Algebra II
Lesson #2 Unit 7
Class Worksheet #2
For Worksheet #2

Given any two points in a plane,

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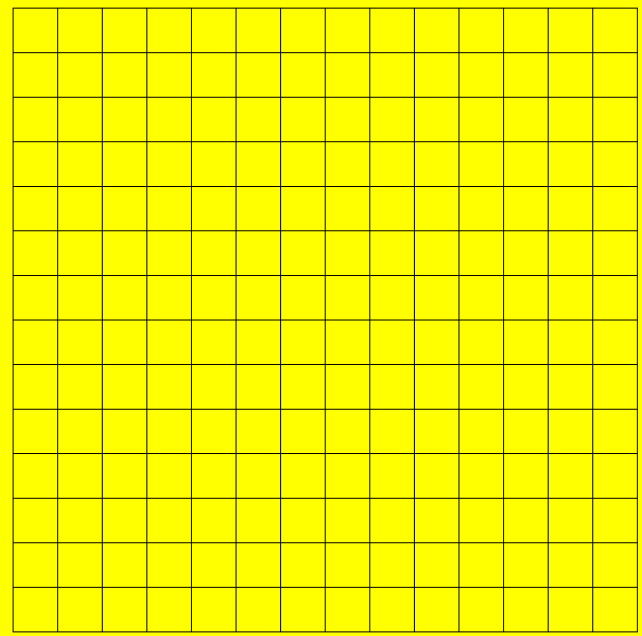
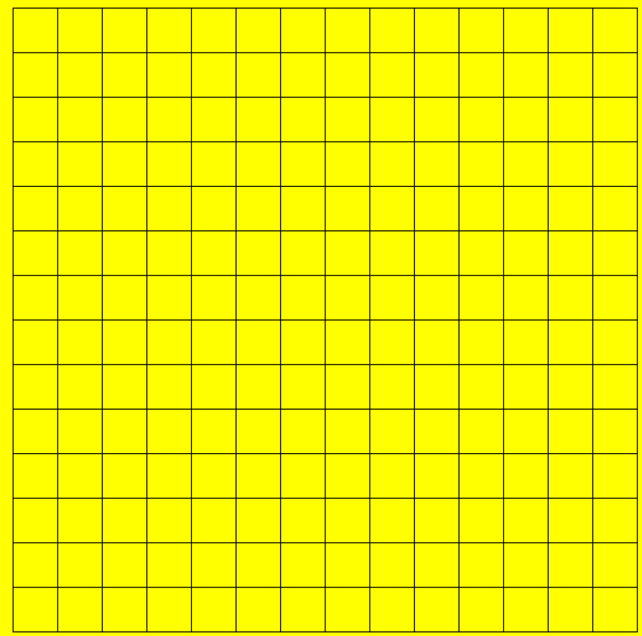


Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

The points we will use are 6 units apart on a horizontal line.



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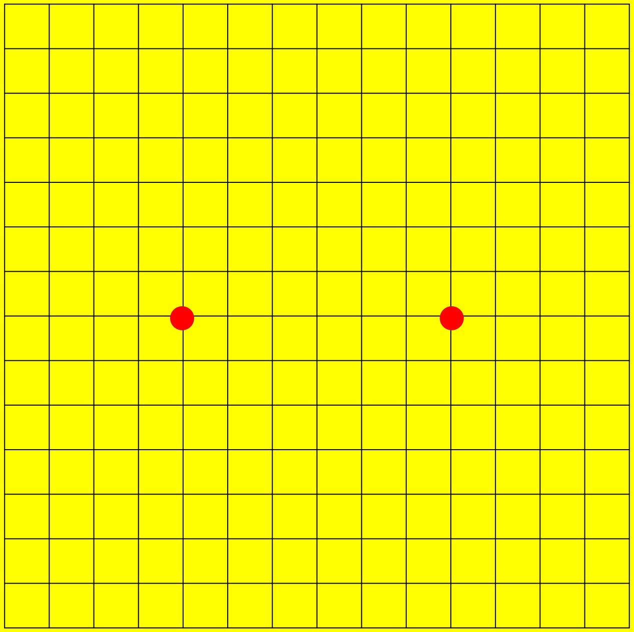

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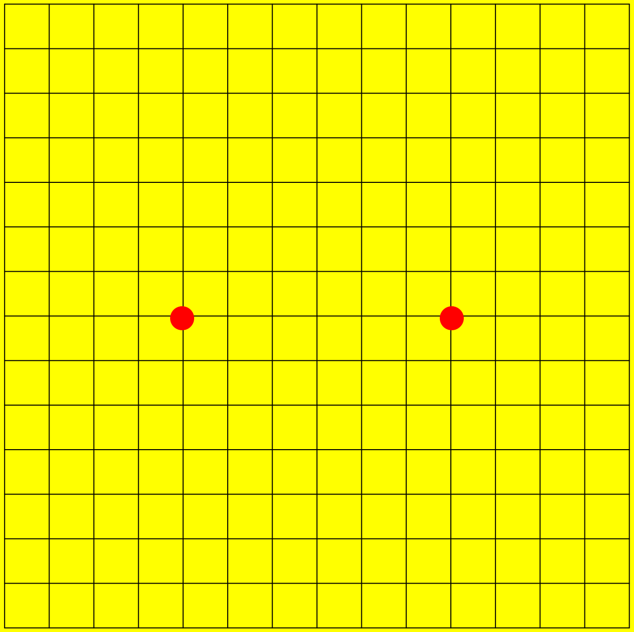

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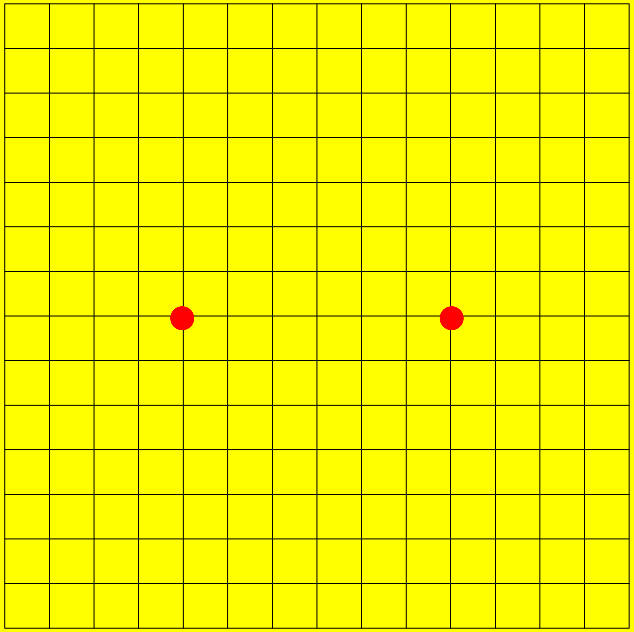

Before we start we will name the two given points F_1 and F_2.

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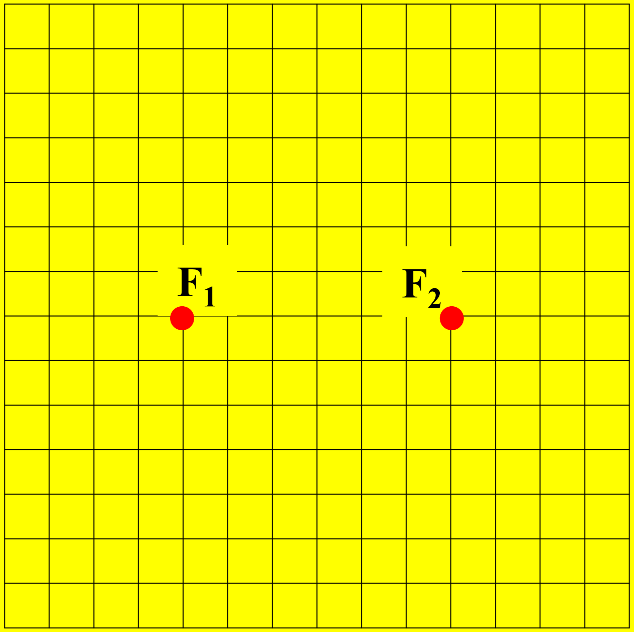

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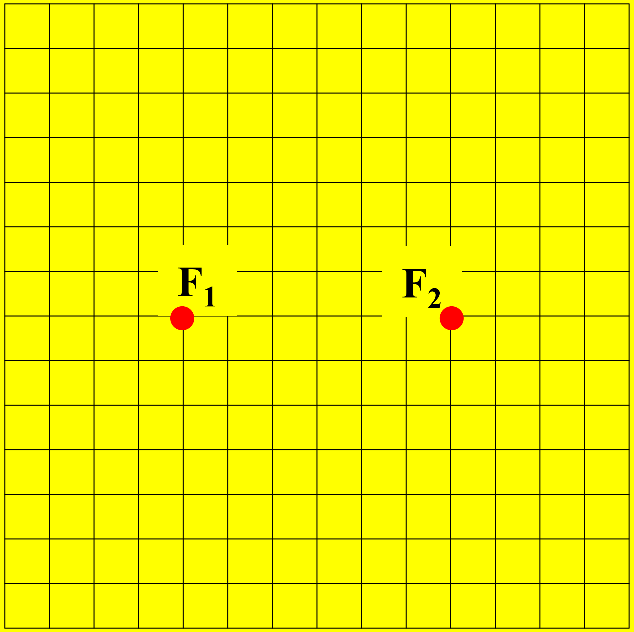

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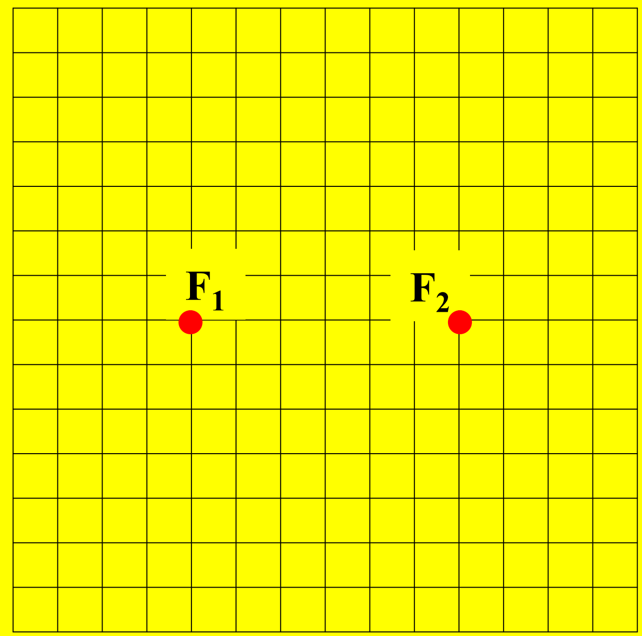
Distance From F_1	**Distance From F_2**



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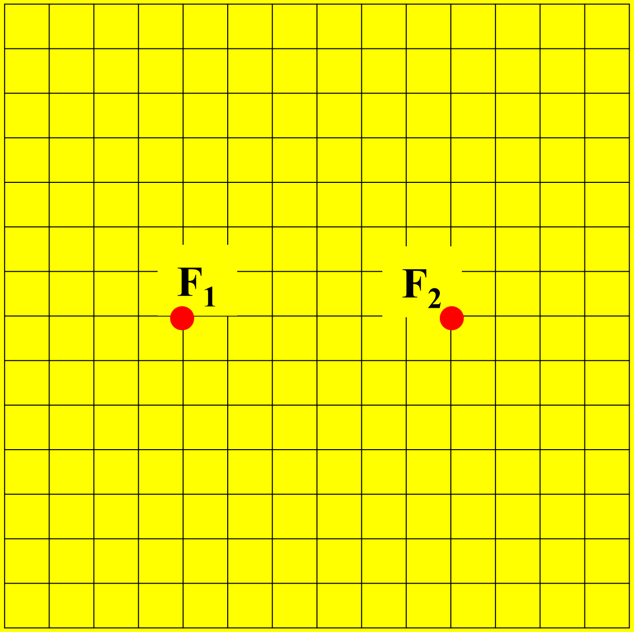
Distance From F_1	Distance From F_2
7	3



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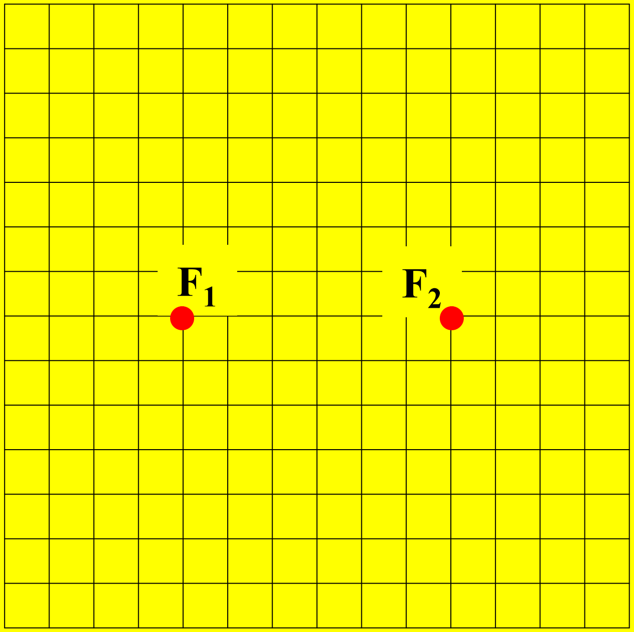

Distance From F_1	Distance From F_2
7	3

Their sum is 10.

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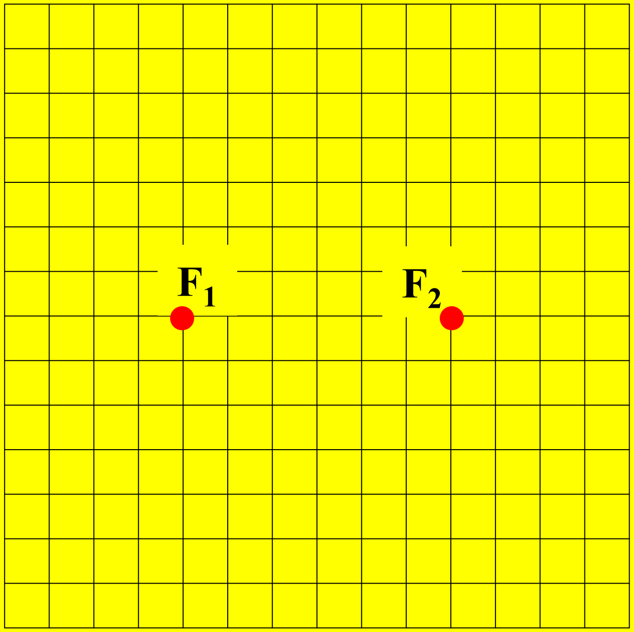
Distance From F_1	Distance From F_2
7	3



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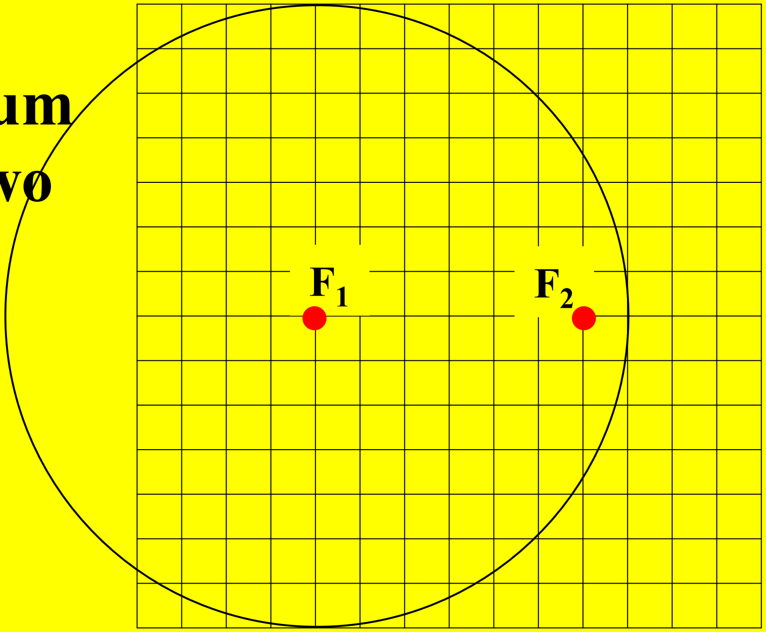

Distance From F_1	Distance From F_2
7	3

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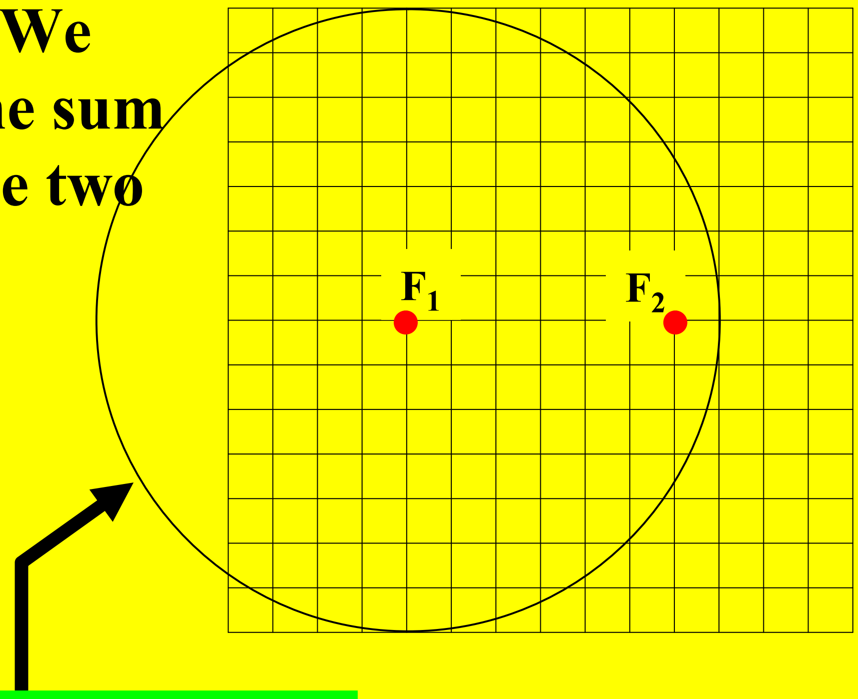
Distance From F_1	**Distance From F_2**
7	**3**



All points on this circle are 7 units from F_1.

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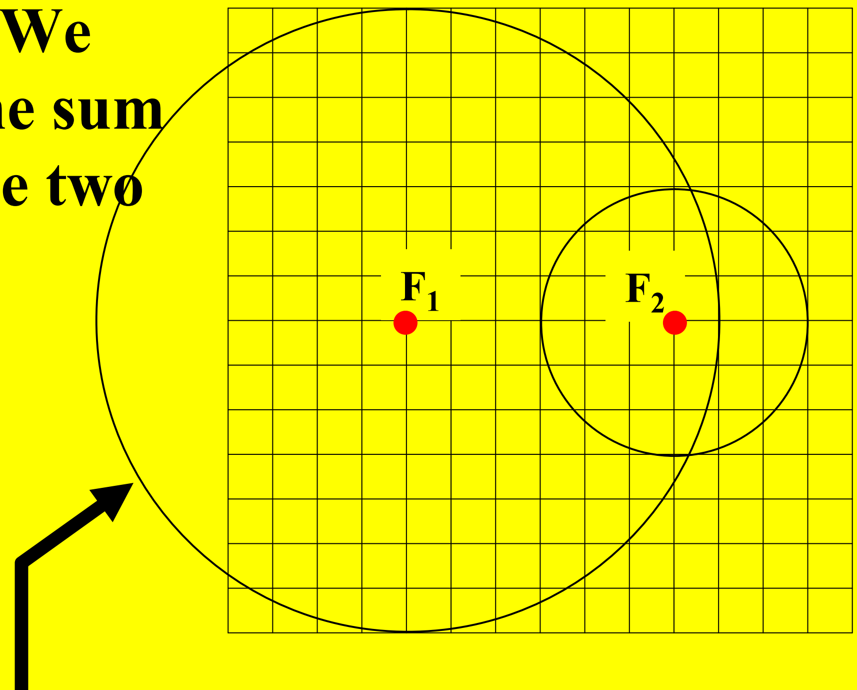

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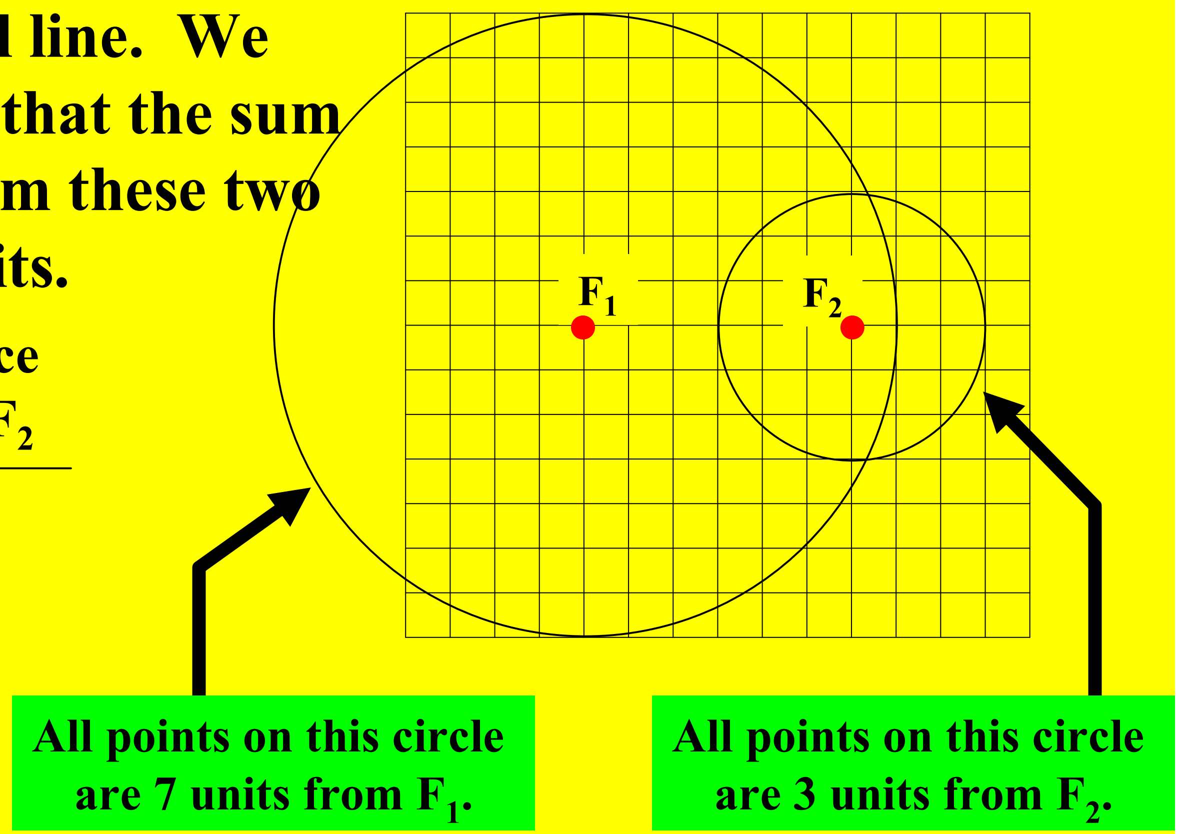

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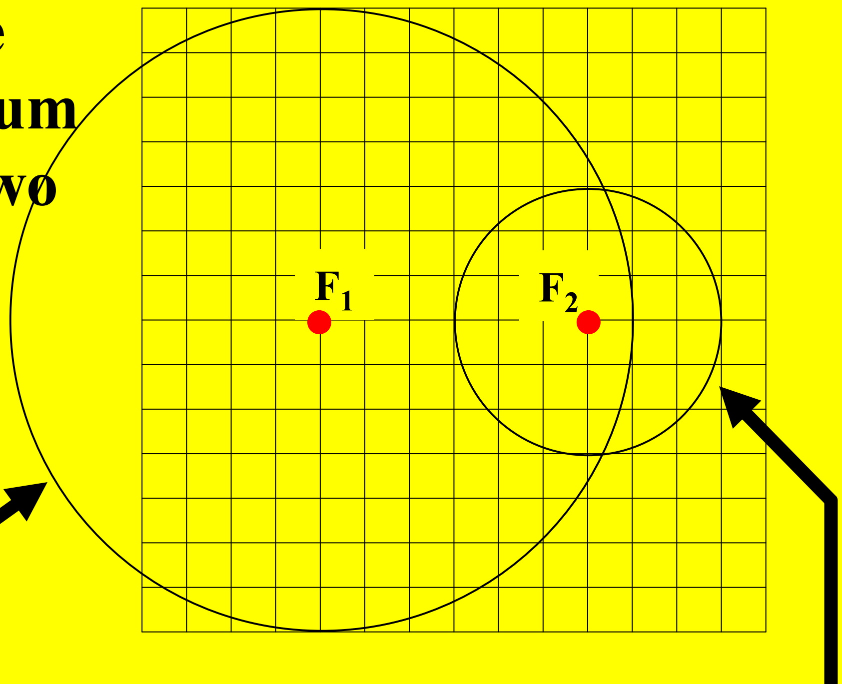

All points on this circle are 7 units from F_1.

All points on this circle are 3 units from F_2.

We need the 2 points where these circles intersect.

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

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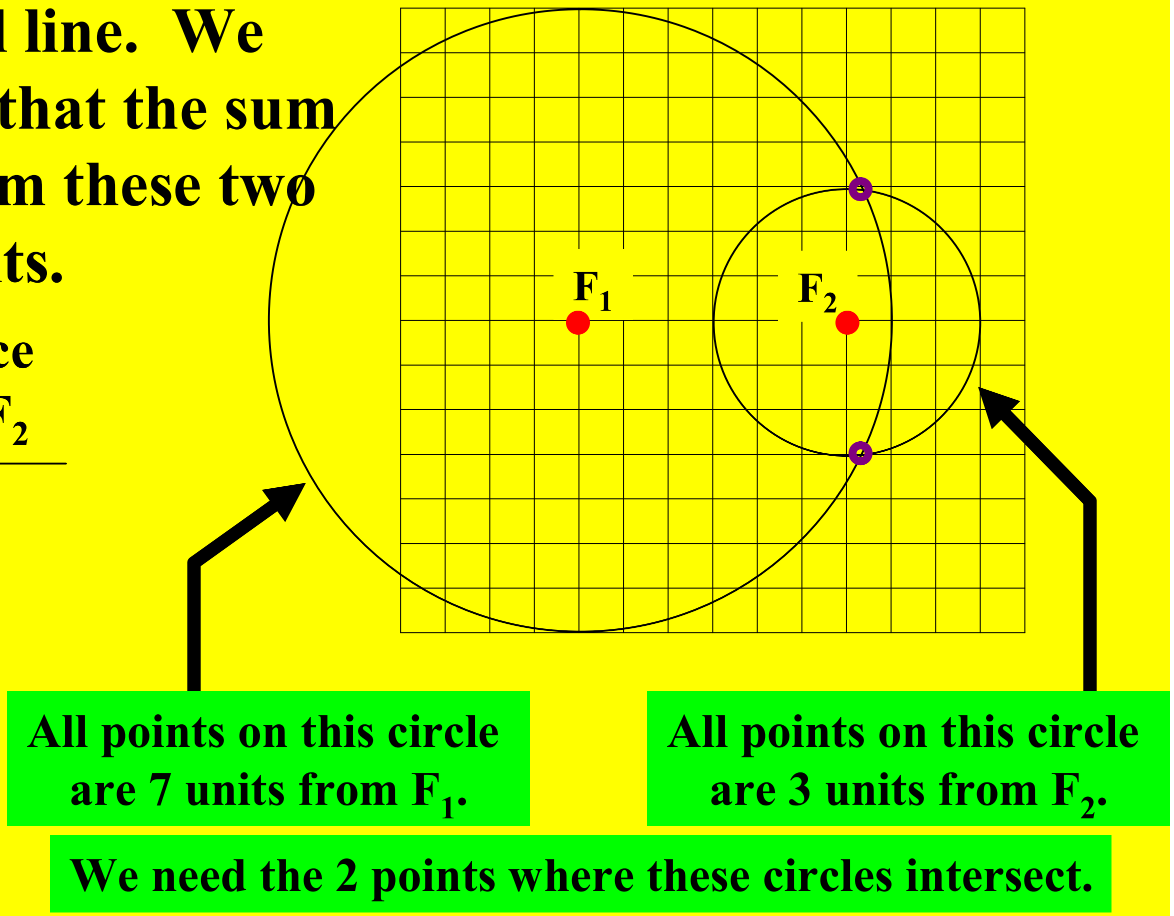

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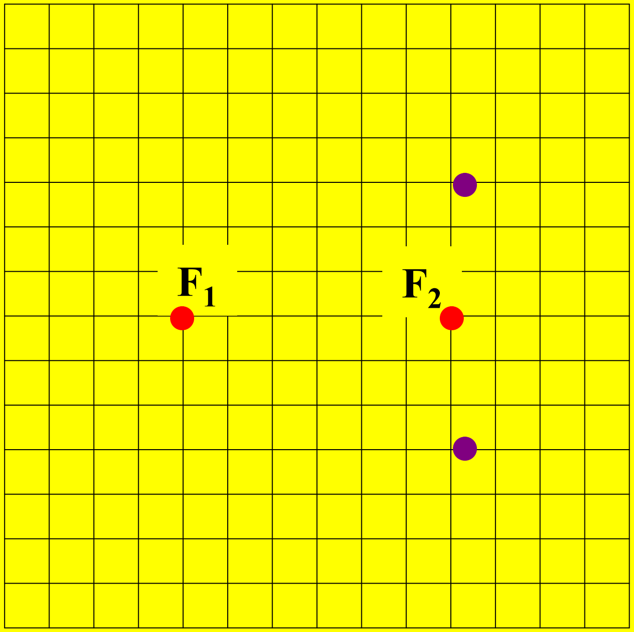

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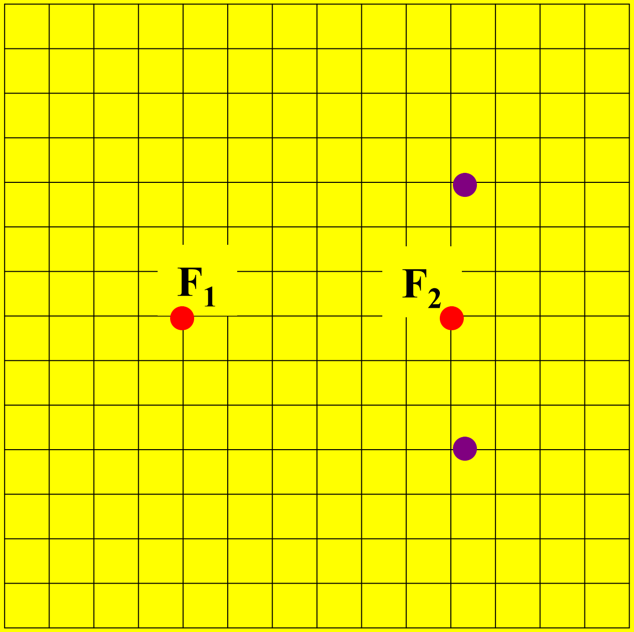
Distance From F_1	Distance From F_2
7	3
3	7



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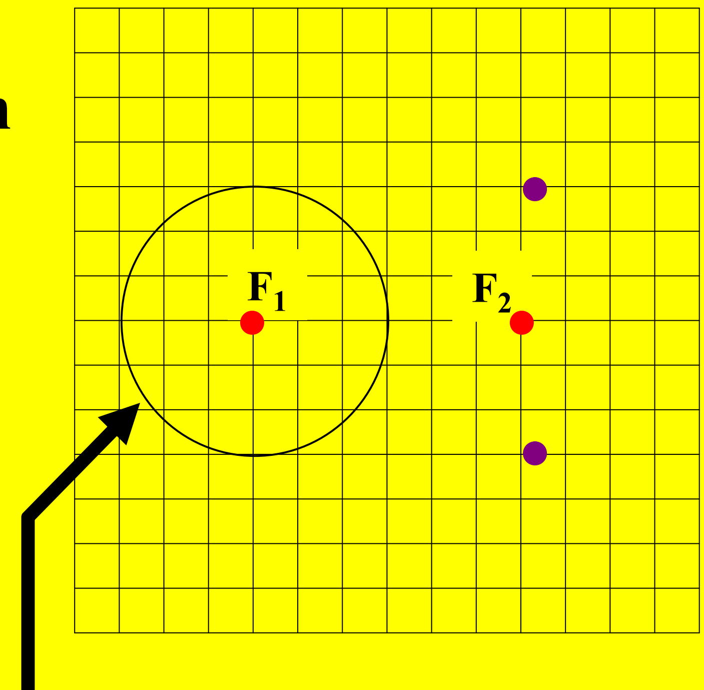

All points on this circle are 3 units from F_1.

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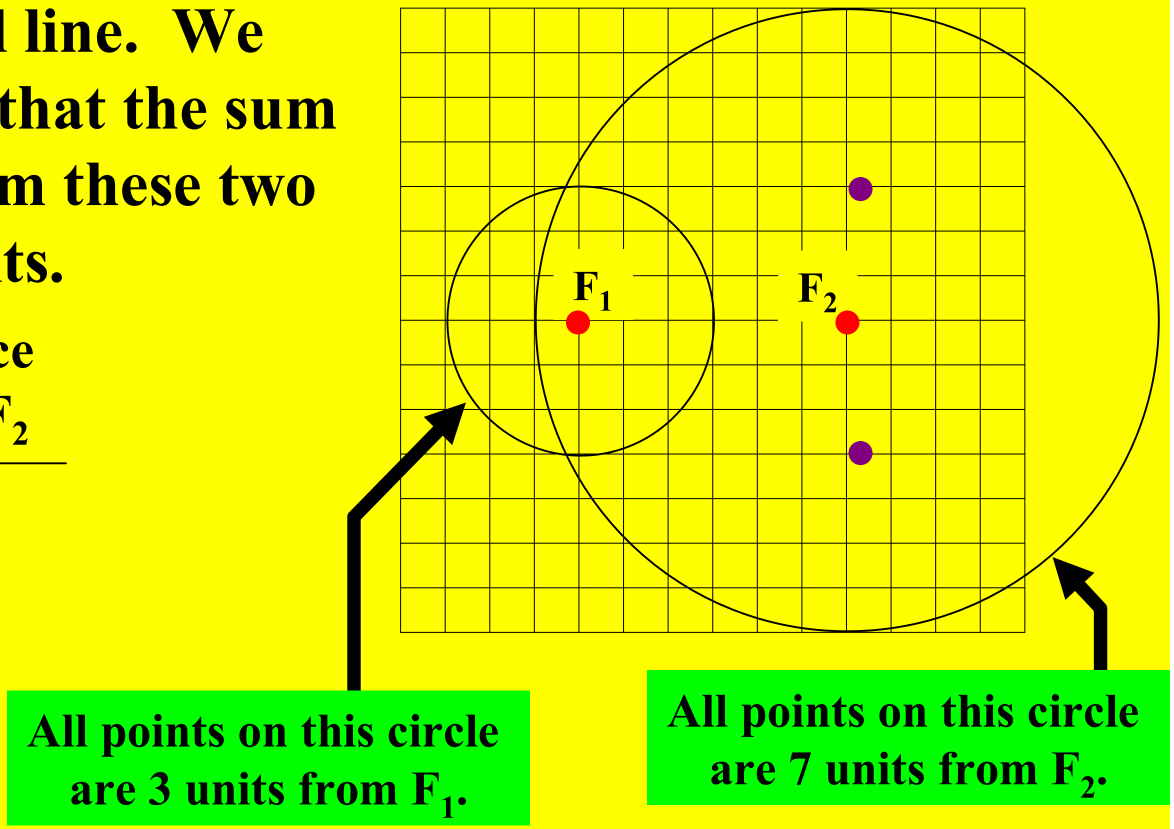
Distance From F_1	Distance From F_2
7	3
3	7



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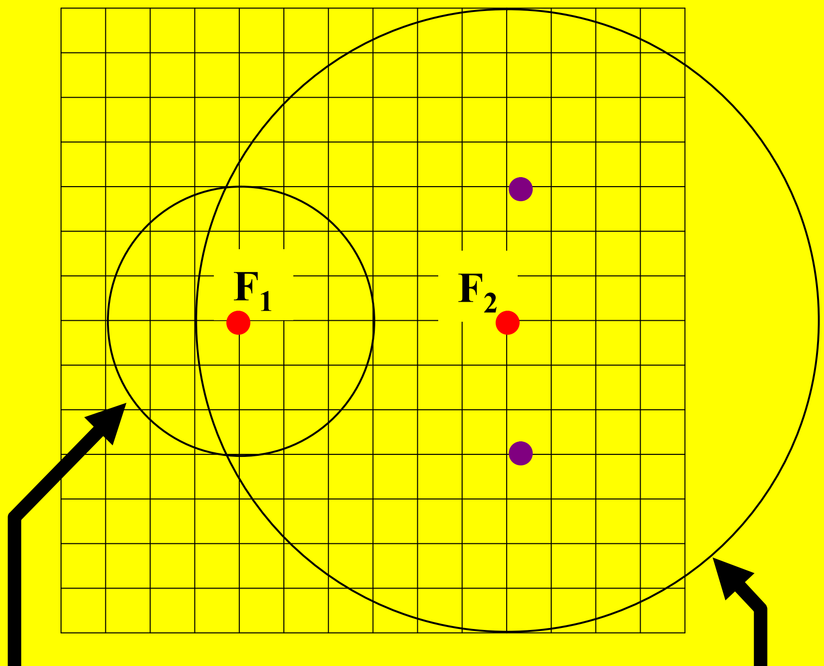

All points on this circle are 3 units from F_1.

All points on this circle are 7 units from F_2.

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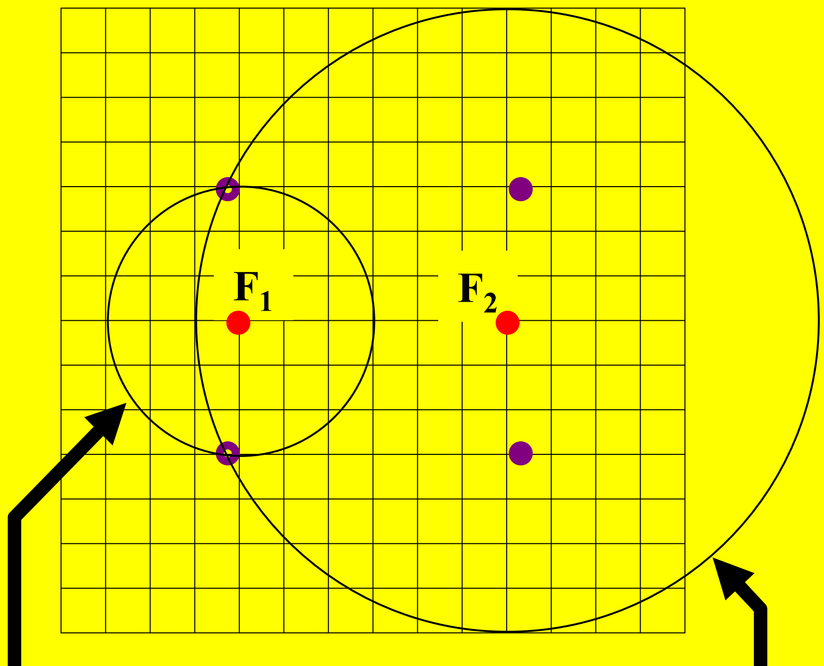

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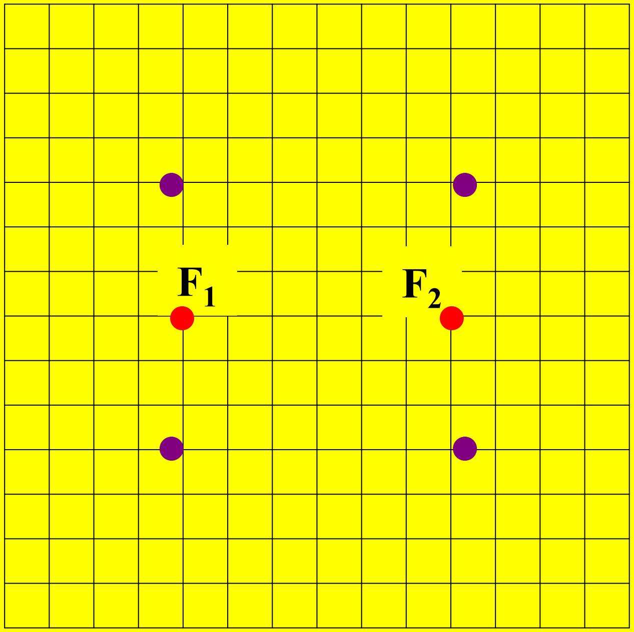

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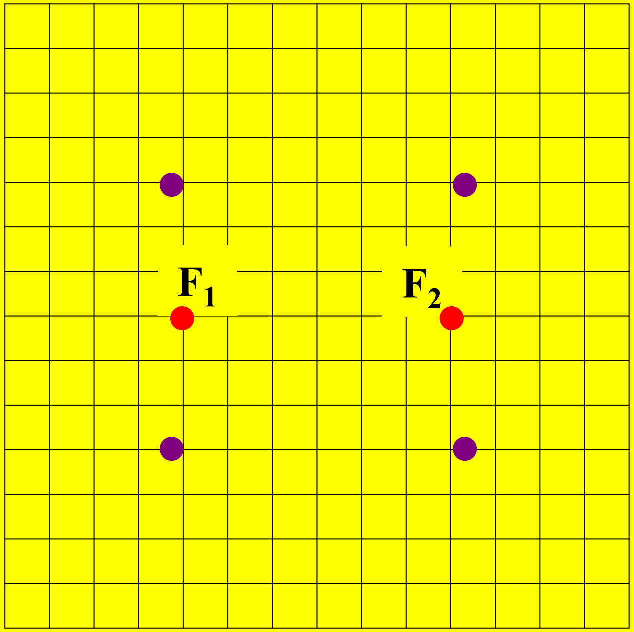
Distance From F_1	Distance From F_2
7	3
3	7
8	2



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7	3
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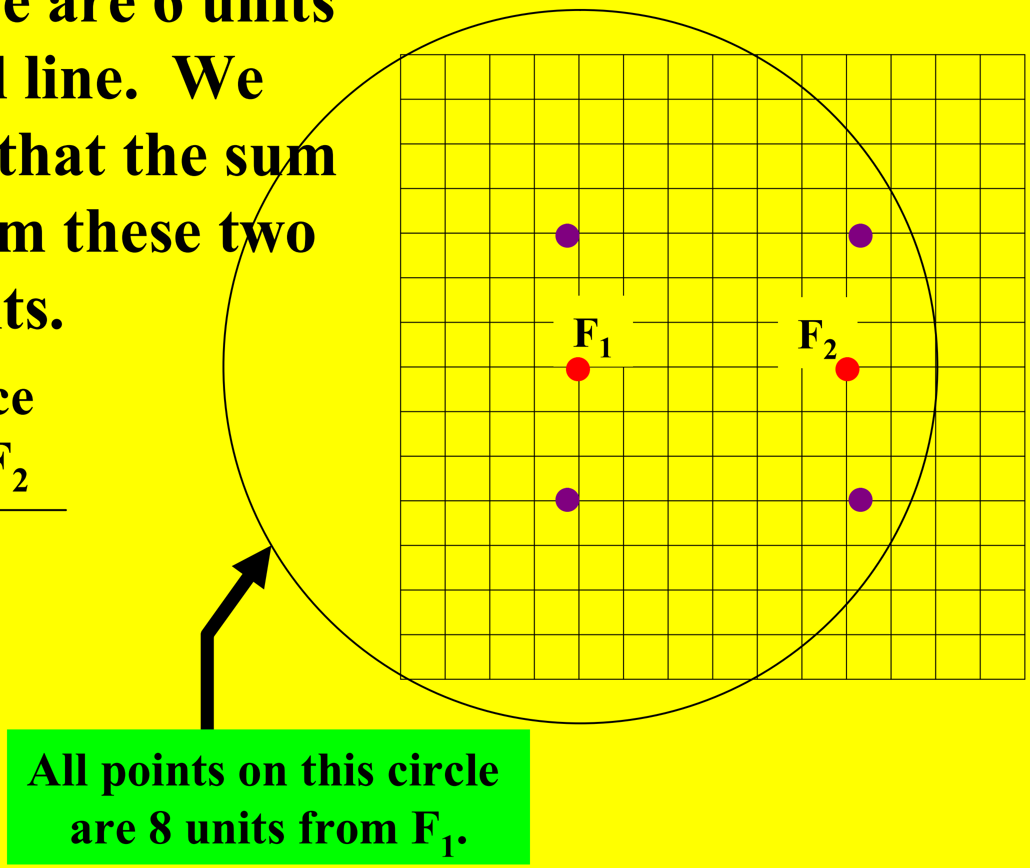

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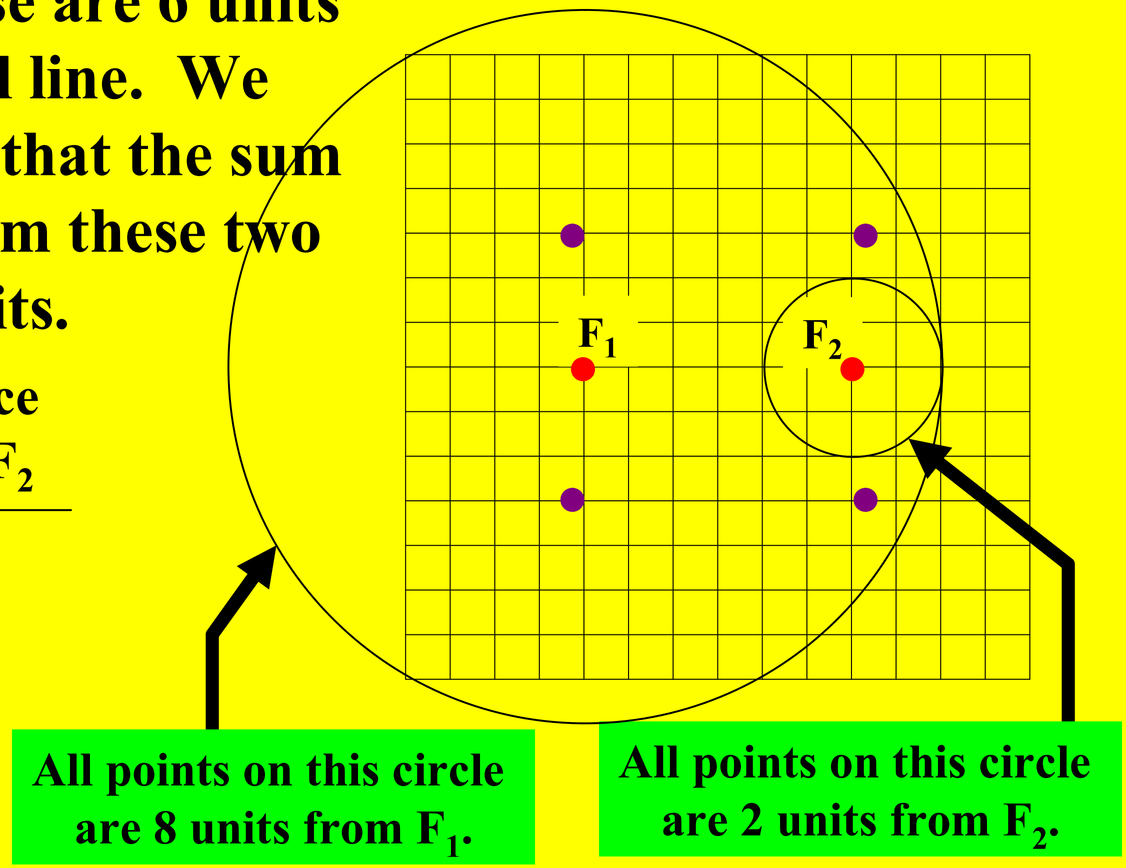

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7	3
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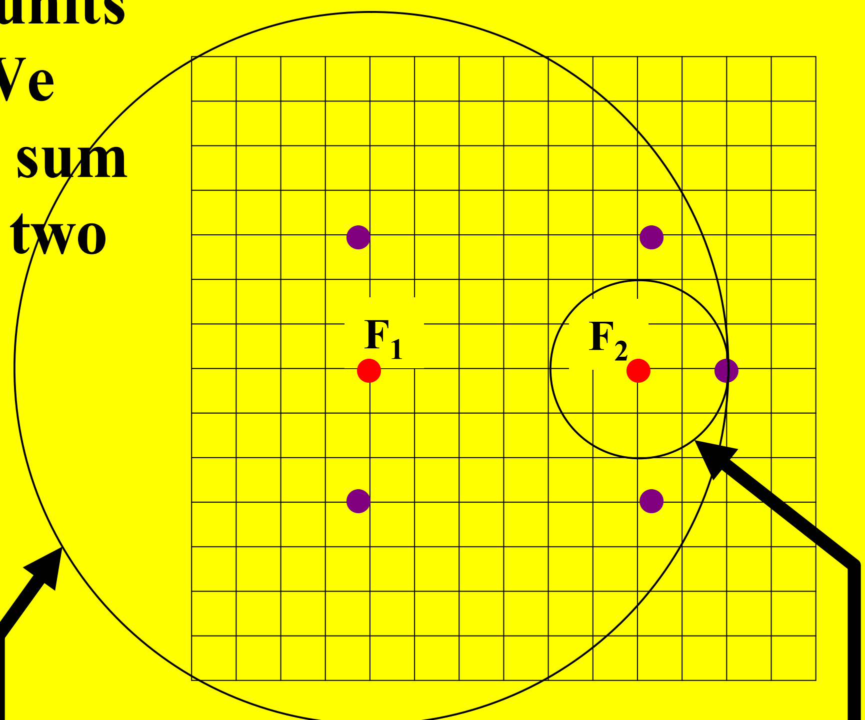

All points on this circle are 8 units from F_1.

