SOLUTIONS ≈> EQUATION OF AN ELLIPSE
WORKSHEET # 1

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

$\frac{x^2}{(10)^2} + \frac{y^2}{(1)^2} = 1$

i) Major Axis = 2a
= 2(10)
= 20 units.

Minor Axis = 2b
= 2(1)
= 2 units.

ii) Coordinates of the vertices:

(-10,0) and (10,0)

iii) x-ints => -10 and 10
y-ints => -1 and 1

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

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

i) Major Axis $= 2a$
$= 2(5)$
$= 10$ units

Minor Axis $= 2b$
$= 2(1)$
$= 2$ units.

ii) Coordinates of the vertices:

$(0,-5)$ and $(0,5)$

iii) x-ints $\Rightarrow -1$ and 1
y-ints $\Rightarrow -5$ and 5

c) $\frac{x^2}{100} + \frac{y^2}{25} = 1$

$\frac{x^2}{(10)^2} + \frac{y^2}{(5)^2} = 1$

i) Major Axis $= 2a$
$= 2(10)$
$= 20$ units

Minor Axis $= 2b$
$= 2(5)$
$= 10$ units

ii) Cordinates of the vertices:
$(-10, 0)$ and $(10, 0)$

iii) x-ints => -10 and 10
y-ints => -5 and 5

d) $\frac{x^2}{64} + \frac{y^2}{36} = 1$

$\frac{x^2}{(8)^2} + \frac{y^2}{(6)^2} = 1$

i) Major Axis $= 2a$
$= 2(8)$
$= 16$ units

Minor Axis $= 2b$
$= 2(6)$
$= 12$ units

ii) Cordinates of the vertices:
$(-8, 0)$ and $(8, 0)$

iii) x-ints => -8 and 8
y-ints => -6 and 6

e) $\frac{x^2}{25} + \frac{y^2}{9} = 1$

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

i) Major Axis $= 2a$
$= 2(5)$
$= 10$ units.

Minor Axis $= 2b$
$= 2(3)$
$= 6$ units

ii) Coordinates of the vertices:
$(-5, 0)$ and $(5, 0)$

iii) x-ints $\Rightarrow -5$ and 5
y-ints $\Rightarrow -3$ and 3

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

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

i) Major Axis $= 2a$
$= 2(5)$
$= 10$ units

Minor Axis $= 2b$
$= 2(2)$
$= 4$ units

ii) Coordinates of the vertices:
$(0,-5)$ and $(0,5)$

iii) x-ints $\Rightarrow -2$ and 2
y-ints $\Rightarrow -5$ and 5

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

$\frac{x^2}{(10)^2} + \frac{y^2}{(8)^2} = 1$

i) Major Axis $= 2a$
$= 2(10)$
$= 20$ units

Minor Axis $= 2b$
$= 2(8)$
$= 16$ units

ii) Coordinates of the vertices:

$(-10, 0)$ and $(10, 0)$

iii) x-ints $\Rightarrow -10$ and 10
y-ints $\Rightarrow -8$ and 8.

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

$\frac{x^2}{(8)^2} + \frac{y^2}{(10)^2} = 1$

i) Major Axis $= 2a$
$= 2(10)$
$= 20$ units

Minor Axis $= 2b$
$= 2(8)$
$= 16$ units

ii) Coordinates of the vertices:

$(0, -10)$ and $(0, 10)$

iii) x-ints $\Rightarrow -8$ and 8
y-ints $\Rightarrow -10$ and 10.

② a) Vertical Major Axis

$a = 5$

$b = 3$

(i) vertices:

$(0,5)$ & $(0,-5)$

(ii) $F_1 = (0,4)$

$F_2 = (0,-4)$

(iii) Length of Major

$= 2a$

$= 2(5)$

$= 10$ units

Length of Minor

$= 2b$

$= 2(3)$

$= 6$ units

(iv) $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

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

$\frac{x^2}{9} + \frac{y^2}{25} = 1$

2a) i) coordinates of vertices:
(0,-5) and (0,5)

ii) coordinates of foci:
(0,-4) and (0,4)

iii) Major Axis
10 units

Minor Axis
6 units

iv) Equation:

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

$$\frac{x^2}{9} + \frac{y^2}{25} = 1$$

b) i) coordinates of vertices:
(-4,0) and (4,0)

ii) coordinates of foci:
(-3.5,0) and (3.5,0)

iii) Major Axis
8 units

Minor Axis
4 units

iv) Equation:

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

$$\frac{x^2}{16} + \frac{y^2}{4} = 1$$

c) i) coordinates of vertices:
(0,-3) and (0,3)

ii) coordinates of foci:
(0,-2) and (0,2)

iii) Major Axis
6 units

Minor Axis
4 units.

iv) Equation:

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

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

3a) x-ints => -4 and 4
y-ints => -3 and 3

$$\frac{x^2}{(x\text{-int})^2} + \frac{y^2}{(y\text{-int})^2} = 1$$

you can think of your equation like this!

Equation:

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

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

b) Major Axis is 8 and horizontal.
Minor Axis is 4

If $\frac{2a}{2} = \frac{8}{2}$

$a = 4$

If $\frac{2b}{2} = \frac{4}{2}$

$b = 2$

Equation:

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

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

$$\frac{x^2}{16} + \frac{y^2}{4} = 1$$

c) One vertex is $(-4,0)$; minor axis is 2

If one vertex is $(-4,0)$, it follows that the other vertex is $(4,0)$

↳ Major axis is 8.

$$\frac{2a}{2} = \frac{8}{2}$$

$$a = 4$$

Minor axis is 2

↳ $\frac{2b}{2} = \frac{2}{2}$

$$b = 1$$

Equation:

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

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

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

d) Major axis is 10 and is vertical
Minor axis is 6.

If major axis is 10:

$$\frac{2a}{2} = \frac{10}{2}$$

$$a = 5$$

If minor axis is 6:

$$\frac{2b}{2} = \frac{6}{2}$$

$$b = 3$$

Since major axis is vertical:

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

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

$$\frac{x^2}{9} + \frac{y^2}{25} = 1$$

Review Worksheet

① Vertical Major Axis
Center : (0,0)

$a = 7$
$b = 4$

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

$$\frac{x^2}{(4)^2} + \frac{y^2}{(7)^2} = 1$$

$$\boxed{\frac{x^2}{16} + \frac{y^2}{49} = 1}$$

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