

HW Ellipse WS

(do not answer
"eccentricity")

#1 a - d

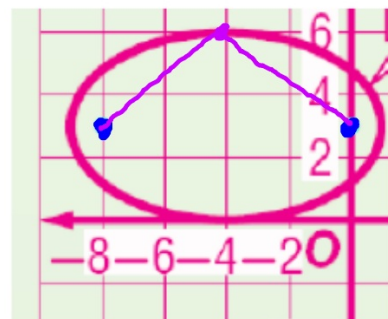
#2 a - h

#3 b, c, d, e

#4 a

An **ellipse** is the set of all points in a plane such that the sum of the distances from two fixed points is constant. These two points are called the **foci** of the ellipse.

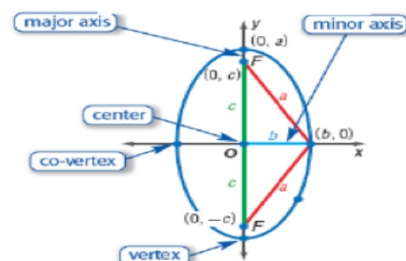
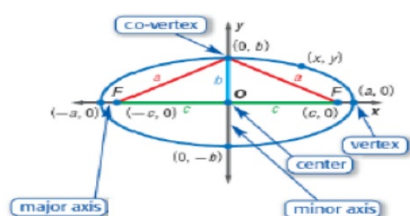
Ellipse:



Every ellipse has two axes of symmetry:

The endpoints of the **Major Axis** are the **vertices** of the ellipse.

The endpoints of the **Minor Axis** are the **co-vertices** of the ellipse.



Key Concept**Equations of Ellipses Centered at (h, k)**

For Your

FOLDABLE

Standard Form	$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$	$\frac{(y - k)^2}{a^2} + \frac{(x - h)^2}{b^2} = 1$
Orientation	horizontal	vertical
Foci	$(h \pm c, k)$	$(h, k \pm c)$
Vertices	$(h \pm a, k)$	$(h, k \pm a)$
Co-vertices	$(h, k \pm b)$	$(h \pm b, k)$

Eccentricity of an ellipse: c/a

$$a^2 > b^2$$

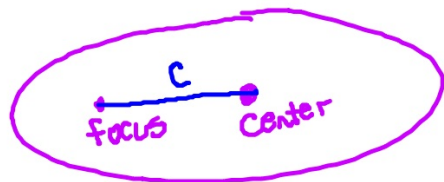
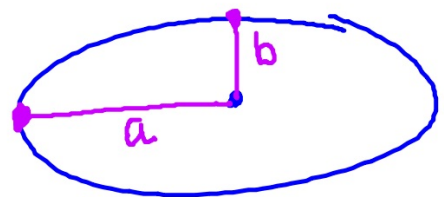
a = the distance from the center to a vertex

b = the distance from the center to a co-vertex

c = the distance from the center to a focus

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

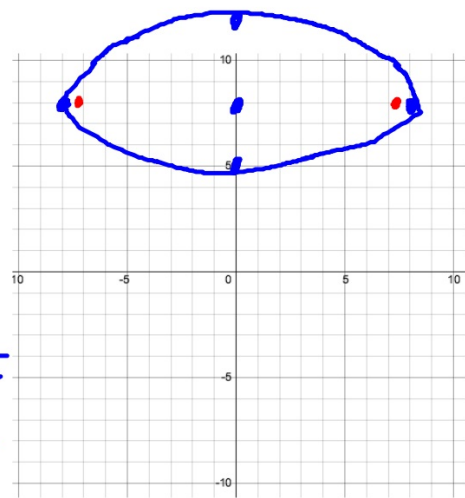
$$a^2 > b^2$$



1) Determine the center, vertices, co-vertices, and foci.
Then graph the ellipse.

$$\frac{x^2}{64} + \frac{(y-8)^2}{9} = 1$$

Center: $(0, 8)$



Vertices	Covertices	Foci
$64 = a^2$	$9 = b^2$	$a^2 - b^2 = c^2$
$8 = a$	$3 = b$	$64 - 9 = c^2$
$(8, 8)$	$(0, 5)$	$\sqrt{55} = c$
$(-8, 8)$	$(0, 11)$	$(\sqrt{55}, 8)$
		$(-\sqrt{55}, 8)$

2) Find the equation of the ellipse in standard form.

Then find the center, vertices, covertices, and foci.

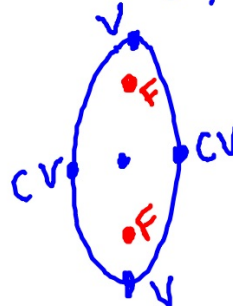
$$-16y + 52 = -2x^2 - 8x - y^2$$

$$2x^2 + 8x + y^2 - 16y = -52$$

$$2(x^2 + 4x + \underline{4}) + (y^2 - 16y + \underline{64}) = -52$$

$$\frac{2(x+2)^2}{20} + \frac{(y-8)^2}{20} = \frac{20}{20}$$

$$\frac{(x+2)^2}{10} + \frac{(y-8)^2}{20} = 1$$



Center $(-2, 8)$

Vertices

$$(-2, 8 + \sqrt{20})$$

$$(-2, 8 - \sqrt{20})$$

Covertices

$$(-2 + \sqrt{10}, 8)$$

$$(-2 - \sqrt{10}, 8)$$

foci: $20 - 10 = c^2$
 $\sqrt{10} = c$

$$(-2, 8 \pm \sqrt{10})$$

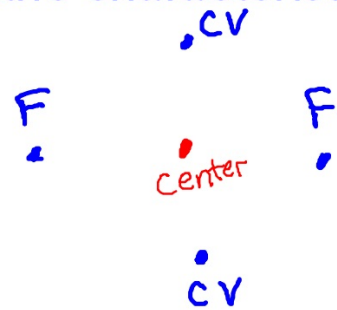
3) Find an equation of the ellipse given the characteristics.

foci $(7, 9)$, $(-1, 9)$

Covertices $(3, 12)$, $(3, 6)$

Center $(3, 9)$

$$\frac{(x-3)^2}{25} + \frac{(y-9)^2}{9} = 1$$



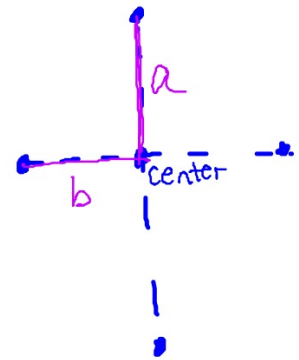
$$\begin{aligned} c^2 &= a^2 - b^2 \\ 16 &= a^2 - 9 \\ 25 &= a^2 \end{aligned}$$

4) Find an equation of the ellipse given the characteristics.

endpoints of major axis (4, 18), (4, -4) $2^2 \ a=11$
endpoints of minor axis (12, 7), (-4, 7) $16 \ b=8$

center (4, 7)

$$\frac{(x-4)^2}{64} + \frac{(y-7)^2}{121} = 1$$



5] major axis vertical with length 10;
length of minor axis = 4 ; Center $(-2, 3)$

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