All points on this circle are 2 units from F_2.

These 2 circles only intersect at one point.

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7	3
3	7
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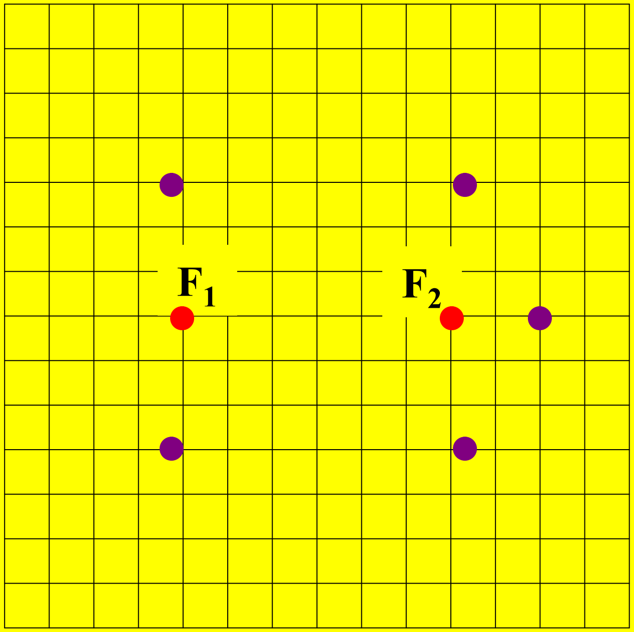

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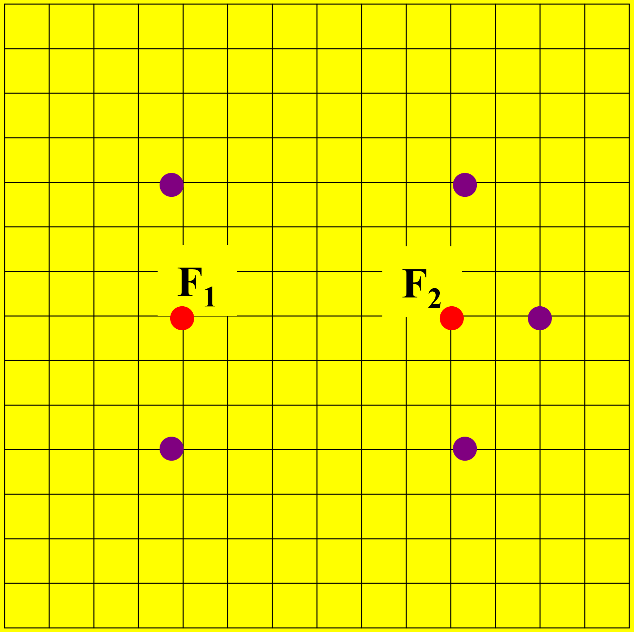
Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8



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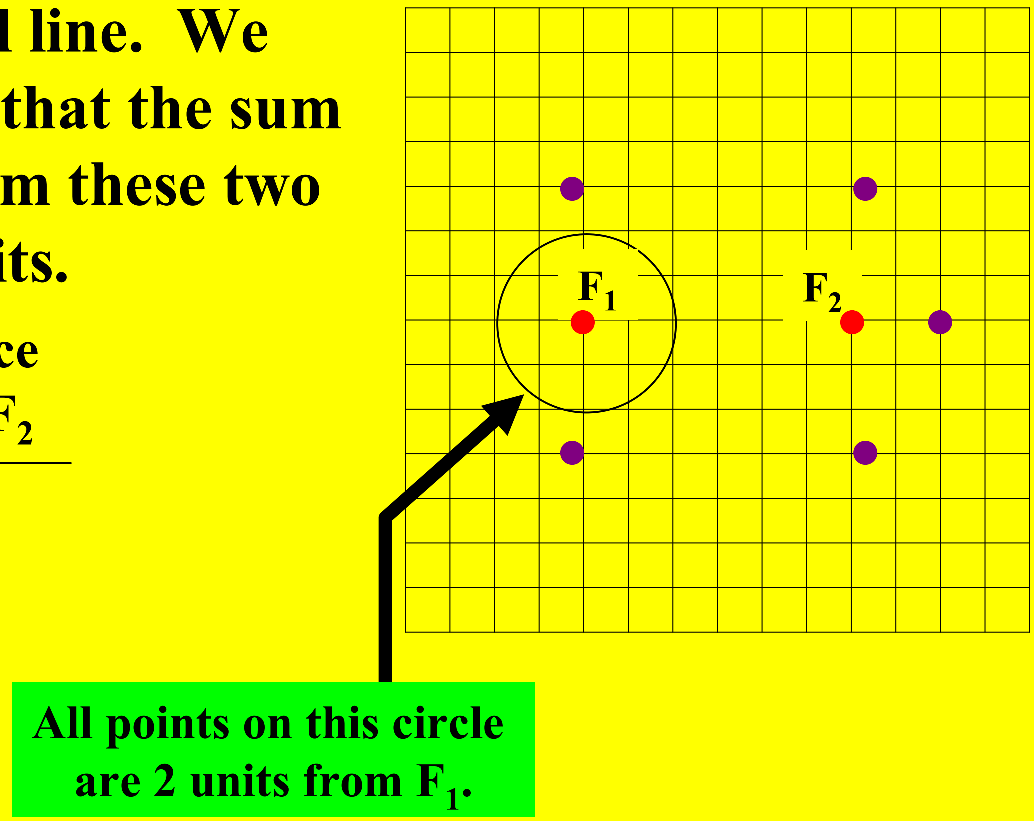

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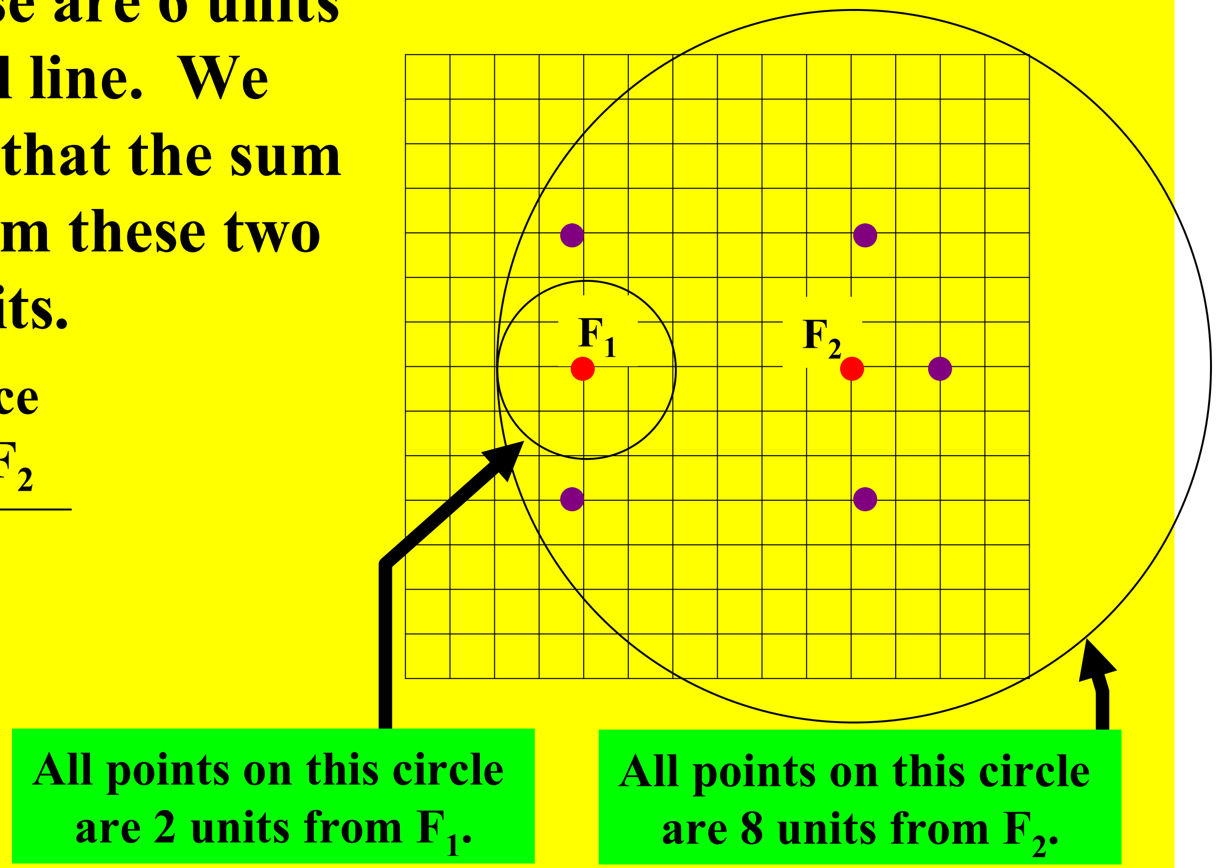
7	3
3	7
8	2
2	8



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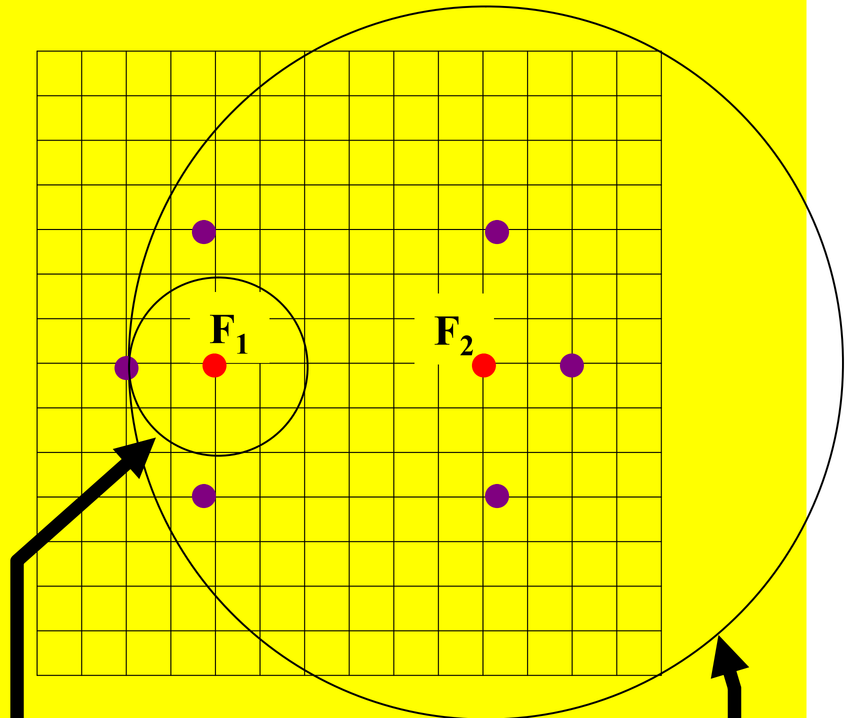
7	3
3	7
8	2
2	8



All points on this circle are 2 units from F_1.

All points on this circle are 8 units from F_2.

These 2 circles only intersect at one point.

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7	3
3	7
8	2
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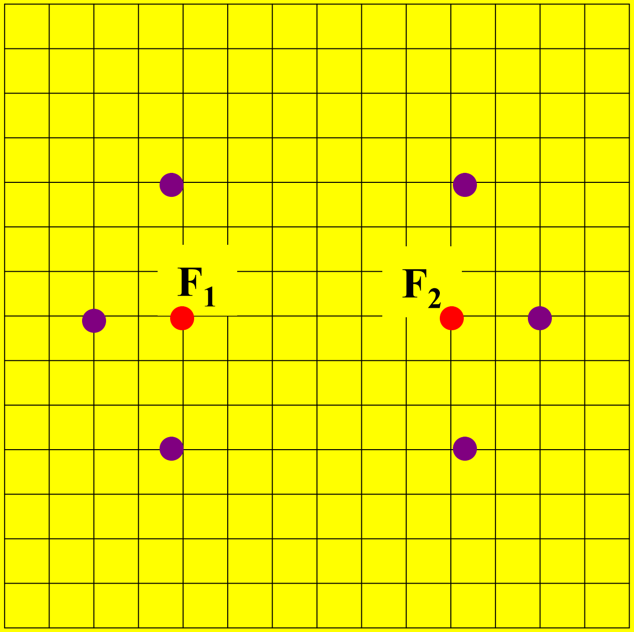

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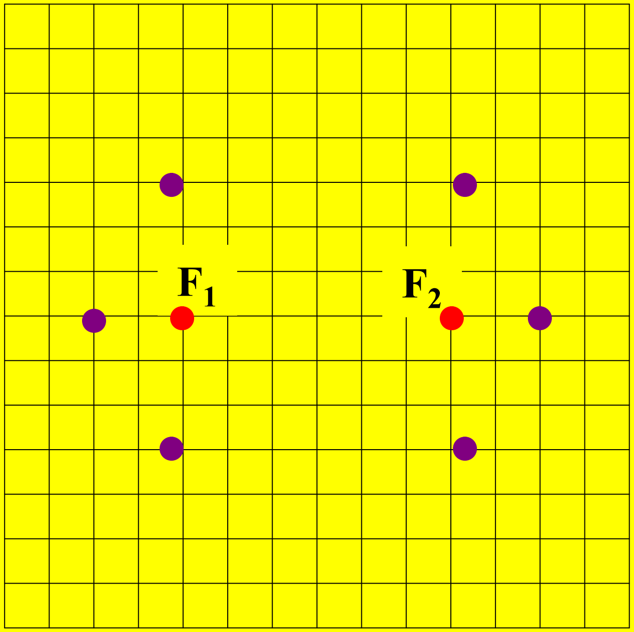
Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8
9	1



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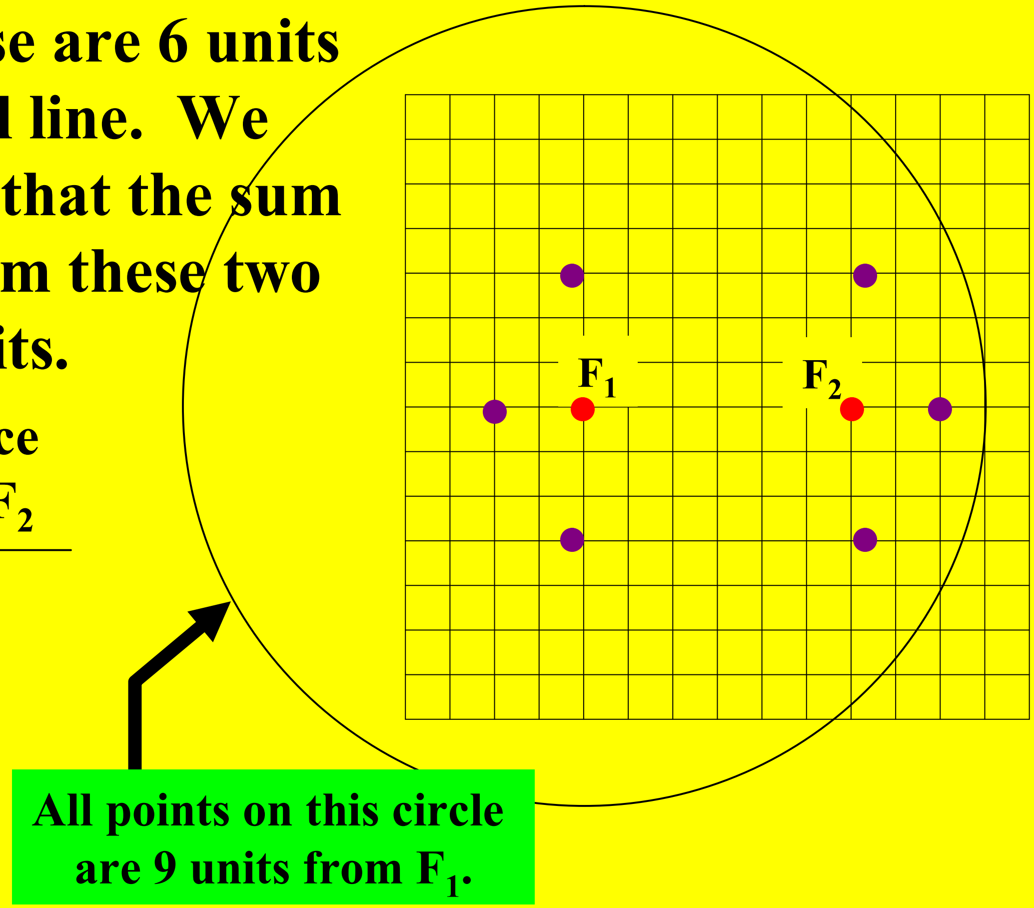
Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8
9	1



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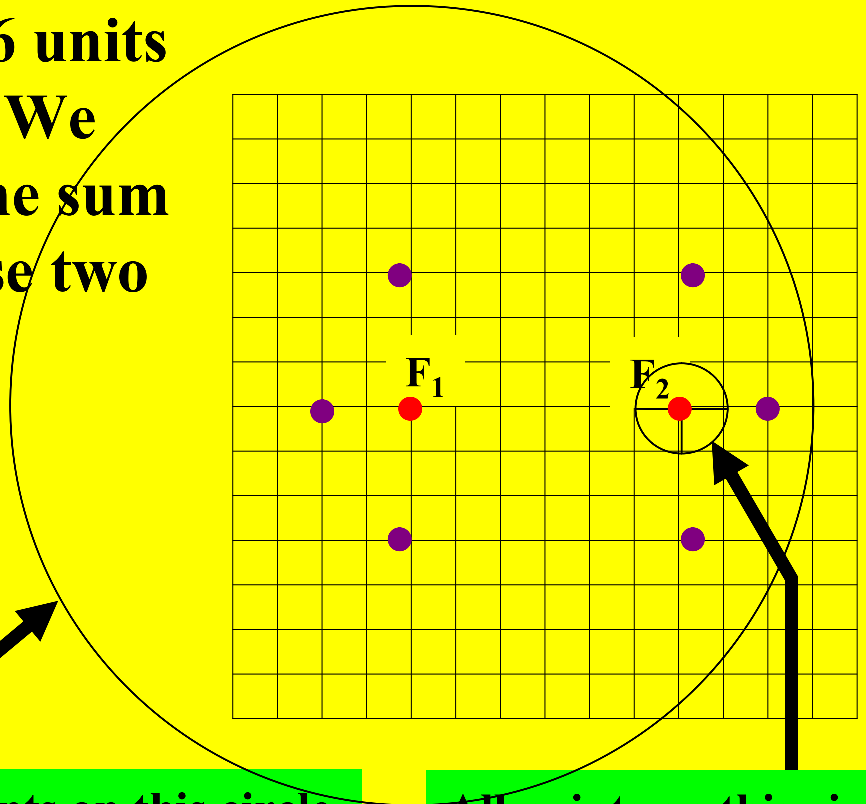
Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8
9	1



All points on this circle are 9 units from F_1.

All points on this circle are 1 unit from F_2.

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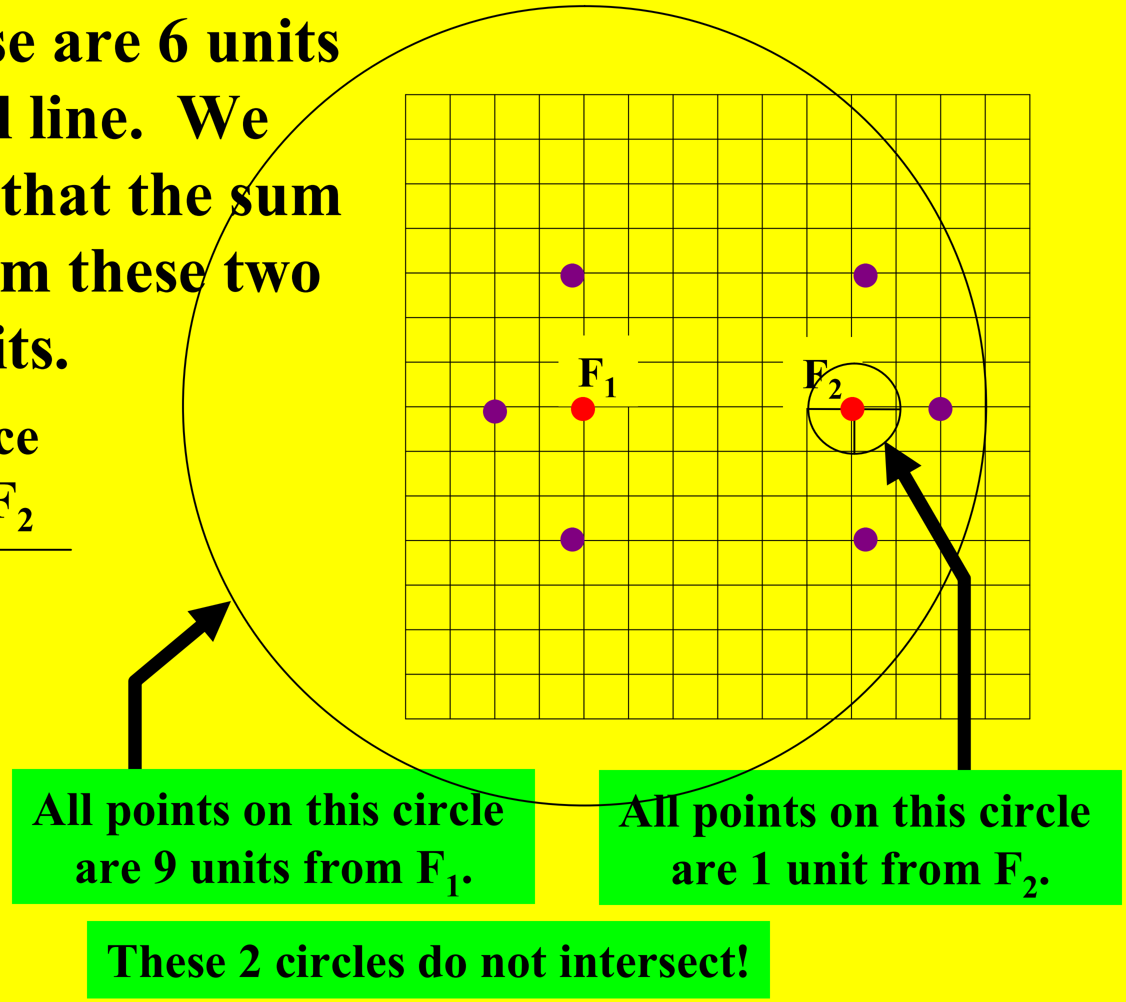
Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8
9	1



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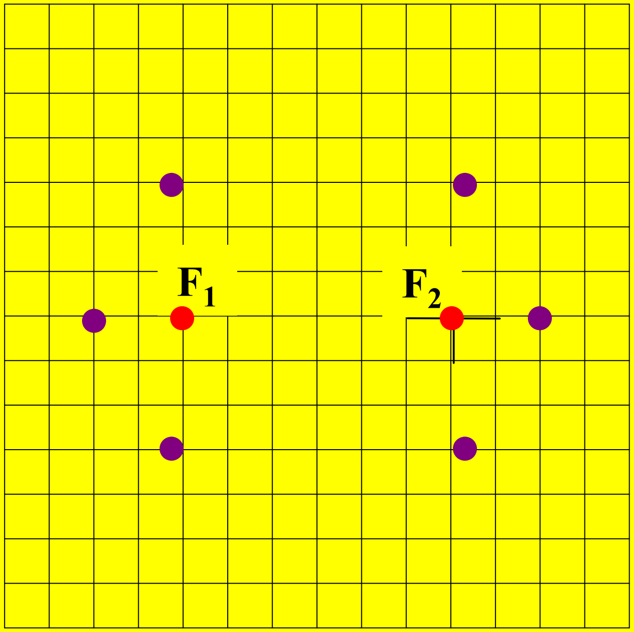
7	3
3	7
8	2
2	8



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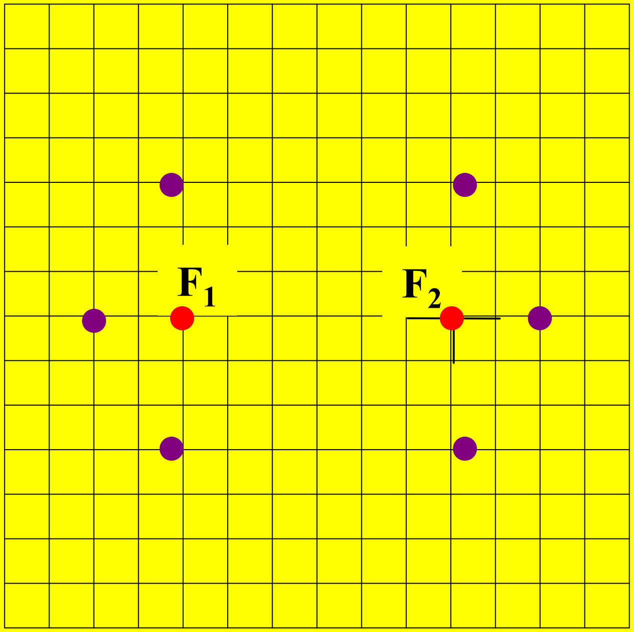
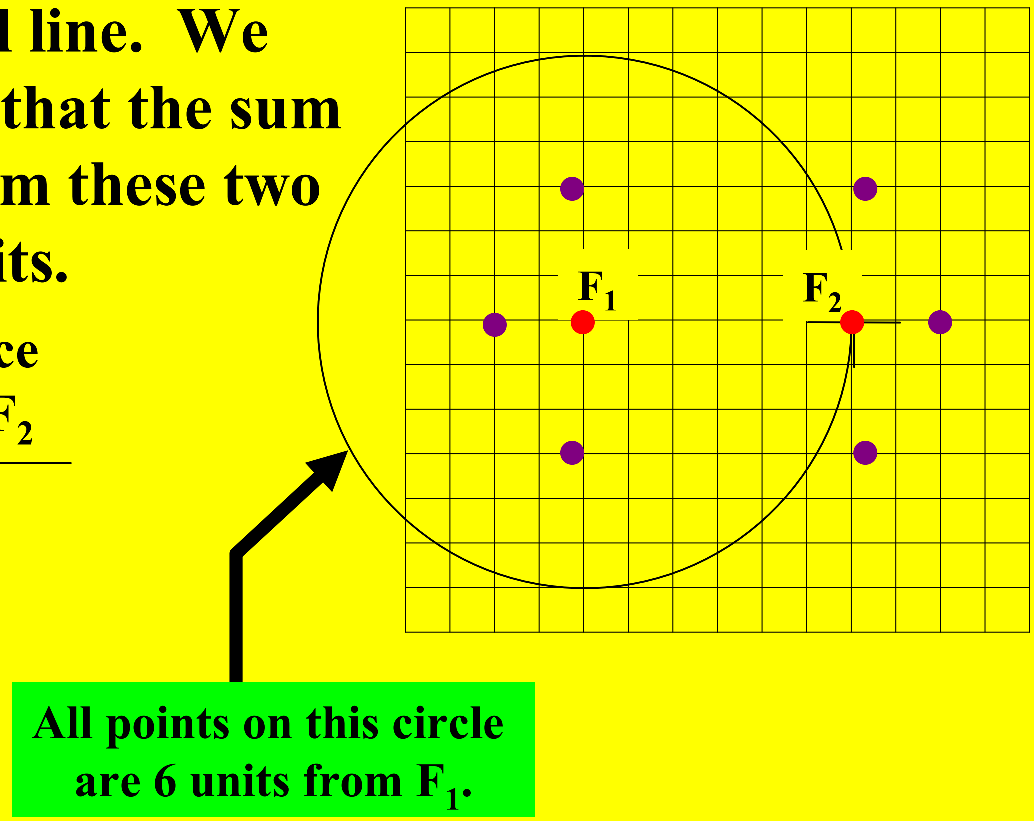


Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8
6	4

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

The points we will use are 6 units apart on a horizontal line. We will find points such that the sum of their distances from these two given points is 10 units.

Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8
6	4



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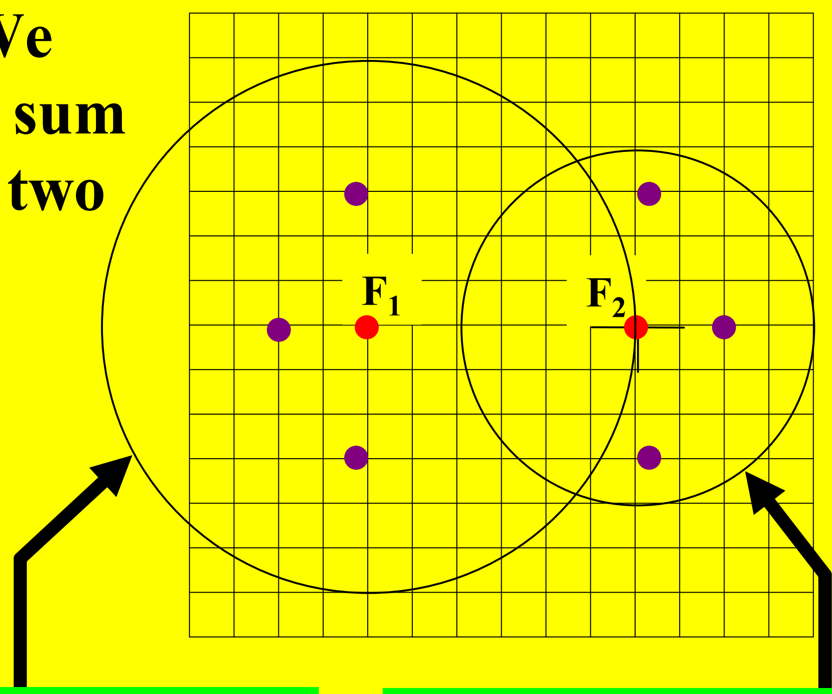

All points on this circle are 6 units from F_1.

All points on this circle are 4 units from F_2.

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

The points we will use are 6 units apart on a horizontal line. We will find points such that the sum of their distances from these two given points is 10 units.

Distance From F_1	Distance From F_2
7	3
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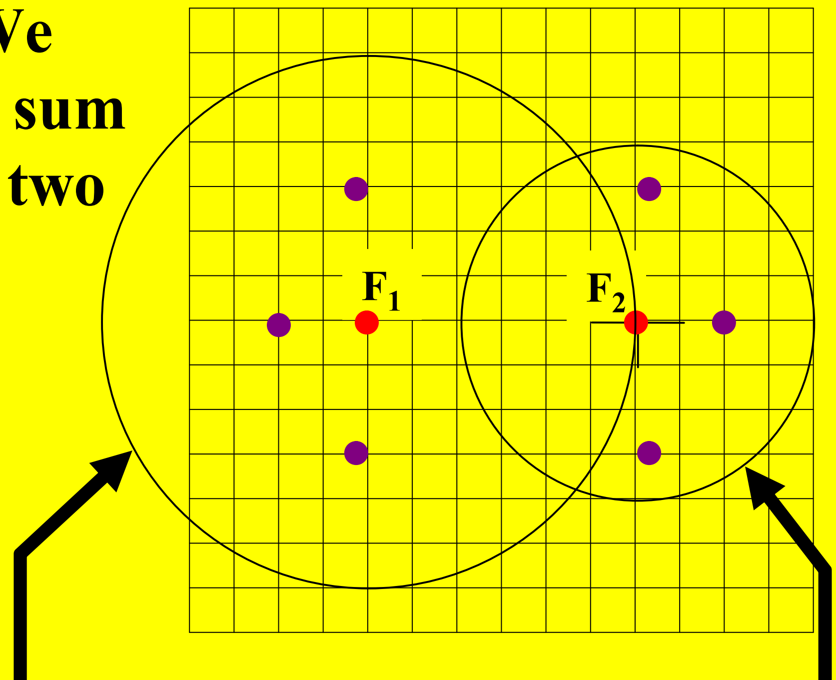
2	8
6	4



All points on this circle are 6 units from F_1.

All points on this circle are 4 units from F_2.

We need the 2 points where these circles intersect.

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

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Distance From F_1	Distance From F_2
7	3
3	7
8	2
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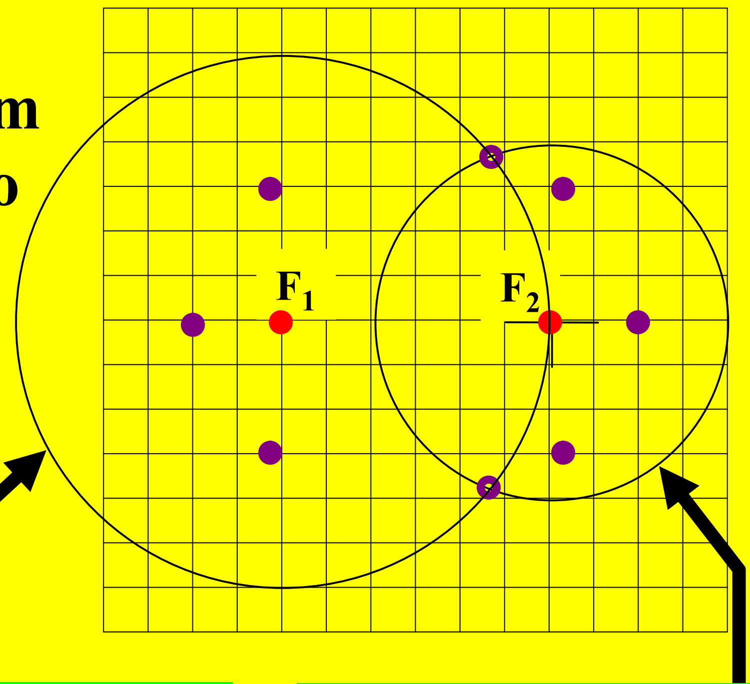

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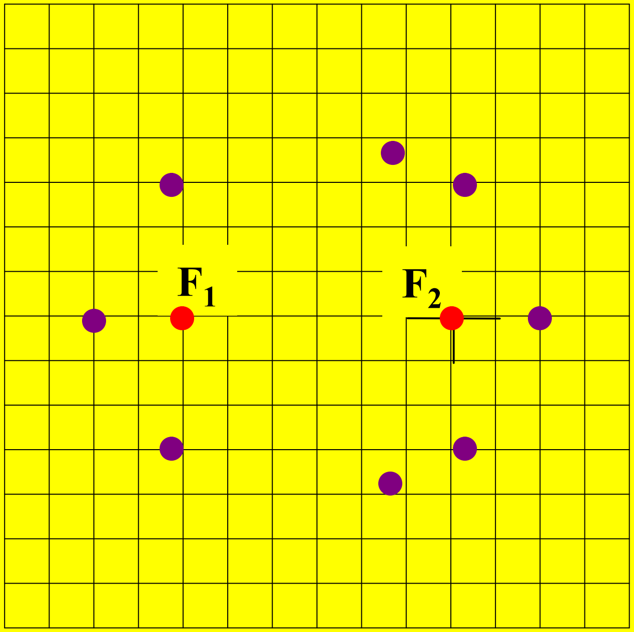

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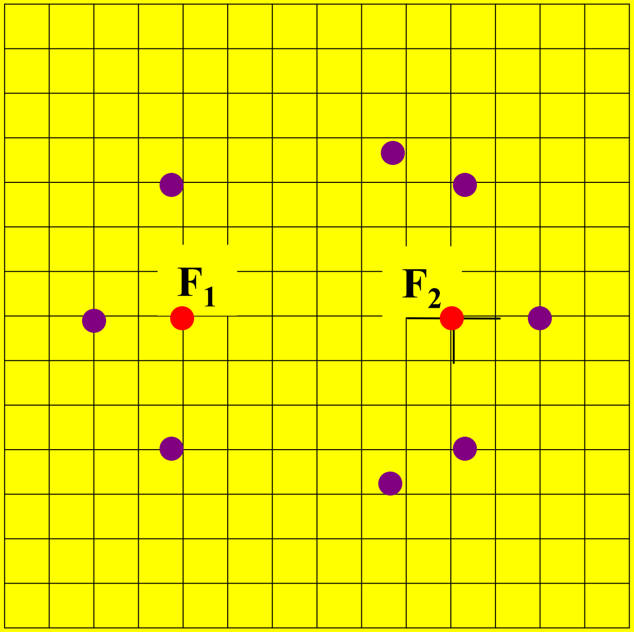

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7	3
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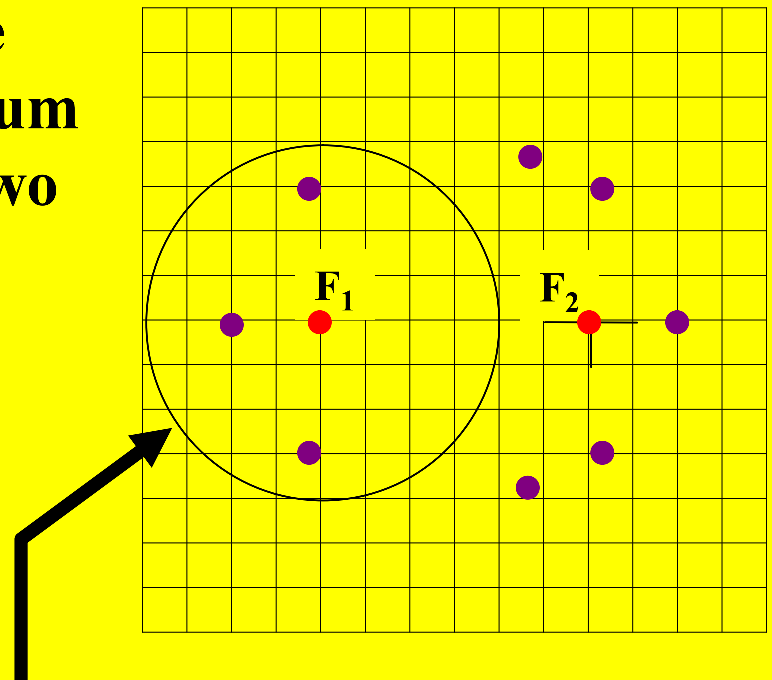
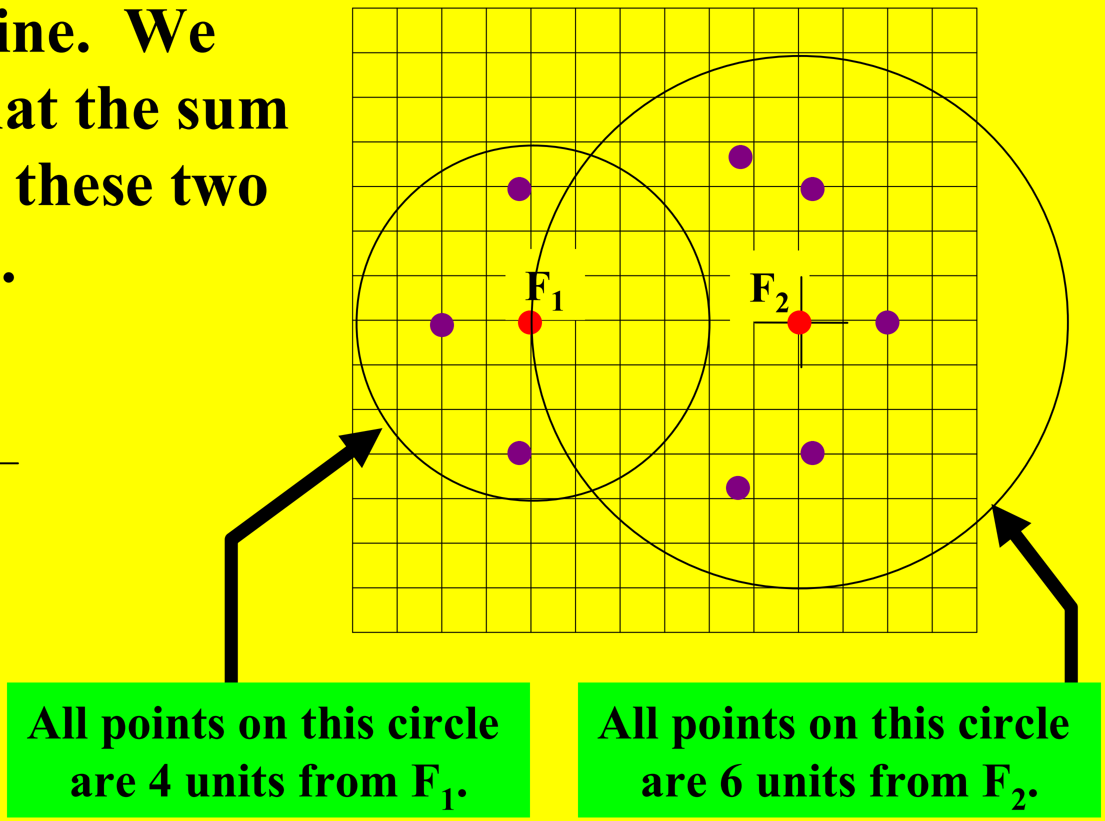


All points on this circle are 4 units from F_1.

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

The points we will use are 6 units apart on a horizontal line. We will find points such that the sum of their distances from these two given points is 10 units.

Distance From F_1	Distance From F_2
7	3
3	7
8	2
2	8
6	4
4	6



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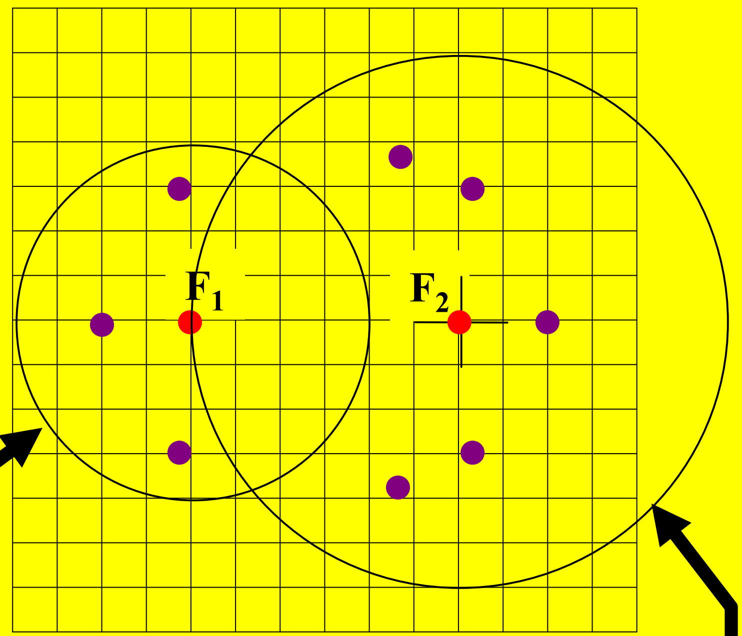

All points on this circle are 4 units from F_1.

All points on this circle are 6 units from F_2.

We need the 2 points where these circles intersect.

