Name:_____ Date:_____ Prd:_____

PART 3: ELLIPSES:

General Formula: $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

Note: You Almost definitely want to do these on a separate sheet.

1. Find the coordinates of the vertices and foci of these ellipses and sketch each.

(a) $\frac{x^2}{36} + \frac{y^2}{16} = 1$

(b) $9x^2 + 25y^2 = 255$

(c) $4x^2 + 25y^2 = 100$

(d) $\frac{x^2}{16} + \frac{y^2}{25} = 1$

(e) $\frac{(x-3)^2}{4} + \frac{(y-6)^2}{25} = 1$

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

2. Each of these ellipses has its center at the origin. Find an equation of the ellipse.

(a) vertex (7, 0), minor axis is 2 units long (total length)

(b) vertex (0, -13), focus (0, -5)

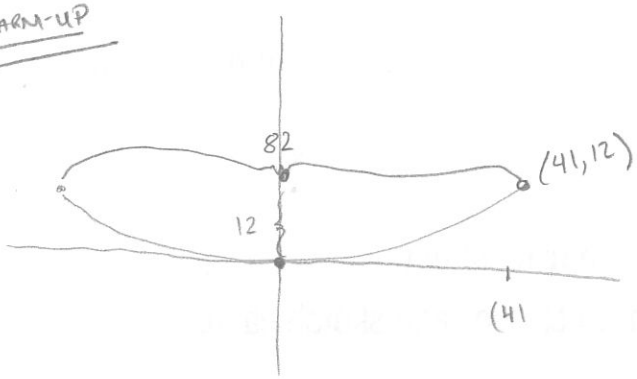
(c) vertex (0, -9), minor axis 6 units long

(d) vertex (17, 0), focus (8, 0)

3. Sketch the graphs of $9x^2 + 2y^2 = 18$ and $3x + y = -3$ on a graph, then determine the points of intersection algebraically.

4.) Find an equation of an ellipse with A focus at (0, 5) and eccentricity e=2/10

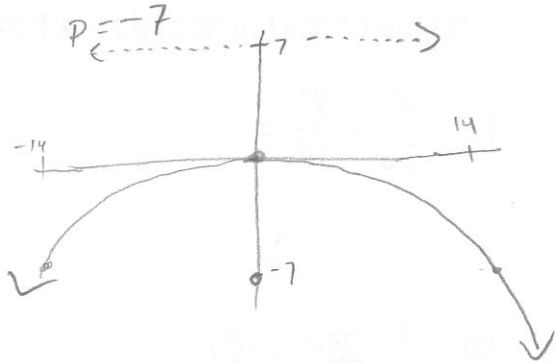
WARM-UP




$y = 7$

$y = -p$

$p = -7$




$x^2 = 4py$

$(41)^2 = 4p(12)$

$\frac{1681}{48} = \frac{48p}{48}$

$p = 35.02$ ft.

$x^2 + 4x + 4 \quad + y^2 - 12y + 36 = -24 + 4 + 36$

$(x+2)^2 + (y-6)^2 = 16$

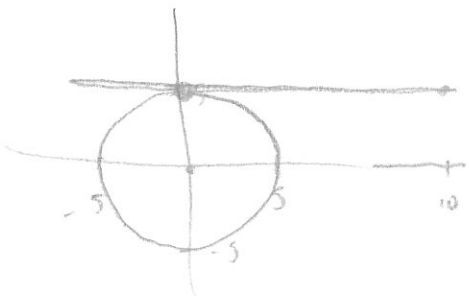
$\boxed{\begin{array}{l} C: (-2, 6) \\ R: 4 \end{array}}$

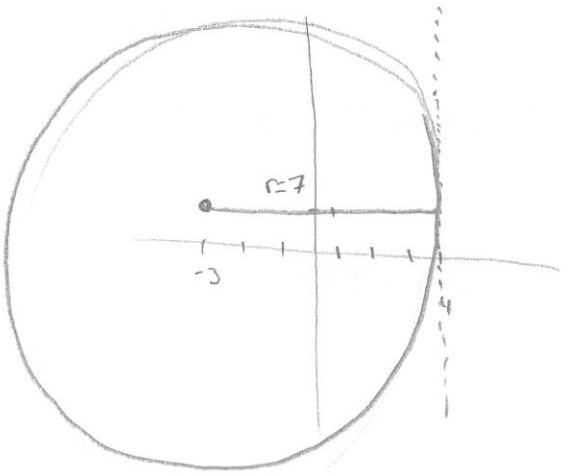
Example 3.

$(x-2)^2 + (y-3)^2 = r^2$

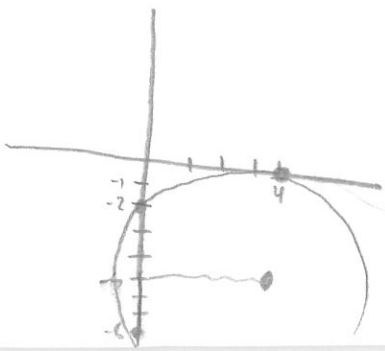
$3(-2) + 2(6) = 6$ ✓

Yes.




