ACC. MATH II PRACTICE QUIZ

NAME _Key_

Ellipses and Hyperbolas
(Sections 9.4 – 9.5)

PERIOD_____ DATE_____

DIRECTIONS: Organize your work **neatly** and **carefully** to answer each of the following problems.
SHOW ALL NECESSARY WORK to fully justify each of your answers.

Write the equation of the following ellipses **in standard form**:

1.) $24x^2 + 4y^2 - 96 = 0$

$$\frac{24x^2}{96} + \frac{4y^2}{96} = \frac{96}{96}$$

$$\boxed{\frac{x^2}{4} + \frac{y^2}{24} = 1}$$

2.) $x^2 + 18x + 12y^2 - 48y = 3$

$$x^2 + 18x + \boxed{81} + 12(y^2 - 4y + \boxed{4}) = 3 + 81 + 48$$

$$\frac{(x+9)^2}{132} + \frac{12(y-2)^2}{132} = \frac{132}{132}$$

$$\boxed{\frac{(x+9)^2}{132} + \frac{(y-2)^2}{11} = 1}$$

For each of the following **ellipses** determine the coordinates of the center, direction of the major axis (horizontal or vertical), coordinates of all the vertices, length of each axis, and coordinates of the foci.

3–9.) $\dfrac{x^2}{64} + \dfrac{y^2}{289} = 1$
$\quad a=8 \qquad b=17$

What are the coordinates of its **center**? ____ $(0,0)$

Is the **major axis** horizontal or vertical? ___ vertical

Find the coordinates of the endpoints (vertices) of the **major axis**. ___ $(0, \pm17)$

Find the coordinates of the endpoints (co-vertices) of the **minor axis**. ___ $(\pm8, 0)$

What is the **length** of the **major axis**? $2(17) =$ ___ 34

What is the **length** of the **minor axis**? $2(8) =$ ___ 16

What are the coordinates of its **foci**? ____ $(0, \pm15)$
$\quad c = \sqrt{289-64} = \sqrt{225}$

10–16.) $\dfrac{(x+5)^2}{36} + \dfrac{(y-1)^2}{4} = 1$
$\quad a=6 \qquad b=2$

What are the coordinates of its **center**? ____ $(-5, 1)$

Is the **major axis** horizontal or vertical? ____ horizontal

Find the coordinates of the endpoints (vertices) of the **major axis**. ___ $(1,1), (-11,1)$

Find the coordinates of the endpoints (co-vertices) of the **minor axis**. ___ $(-5,3), (-5,-1)$

What is the **length** of the **major axis**? $2(6) =$ ___ 12

What is the **length** of the **minor axis**? $2(2) =$ ___ 4

What are the coordinates of its **foci**? ___ $(-5 \pm 4\sqrt{2}, 1)$ $= \begin{matrix}(0.65685424975, 1)\\(-10.65685425, 1)\end{matrix}$
$\quad c = \sqrt{36-4} = \sqrt{32} = 4\sqrt{2}$

17.) Write the standard form of the equation of the **ellipse** with a center at the origin and vertices of $(0,-8)$, $(0,8)$, $(2,0)$, and $(-2,0)$.

$$\frac{x^2}{4} + \frac{y^2}{64} = 1$$

18.) Write the standard form of the equation of the **ellipse** with a center at $(1,-3)$, vertices of $(7,-3)$ and $(-5,-3)$. and foci of $(5,-3)$ and $(-3,-3)$.

$$\frac{(x-1)^2}{36} + \frac{(y+3)^2}{20} = 1$$

$c^2 = a^2 - b^2$
$4^2 = 6^2 - b^2$
$b^2 = 36 - 16$

Write the equation of the following **hyperbolas** in **standard form**:

19.) $12x^2 = 96 + 16y^2$

$$\frac{12x^2}{96} - \frac{16y^2}{96} = \frac{96}{96}$$

$$\frac{x^2}{8} - \frac{y^2}{6} = 1$$

20.) $x^2 + 8x - 36y^2 - 36y = 65$

$x^2 + 8x + \boxed{16} - 36(y^2 + y + \boxed{\frac{1}{4}}) = 65 + 16$
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$$\frac{(x+4)^2}{72} - \frac{36(y+\frac{1}{2})^2}{72} = \frac{72}{72}$$

$$\frac{(x+4)^2}{72} - \frac{(y+\frac{1}{2})^2}{2} = 1$$

For each of the following **hyperbolas** determine the coordinates of the center, direction of opening (left/right or up/down), coordinates of the vertices, coordinates of the foci, and slopes of the asymptotes.

21–25.) $\dfrac{x^2}{25} - \dfrac{y^2}{9} = 1$

$a=5$ $b=3$

What are the coordinates of its **center**? $(0,0)$

What **direction** does the hyperbola open? left/right

What are the coordinates of the **vertices**? $(\pm 5, 0)$

What is the coordinates of the **foci**? $(\pm\sqrt{34}, 0)$ $= (5.830951895, 0)$

$c = \sqrt{25+9} = \sqrt{34}$

What are the **slopes** of the **asymptotes**? $m = \pm\frac{3}{5}$

26–30.) $\dfrac{(y-9)^2}{49} - \dfrac{(x-1)^2}{1} = 1$

$b=7$ $a=1$

What are the coordinates of its **center**? $(1,9)$

What **direction** does the hyperbola open? up/down

What are the coordinates of the **vertices**? $(1,16)$, $(1,2)$

What is the coordinates of the **foci**? $(1, 9\pm5\sqrt{2})$ $= (1, 16.07106781)$
$(1, 1.928932188)$

$c = \sqrt{49+1} = \sqrt{50}$

What are the **slopes** of the **asymptotes**? $m = \pm 7$