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

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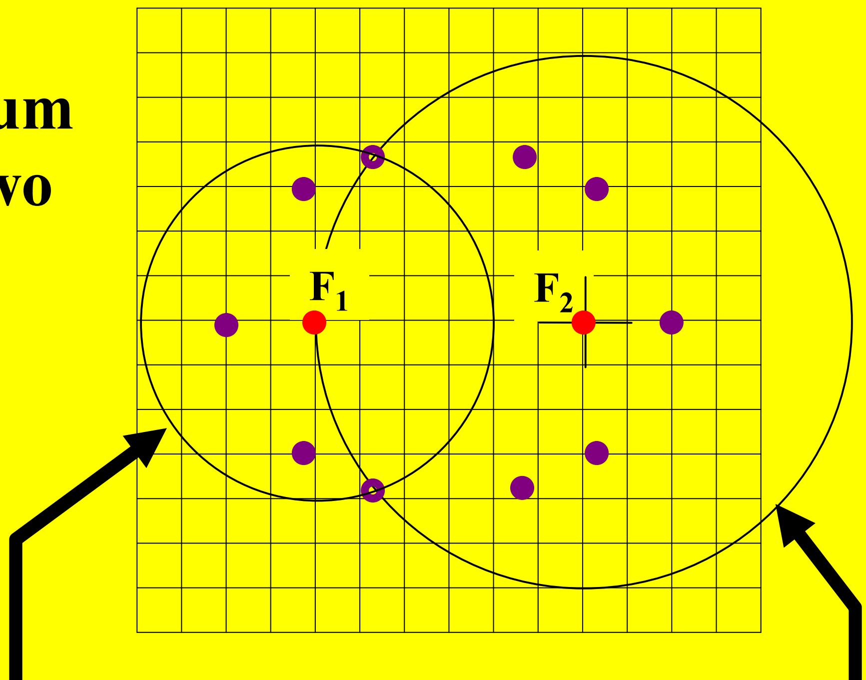

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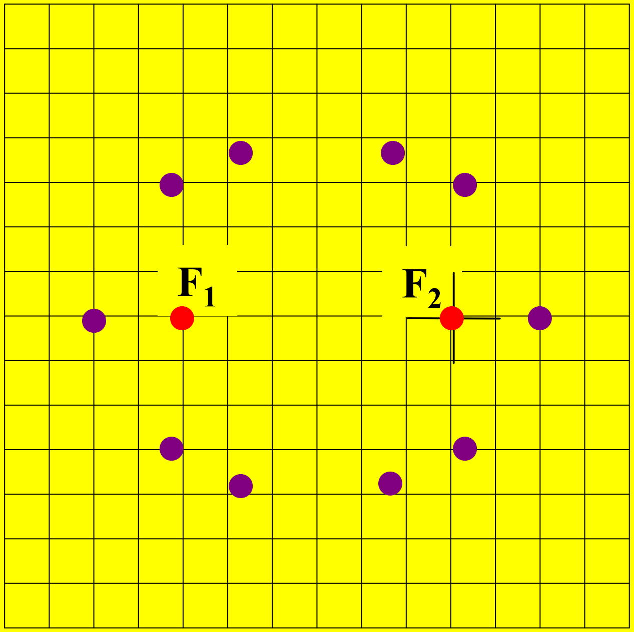

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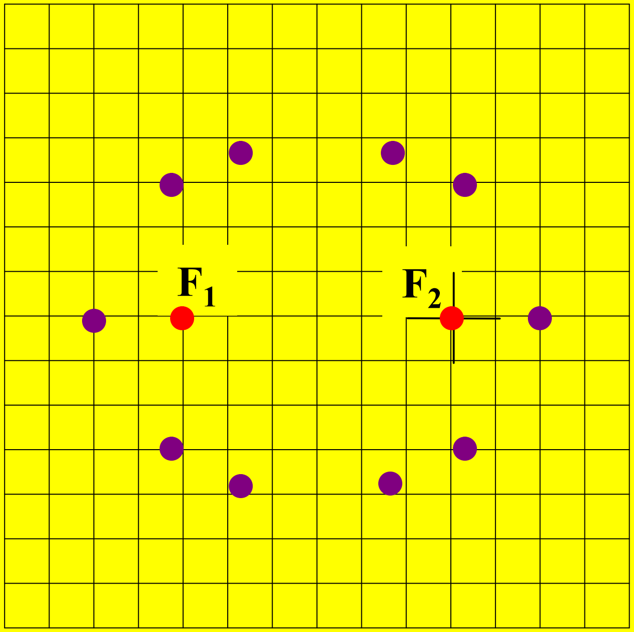

Distance From F_1	Distance From F_2
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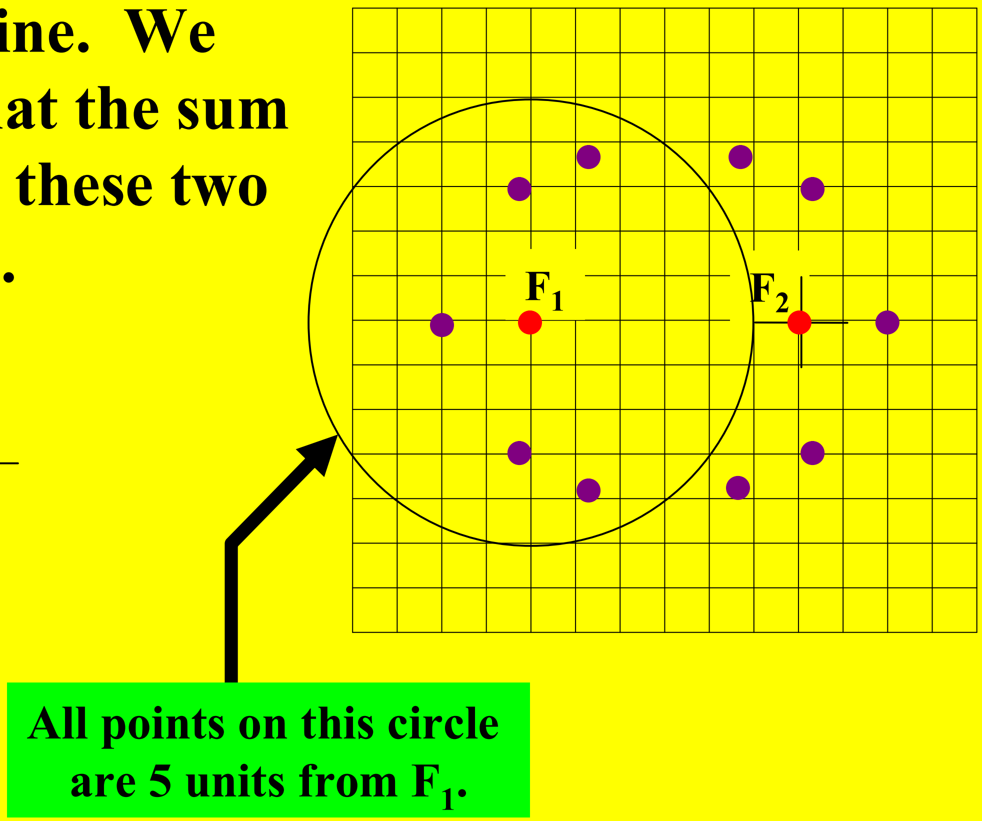

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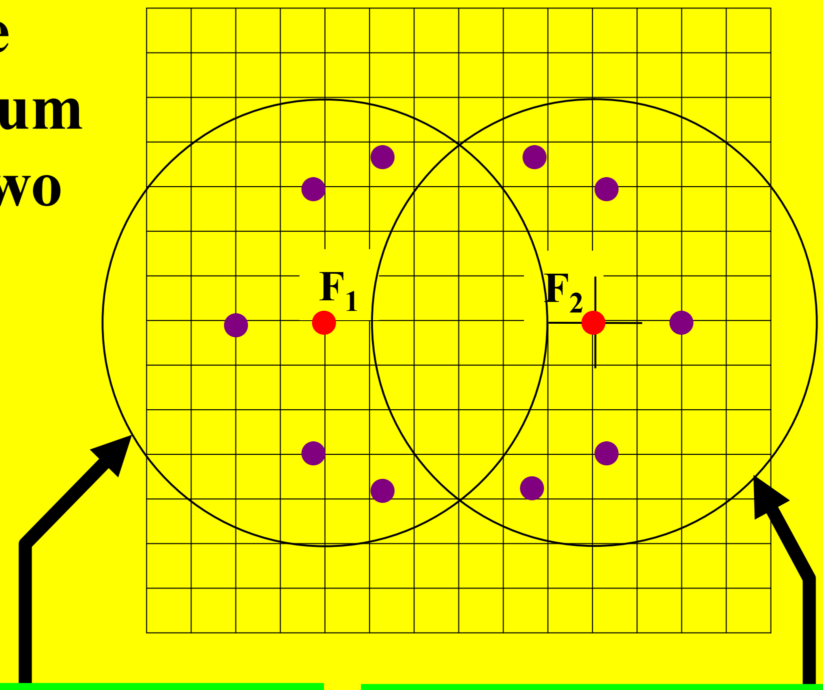

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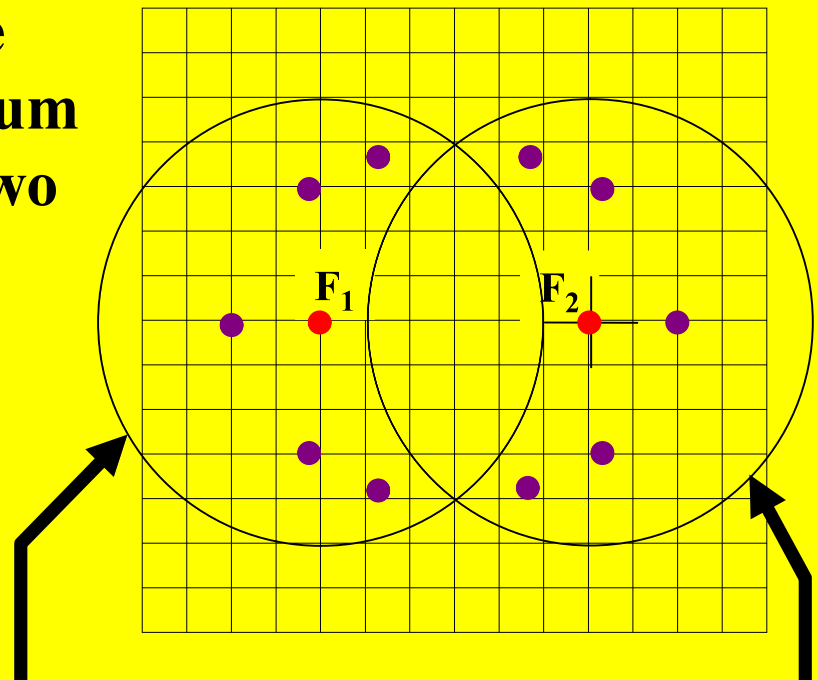

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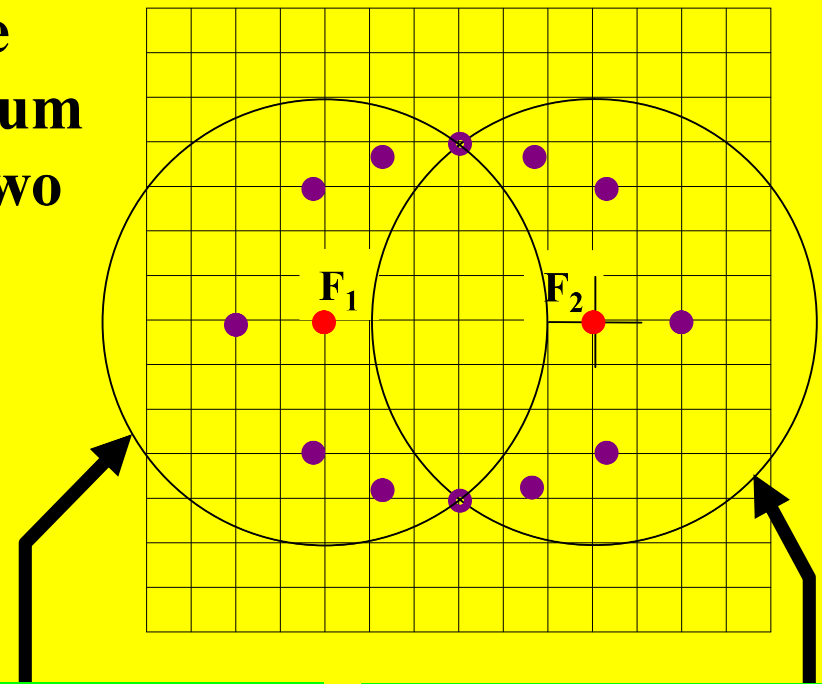

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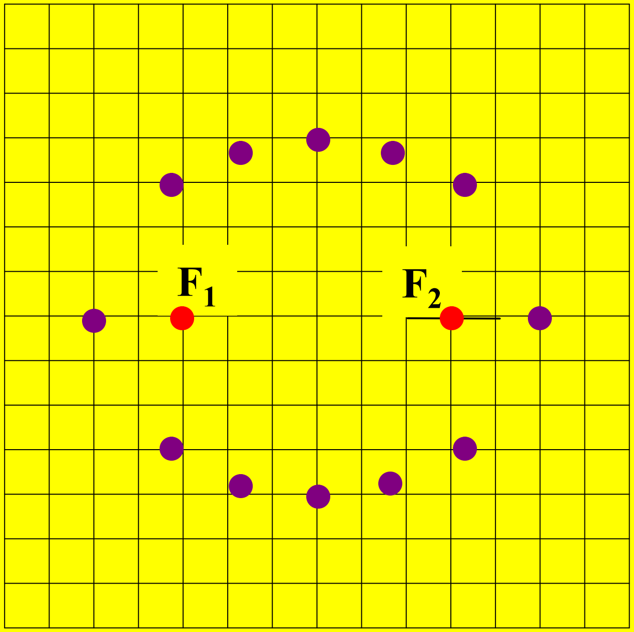

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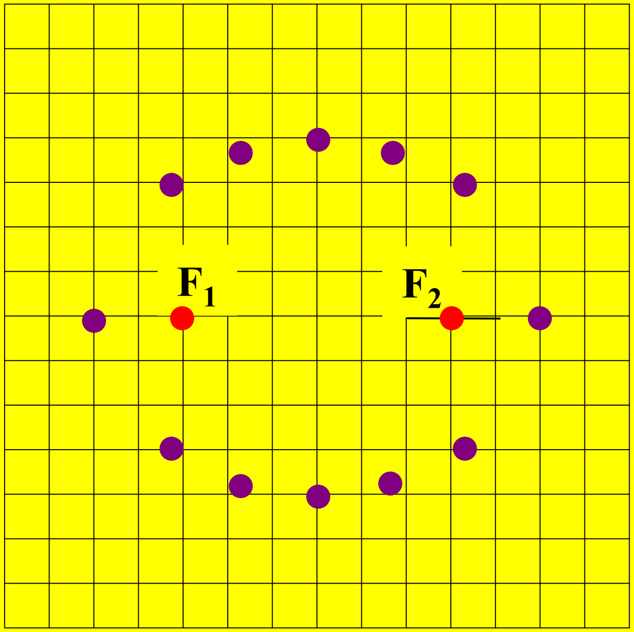

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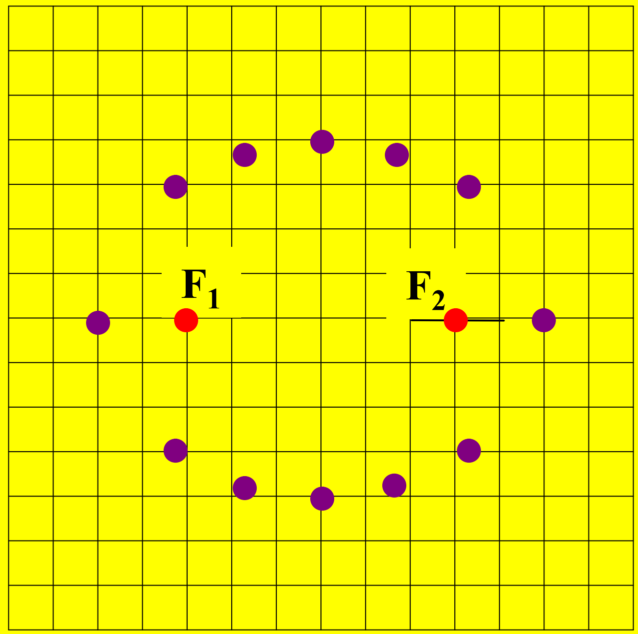

The complete graph of <u>all points</u> in the plane such that the sum of their distances from F_1 and F_2 is 10 units

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

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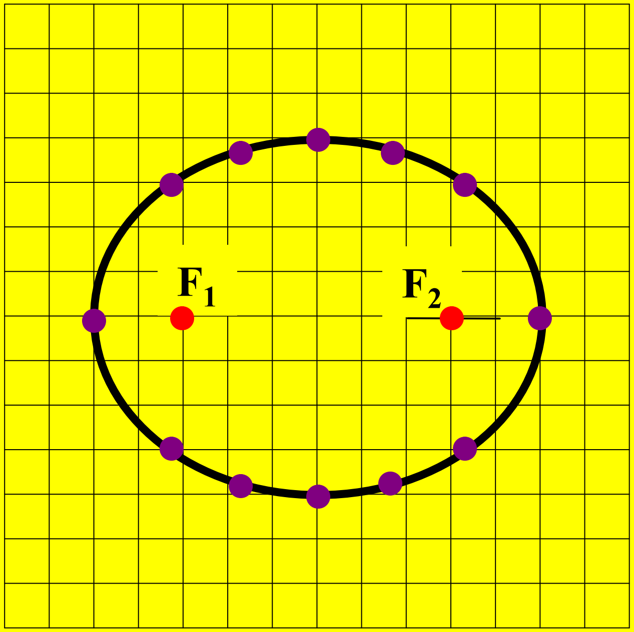

The complete graph of <u>all points</u> in the plane such that the sum of their distances from F_1 and F_2 is 10 units looks like this.

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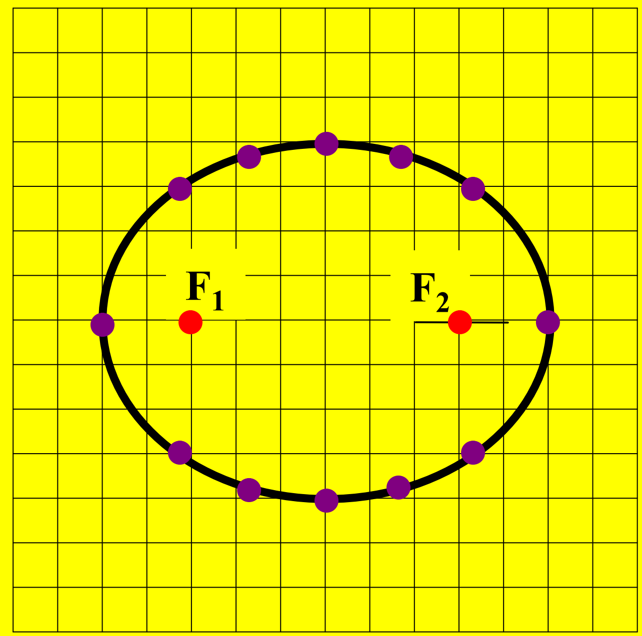
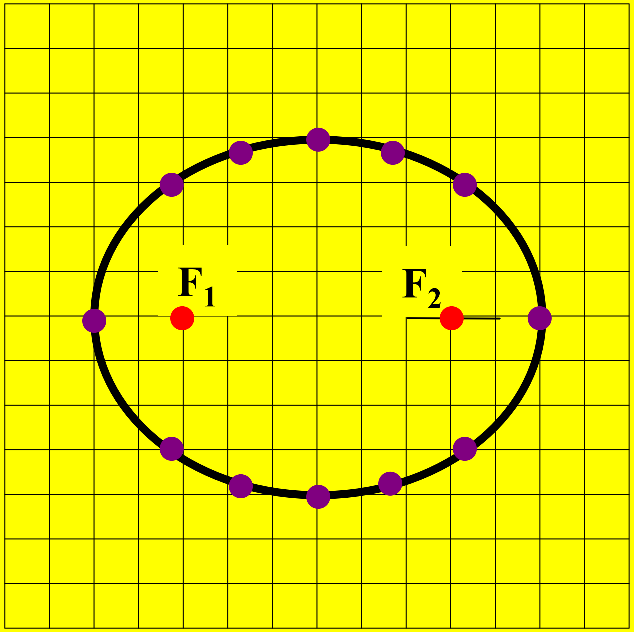


The complete graph of <u>all points</u> in the plane such that the sum of their distances from F_1 and F_2 is 10 units looks like this.

This shape is called an ellipse.

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

The points we will use are 6 units apart on a horizontal line. We will find points such that the sum of their distances from these two given points is 10 units.



The complete graph of <u>all points</u> in the plane such that the sum of their distances from F_1 and F_2 is 10 units looks like this.

This shape is called an ellipse. Next we will add the x and y axes

Given any two points in a plane, we want to consider all points in the plane such that the sum of their distances from the two given points is a constant.

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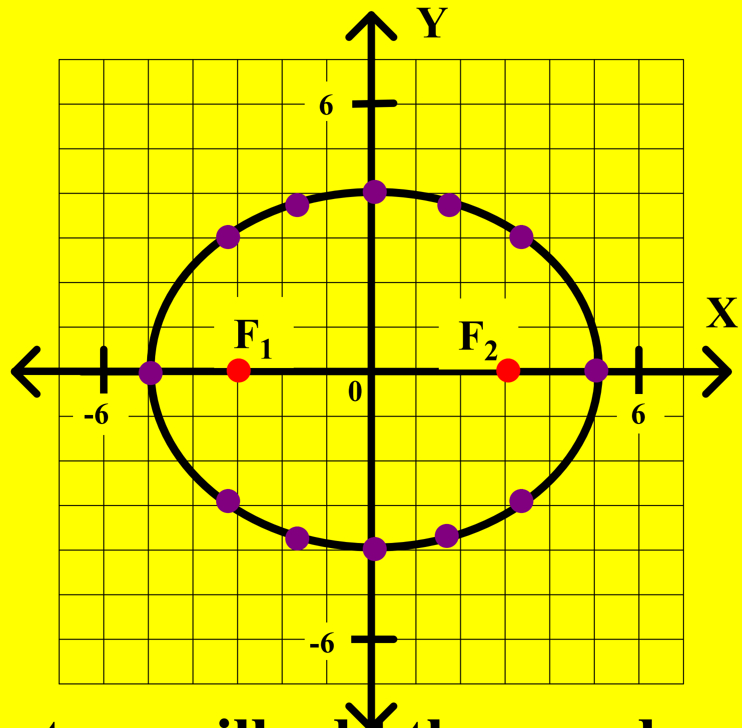

The complete graph of <u>all points</u> in the plane such that the sum of their distances from F_1 and F_2 is 10 units looks like this.

This shape is called an ellipse. Next we will add the x and y axes

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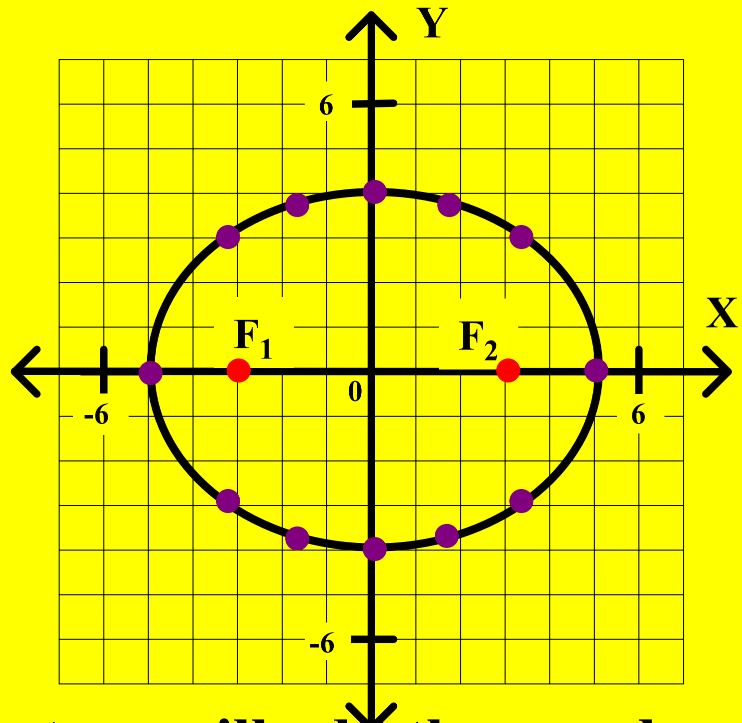
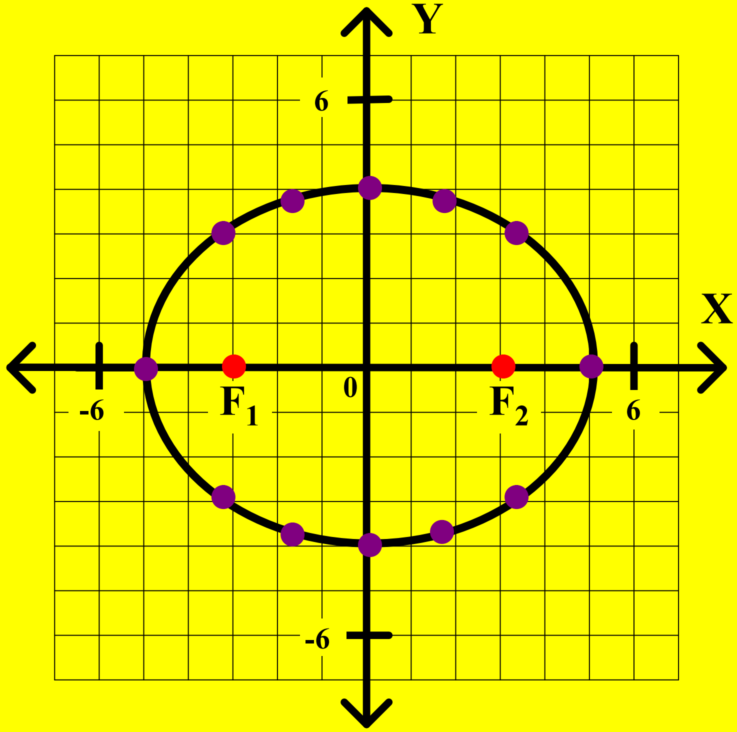


The complete graph of <u>all points</u> in the plane such that the sum of their distances from F_1 and F_2 is 10 units looks like this.

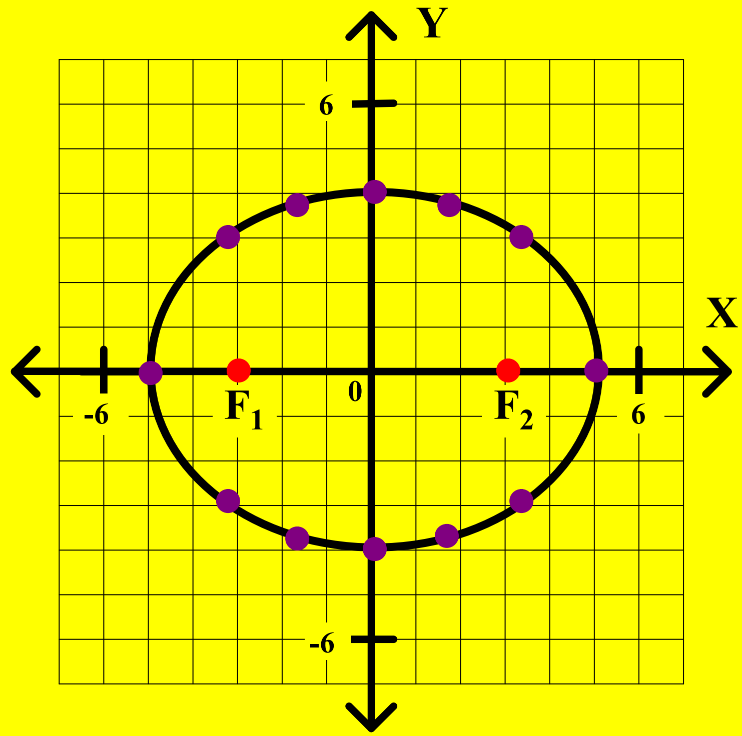
This shape is called an ellipse. Next we will add the x and y axes and determine the 'standard' form equation for this ellipse.

Ellipse Notation



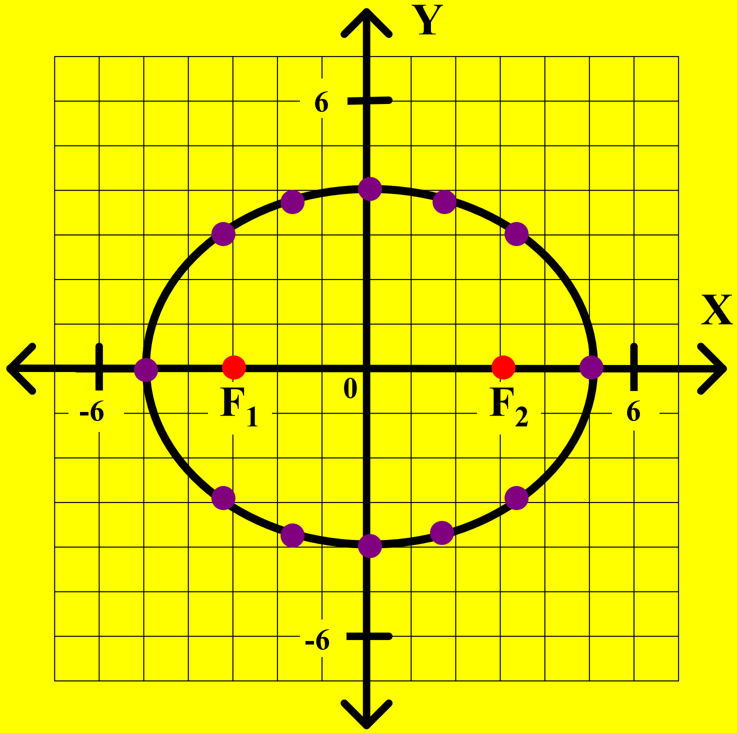
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse.



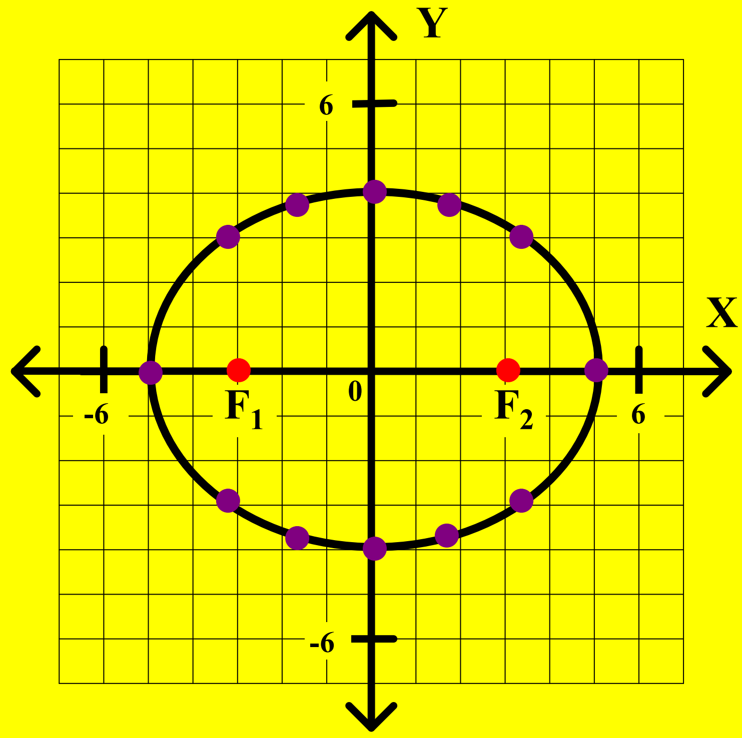
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse.



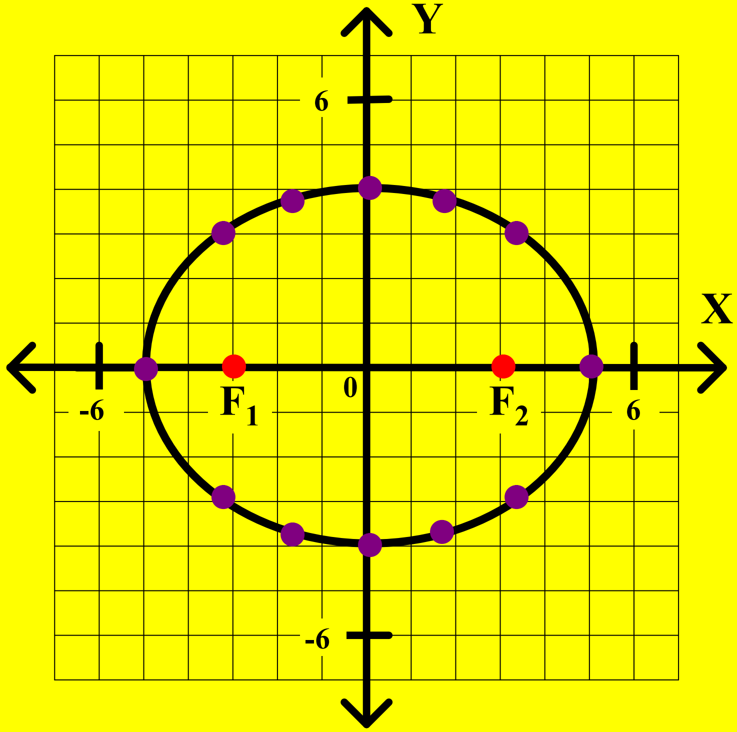
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus.



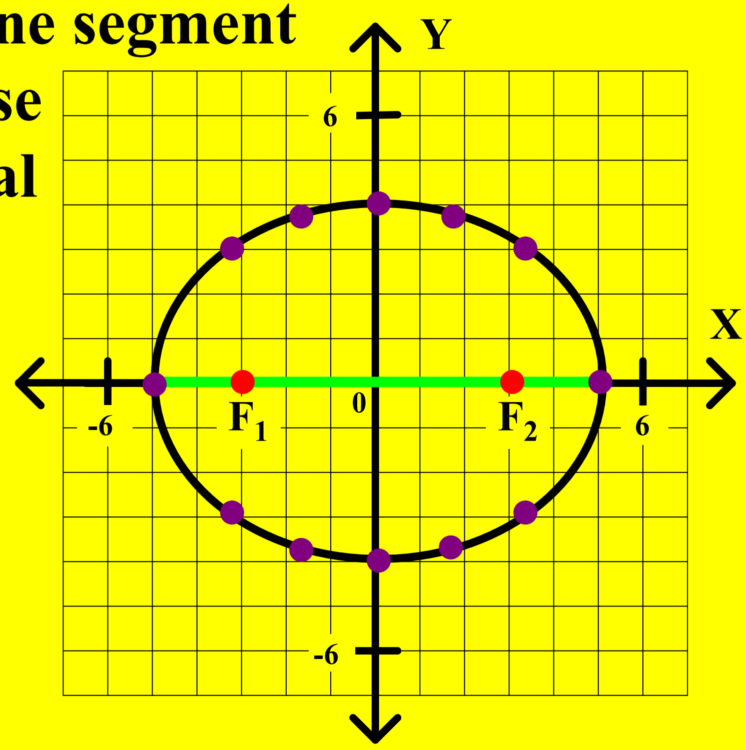
Ellipse Notation

Each of the two points F_1 and F_2 is a focus of the ellipse. The origin is the center of this ellipse. The letter c is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3.



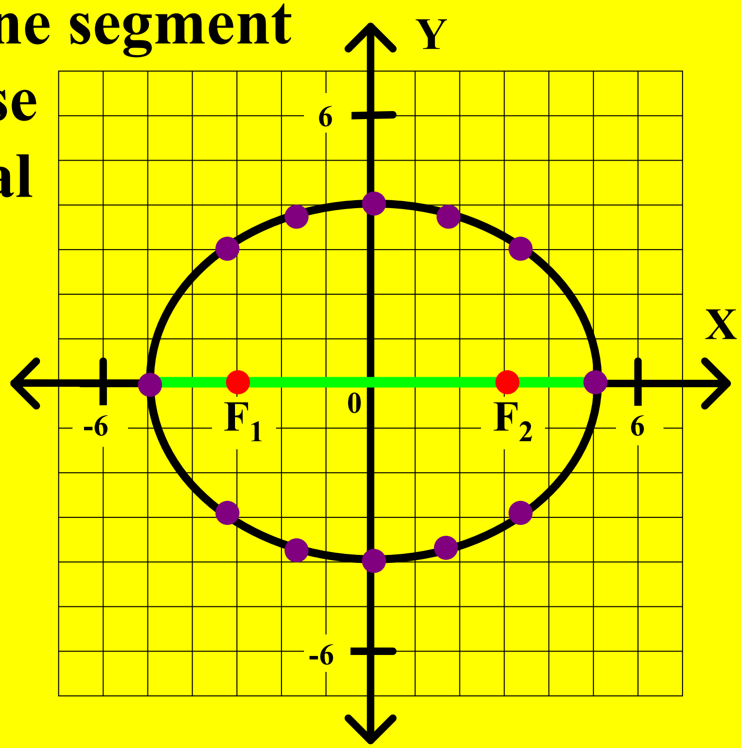
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus).



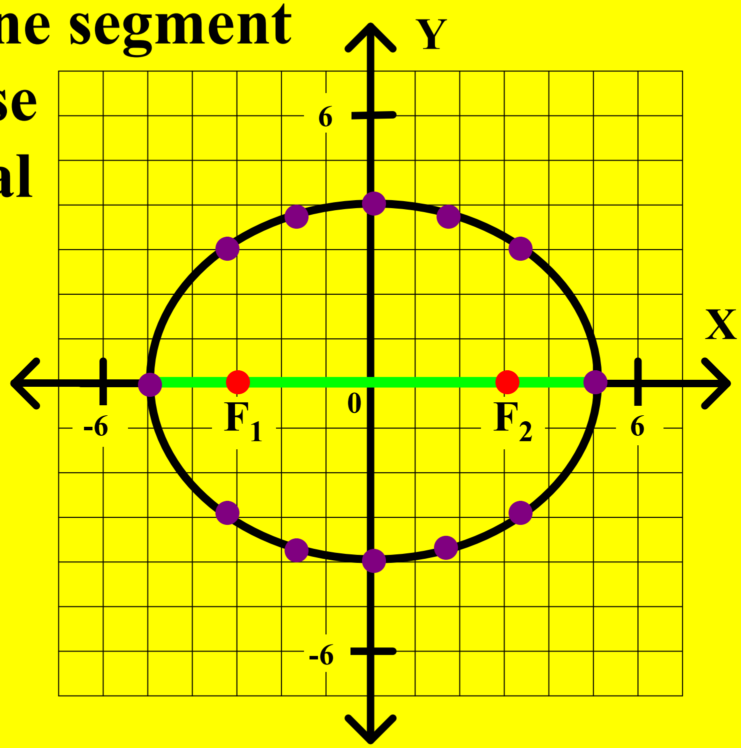
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units.



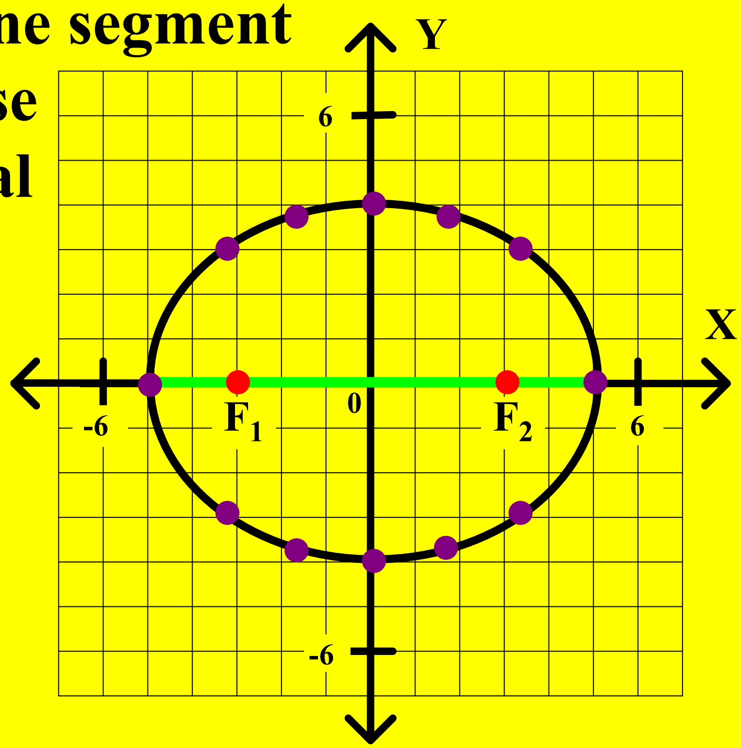
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10,



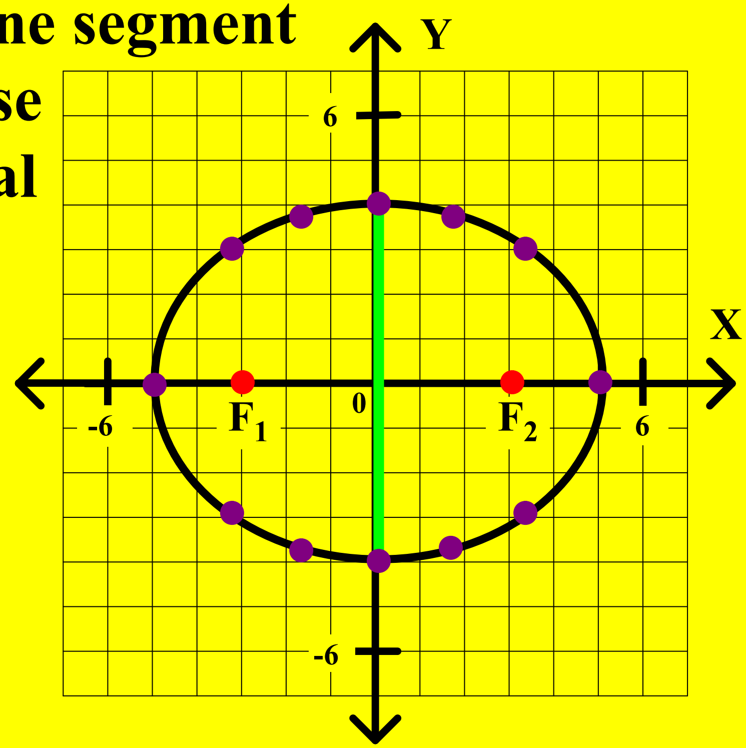
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5.



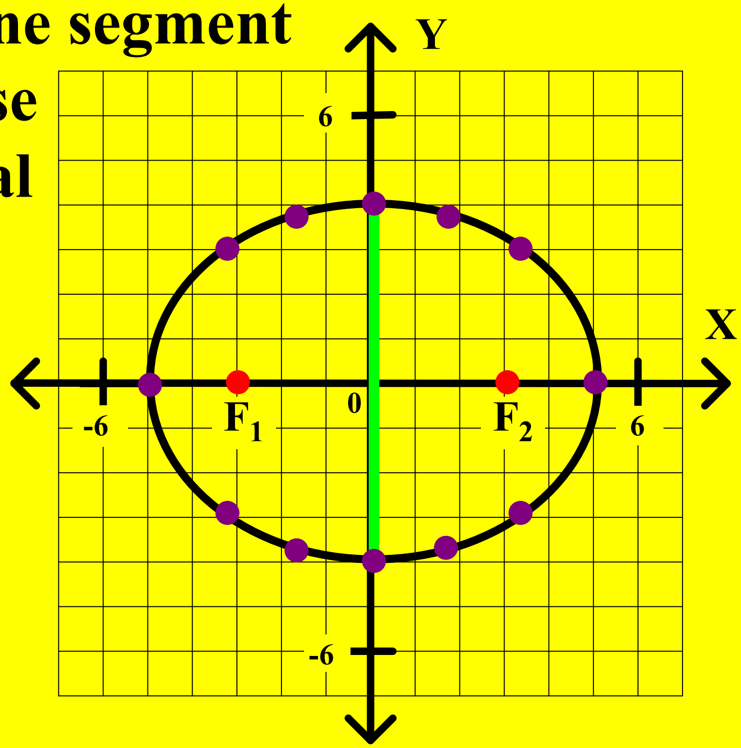
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse,



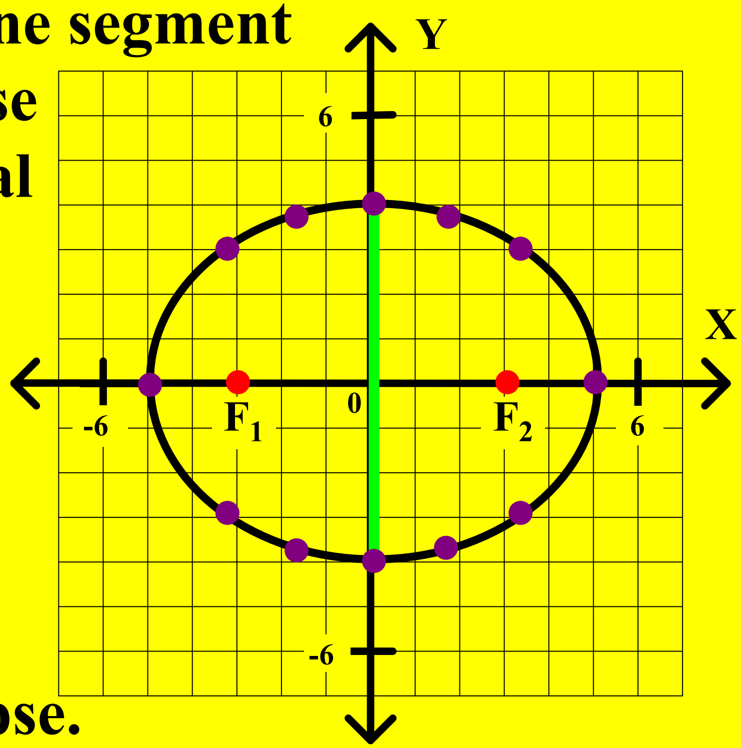
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse, is perpendicular to the major axis,



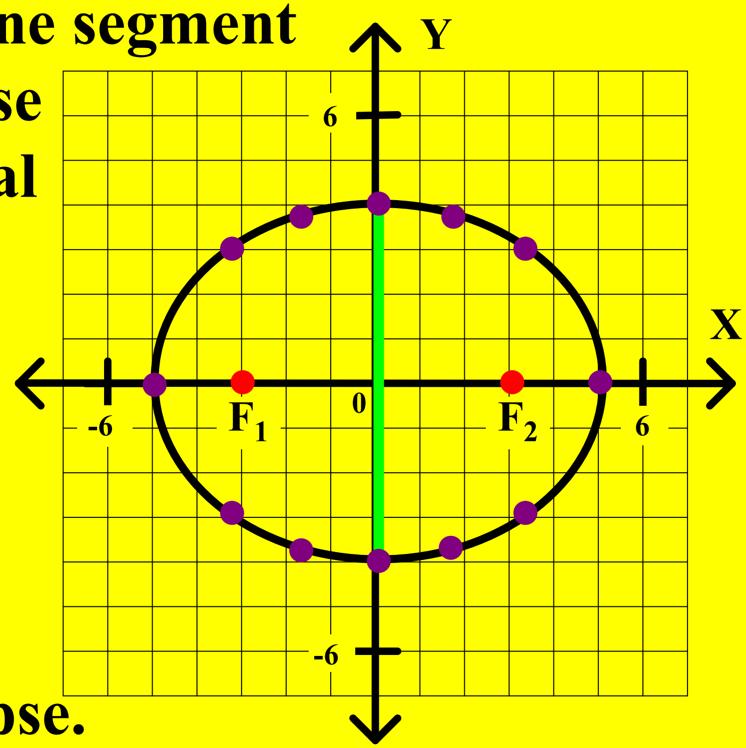
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse, is perpendicular to the major axis, and has both endpoints on the ellipse.



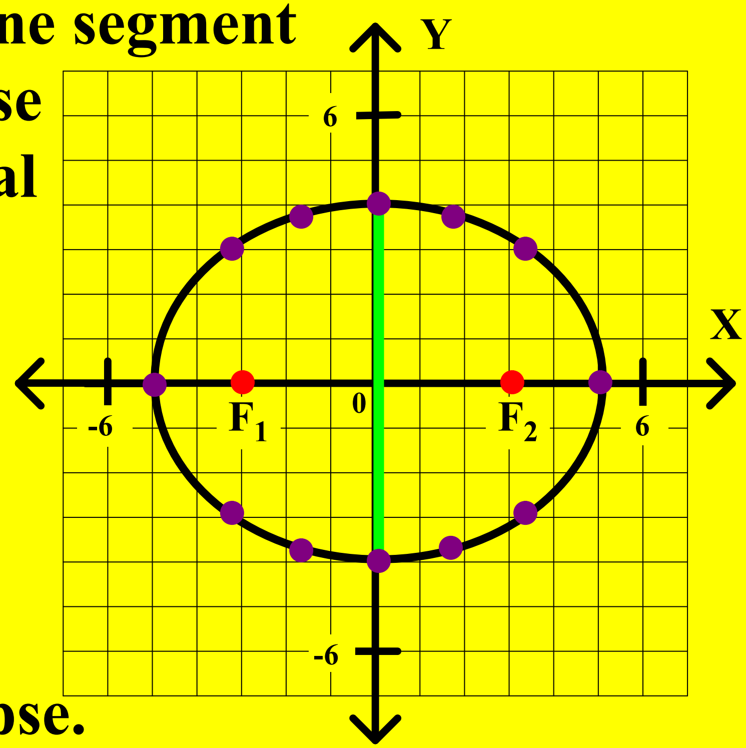
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse, is perpendicular to the major axis, and has both endpoints on the ellipse. The length of the minor axis is <u>2b</u> units.