Example 4:




$h = 4$

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

$(x-4)^2 + (y+5)^2 = 25$

$(x+3)^2 + (y-1)^2 = 49$

1) a) $\frac{x^2}{36} + \frac{y^2}{16} = 1$

$c^2 = a^2 - b^2$

$= 36 - 16$

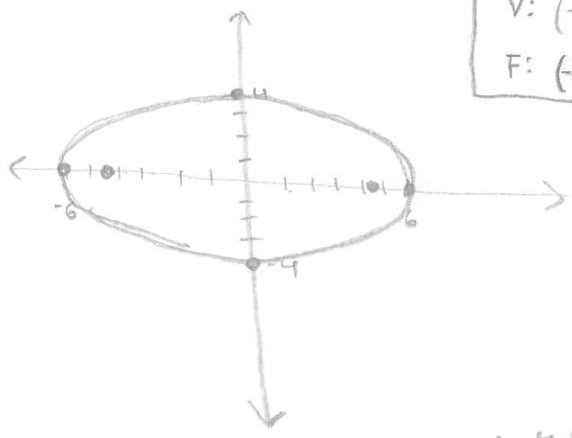
$\sqrt{c^2} = \sqrt{20}$

$a^2 = 36 \quad b^2 = 16$

$a = 6 \quad b = 4$

V: $(-6, 0)$ and $(6, 0)$

F: $(-\sqrt{20}, 0)$ and $(\sqrt{20}, 0)$




b) You didn't need to do this.

changed this

$\frac{9x^2 + 25y^2}{225} = \frac{225}{225}$

$\frac{x^2}{85} + \frac{y^2}{9} = 1$

$a^2 = 85 \quad b^2 = 9$

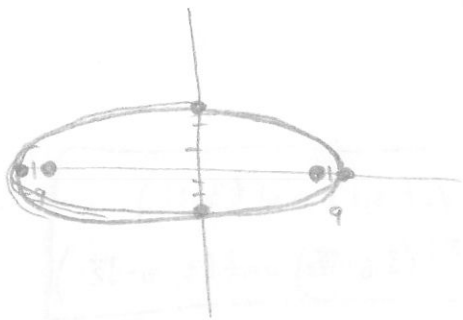
$a = 9.22 \quad b = 3$

$c^2 = a^2 - b^2$

$c^2 = 85 - 9$

$c^2 = 76$

$c = 8.72$




V: $(9.22, 0)$ and $(-9.22, 0)$

F: $(8.72, 0)$ and $(-8.72, 0)$

c.) $\frac{4x^2 + 25y^2}{100} = \frac{100}{100}$

vertices/foci on x-axis

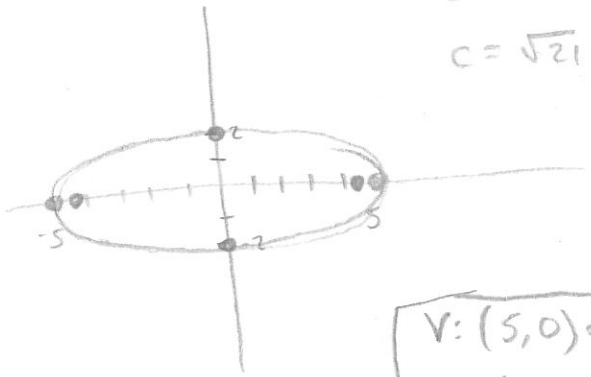
$\frac{x^2}{25} + \frac{y^2}{4} = 1$

$a^2 = 25$ $\quad b^2 = 4$ $\quad c^2 = a^2 - b^2$

$a = 5$ $\quad b = 2$ $\quad c^2 = 25 - 4$

$c^2 = 21$

$c = \sqrt{21}$




V: $(5,0)$ and $(-5,0)$
F: $(\sqrt{21},0)$ and $(-\sqrt{21},0)$

e.) $\frac{(x-3)^2}{4} + \frac{(y-6)^2}{25} = 1$

tall and skinny ellipse.

