 and a minor axis length of 6.

	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

8. ANS: A

$-9x^2 - 54x + [\ \ ] + 25y^2 + 50y + [\ \ ] = 236 + [\ \ ] + [\ \ ]$	Rearrange to complete the square in x and y.
$-9\left(x^2 + 6x + [\ \ ]\right) + 25\left(y^2 + 2y + [\ \ ]\right) = 236 + [\ \ ] + [\ \ ]$	Factor –9 from the x-terms and 25 from the y-terms.
$-9\left(x^2 + 6x + \left(\frac{6}{3}\right)^2\right) + 25\left(y^2 + 2y + \left(\frac{2}{2}\right)^2\right) = 236 - 9\left(\frac{6}{3}\right)^2 + 25\left(\frac{2}{2}\right)^2$	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 $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$, 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

9. 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

NUMERIC RESPONSE

10. ANS: 12

PTS: 1 DIF: Advanced TOP: 10-5 Parabolas