Ellipse Notation

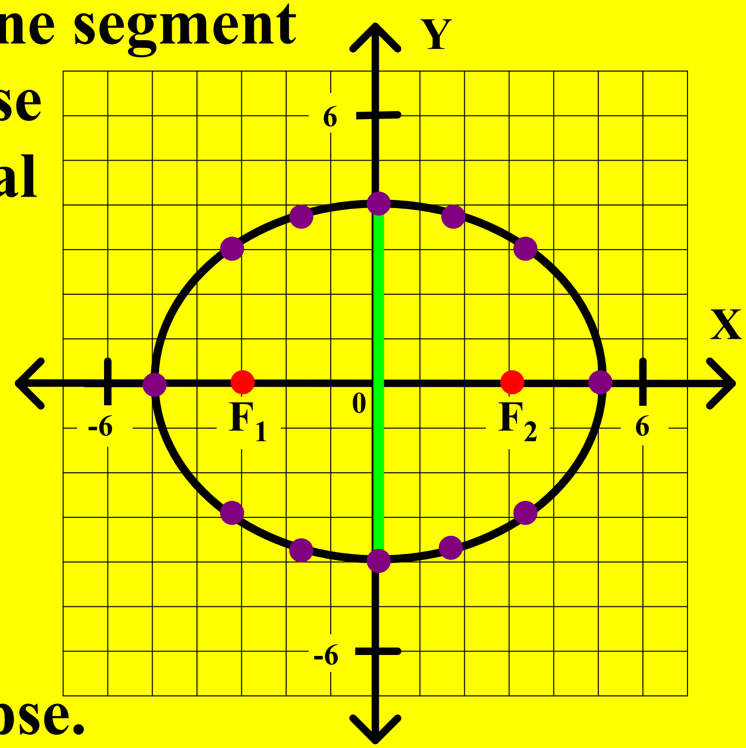
Each of the two points F_1 and F_2 is a focus of the ellipse. The origin is the center of this ellipse. The letter c is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The major axis is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is 2a units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse, is perpendicular to the major axis, and has both endpoints on the ellipse.



The length of the minor axis is 2b units. In this case, 2b = 8,

Ellipse Notation

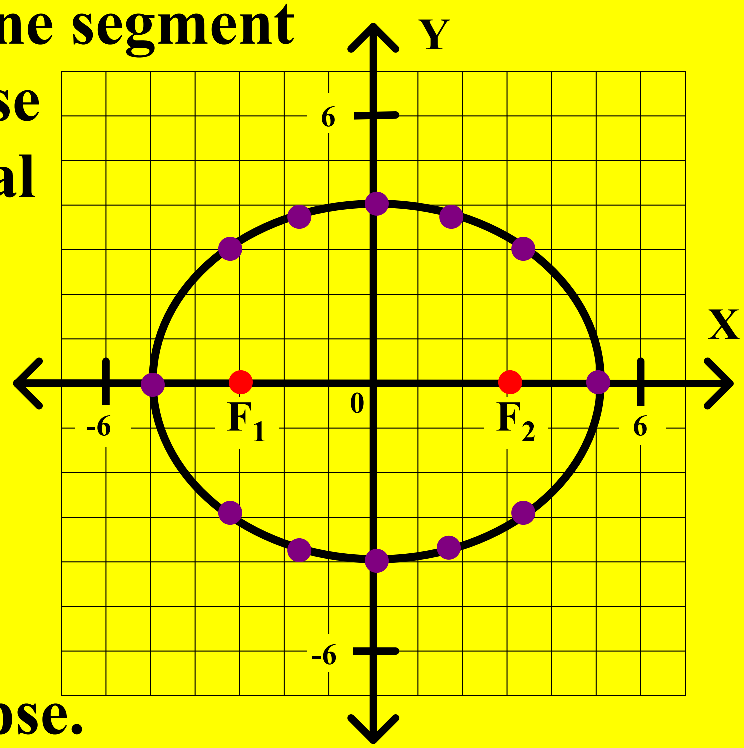
Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse, is perpendicular to the major axis, and has both endpoints on the ellipse.



The length of the minor axis is <u>2b</u> units. In this case, 2b = 8, so b = 4.

Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse, is perpendicular to the major axis, and has both endpoints on the ellipse.



The length of the minor axis is <u>2b</u> units. In this case, 2b = 8, so b = 4.

Ellipse Notation

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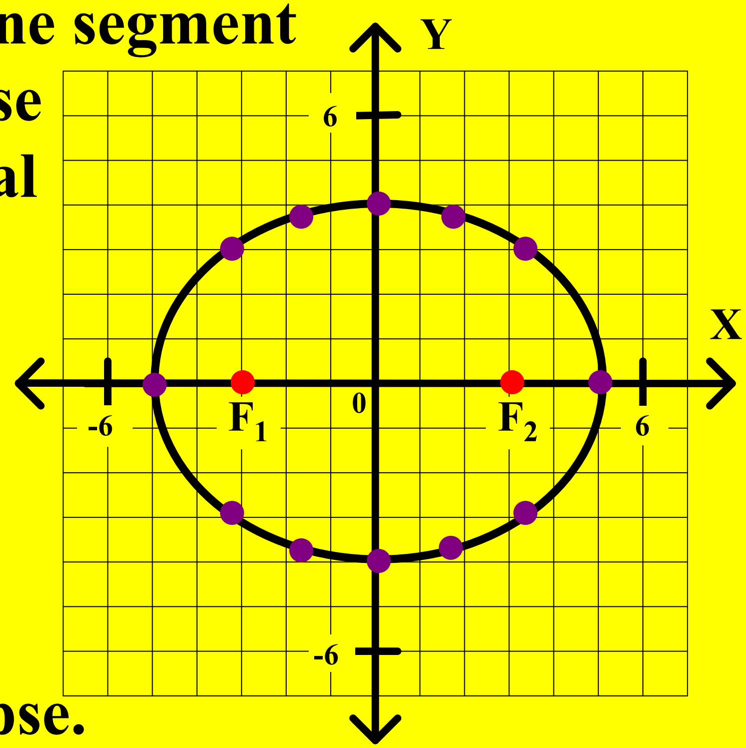
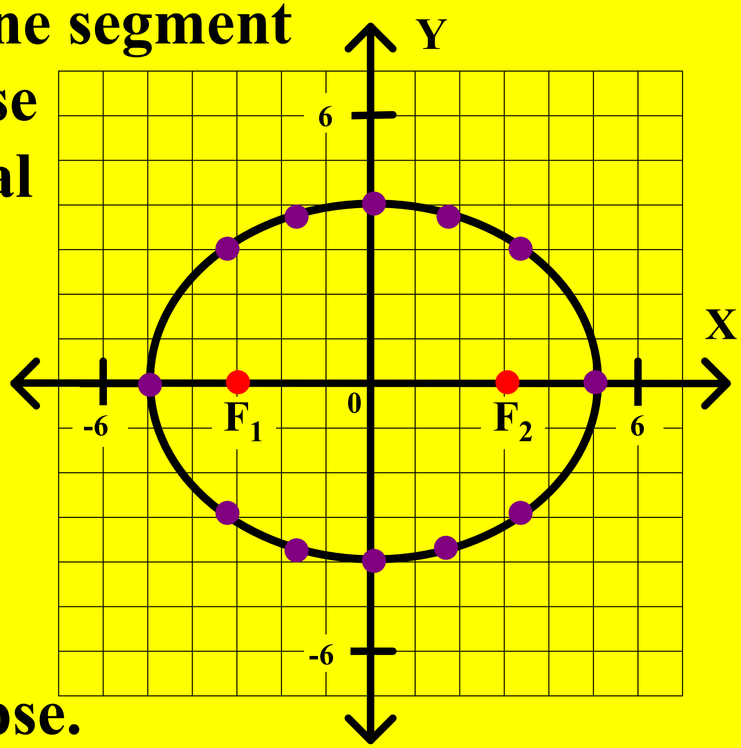


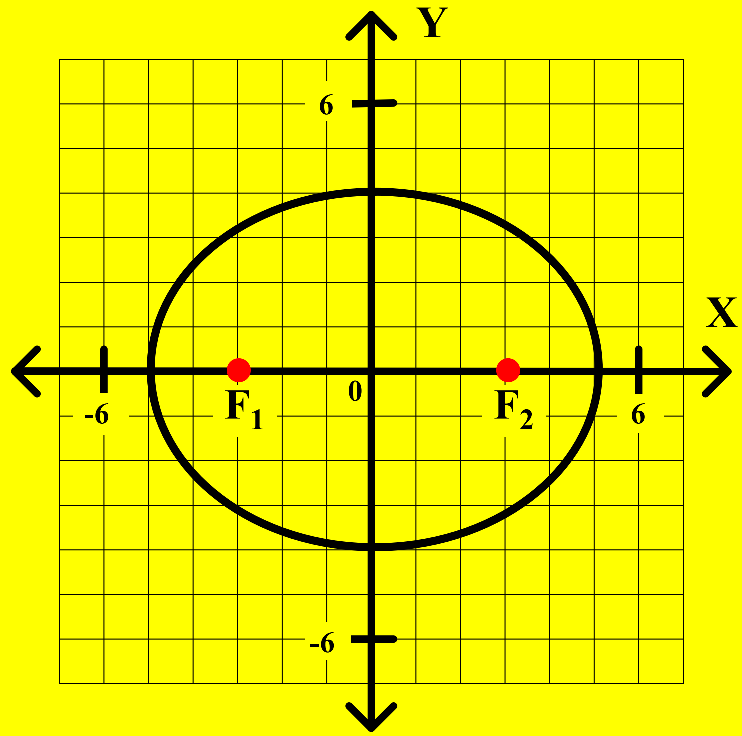
Ellipse Notation

Each of the two points F_1 and F_2 is a <u>focus</u> of the ellipse. The origin is the <u>center</u> of this ellipse. The letter <u>c</u> is used to represent the distance from the center of the ellipse to each focus. In this case, c = 3. The <u>major axis</u> is the line segment that goes from one end of the ellipse to the other through the foci (plural of focus). The length of the major axis is <u>2a</u> units. In this case, 2a = 10, so a = 5. The minor axis is the line segment that goes through the center of the ellipse, is perpendicular to the major axis, and has both endpoints on the ellipse.



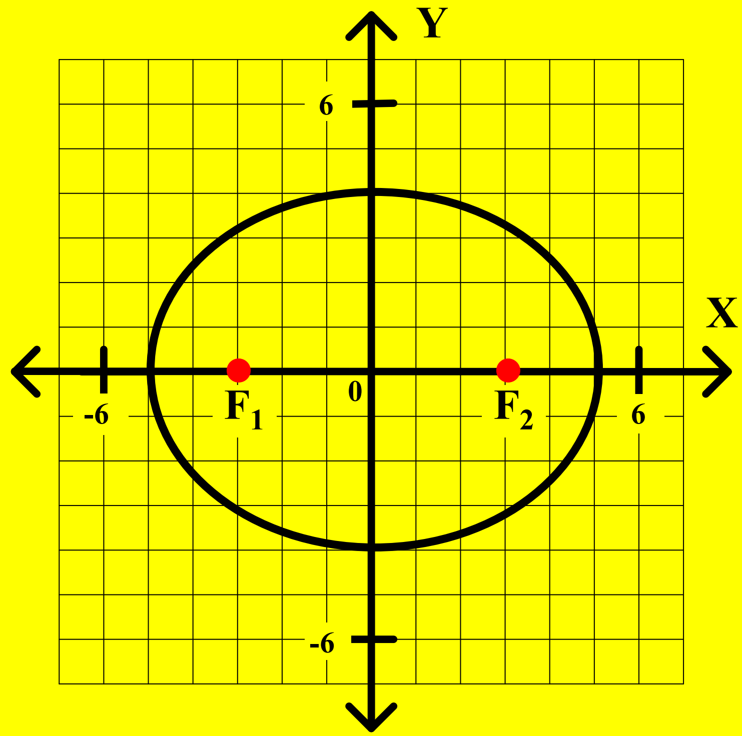
The length of the minor axis is <u>2b</u> units. In this case, 2b = 8, so b = 4. For every ellipse, $c^2 = a^2 - b^2$.

Equations of an Ellipse



Equations of an Ellipse

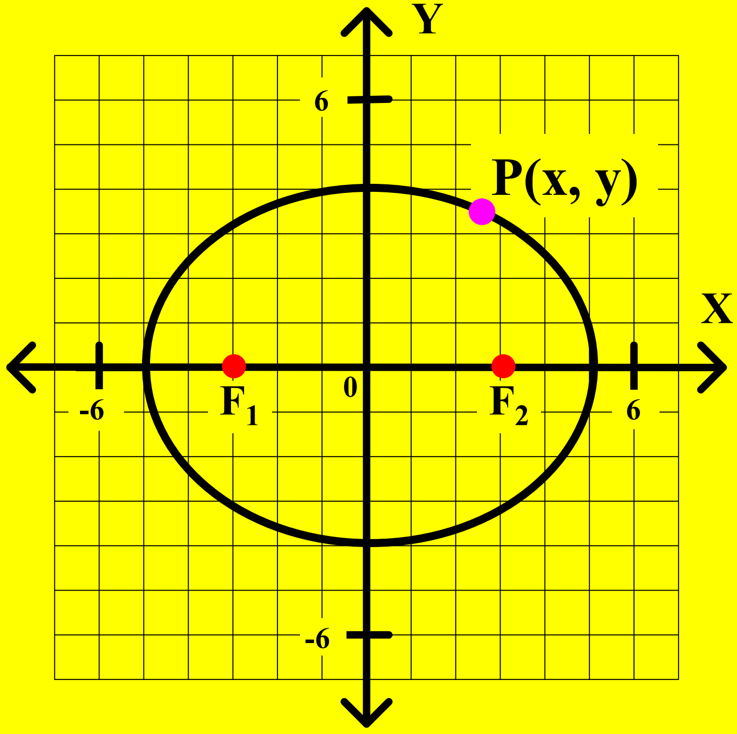
The Standard Form Equation



Equations of an Ellipse

The Standard Form Equation

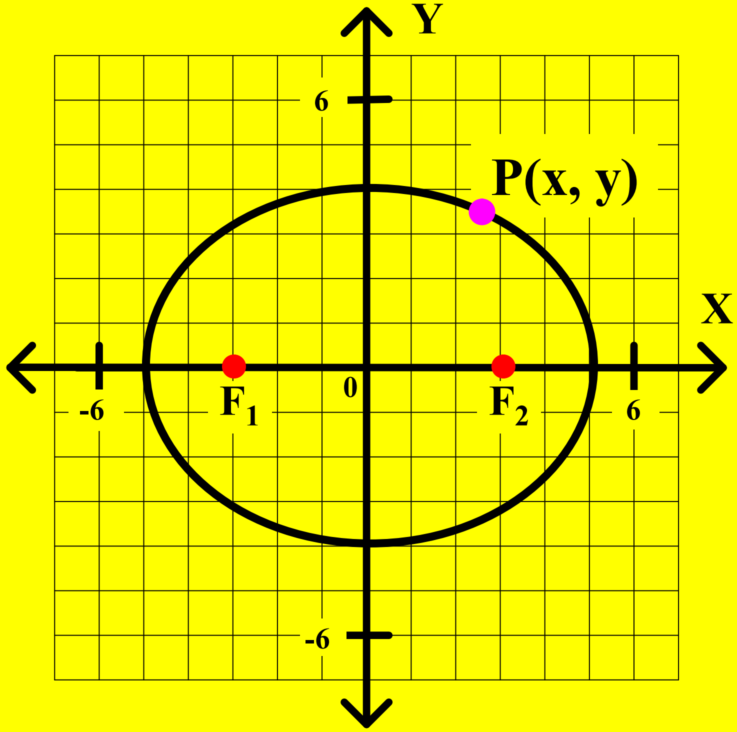
Let P(x, y) represent any point on the ellipse.



Equations of an Ellipse

The Standard Form Equation

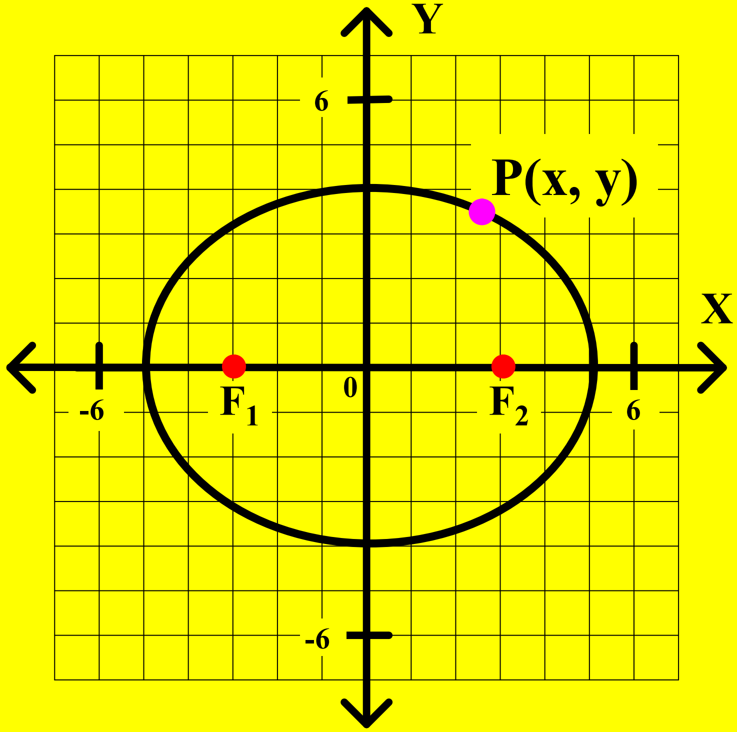
Let P(x, y) represent any point on the ellipse. For this ellipse, the sum of the distances from point P to each focus is 10 units.



Equations of an Ellipse

The Standard Form Equation

Let P(x, y) represent any point on the ellipse. For this ellipse, the sum of the distances from point P to each focus is 10 units. The coordinates of F_1 are (-3,0).



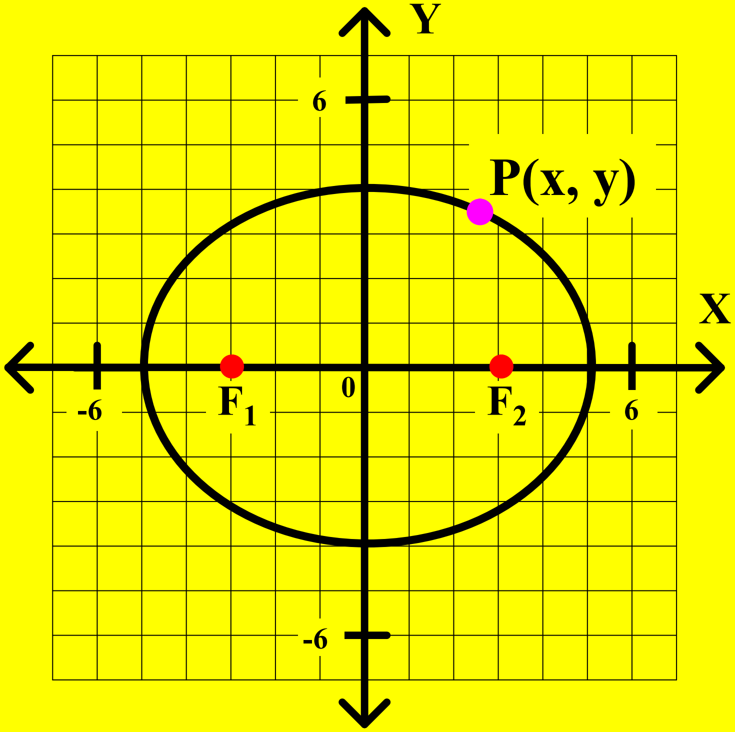
Equations of an Ellipse

The Standard Form Equation

Let P(x, y) represent any point on the ellipse. For this ellipse, the sum of the distances from point P to each focus is 10 units.

The coordinates of F_1 are (-3,0).

The coordinates of F_2 are (3,0).



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The coordinates of F_1 are (-3,0).

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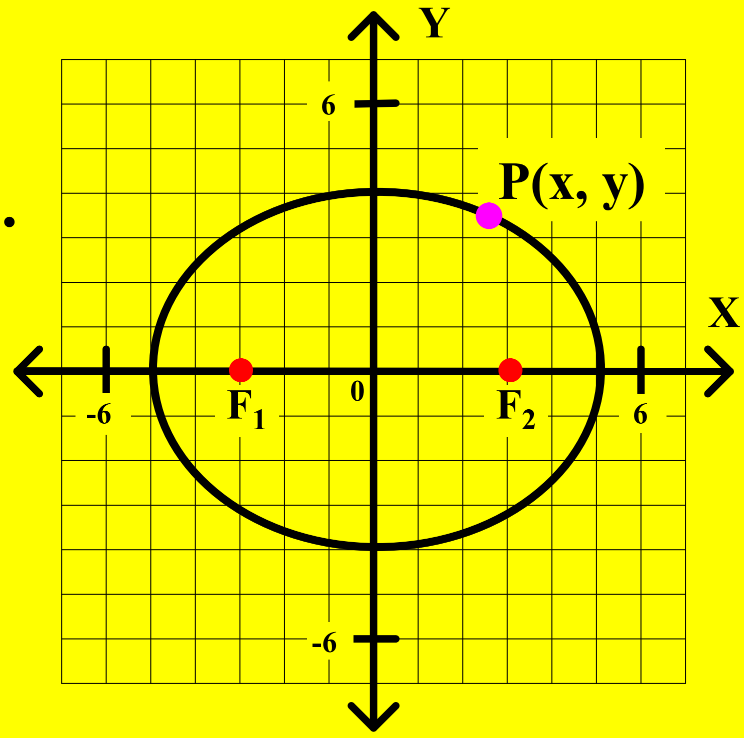
Applying the distance formula …



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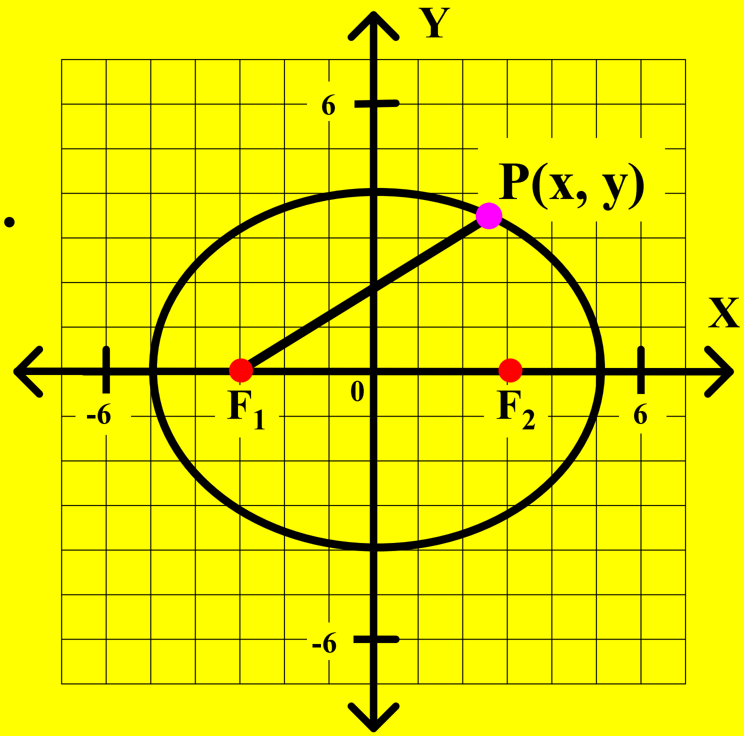

$PF_1 =$

Equations of an Ellipse

The Standard Form Equation

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The coordinates of F_1 are (-3,0).

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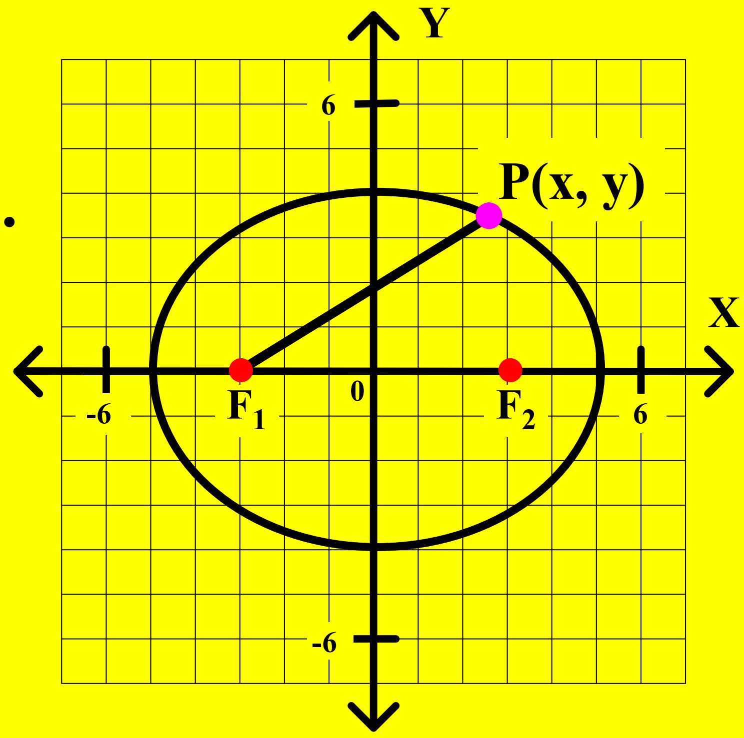


Applying the distance formula …

$$PF_1 = \sqrt{\qquad}$$

Equations of an Ellipse

The Standard Form Equation

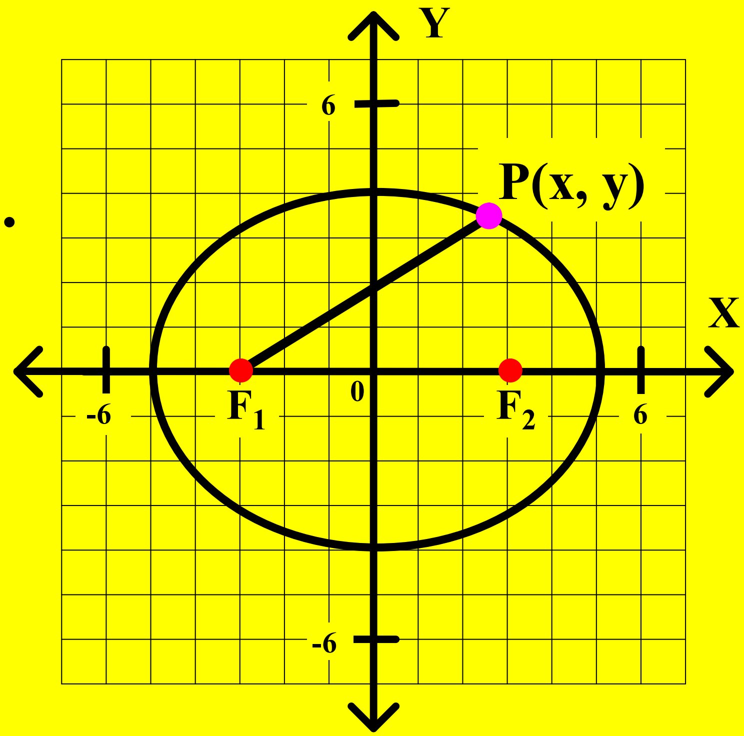
Let P(x, y) represent any point on the ellipse. For this ellipse, the sum of the distances from point P to each focus is 10 units.

The coordinates of F_1 are (-3,0).

The coordinates of F_2 are (3,0).

Applying the distance formula …

$$PF_1 = \sqrt{(x - -3)^2}$$



Equations of an Ellipse

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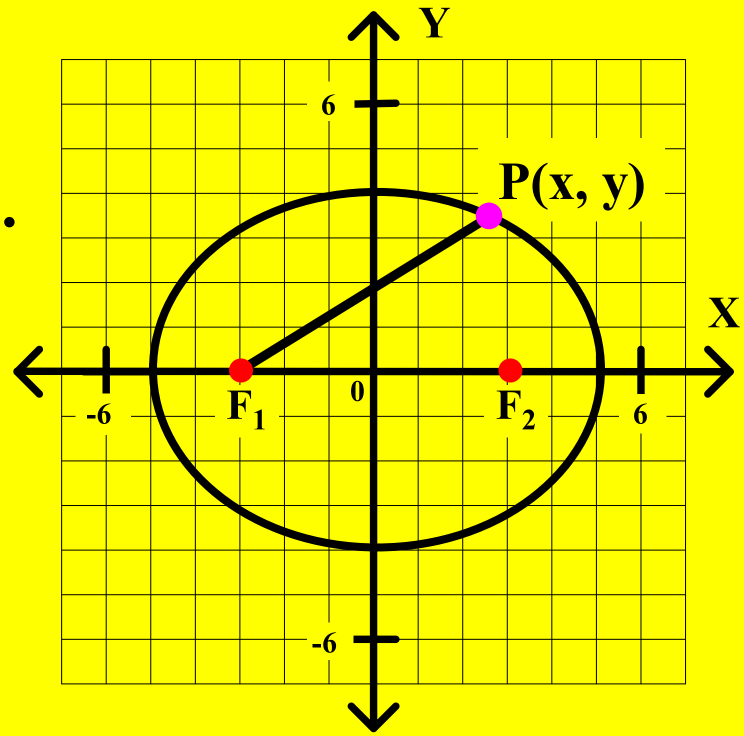
Applying the distance formula …

$$PF_1 = \sqrt{(x - -3)^2 + \quad}$$



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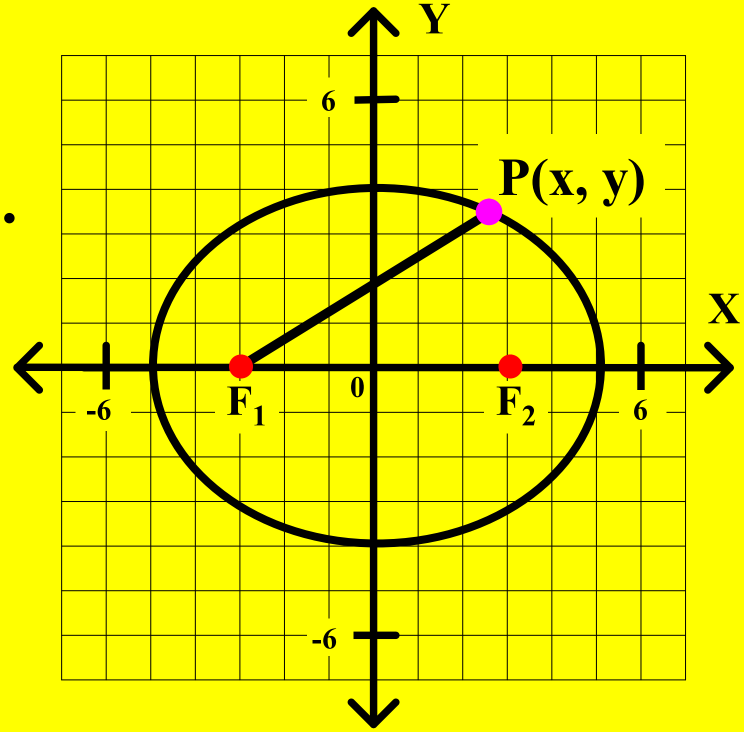

Applying the distance formula …

$$PF_1 = \sqrt{(x - -3)^2 + (y - 0)^2}$$

Equations of an Ellipse

The Standard Form Equation

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The coordinates of F_1 are (-3,0).

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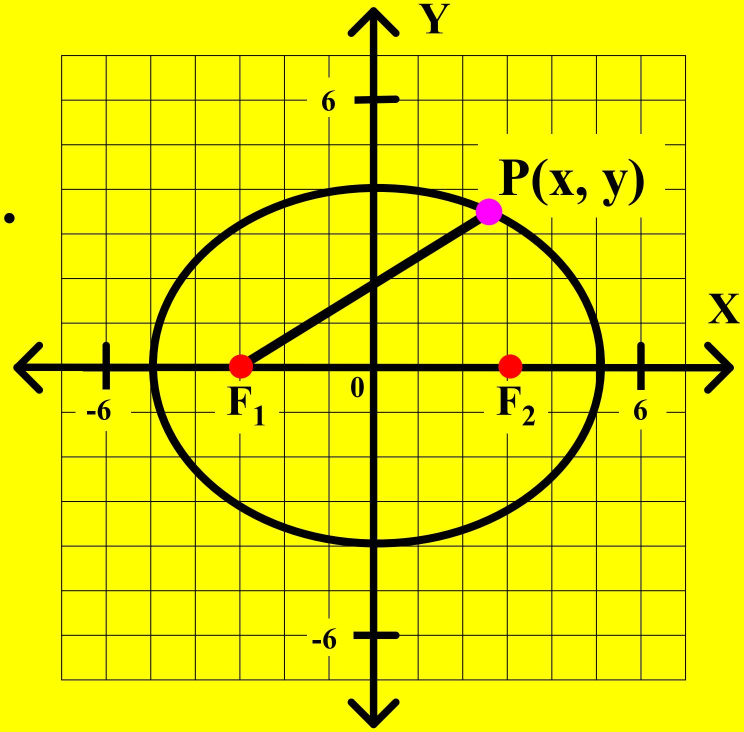

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$$PF_1 = \sqrt{(x - -3)^2 + (y - 0)^2}$$

$PF_1 =$

Equations of an Ellipse

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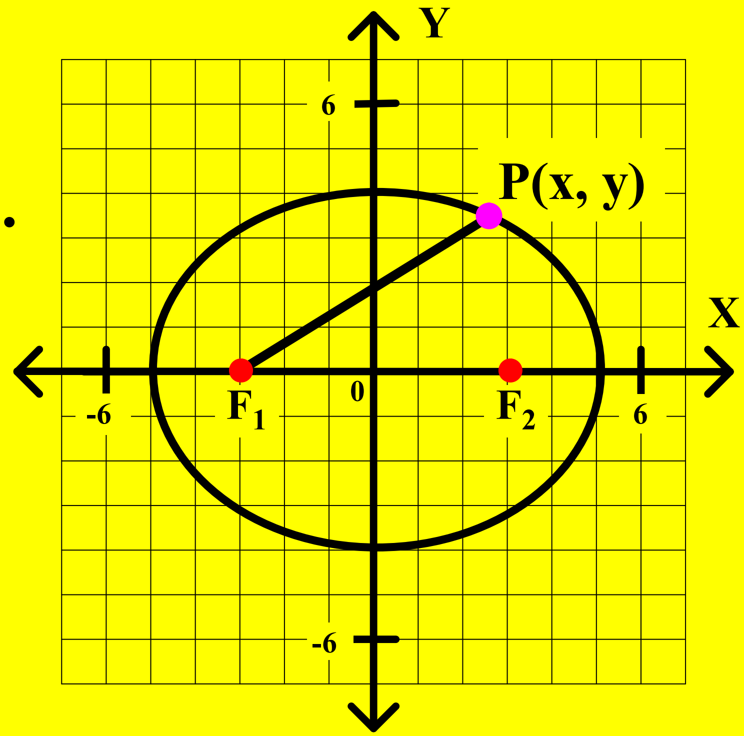

Applying the distance formula …

$$PF_1 = \sqrt{(x - -3)^2 + (y - 0)^2}$$

$$PF_1 = \sqrt{}$$

Equations of an Ellipse

The Standard Form Equation

Let P(x, y) represent any point on the ellipse. For this ellipse, the sum of the distances from point P to each focus is 10 units.

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Applying the distance formula …

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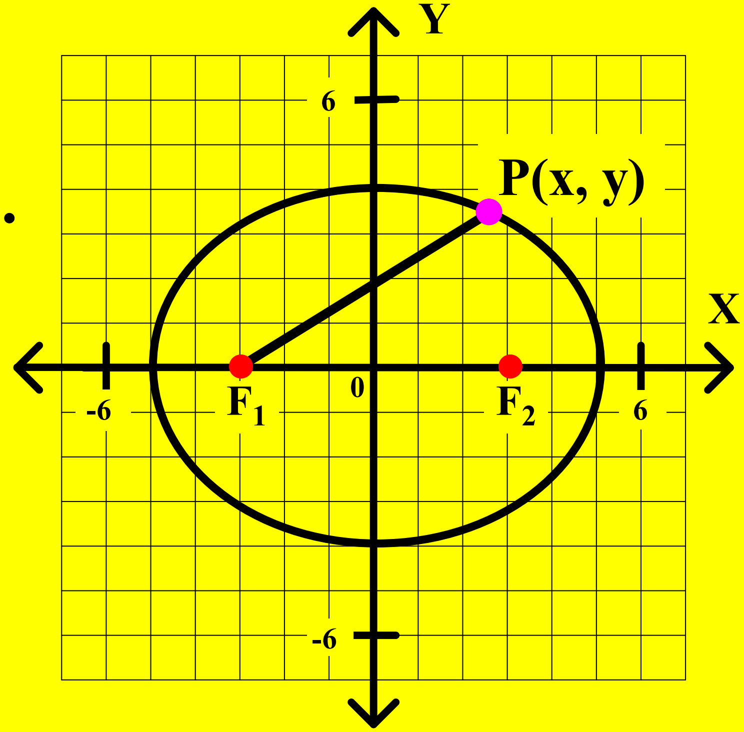
$$PF_1 = \sqrt{(x + 3)^2}$$



Equations of an Ellipse

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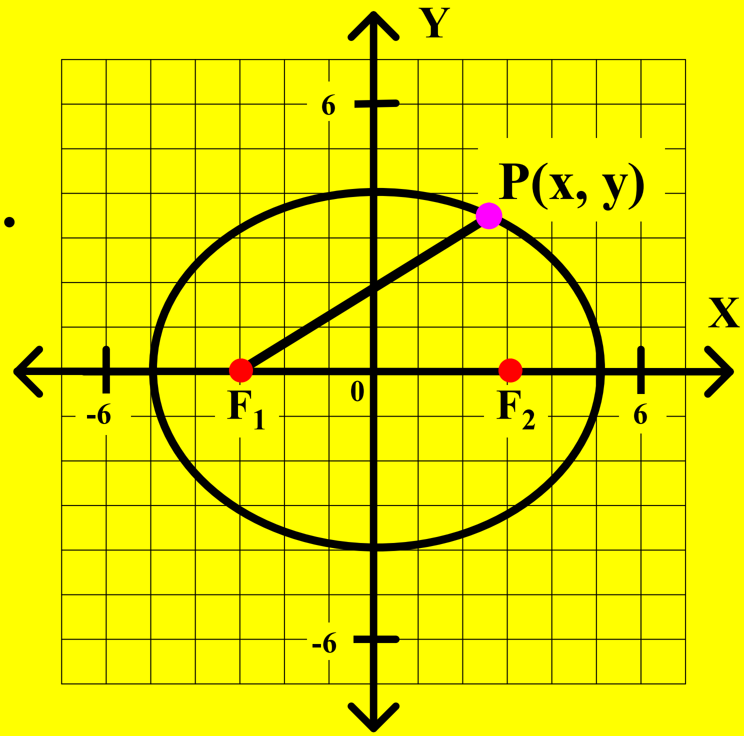
Applying the distance formula …

$$PF_1 = \sqrt{(x - -3)^2 + (y - 0)^2}$$

$$PF_1 = \sqrt{(x + 3)^2 + y^2}$$



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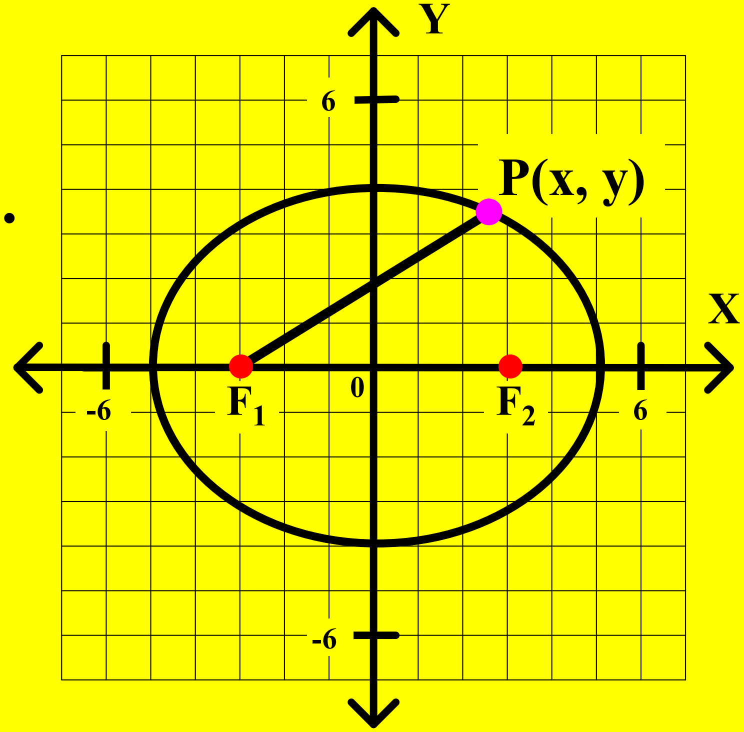

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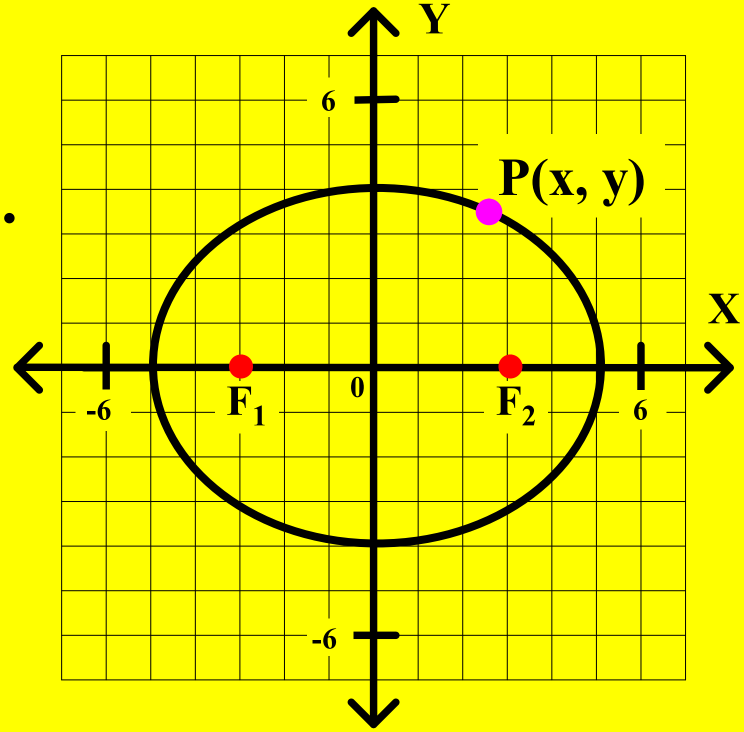

$$PF_1 = \sqrt{(x - -3)^2 + (y - 0)^2}$$

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and

Equations of an Ellipse

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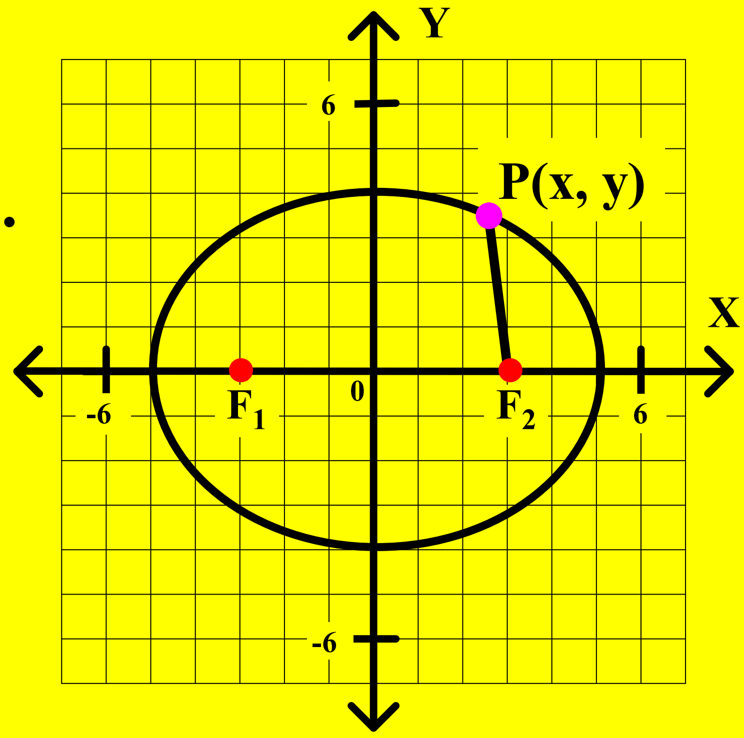

Applying the distance formula …

$$PF_1 = \sqrt{(x - -3)^2 + (y - 0)^2}$$

$$PF_1 = \sqrt{(x + 3)^2 + y^2}$$

and

$PF_2 =$

Equations of an Ellipse

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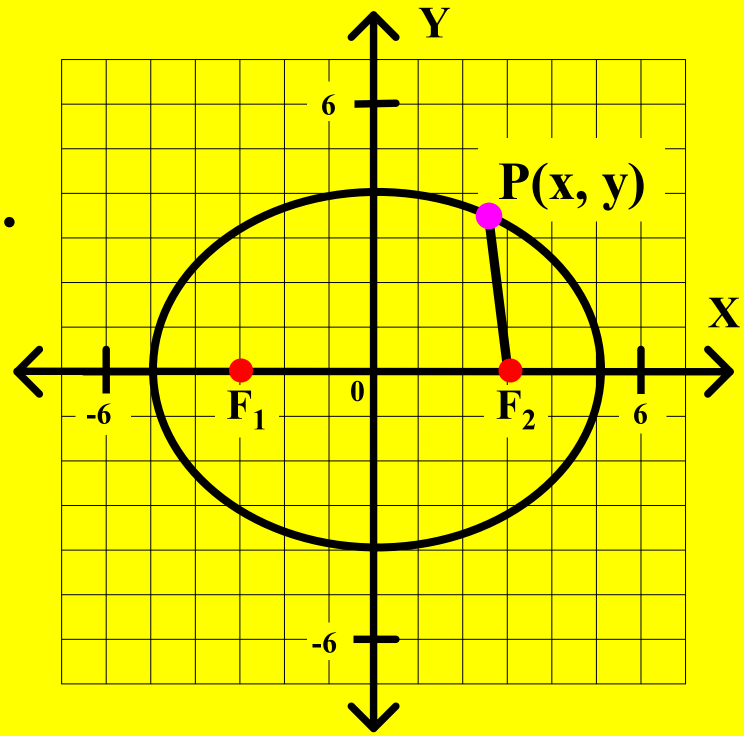

Applying the distance formula …

$$PF_1 = \sqrt{(x - -3)^2 + (y - 0)^2}$$

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Equations of an Ellipse

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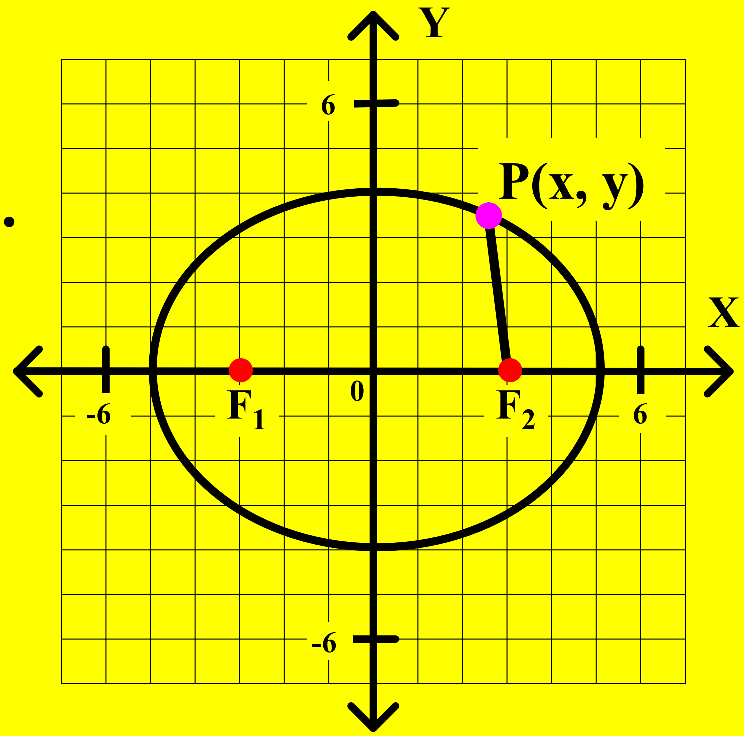