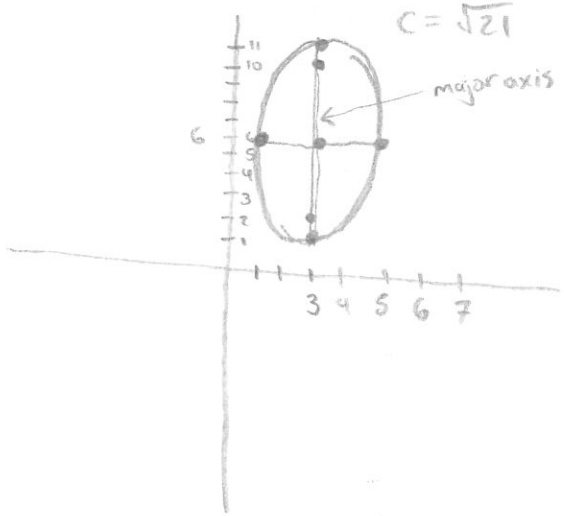
center

$(h,k) = (3,6)$

$b^2 = 4$ $\quad a^2 = 25$ $\quad c^2 = 25 - 4$

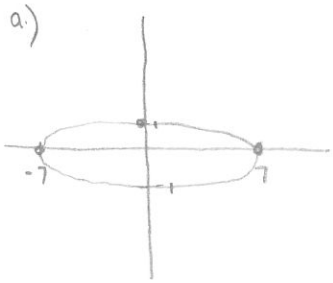
$b = 2$ $\quad a = 5$ $\quad \sqrt{c^2} = \sqrt{21}$

$c = \sqrt{21}$




V: $(3,1)$ and $(3,11)$
F: $(3, 6+\sqrt{21})$ and $(3, 6-\sqrt{21})$

2.) a.)

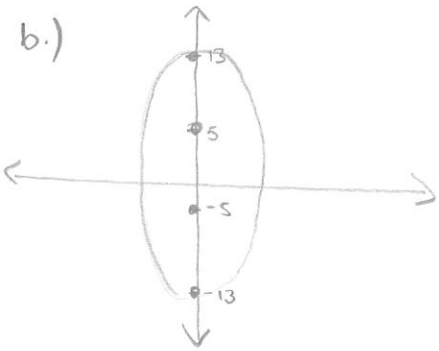



$a = 7 \quad b = 1$

$a^2 = 49 \quad b^2 = 1$

$$\boxed{\frac{x^2}{49} + \frac{y^2}{1} = 1}$$

b.)




$c = 5 \quad a = 13$

$c^2 = 25 \quad a^2 = 169$

$c^2 = a^2 - b^2$

$25 = 169 - b^2$

$b^2 = 144$

$$\boxed{\frac{x^2}{144} + \frac{y^2}{169} = 1}$$

c.) $a = 9$ (y-axis) $\quad b = 3$

$a^2 = 81 \quad b^2 = 9$

$$\boxed{\frac{x^2}{9} + \frac{y^2}{81} = 1}$$

d.) $a = 17 \quad c = 8$

$a^2 = 289 \quad c^2 = 64$

$c^2 = a^2 - b^2$

$64 = 289 - b^2$

$b^2 = 225$

$$\boxed{\frac{x^2}{289} + \frac{y^2}{225} = 1}$$

3.) $\dfrac{9x^2 + 2y^2}{18} = \dfrac{18}{18}$

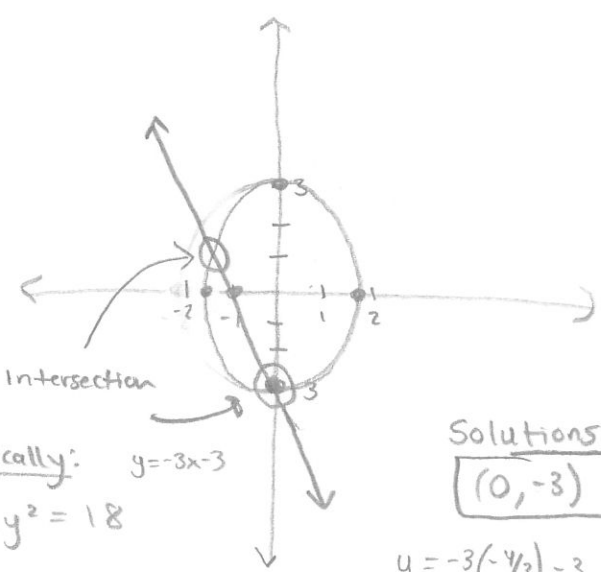
$$\frac{x^2}{2} + \frac{y^2}{9} = 1$$

$b^2 = 2 \quad a^2 = 9$

$b = \sqrt{2} \quad a = 3$

$3x + y = -3$

$y = -3x - 3$




Algebraically: $y = -3x - 3$

$9x^2 + 2y^2 = 18$

$9x^2 + 2(-3x-3)^2 = 18$

$9x^2 + 2(9x^2 + 18x + 9) = 18$

$9x^2 + 18x^2 + 36x + 18 = 18$

$\quad -18 \quad -18$

$27x^2 + 36x = 0$

$9x(3x+4) = 0$

$x = 0$

$x = -4/3$

Solutions:

$\boxed{(0, -3)}$

$y = -3(-4/3) - 3$

$y = 4 - 3 = 1$

$\boxed{(-4/3, 1)}$