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and

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Equations of an Ellipse

The Standard Form Equation

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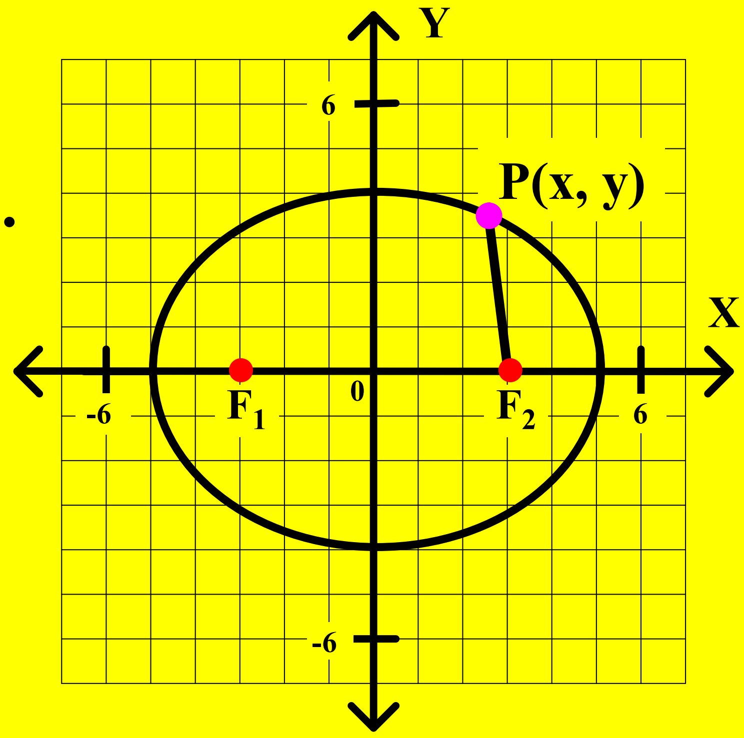

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and

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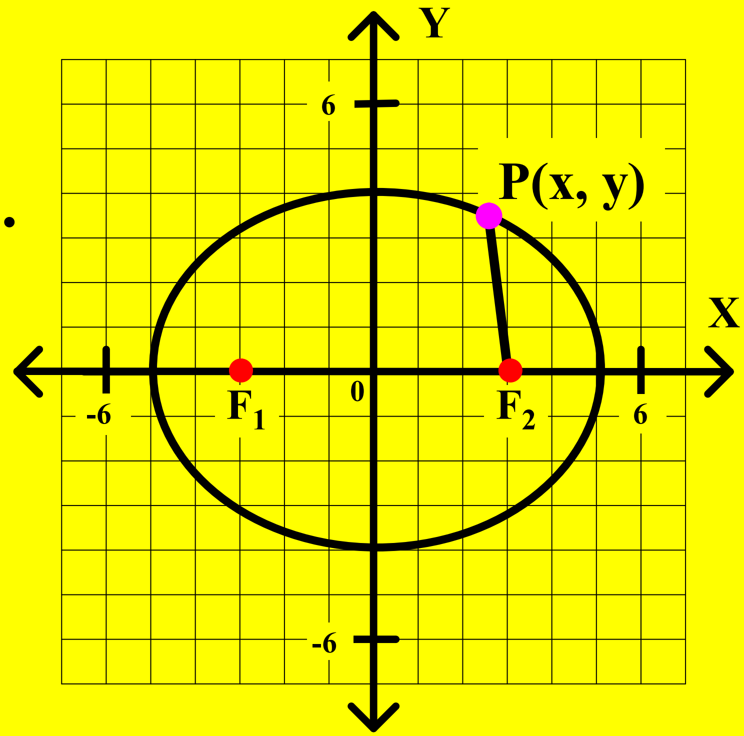

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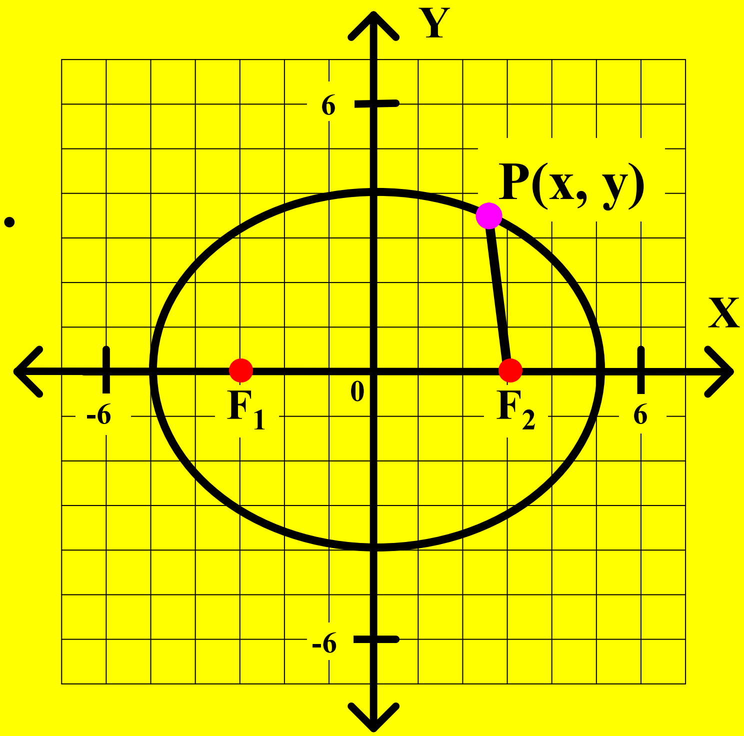

Applying the distance formula …

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$$PF_1 = \sqrt{(x + 3)^2 + y^2}$$

and

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$$PF_2 =$$

Equations of an Ellipse

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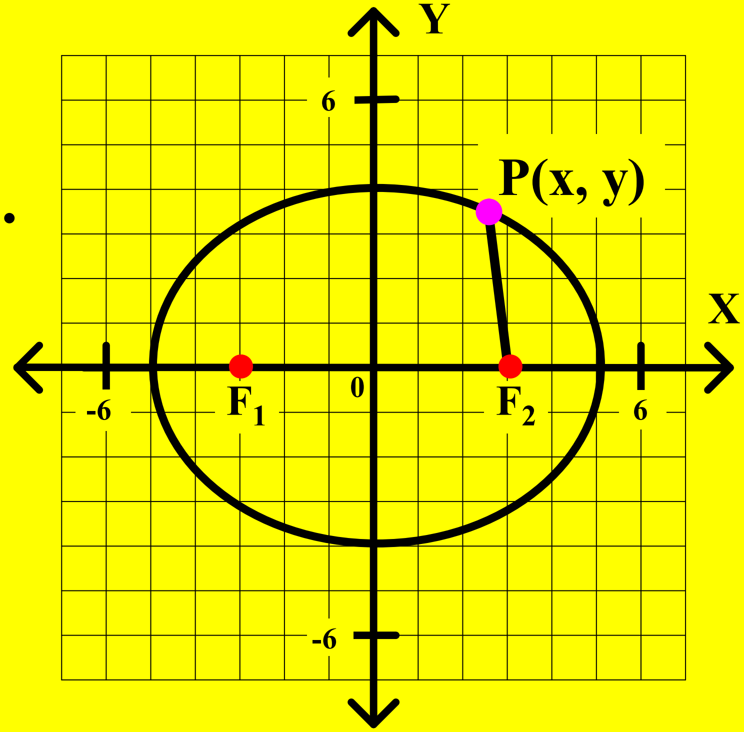

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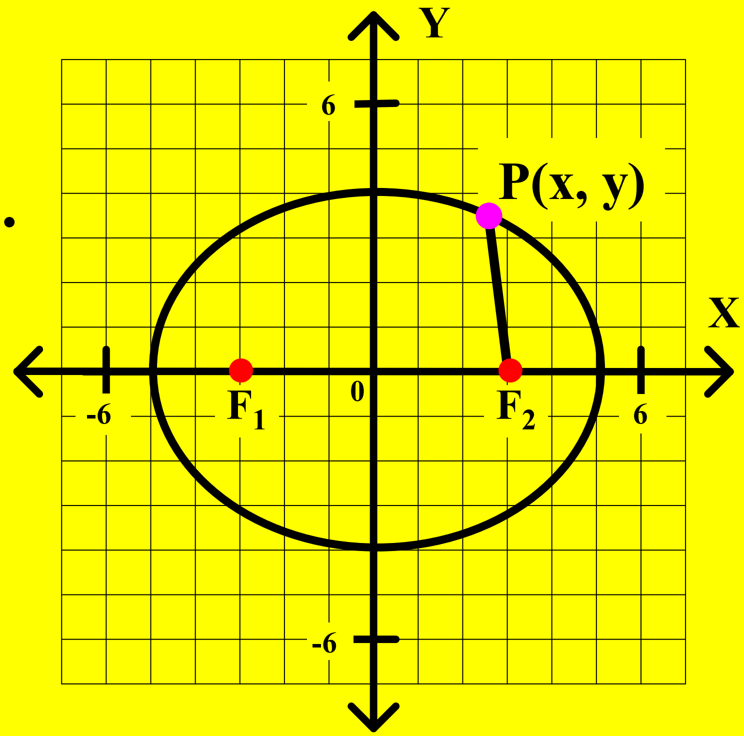

Applying the distance formula …

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$$PF_2 = \sqrt{(x - 3)^2}$$

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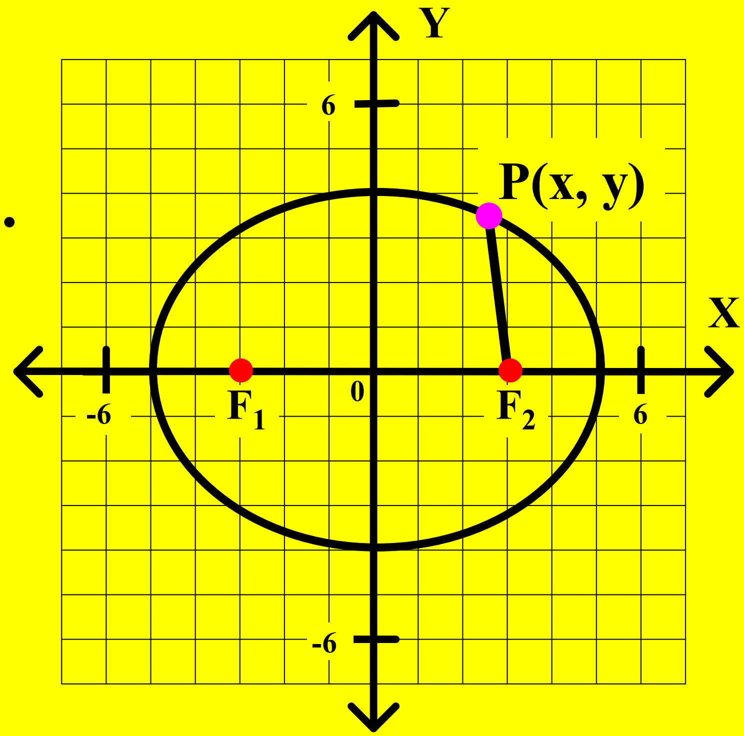

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$$PF_2 = \sqrt{(x - 3)^2 + y^2}$$

Equations of an Ellipse

The Standard Form Equation

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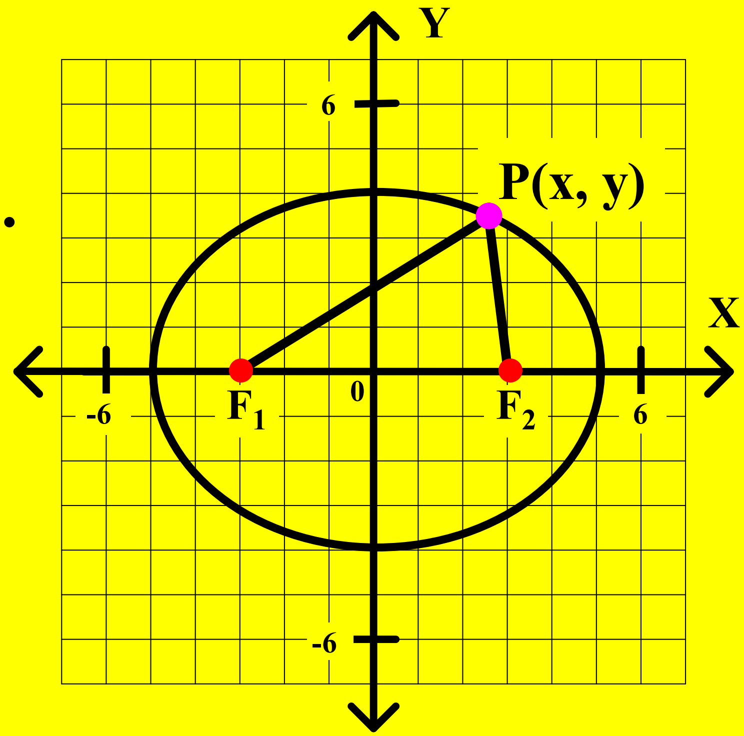

Applying the distance formula …

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$$PF_1 = \sqrt{(x + 3)^2 + y^2}$$

and

$$PF_2 = \sqrt{(x - 3)^2 + (y - 0)^2}$$

$$PF_2 = \sqrt{(x - 3)^2 + y^2}$$

Equations of an Ellipse

The Standard Form Equation

Let P(x, y) represent any point on the ellipse. For this ellipse, the sum of the distances from point P to each focus is 10 units.

$$PF_1 = \sqrt{(x + 3)^2 + y^2}$$

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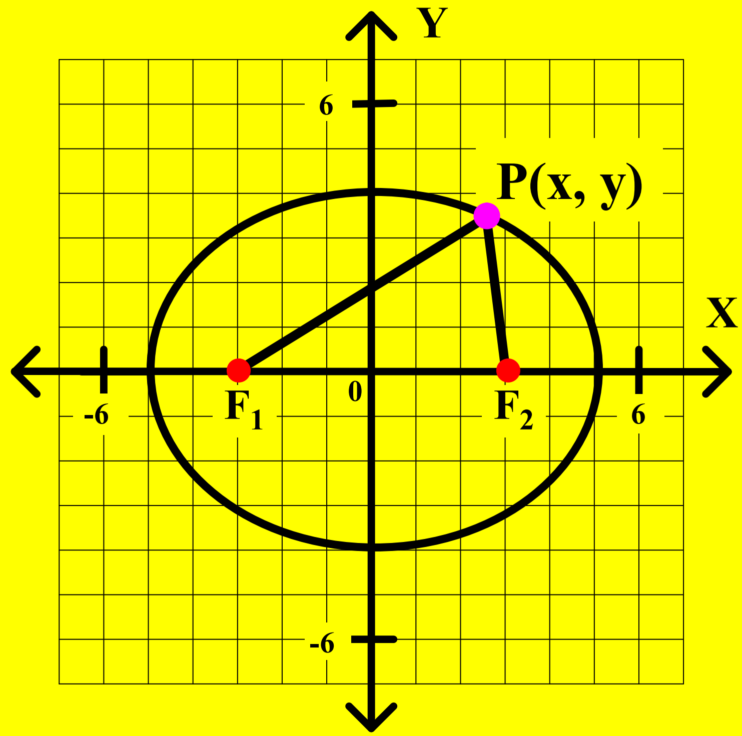

Equations of an Ellipse

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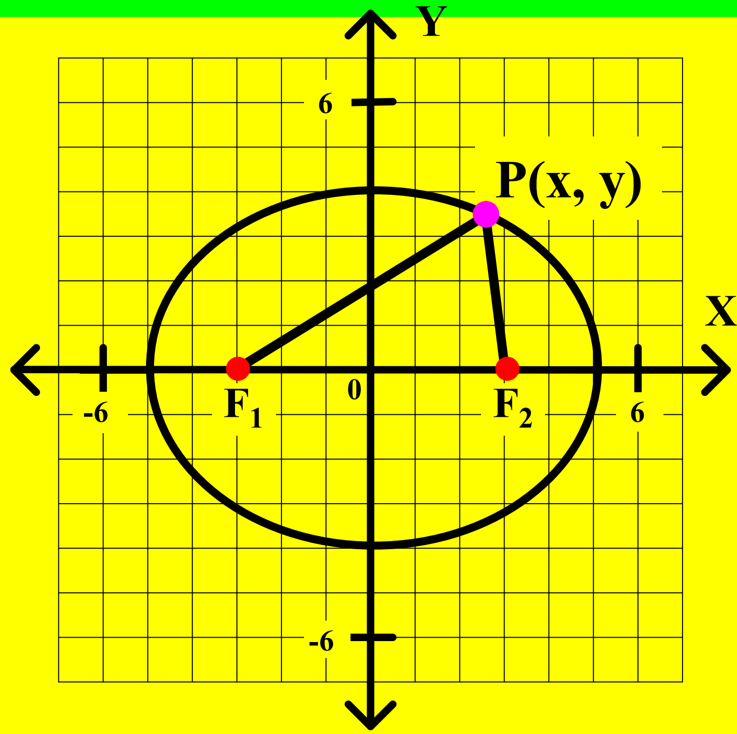

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Square the binomials.

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The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$x^2+6x+9=100-20\sqrt{(x-3)^2+y^2}+x^2-6x+9$$

$$6x=100-20\sqrt{(x-3)^2+y^2}-6x$$

Subtract x^2+9 from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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Add 6x to both sides.

Equations of an Ellipse

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$$12x$$

Add 6x to both sides.

Equations of an Ellipse

The Standard Form Equation

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$$12x=100-20\sqrt{(x-3)^2+y^2}$$

Subtract 100 from both sides.

Equations of an Ellipse

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$$12x - 100$$

Subtract 100 from both sides.

Equations of an Ellipse

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$$12x - 100 = -20\sqrt{(x-3)^2+y^2}$$

Subtract 100 from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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$$12x-100=-20\sqrt{(x-3)^2+y^2}$$

Divide both sides by 4.

Equations of an Ellipse

The Standard Form Equation

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$$3x$$

Divide both sides by 4.

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$$12x - 100 = -20\sqrt{(x-3)^2+y^2}$$

$$3x - 25 = -5\sqrt{(x-3)^2+y^2}$$

Divide both sides by 4.

Equations of an Ellipse

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$$3x - 25 = -5\sqrt{(x-3)^2+y^2}$$

Square both sides.

Equations of an Ellipse

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$$(3x-25)^2$$

Square both sides.

Equations of an Ellipse

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$$(3x-25)^2 = 25[$$

Square both sides.

Equations of an Ellipse

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$$3x - 25 = -5\sqrt{(x-3)^2 + y^2}$$

$$(3x - 25)^2 = 25[(x-3)^2 + y^2]$$

Square both sides.

Equations of an Ellipse

The Standard Form Equation

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Square the binomials.

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$$(3x-25)^2 = 25[(x-3)^2+y^2]$$

$$9x^2$$

Square the binomials.

Equations of an Ellipse

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$$(3x-25)^2 = 25[(x-3)^2+y^2]$$

$$9x^2 - 150x$$

Square the binomials.

Equations of an Ellipse

The Standard Form Equation

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$$(3x - 25)^2 = 25[(x-3)^2 + y^2]$$

$$9x^2 - 150x + 625$$

Square the binomials.

Equations of an Ellipse

The Standard Form Equation

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$$9x^2 - 150x + 625 = 25[x^2 - 6x + 9 + y^2]$$

Perform the indicated multiplication.

Equations of an Ellipse

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$$9x^2-150x+625=25x^2$$

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Equations of an Ellipse

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$$9x^2-150x+625=25x^2-150x$$

Perform the indicated multiplication.

Equations of an Ellipse

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$$9x^2-150x+625=25x^2-150x+225$$

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Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2-150x+625=25x^2-150x+225+25y^2$$

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2-150x+625=25x^2-150x+225+25y^2$$

Add 150x to both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

$$9x^2 - 150x + 625 = 25x^2 - 150x + 225 + 25y^2$$

$$9x^2$$

Add 150x to both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2-150x+625=25x^2-150x+225+25y^2$$

$$9x^2+625$$

Add 150x to both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

$$9x^2 - 150x + 625 = 25x^2 - 150x + 225 + 25y^2$$

$$9x^2 + 625 =$$

Add 150x to both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2-150x+625=25x^2-150x+225+25y^2$$

$$9x^2+625=25x^2$$

Add 150x to both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$9x^2 - 150x + 625 = 25x^2 - 150x + 225 + 25y^2$$

$$9x^2 + 625 = 25x^2 + 225$$

Add 150x to both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2-150x+625=25x^2-150x+225+25y^2$$

$$9x^2+625=25x^2+225+25y^2$$

Add 150x to both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$9x^2 - 150x + 625 = 25x^2 - 150x + 225 + 25y^2$$

$$9x^2 + 625 = 25x^2 + 225 + 25y^2$$

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$9x^2 + 625 = 25x^2 + 225 + 25y^2$$

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2+625=25x^2+225+25y^2$$

Subtract $9x^2 + 225$ from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$9x^2 + 625 = 25x^2 + 225 + 25y^2$$

400

Subtract $9x^2 + 225$ from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2+625=25x^2+225+25y^2$$

$$400=$$

Subtract $9x^2 + 225$ from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2+625=25x^2+225+25y^2$$

$$400=16x^2$$

Subtract $9x^2+225$ from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x + 3)^2 + y^2} + \sqrt{(x - 3)^2 + y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x + 3)^2 + y^2} + \sqrt{(x - 3)^2 + y^2} = 10$$

$$9x^2 + 625 = 25x^2 + 225 + 25y^2$$

$$400 = 16x^2 +$$

Subtract $9x^2 + 225$ from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$9x^2+625=25x^2+225+25y^2$$

$$400=16x^2+25y^2$$

Subtract $9x^2 + 225$ from both sides.

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

$$9x^2 + 625 = 25x^2 + 225 + 25y^2$$

$$400 = 16x^2 + 25y^2$$

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$400 = 16x^2 + 25y^2$$

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$400=16x^2+25y^2$$

Divide both sides of the equation by 400 (and reduce).

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

$$\frac{400}{400}=\frac{16x^2}{400}+\frac{25y^2}{400}$$

Divide both sides of the equation by 400 (and reduce).

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$\frac{400}{400} = \frac{16x^2}{400} + \frac{25y^2}{400}$$

1

Divide both sides of the equation by 400 (and reduce).

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$\frac{400}{400} = \frac{16x^2}{400} + \frac{25y^2}{400}$$

$$1 =$$

Divide both sides of the equation by 400 (and reduce).

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2 + y^2} + \sqrt{(x-3)^2 + y^2} = 10$$

$$\frac{400}{400} = \frac{16x^2}{400} + \frac{25y^2}{400}$$

$$1 = \frac{x^2}{25}$$

Divide both sides of the equation by 400 (and reduce).

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$\frac{400}{400} = \frac{16x^2}{400} + \frac{25y^2}{400}$$

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

Divide both sides of the equation by 400 (and reduce).

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$\frac{400}{400} = \frac{16x^2}{400} + \frac{25y^2}{400}$$

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

Divide both sides of the equation by 400 (and reduce).

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2} + \sqrt{(x-3)^2+y^2} = 10$$

$$\frac{400}{400} = \frac{16x^2}{400} + \frac{25y^2}{400}$$

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

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

Equations of an Ellipse

The Standard Form Equation

$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

The process used to derive this equation is complicated.

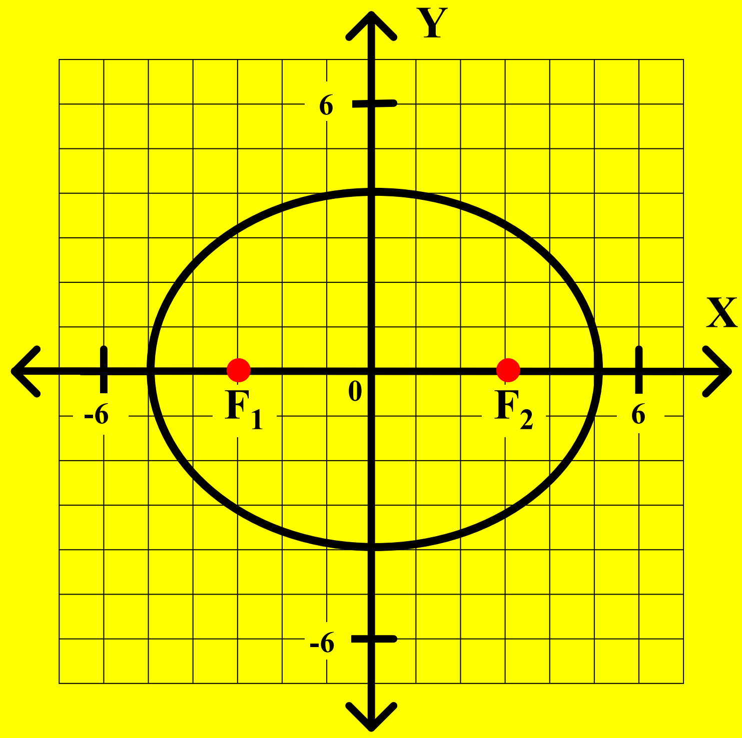
$$\sqrt{(x+3)^2+y^2}+\sqrt{(x-3)^2+y^2}=10$$

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

Equations of an Ellipse

The Standard Form Equation of an Ellipse

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

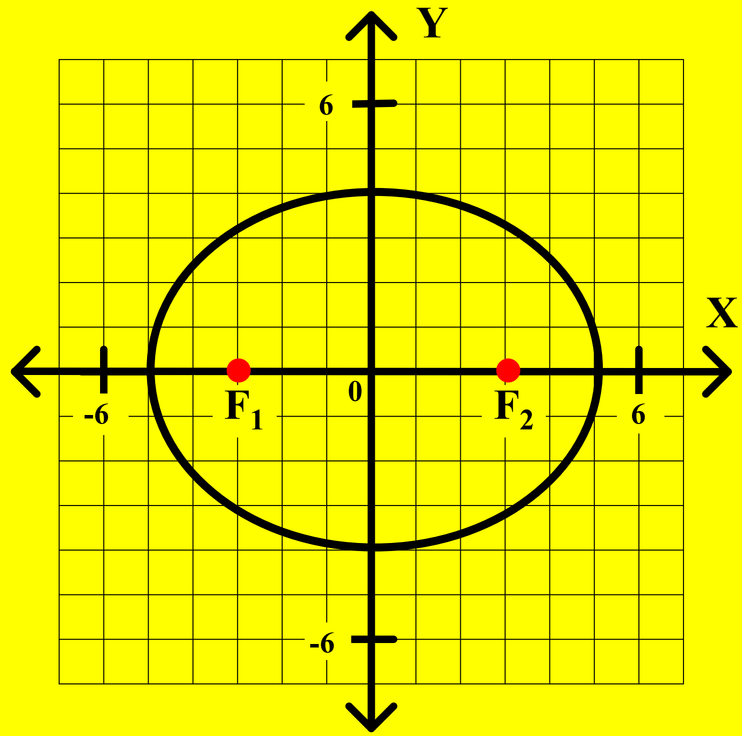


Equations of an Ellipse

The Standard Form Equation of an Ellipse

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

We will be studying two types of ellipses.

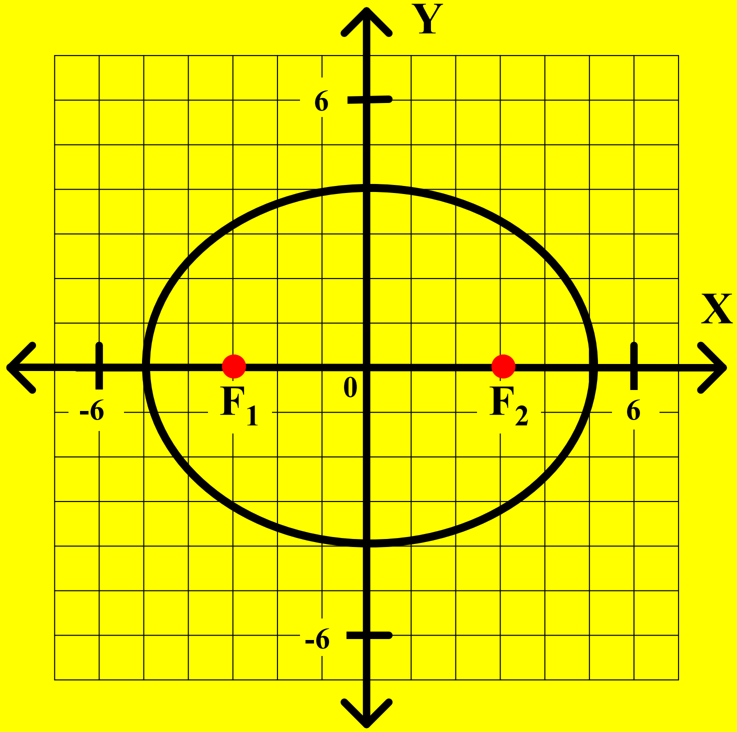


Equations of an Ellipse

The Standard Form Equation of an Ellipse

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

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal.



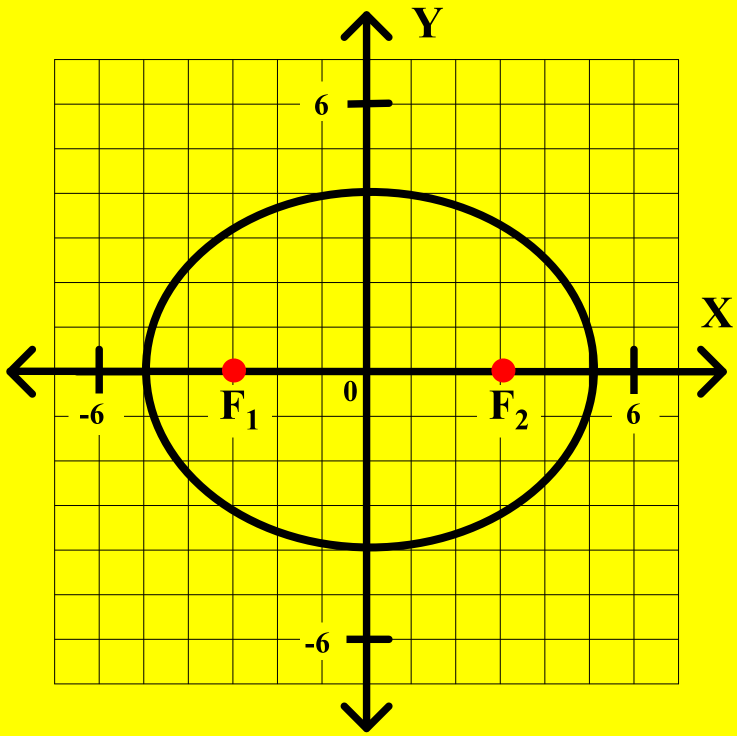
Equations of an Ellipse

The Standard Form Equation of an Ellipse

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

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



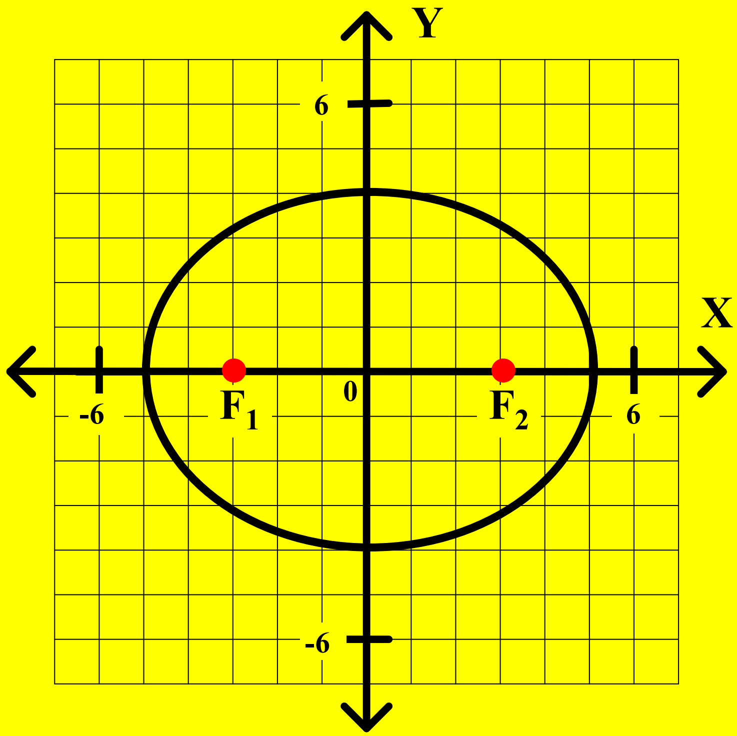
Equations of an Ellipse

The Standard Form Equation of an Ellipse

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

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



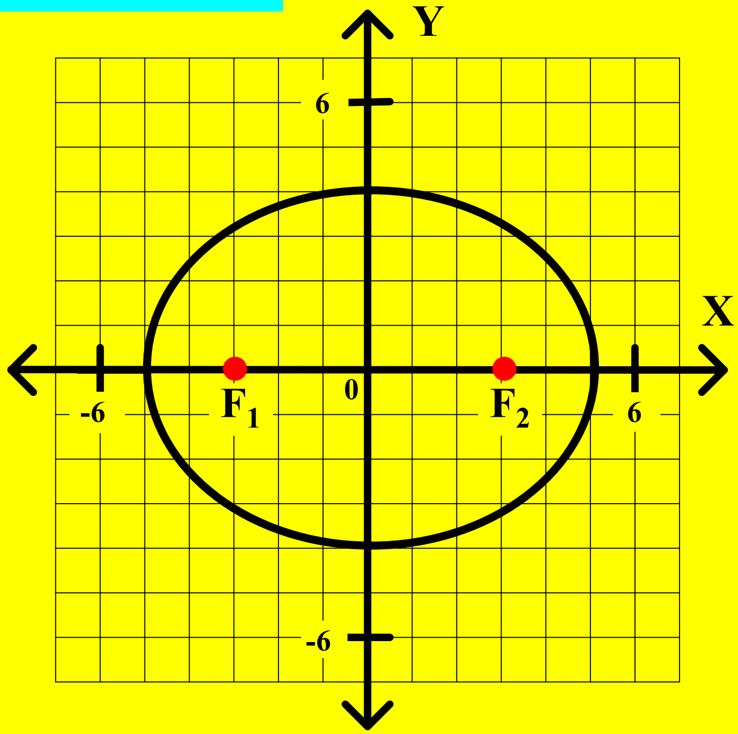
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2}$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



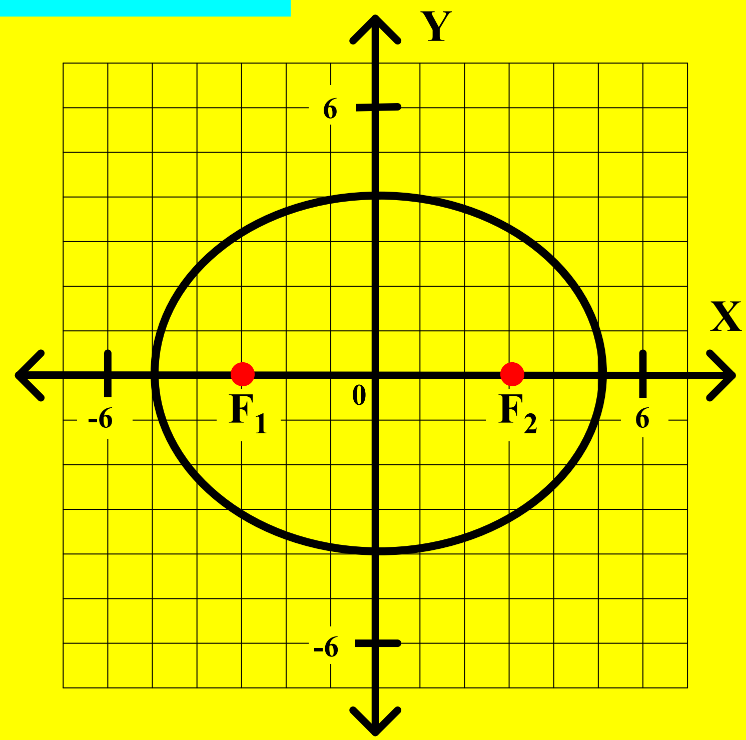
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} +$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



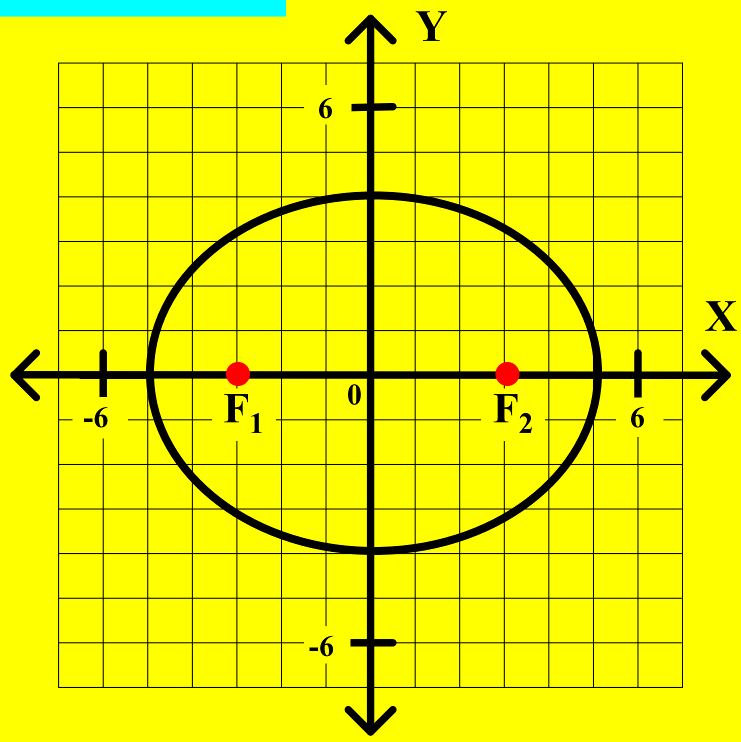
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2}$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



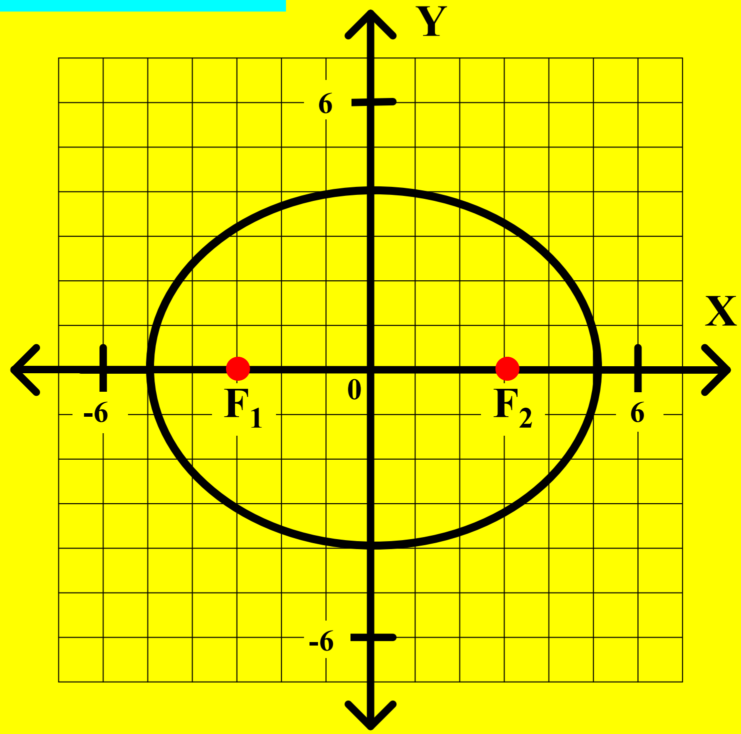
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \quad \Rightarrow \quad \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} =$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



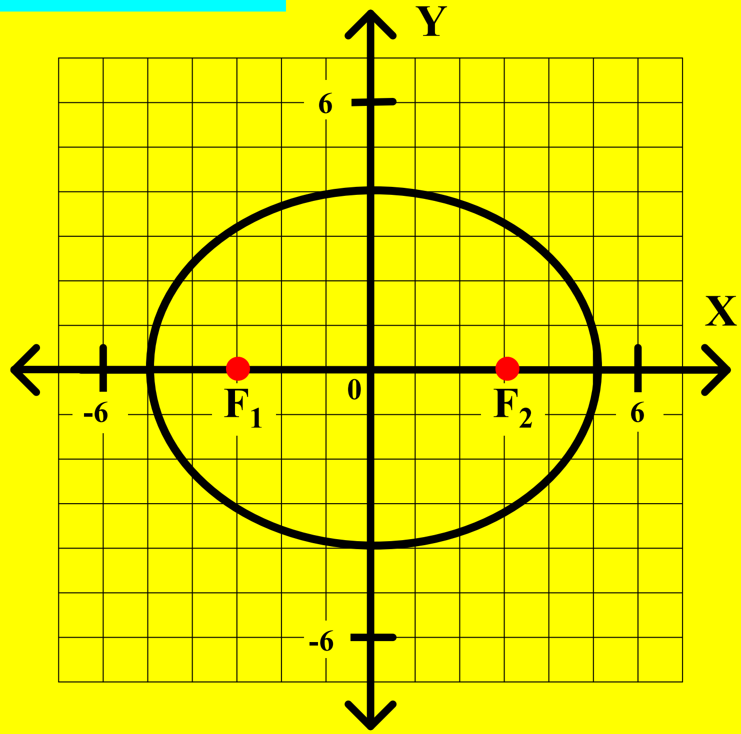
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



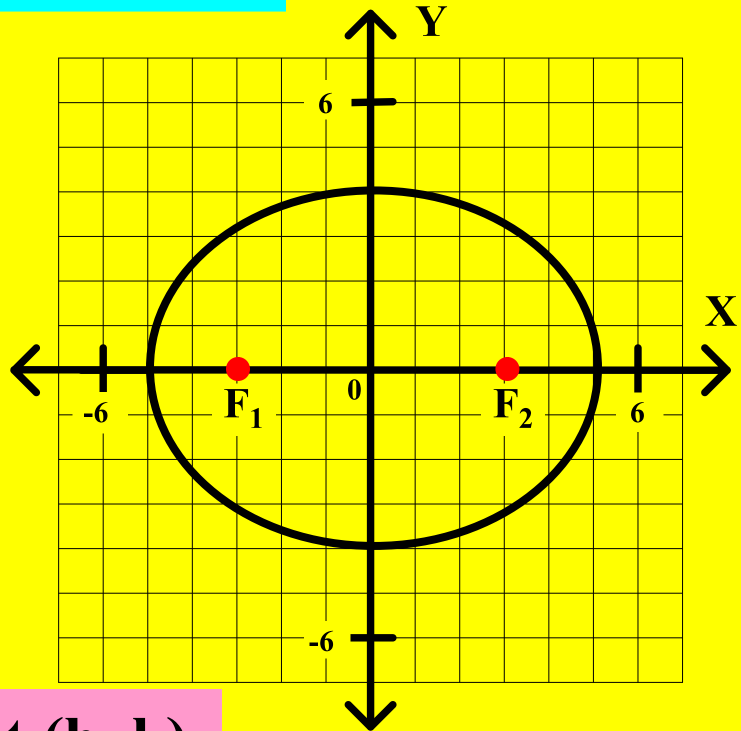
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



The center of the ellipse is the point (h, k).

Equations of an Ellipse

The Standard Form Equation of an Ellipse

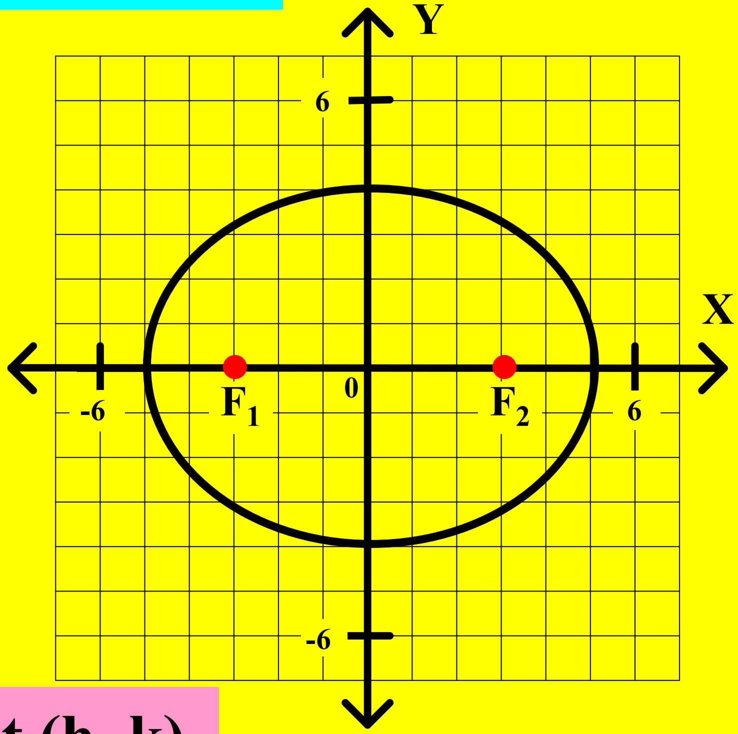
$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1 \rightarrow$$

$h = 0$

$k = 0$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



The center of the ellipse is the point (h, k).

Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1 \Rightarrow$$

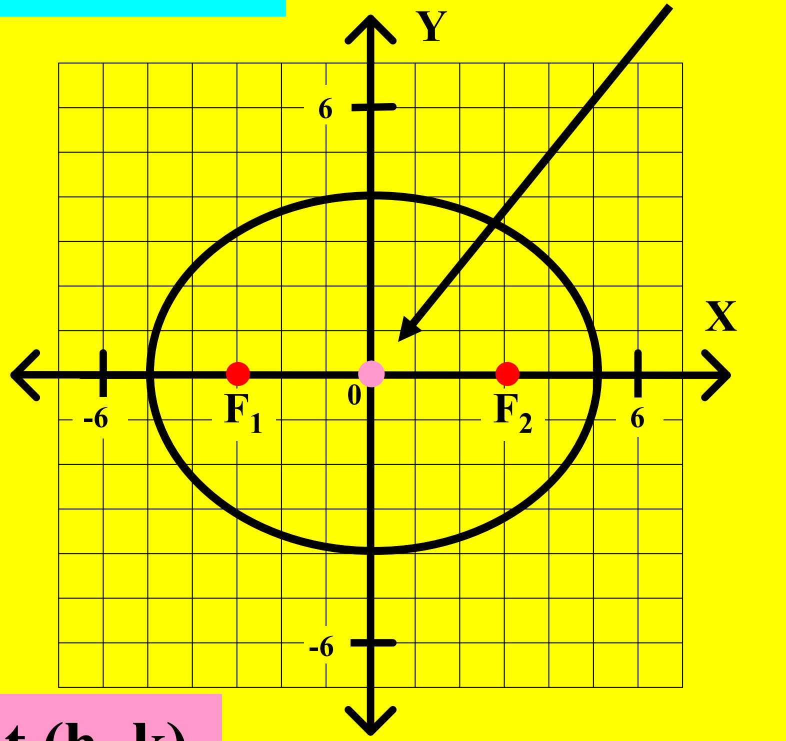
$h = 0$

$k = 0$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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

The center of the ellipse is the point (h, k).



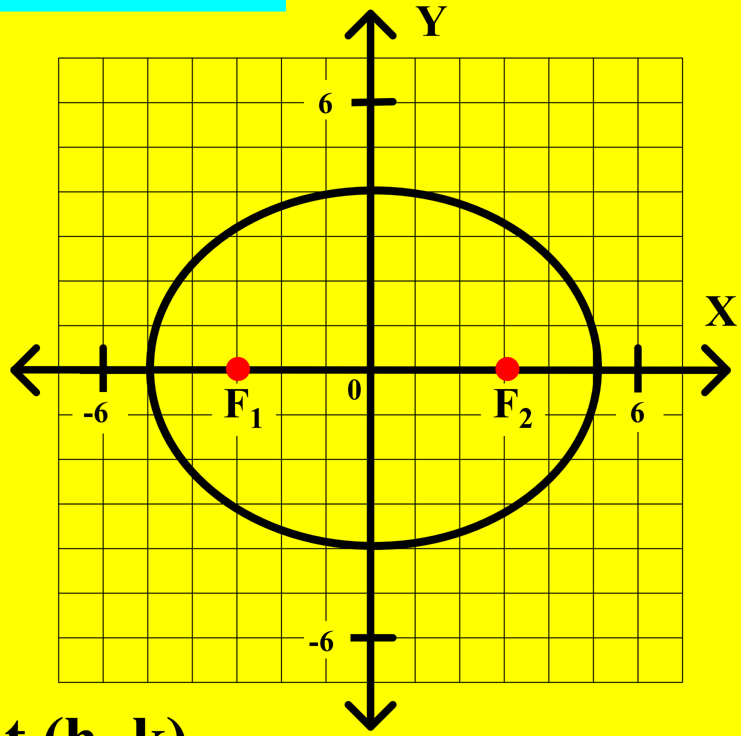
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



The center of the ellipse is the point (h, k).

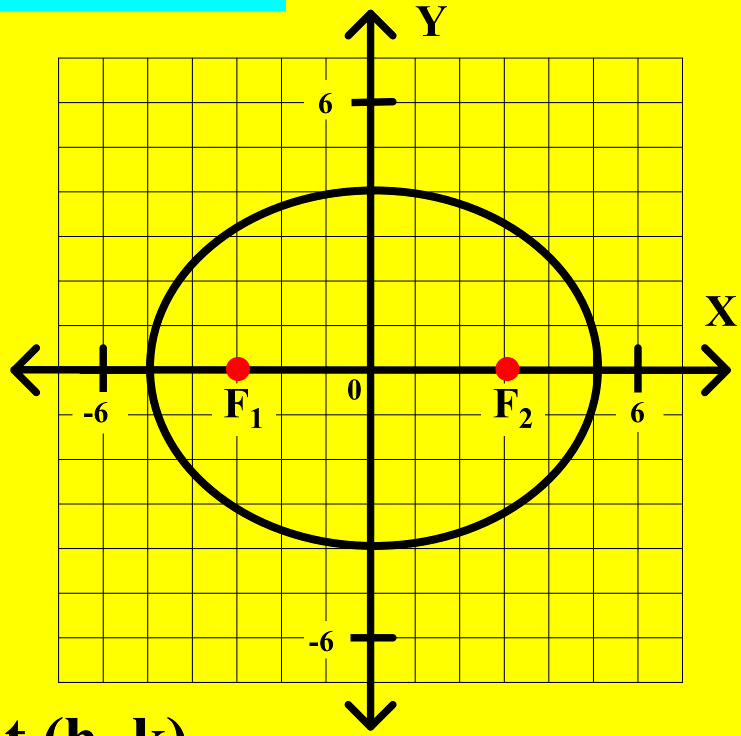
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



The center of the ellipse is the point (h, k).

The major axis of the ellipse is 2a units long.

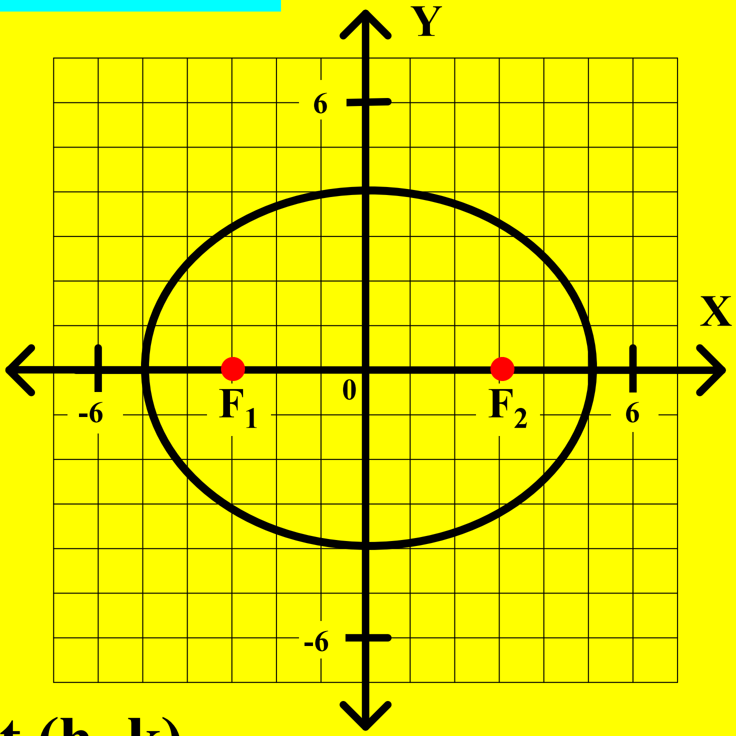
Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1 \Rightarrow a = 5$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



The center of the ellipse is the point (h, k).

The major axis of the ellipse is 2a units long.

Equations of an Ellipse

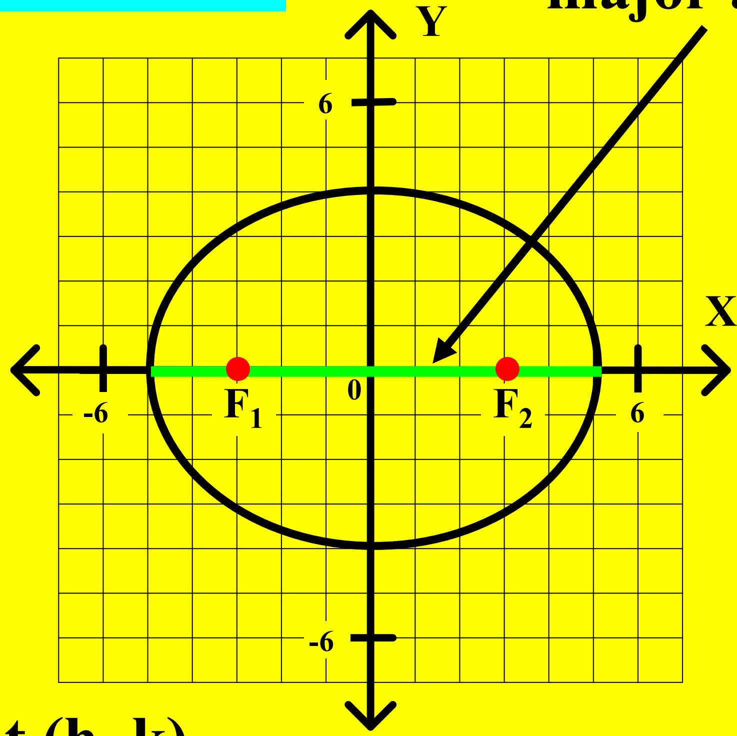
The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1 \Rightarrow a = 5$$

major axis

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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



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Equations of an Ellipse

The Standard Form Equation of an Ellipse

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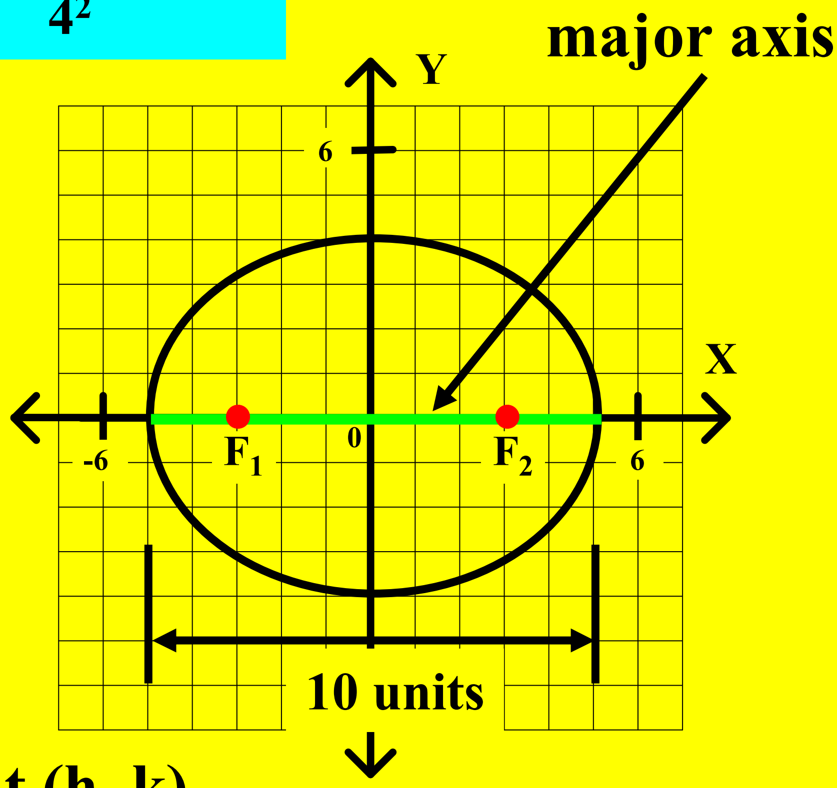

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Equations of an Ellipse

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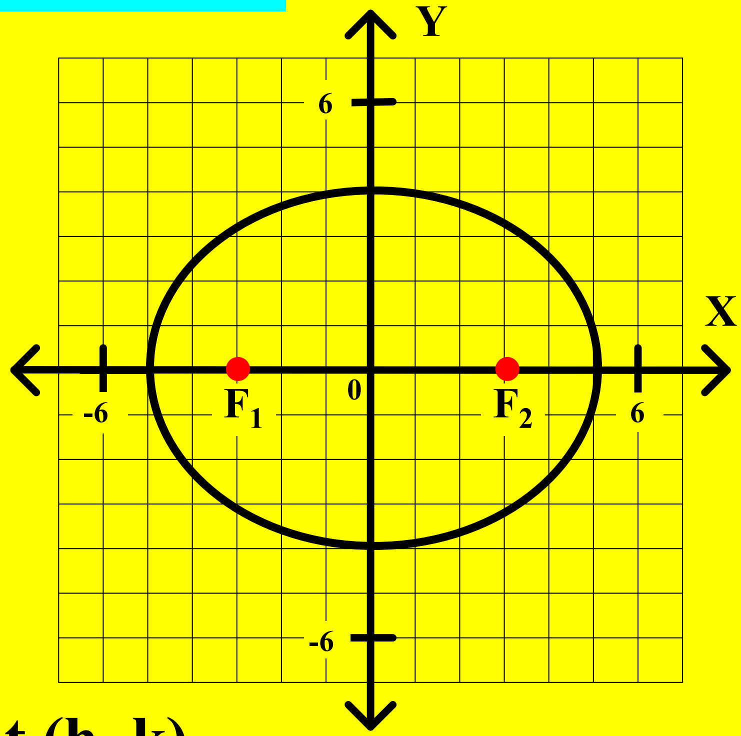

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Equations of an Ellipse

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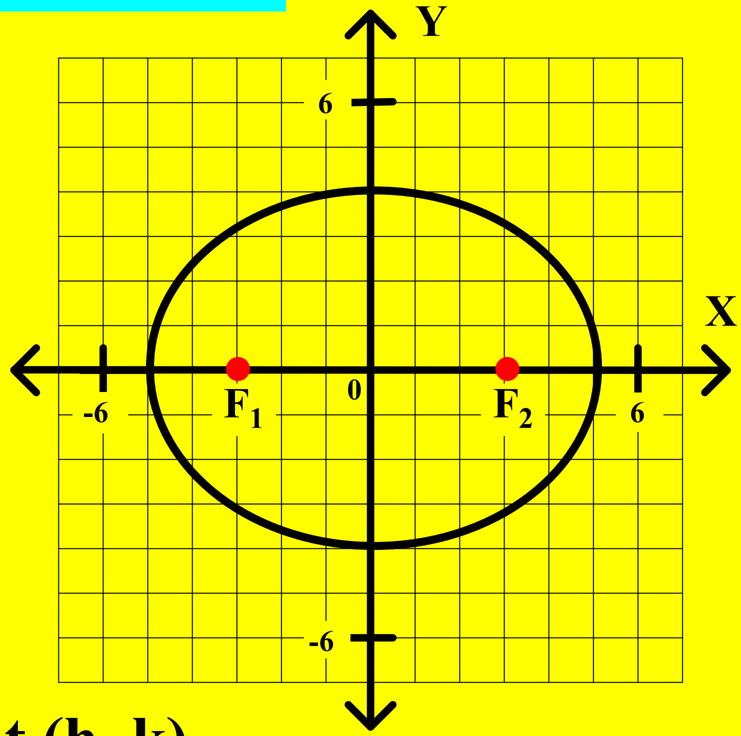

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Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1 \rightarrow b = 4$$

We will be studying two types of ellipses. This type, type 1, has its major axis horizontal. The standard form equation for this type of ellipse is

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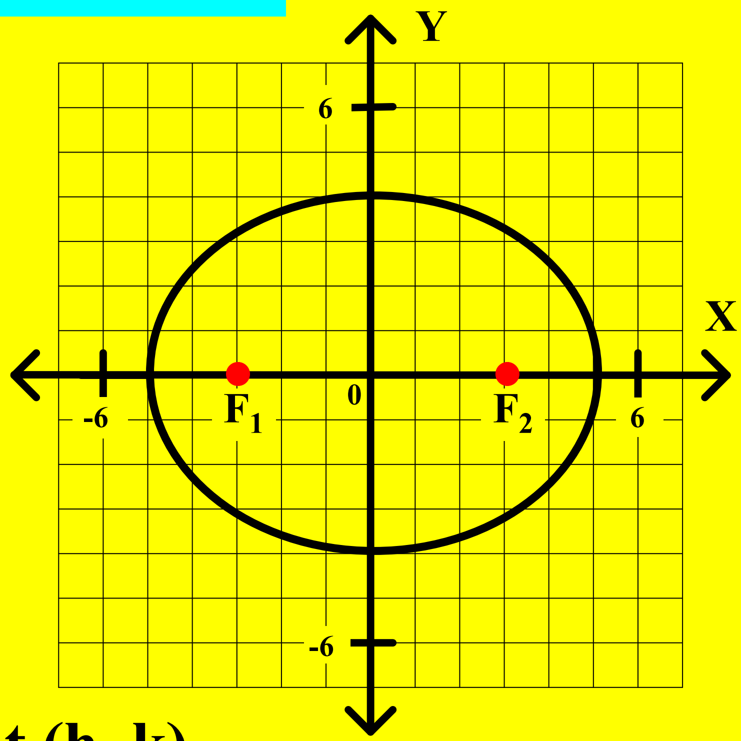

The center of the ellipse is the point (h, k).

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Equations of an Ellipse

The Standard Form Equation of an Ellipse

$$\frac{x^2}{25} + \frac{y^2}{16} = 1 \Rightarrow \frac{(x-0)^2}{5^2} + \frac{(y-0)^2}{4^2} = 1 \Rightarrow b = 4$$

minor axis

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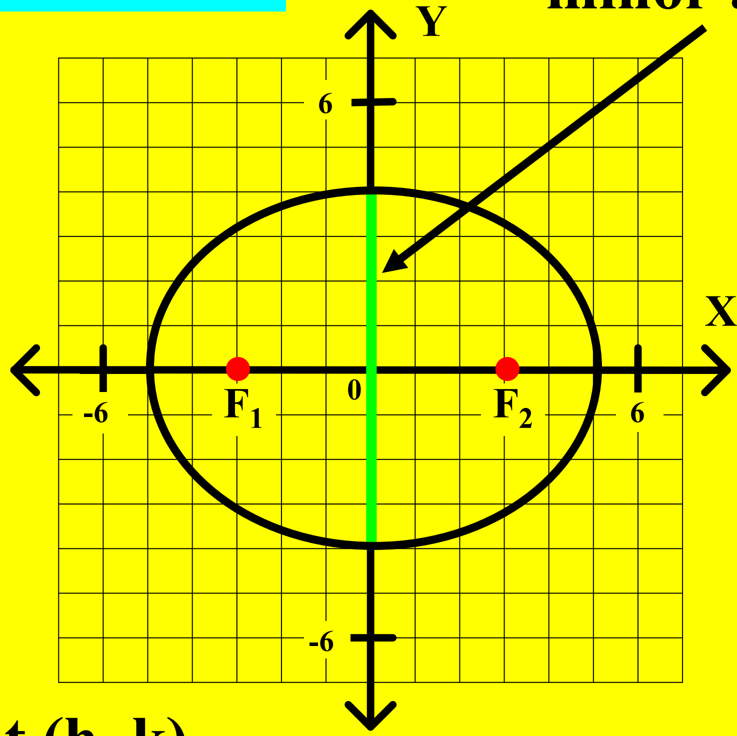

The center of the ellipse is the point (h, k).

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Equations of an Ellipse

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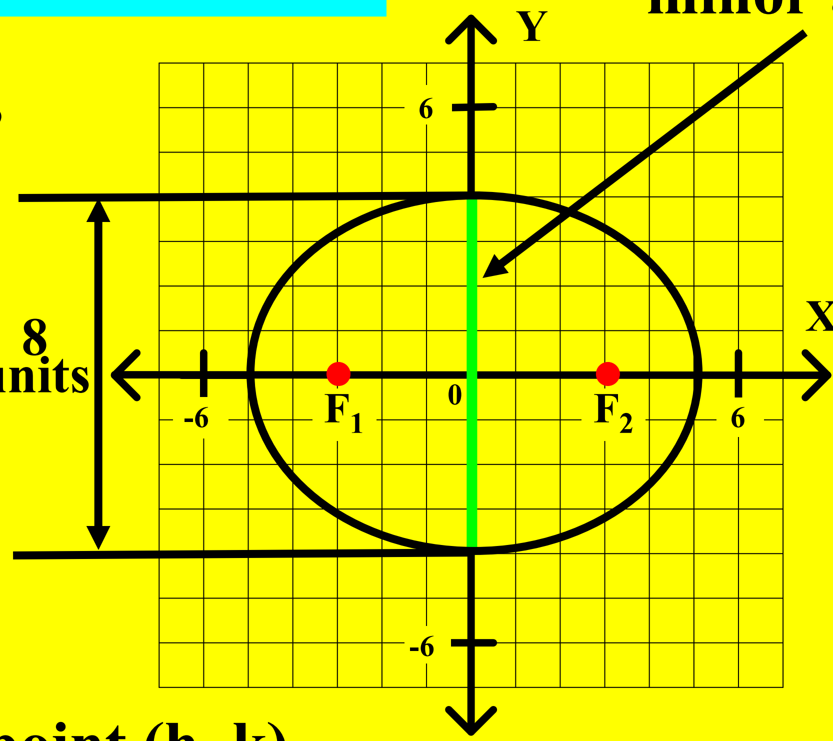

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Equations of an Ellipse

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The Standard Form Equation of an Ellipse

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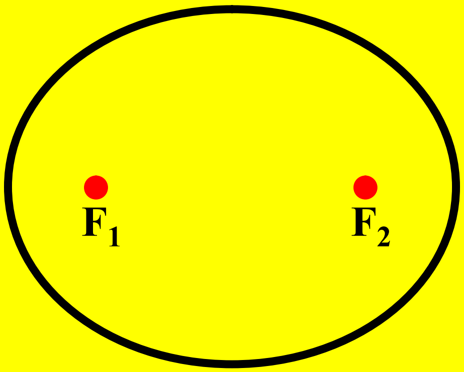

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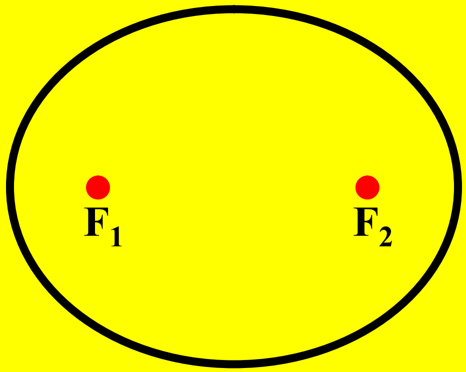

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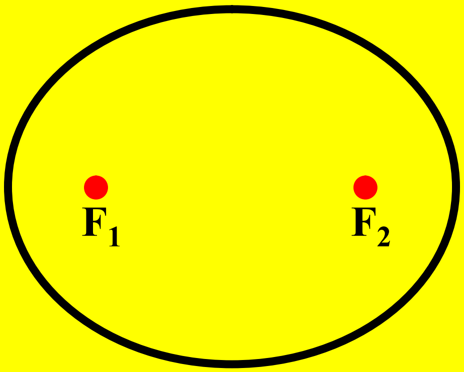

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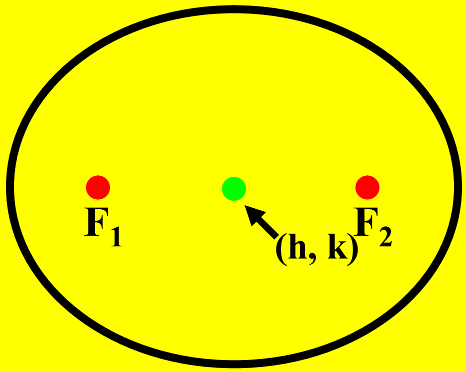

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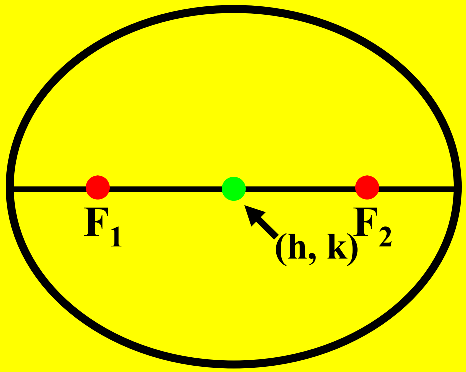
Major Axis:



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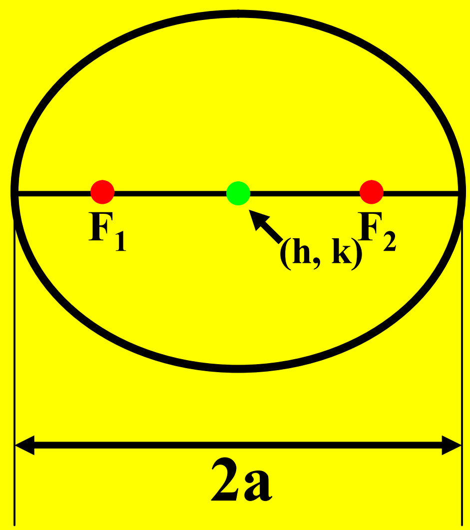
The Standard Form Equation of an Ellipse

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

Center: (h, k)

Major Axis: 2a units long



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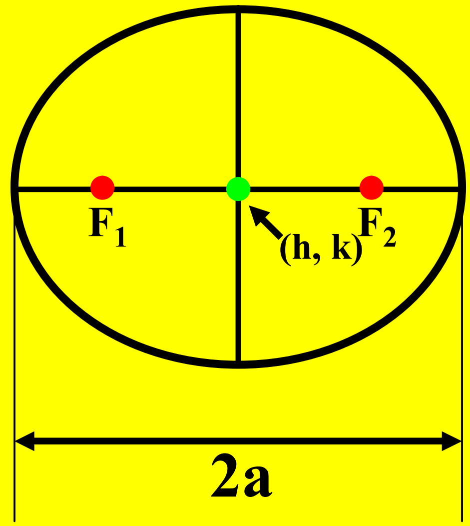

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Equations of an Ellipse

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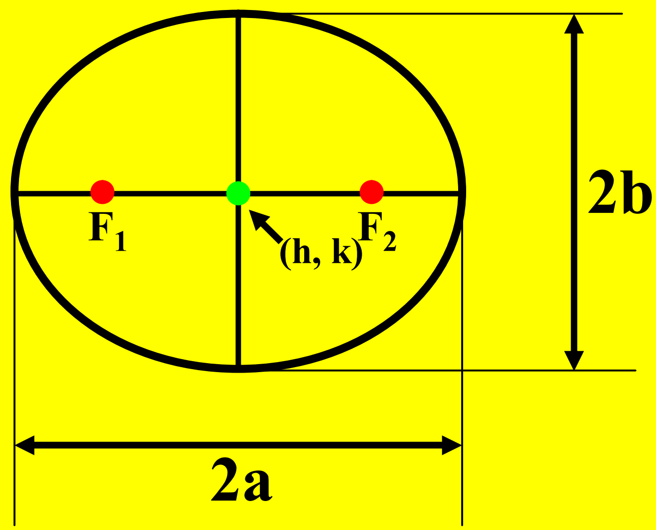

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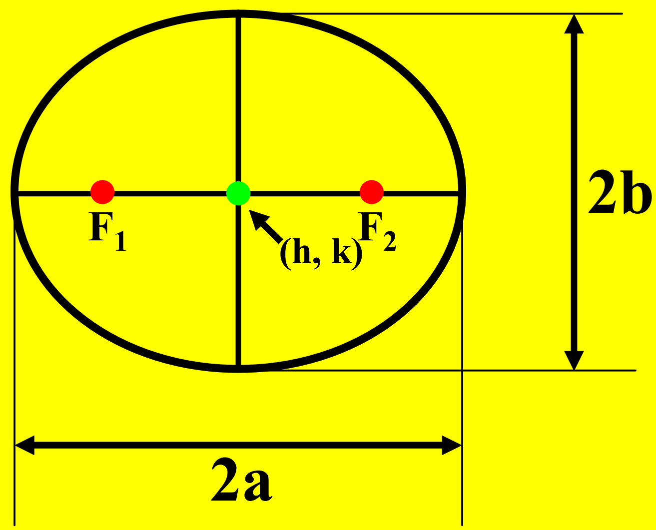

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If P represents <u>any</u> point on <u>any</u> ellipse with foci F_1 and F_2,

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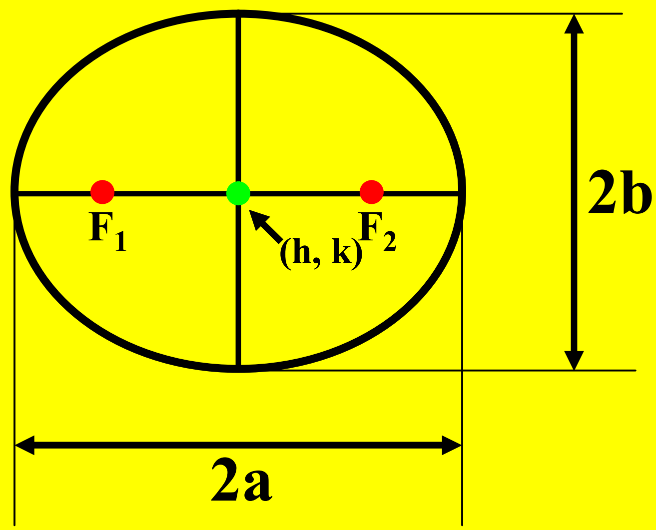

If P represents <u>any</u> point on <u>any</u> ellipse with foci F_1 and F_2, then $PF_1 + PF_2$ = a constant.

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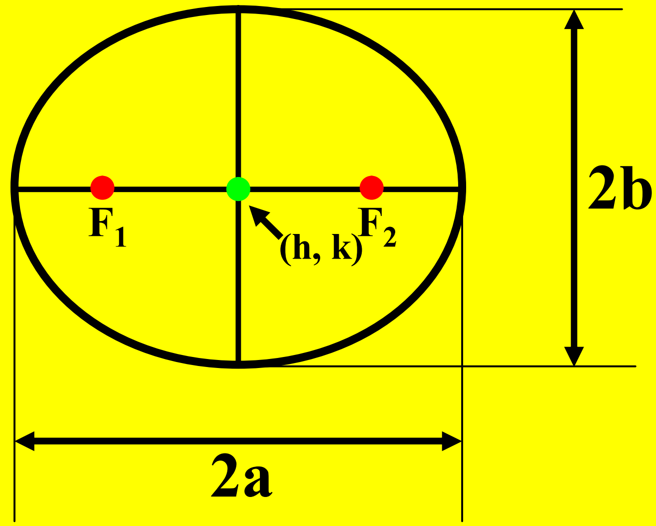

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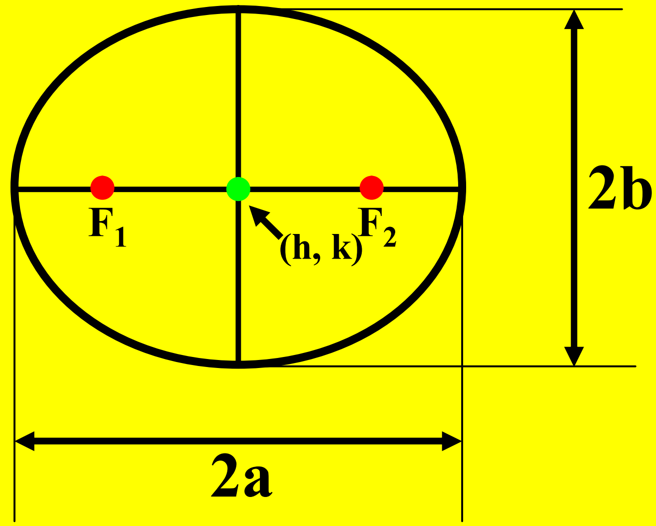

If P represents <u>any</u> point on <u>any</u> ellipse with foci F_1 and F_2, then $PF_1 + PF_2 =$ a constant. Suppose point P is at one end of the major axis.

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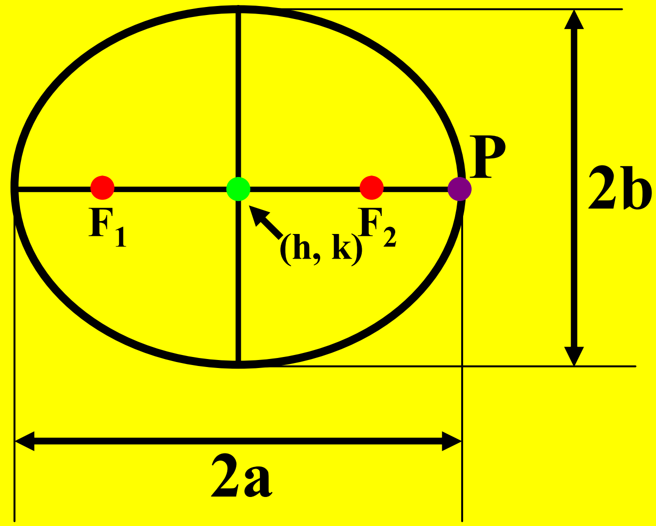

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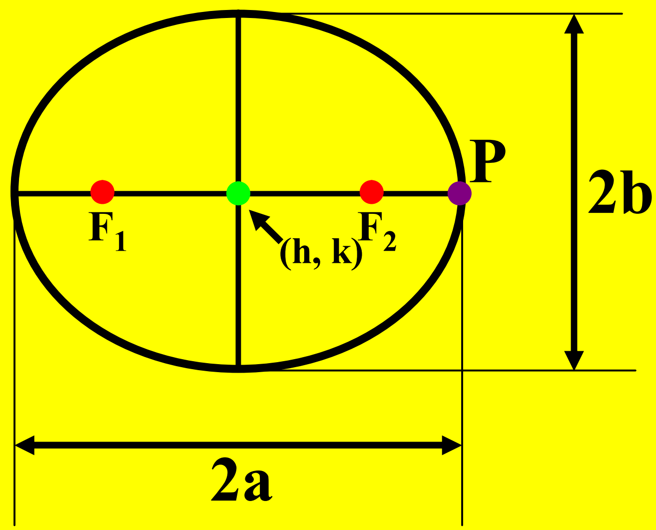

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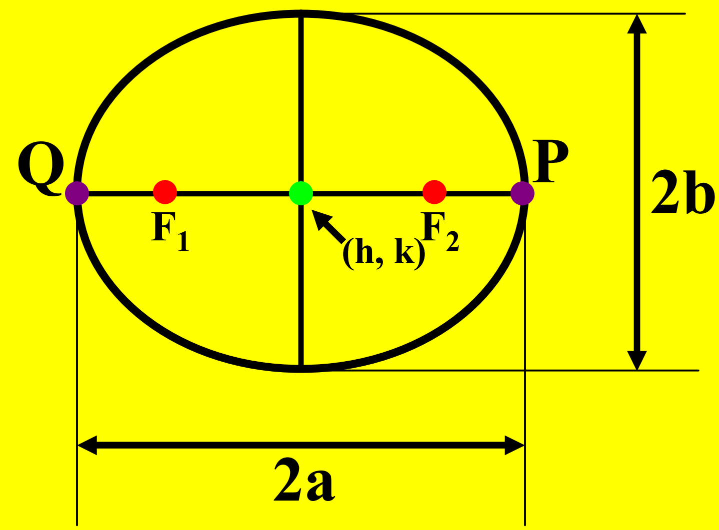

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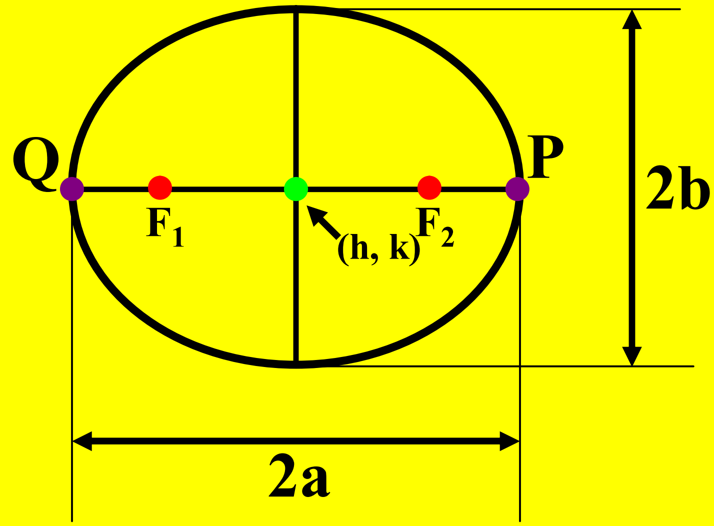

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Equations of an Ellipse

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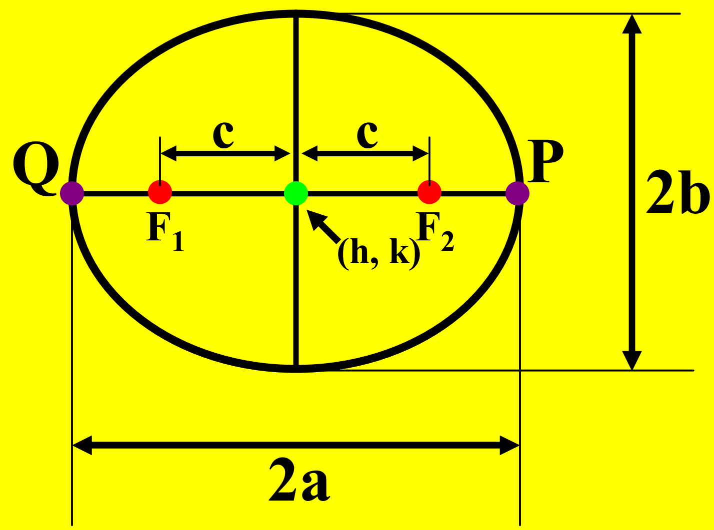

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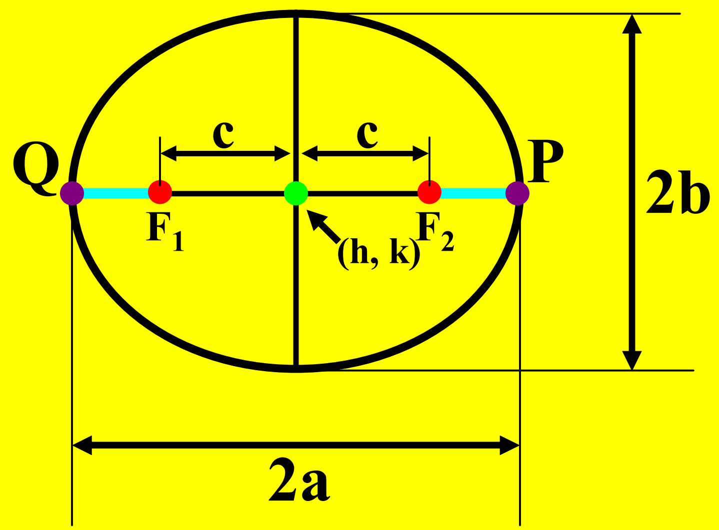

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Equations of an Ellipse

The Standard Form Equation of an Ellipse

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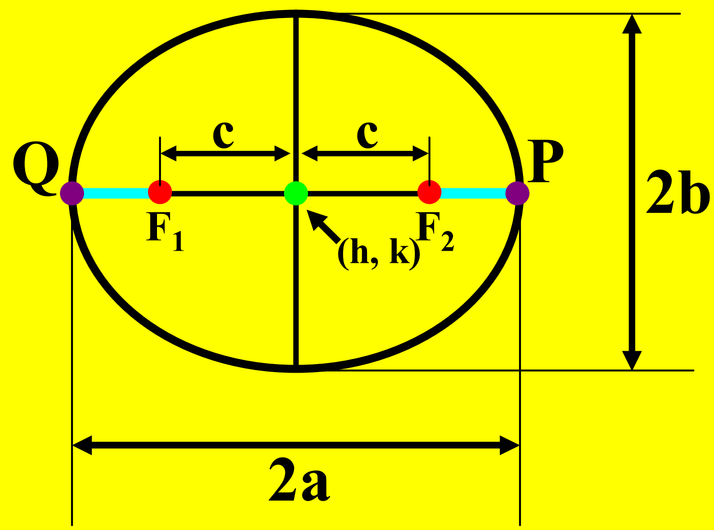

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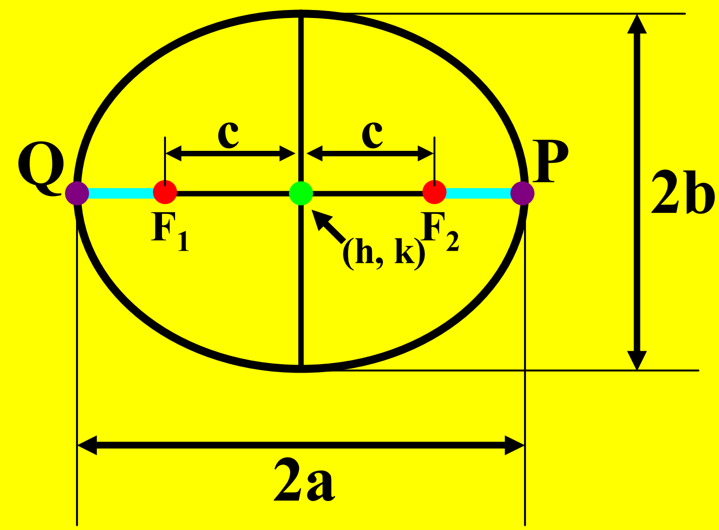

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Equations of an Ellipse

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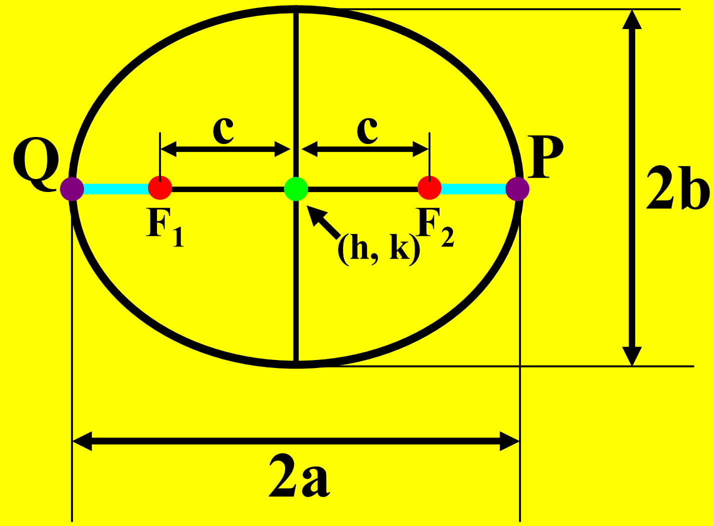

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Therefore, $PF_1 + PF_2 =$

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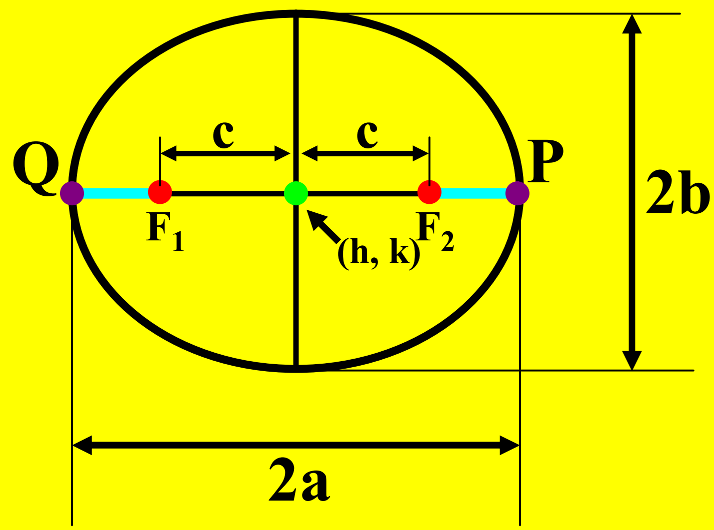

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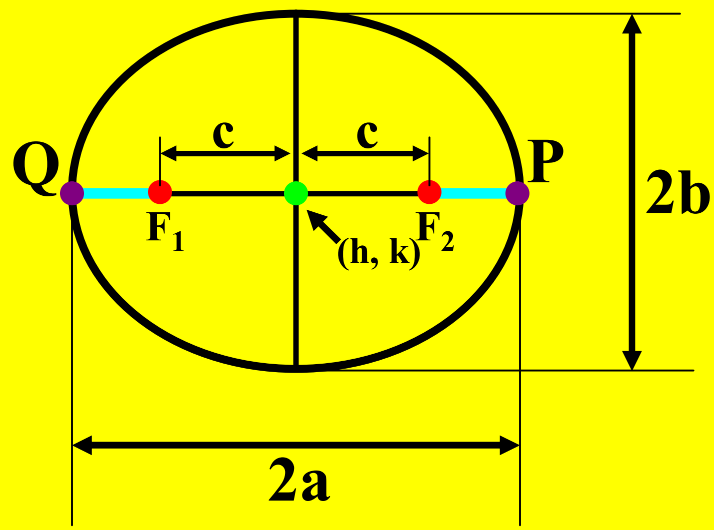

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Therefore, $PF_1 + PF_2 = PF_1 + QF_1$ Please find this in the diagram.

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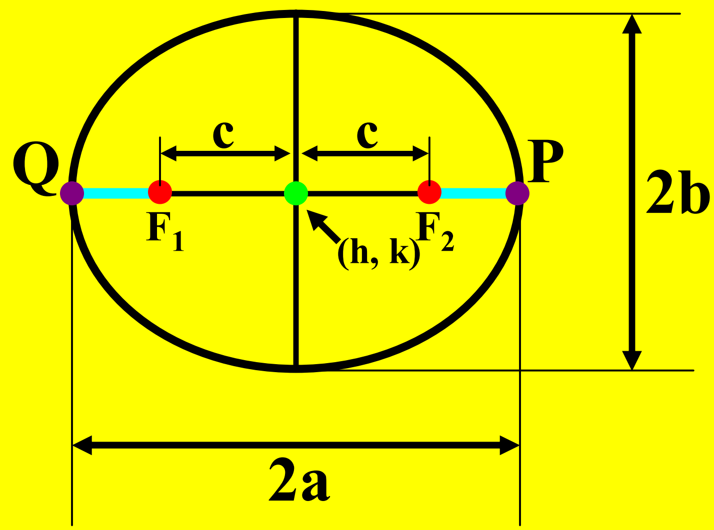

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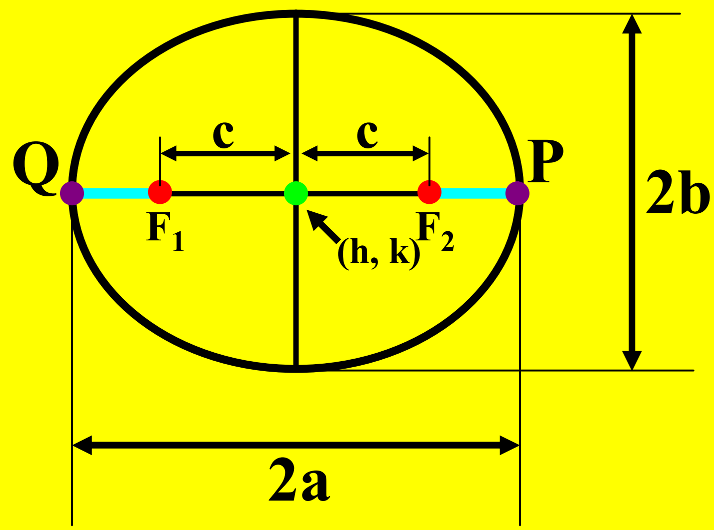

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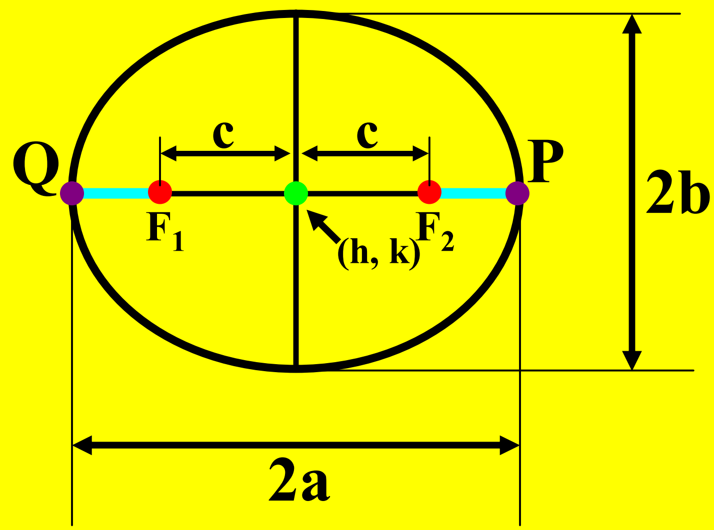

Center: (h, k)

Major Axis: 2a units long

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If P represents <u>any</u> point on <u>any</u> ellipse with foci F_1 and F_2, then $PF_1 + PF_2$ = a constant. Suppose point P is at one end of the major axis. Let point Q be the 'other endpoint' of the major axis. Since each focus is c units from the center, $PF_2 = QF_1$! Therefore, $PF_1 + PF_2 = PF_1 + QF_1 = 2a$, the length of the major axis.

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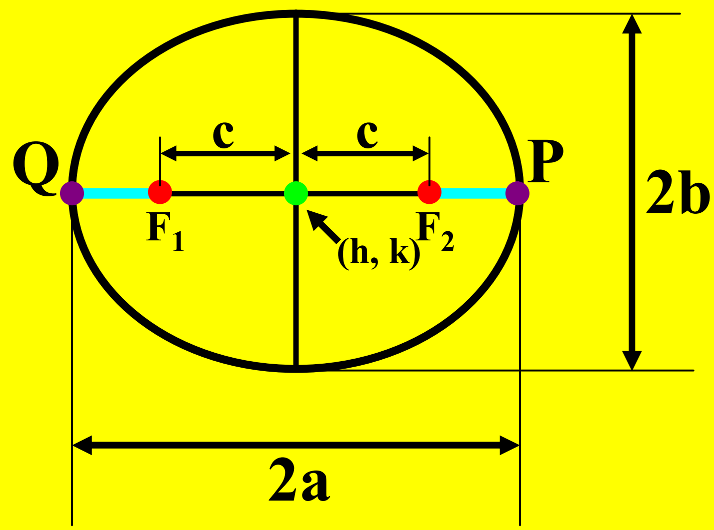

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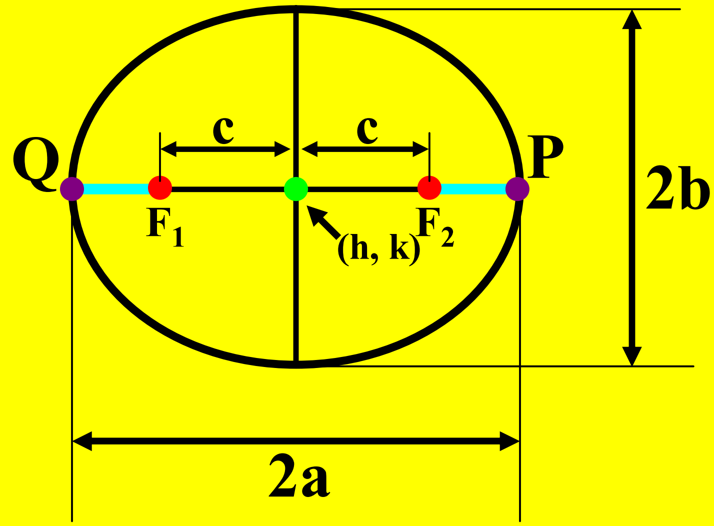

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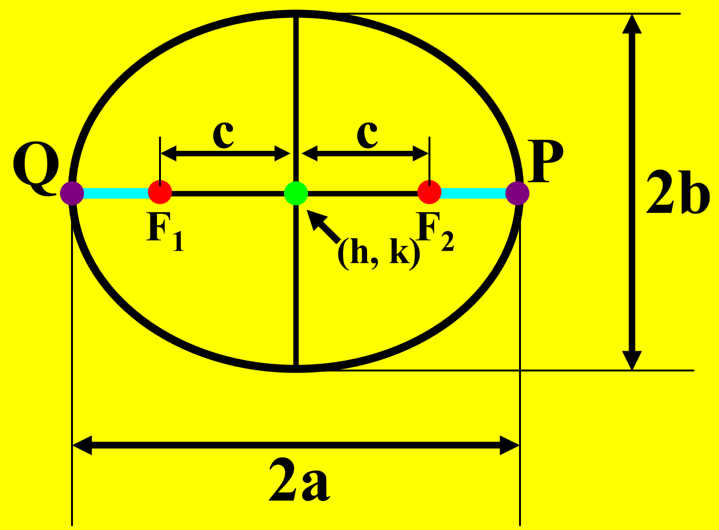

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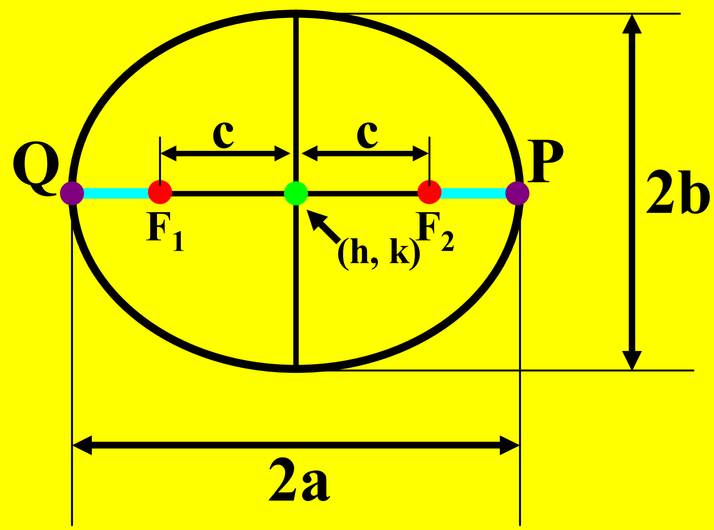

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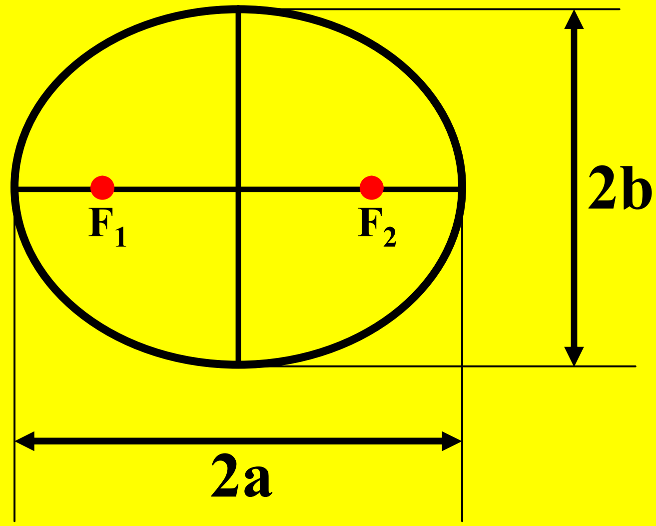

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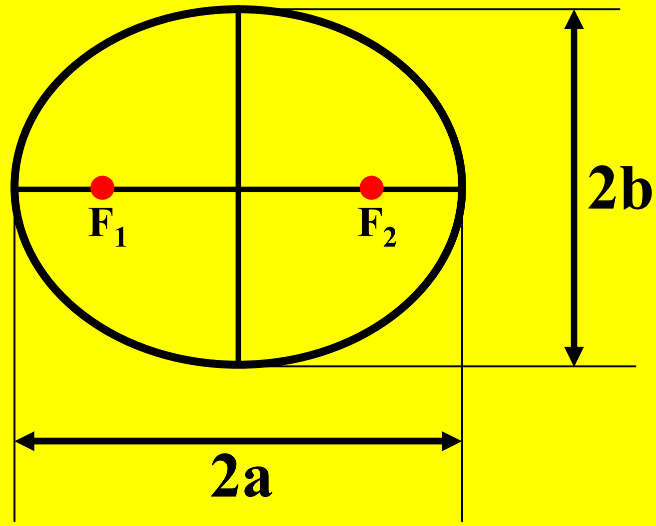

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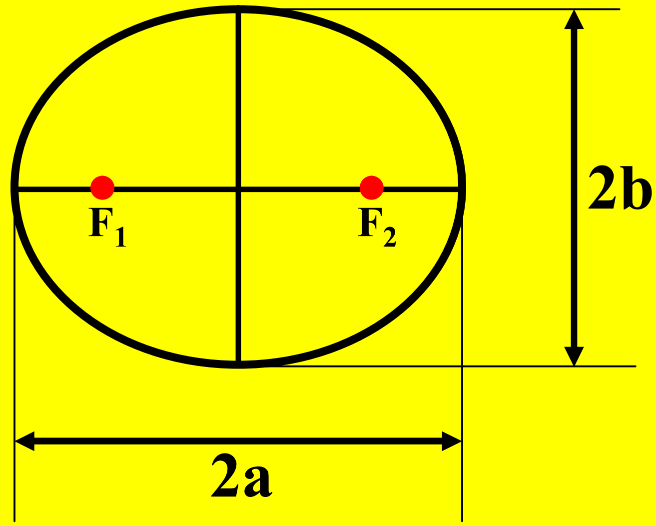

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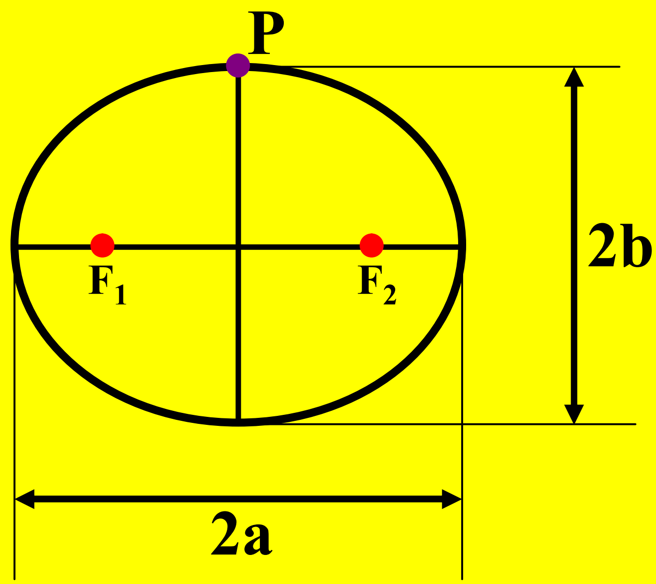

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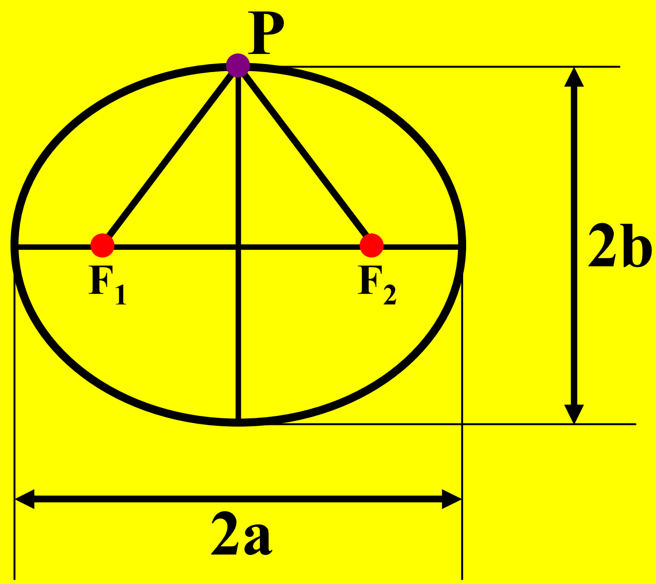

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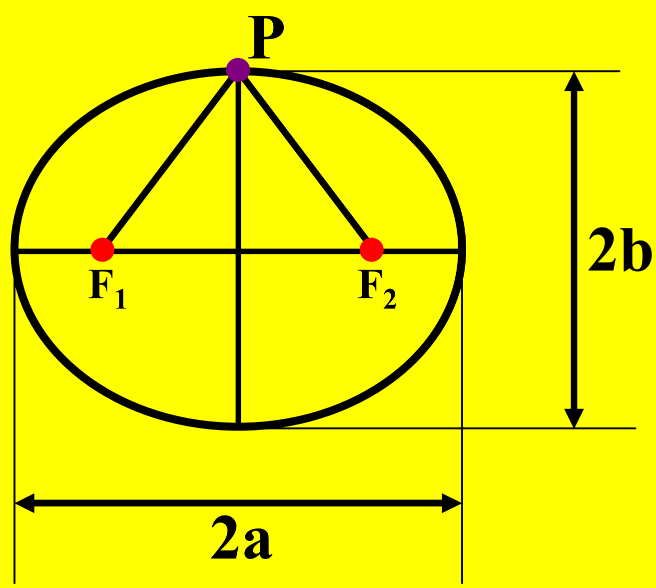

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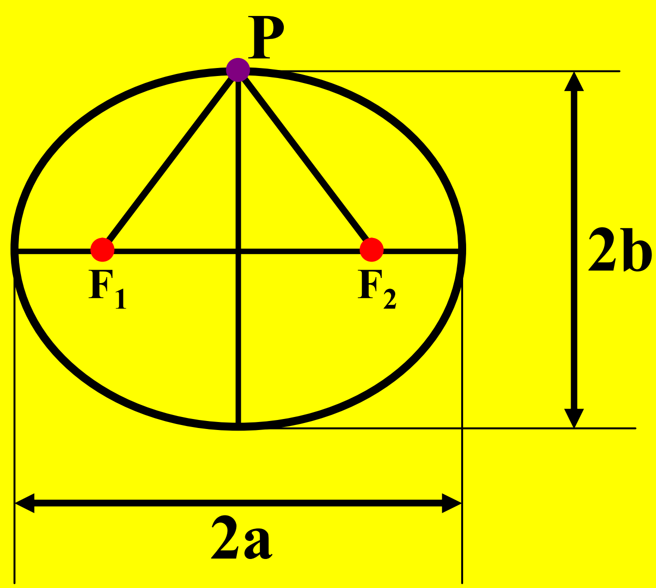

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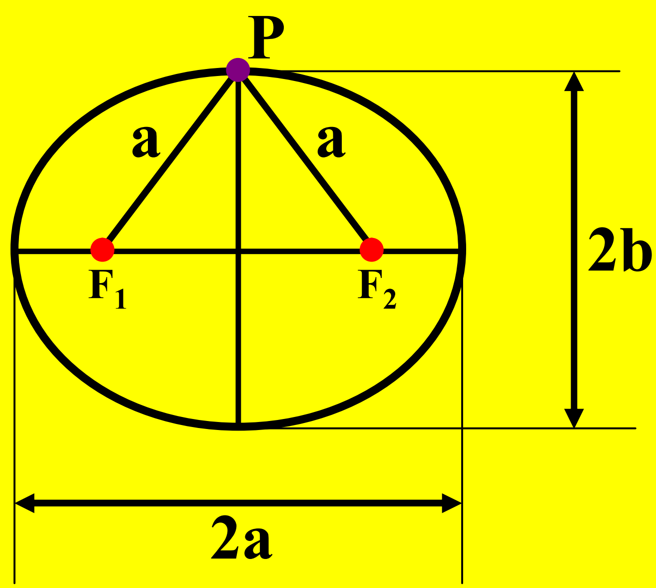

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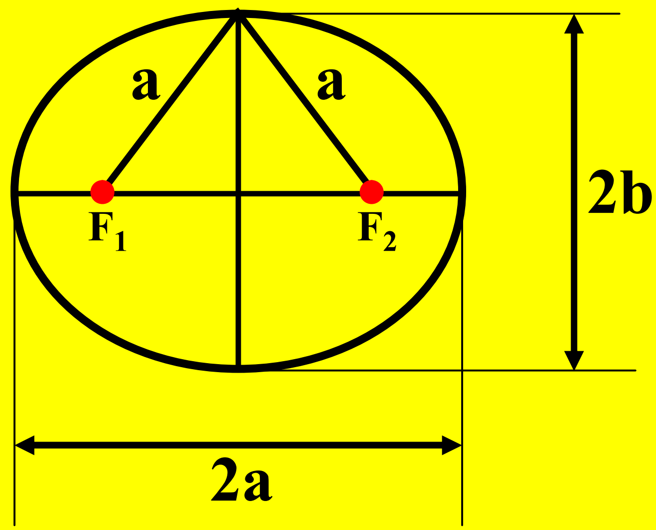

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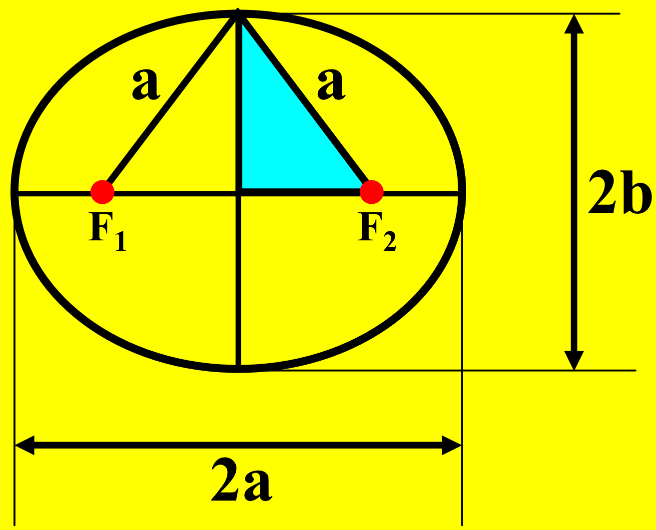

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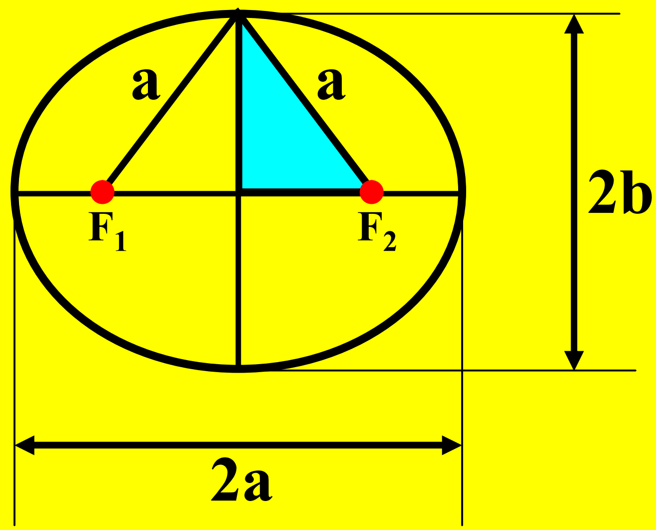

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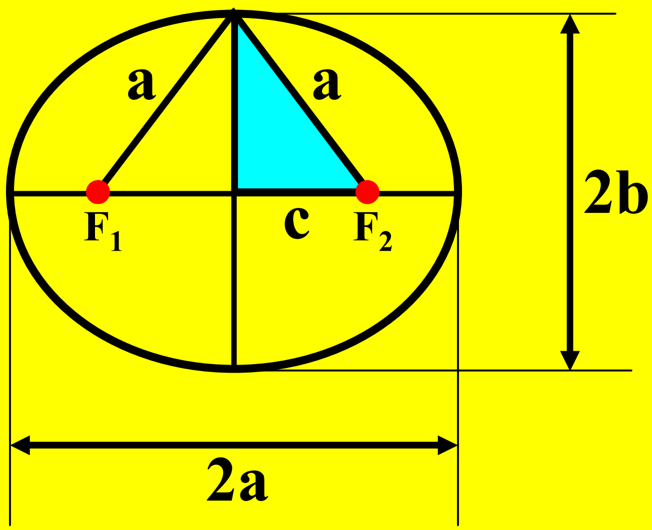

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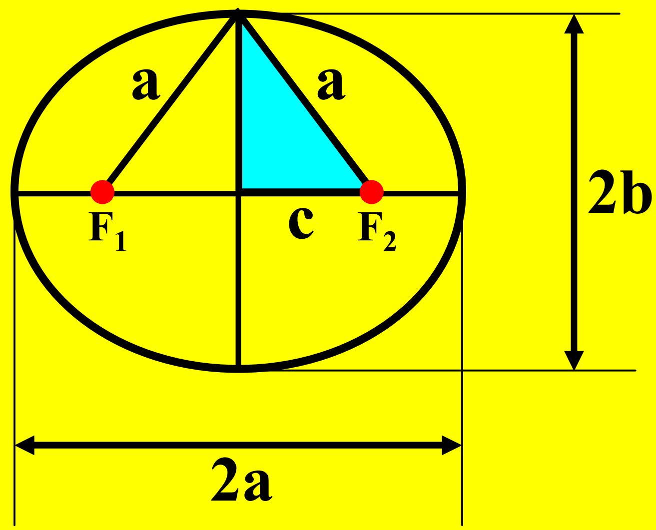

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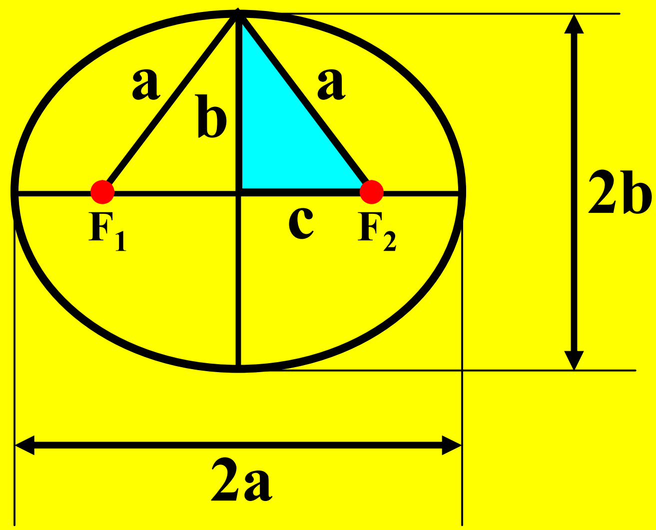

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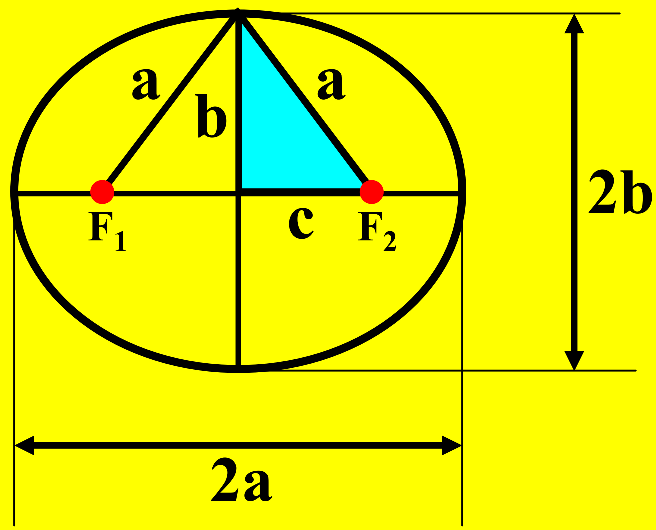

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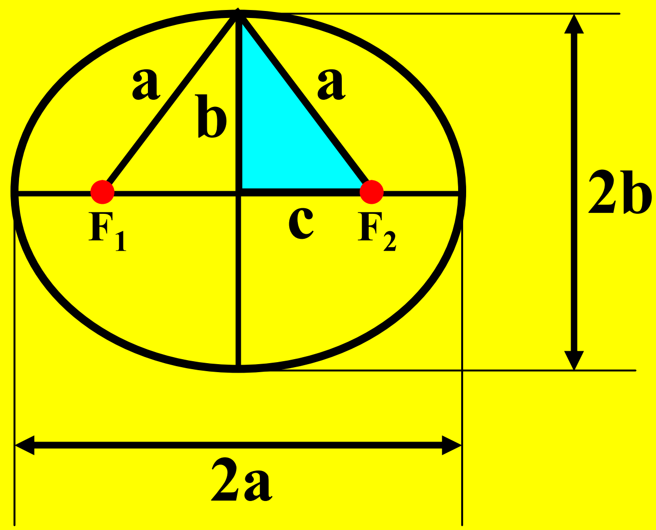

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Applying the Pythagorean Theorem,

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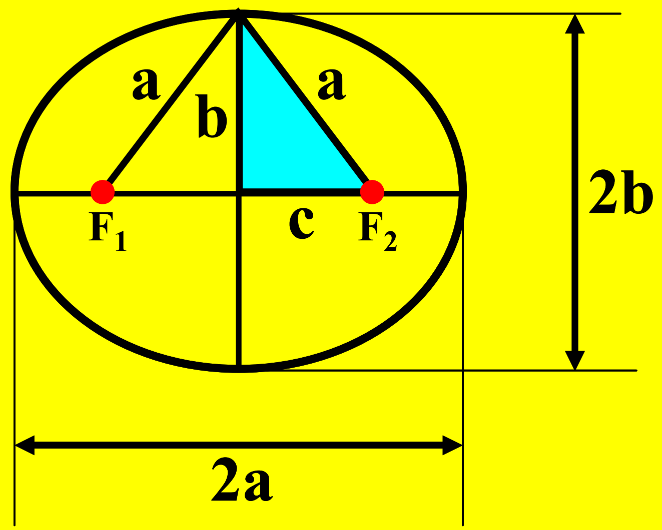

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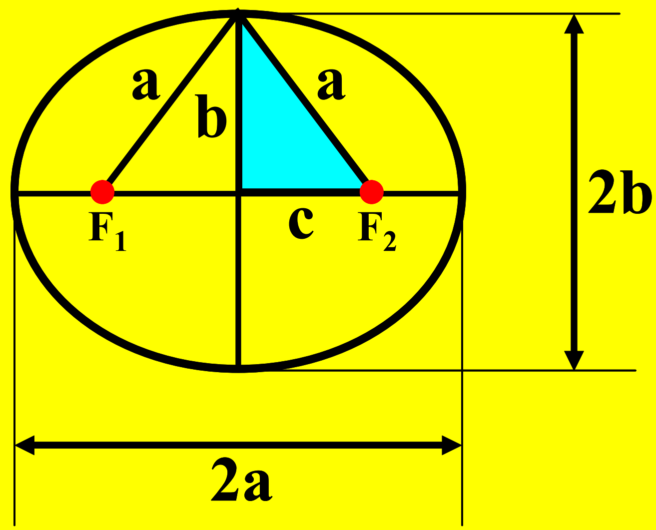

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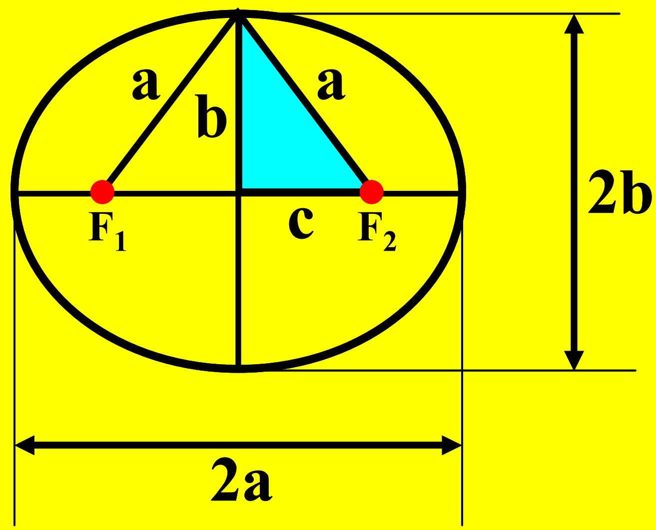

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$$c = \sqrt{a^2 - b^2}$$

Equations of an Ellipse

There are 2 types of ellipses that we will deal with.

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Type 1 Major Axis Horizontal

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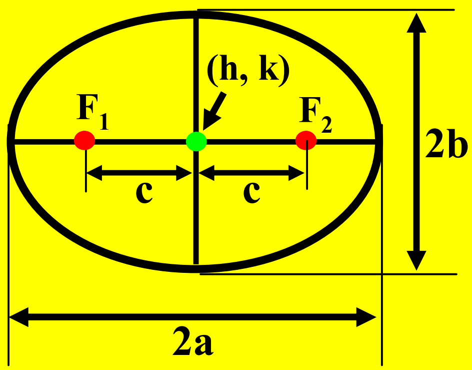

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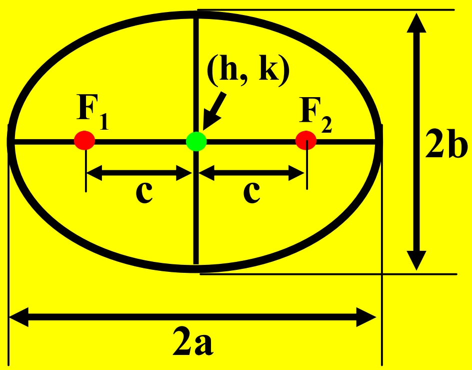

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Type 2 Major Axis Vertical

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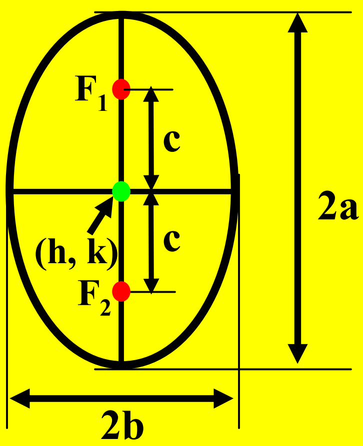

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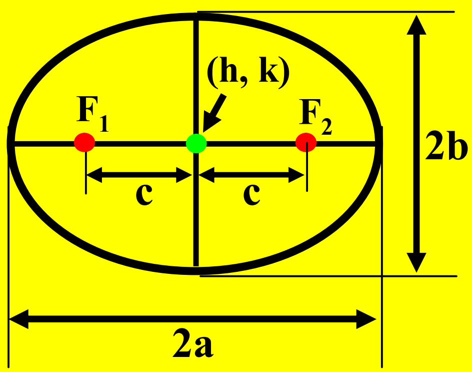

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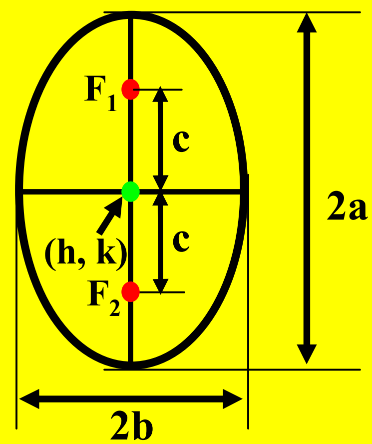

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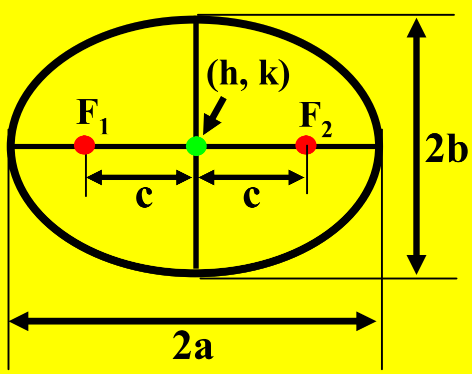

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Type 2 Major Axis Vertical

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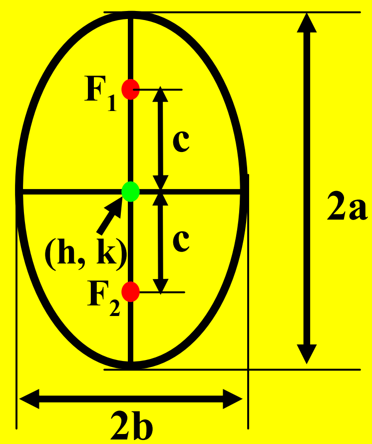
As you compare these two equations, realize that a^2 and b^2 are just numbers.



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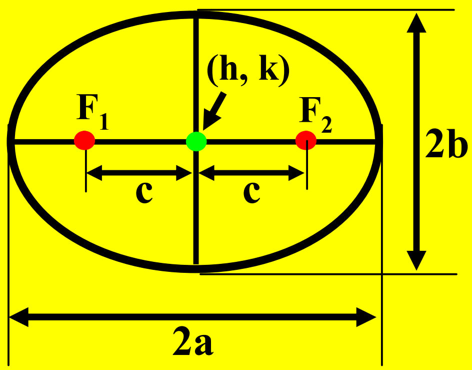

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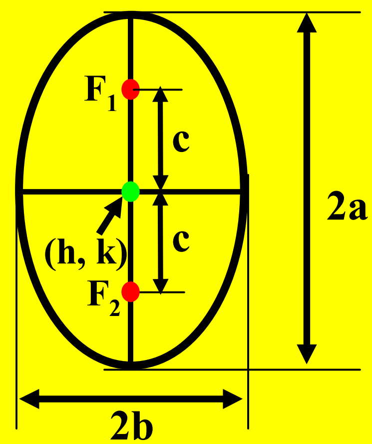

$$c = \sqrt{a^2 - b^2}$$

Equations of an Ellipse

There are 2 types of ellipses that we will deal with.

Type 1 Major Axis Horizontal

Standard Form Equation

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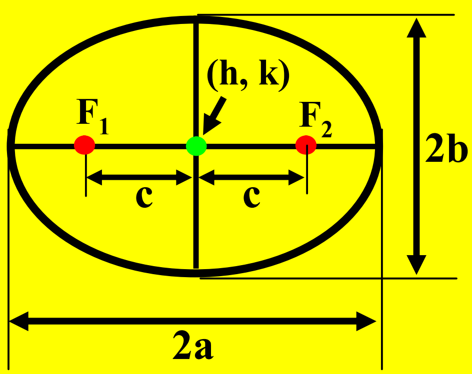

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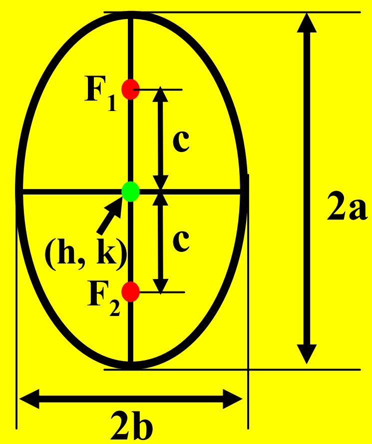

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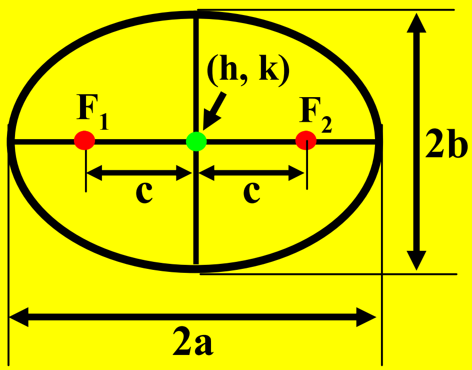

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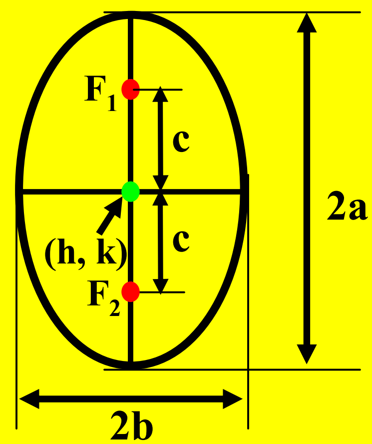

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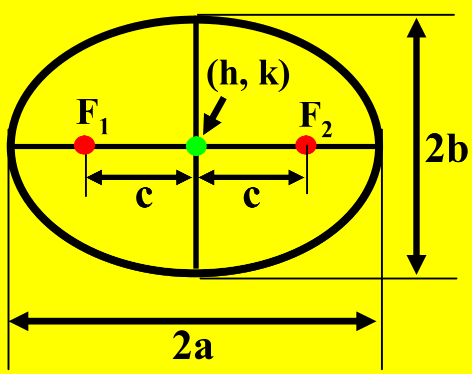

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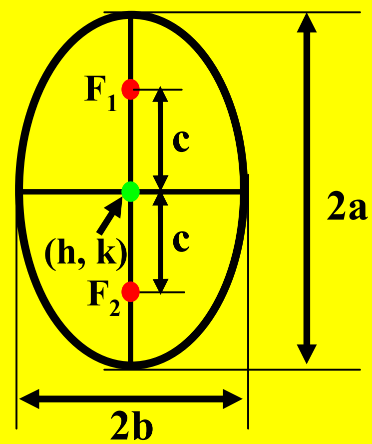

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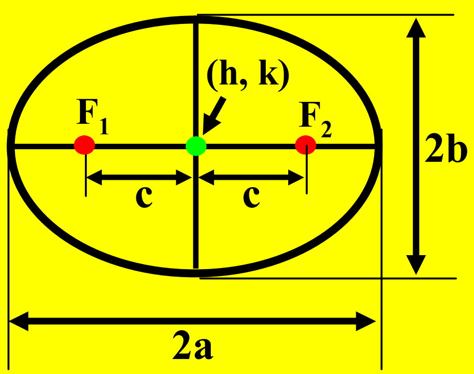

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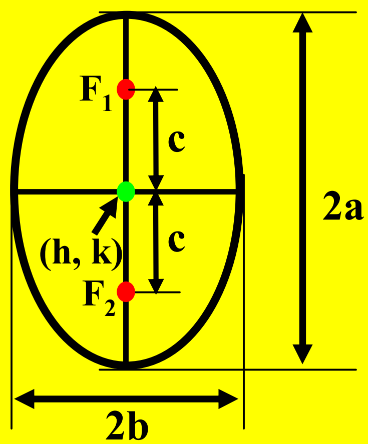

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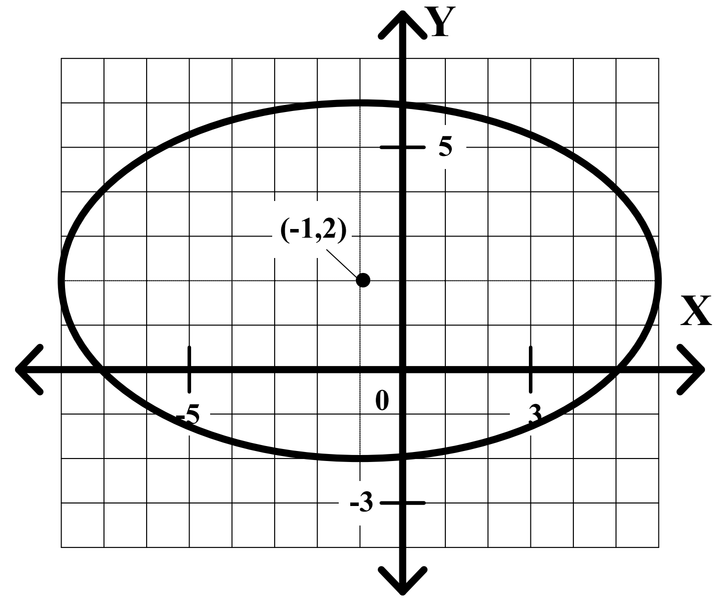

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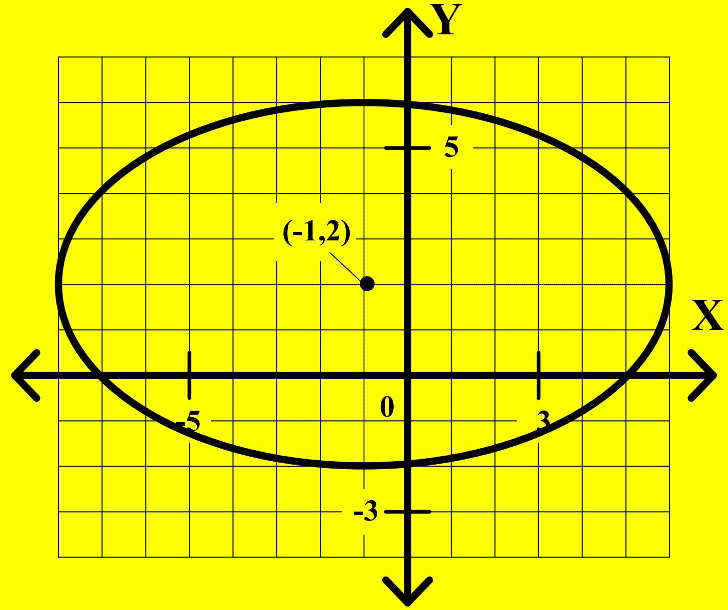

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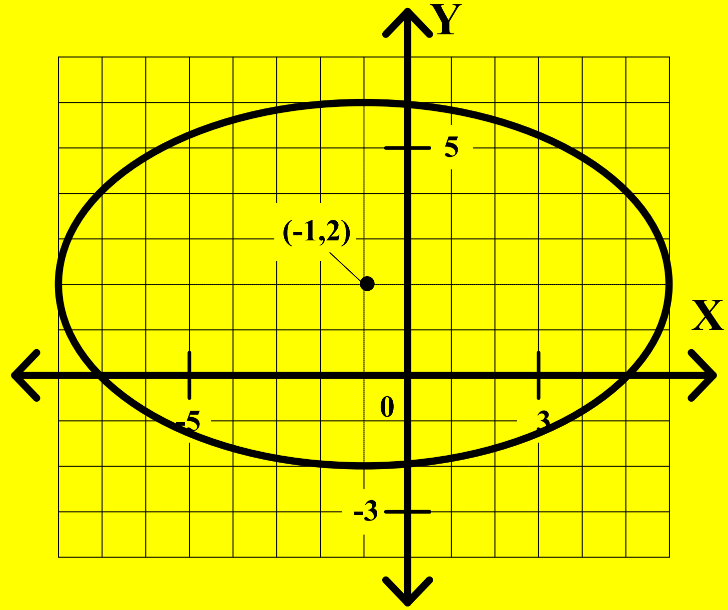

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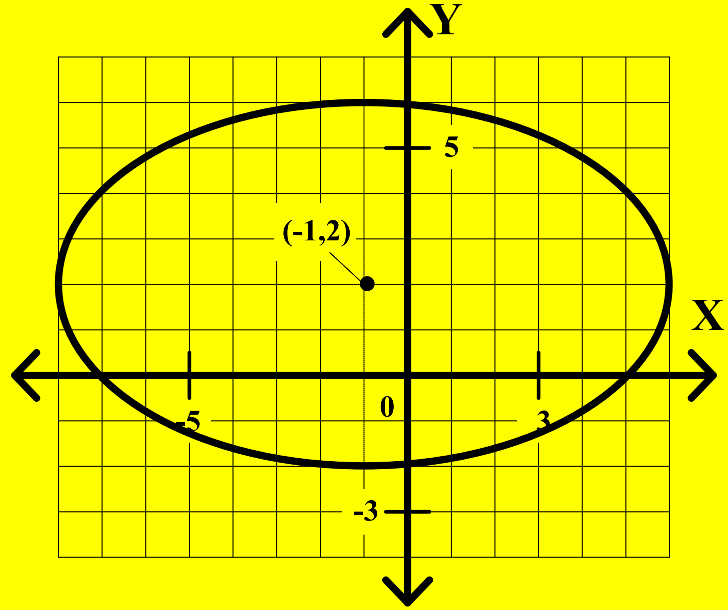

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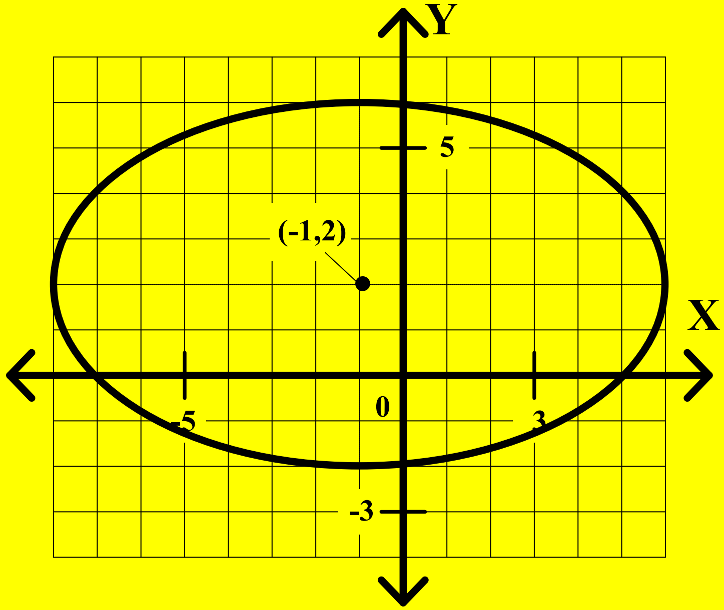

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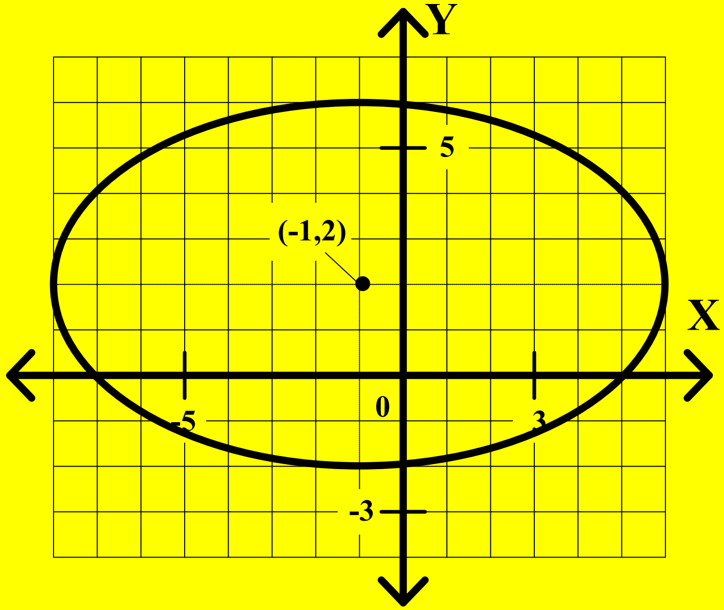

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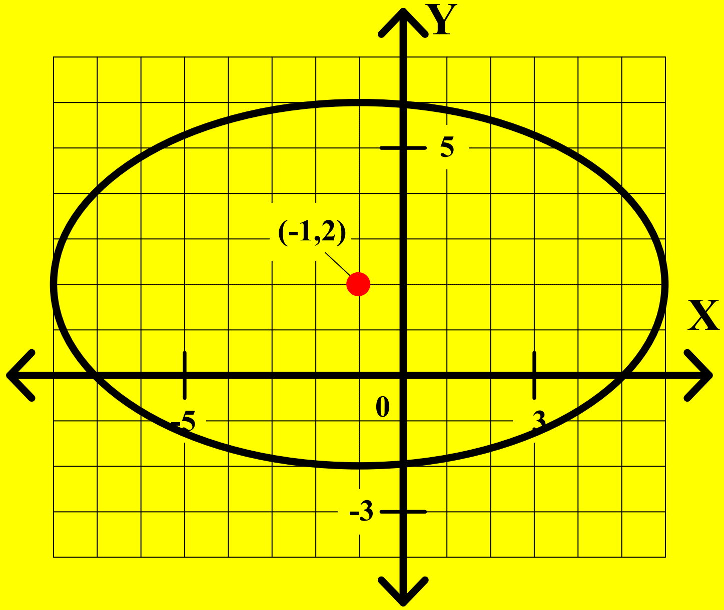

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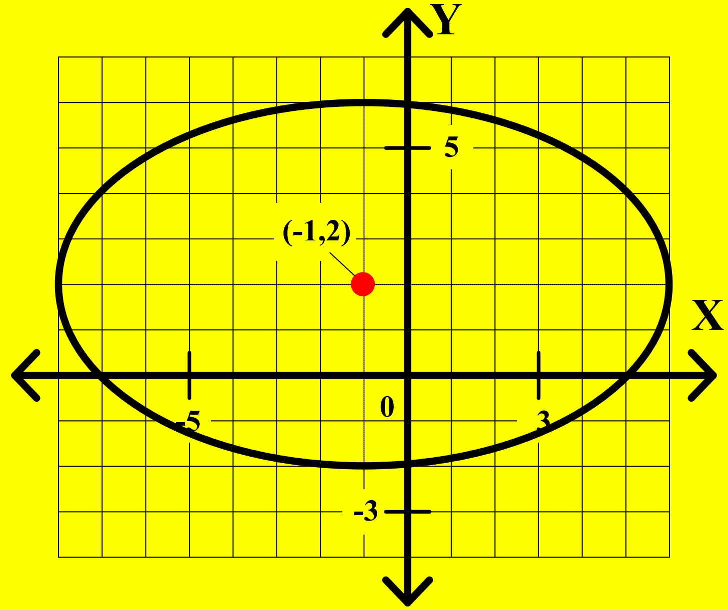

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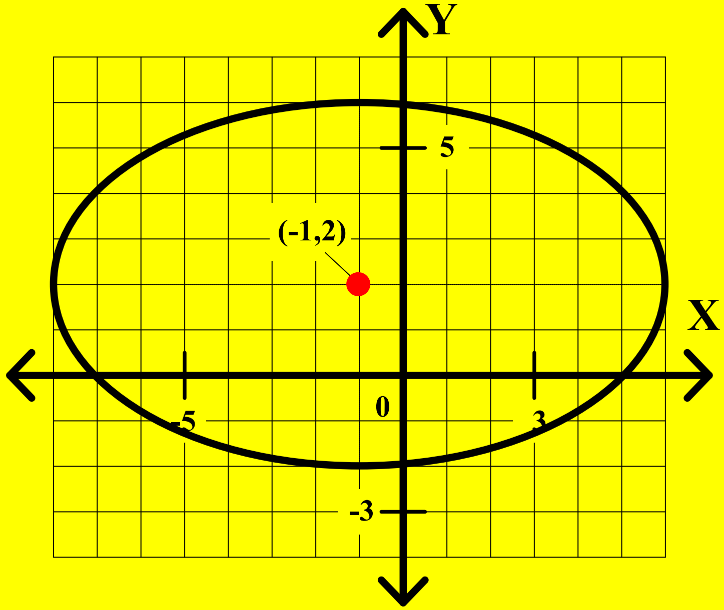

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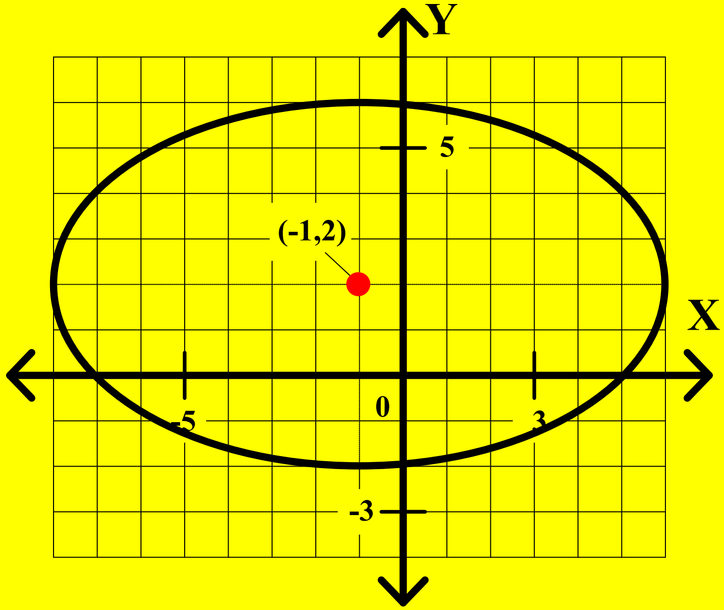

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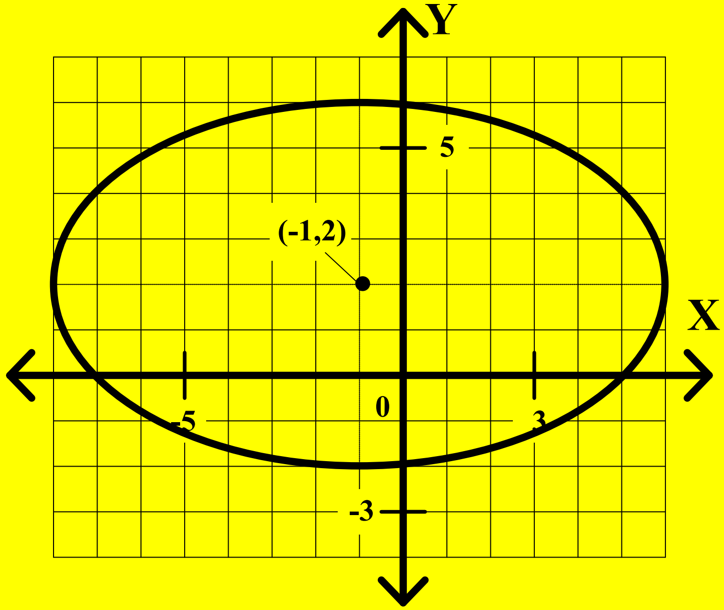

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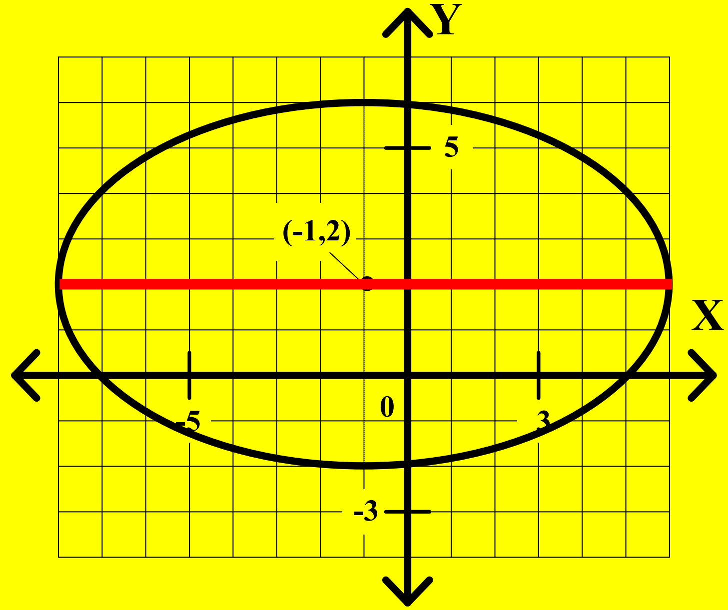

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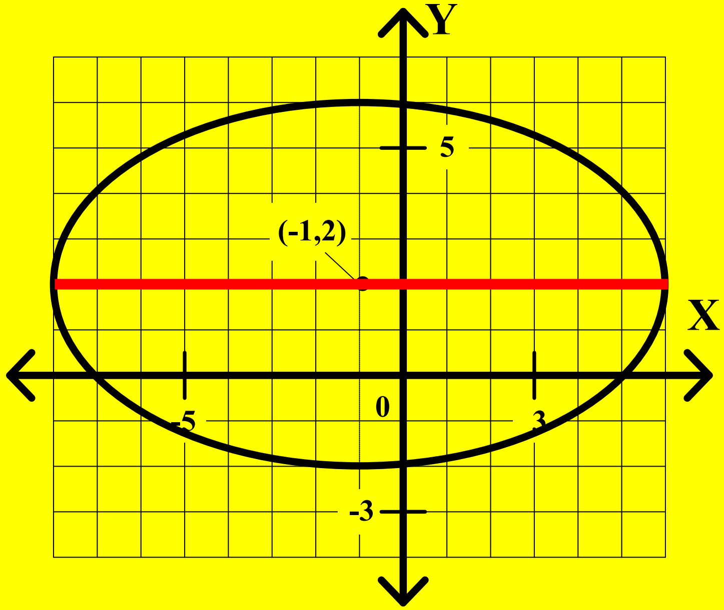
Major Axis: 2a units long



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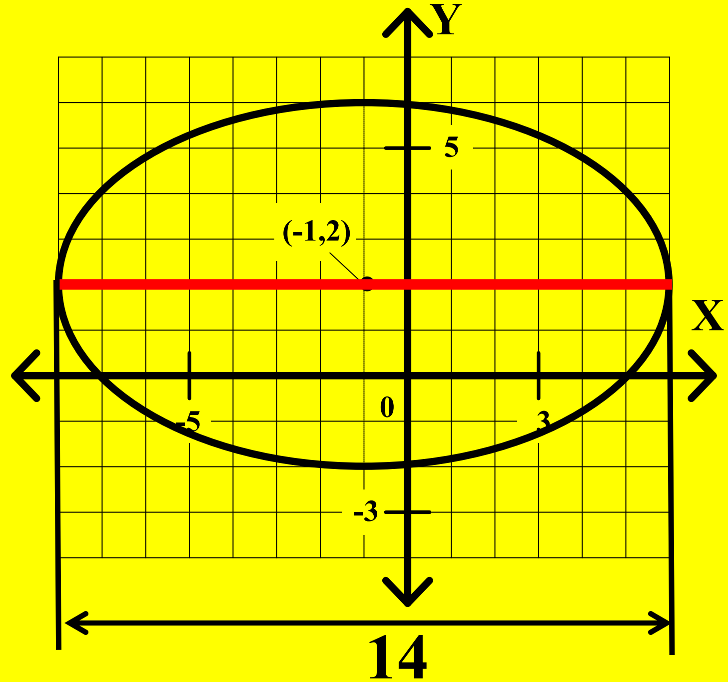

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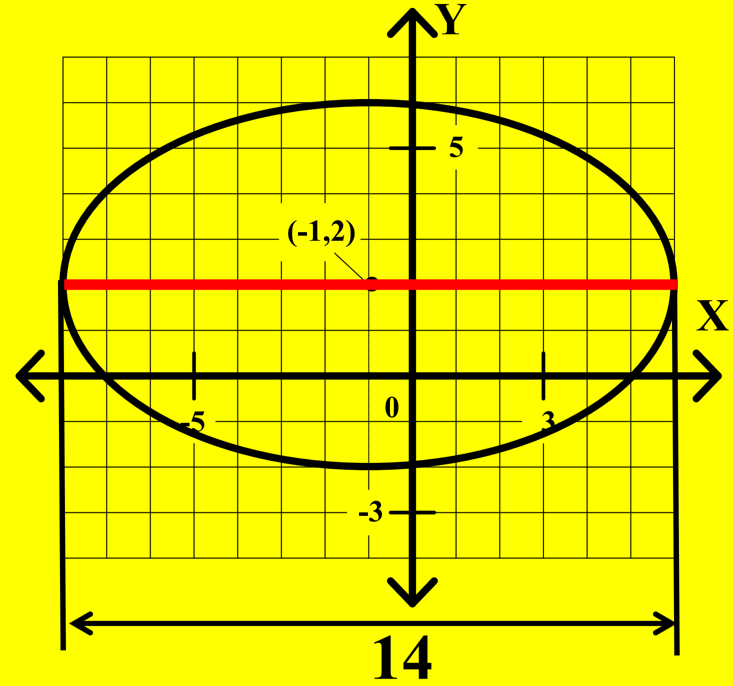

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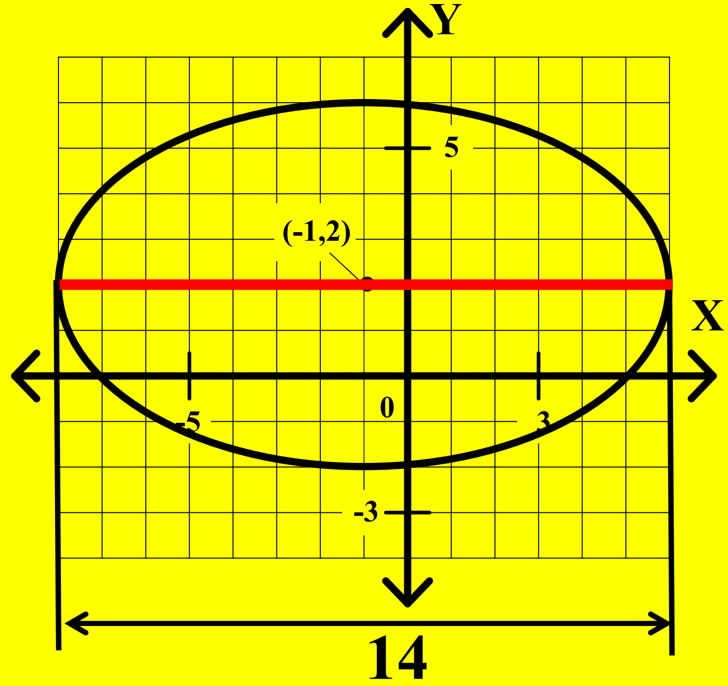

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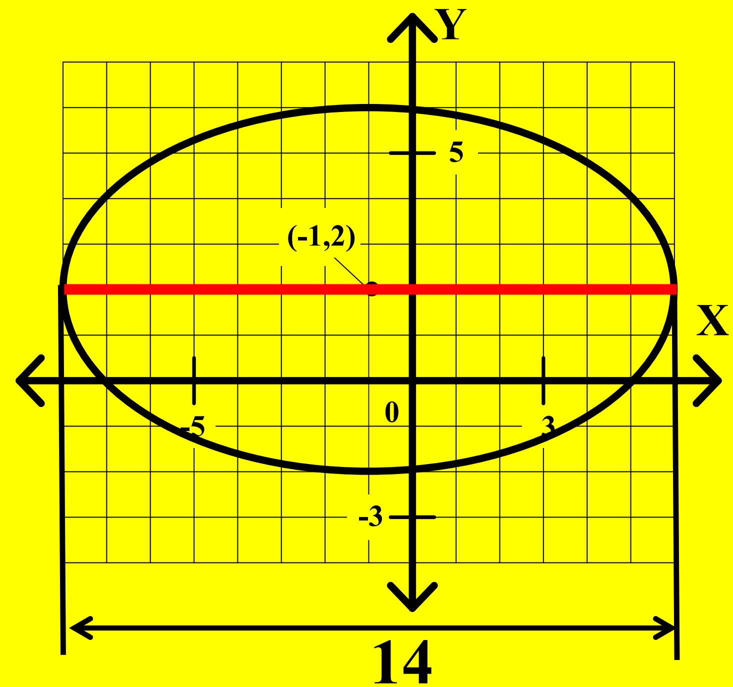

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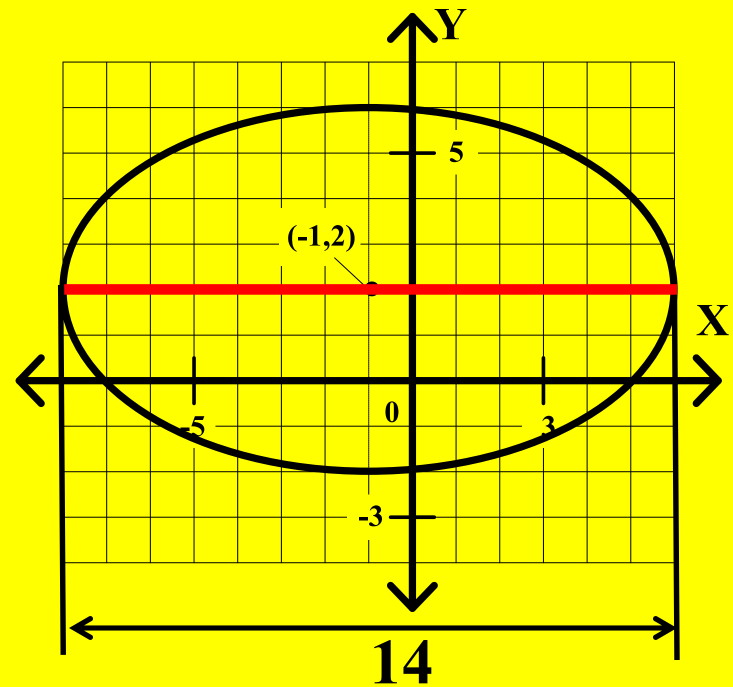

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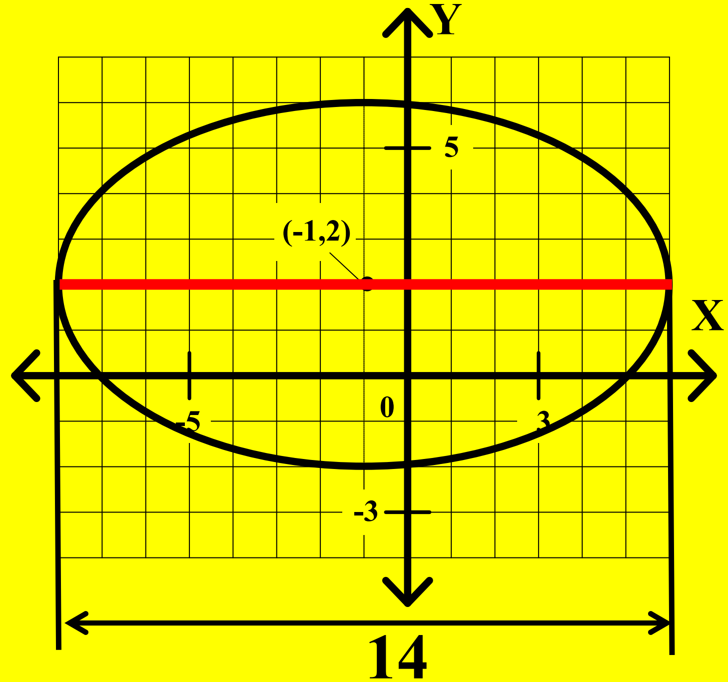

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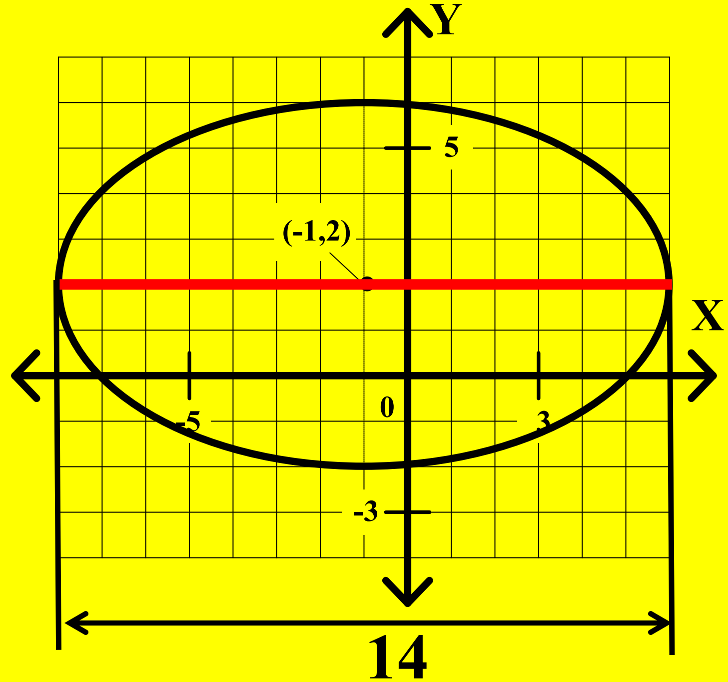

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Major Axis: 2a units long

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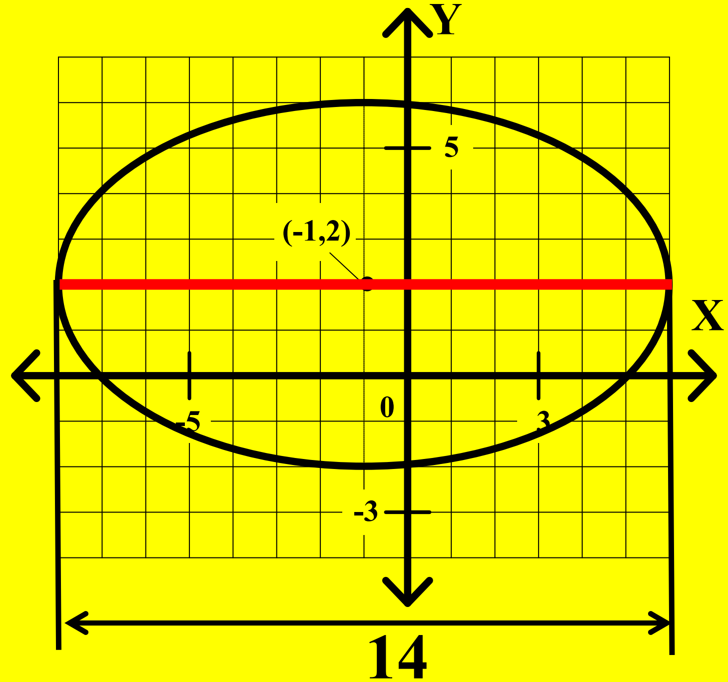

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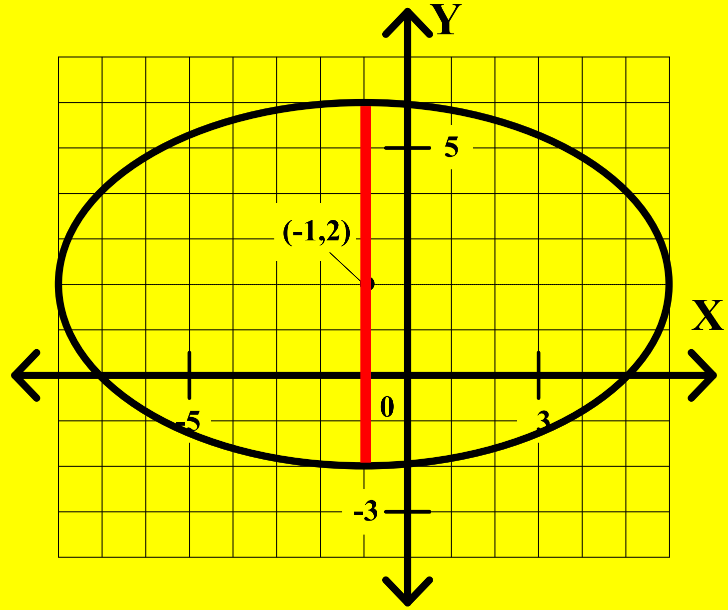

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Minor Axis:

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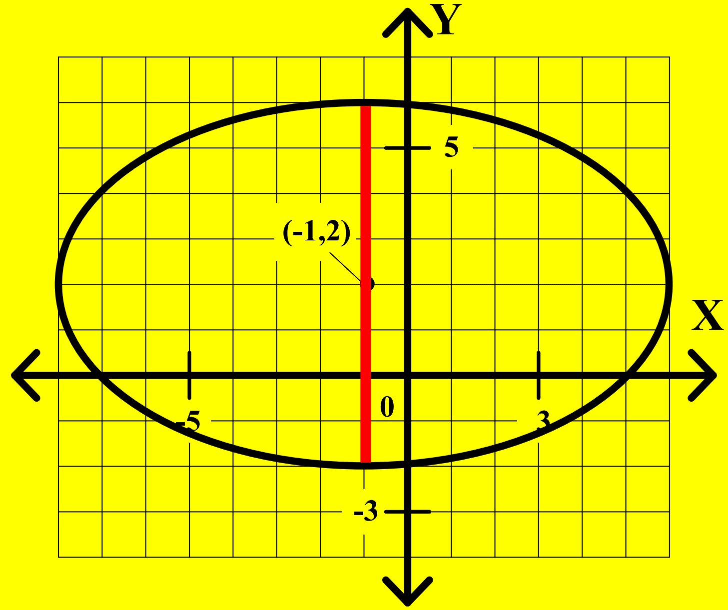

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Minor Axis: 2b units long

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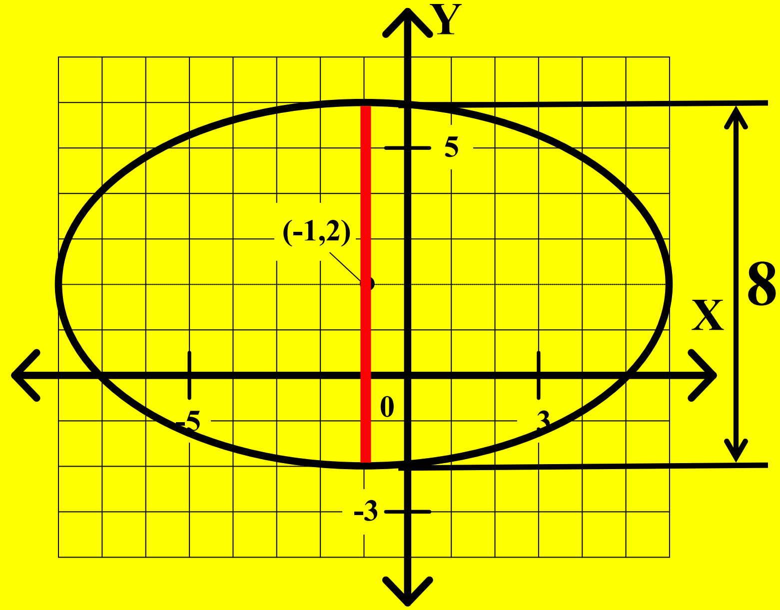

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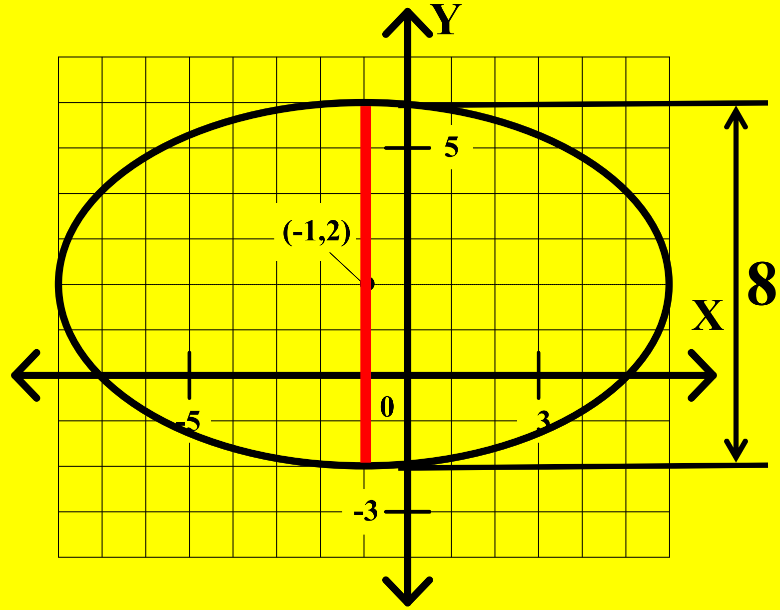

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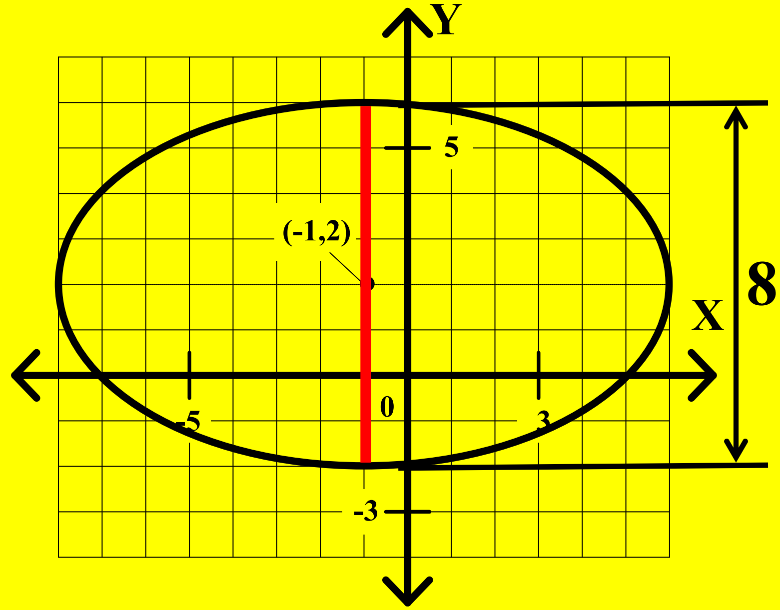

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2b = 8

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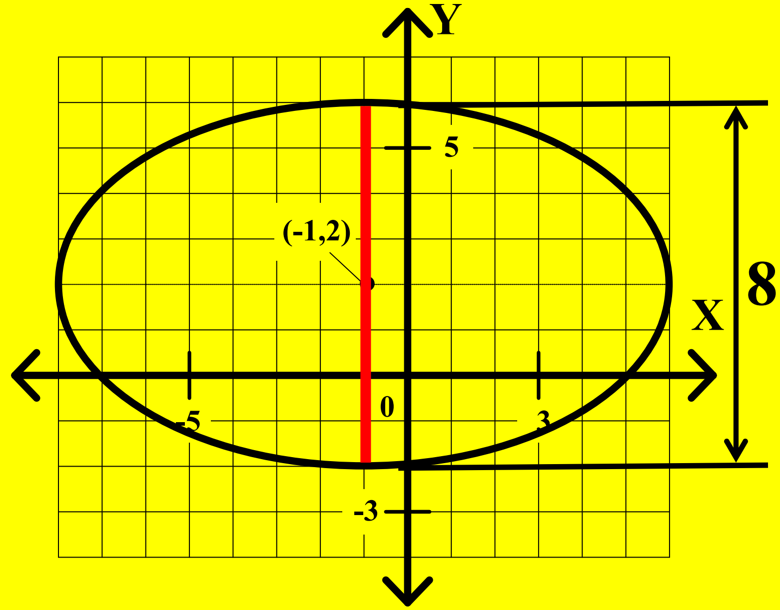

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b =

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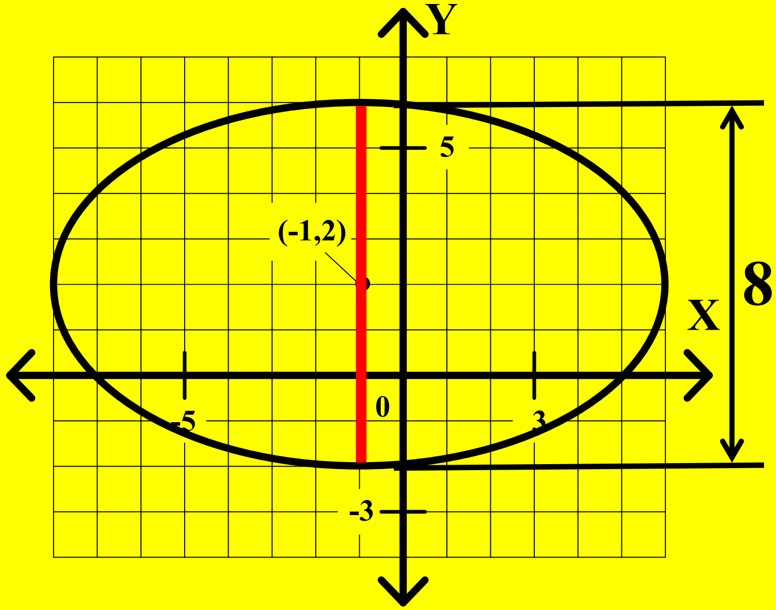

Center: (-1, 2) ⇨ h = -1 and k = 2

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$$2b = 8$$
$$b = 4$$

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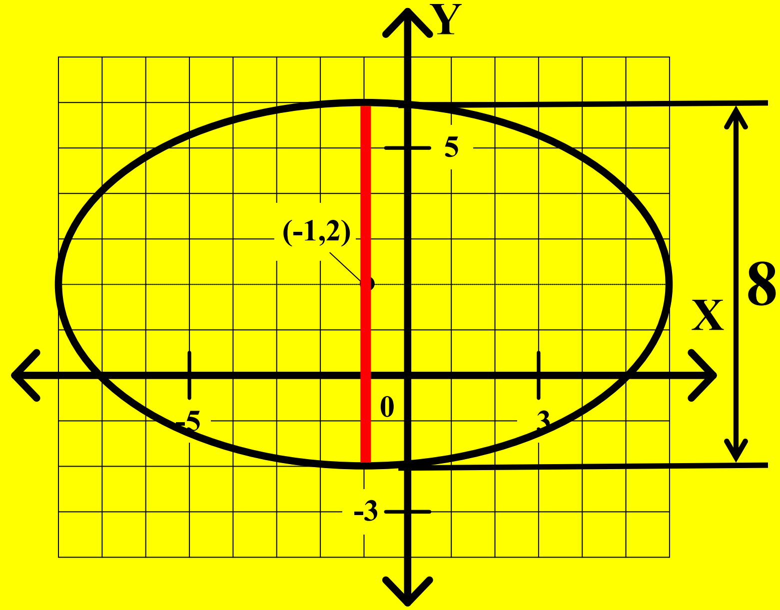

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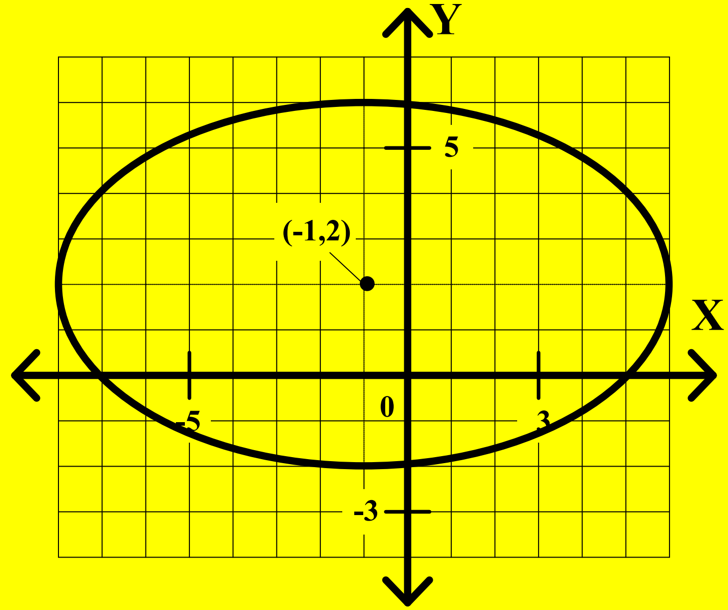

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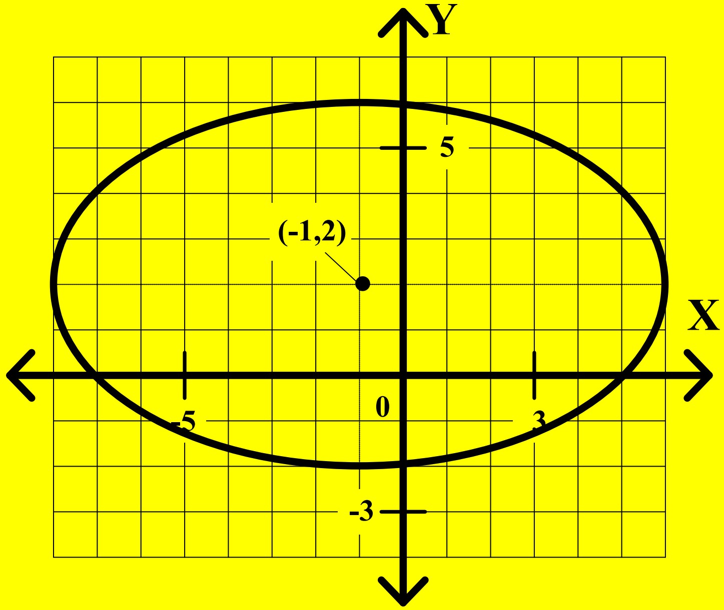

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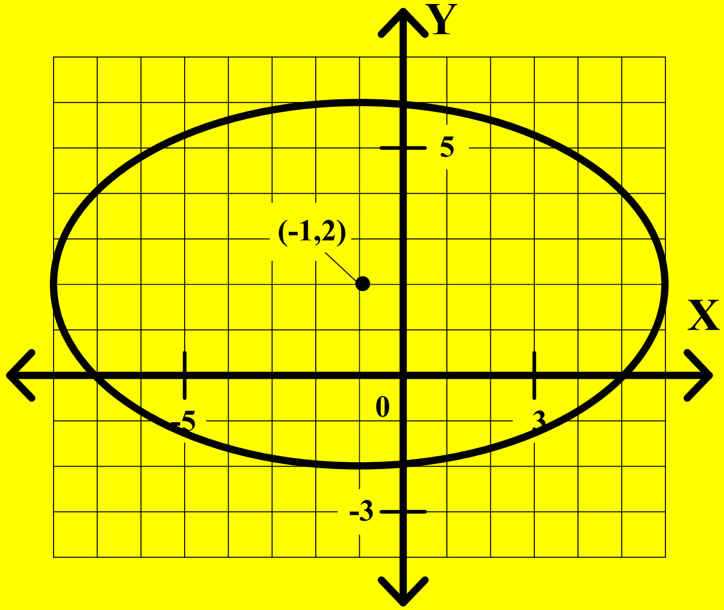

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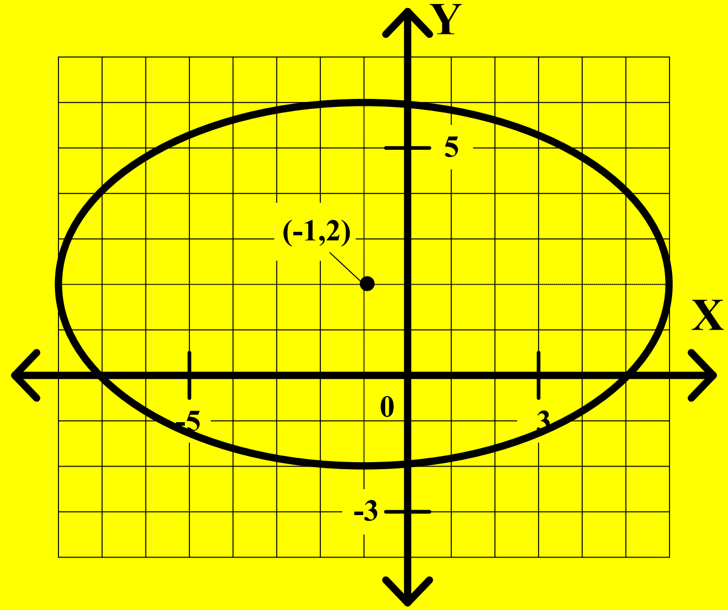

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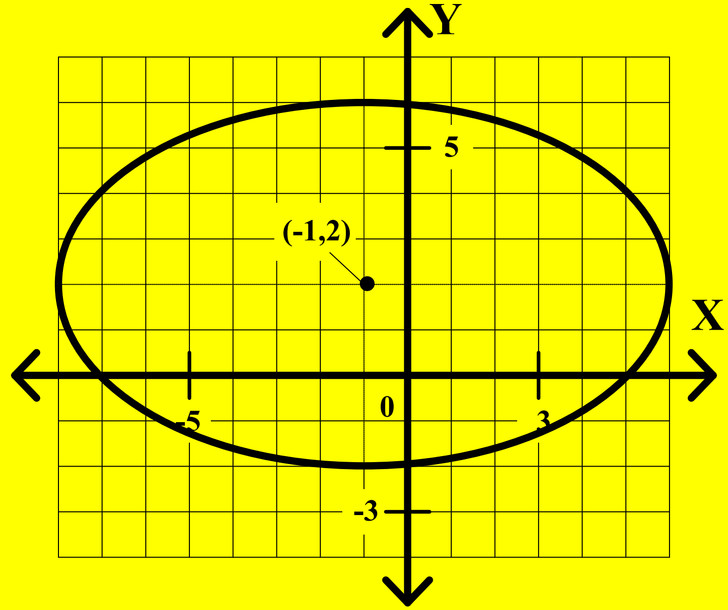

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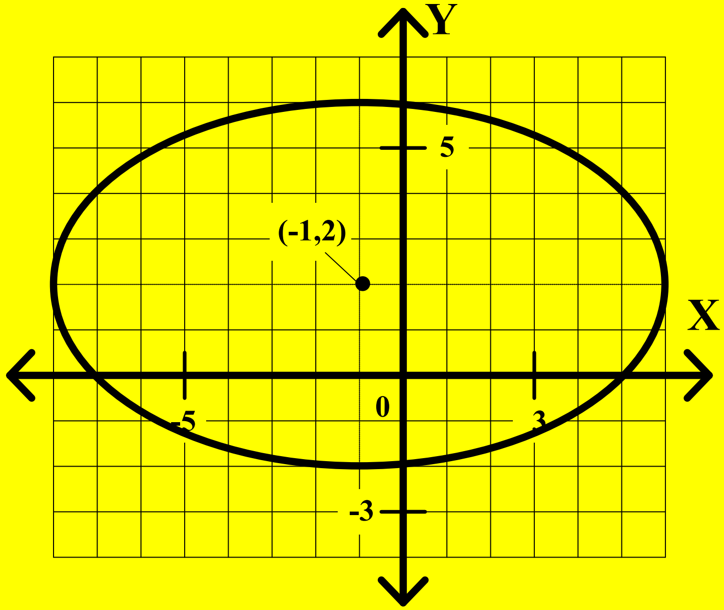

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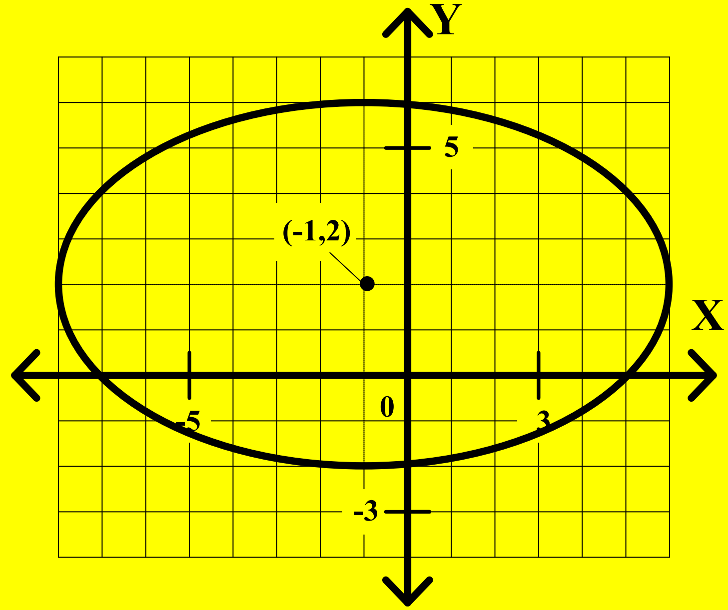

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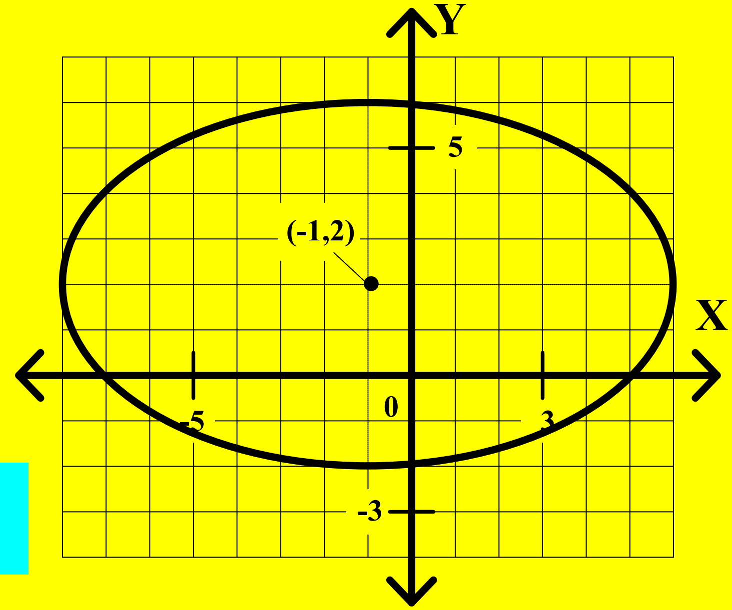

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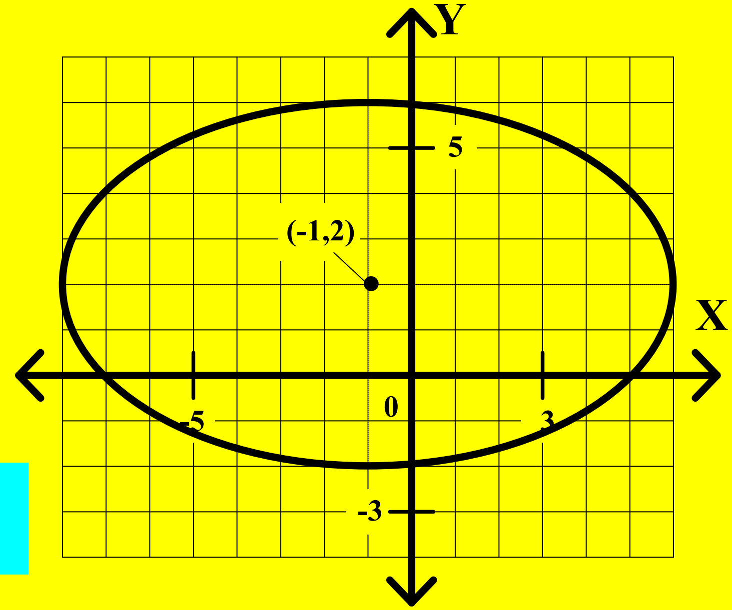

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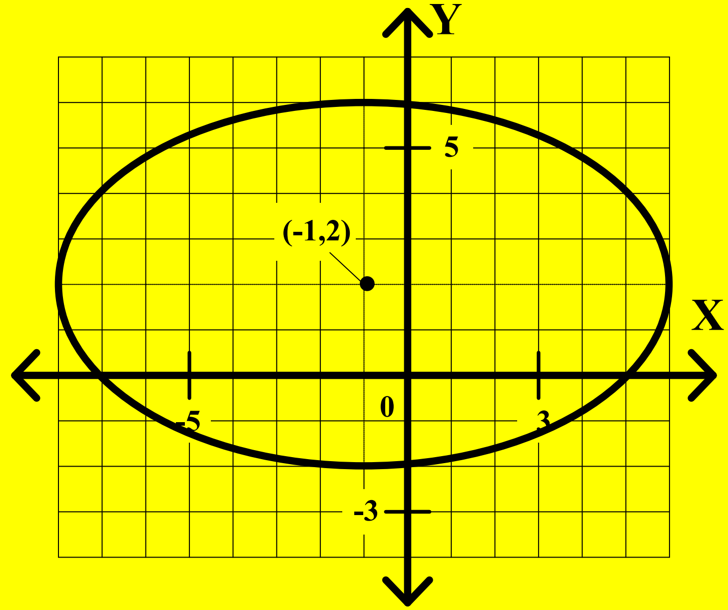

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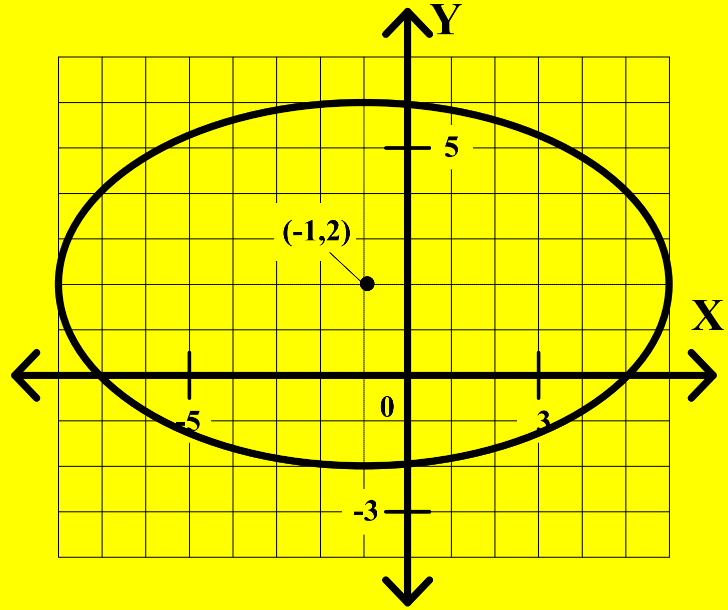

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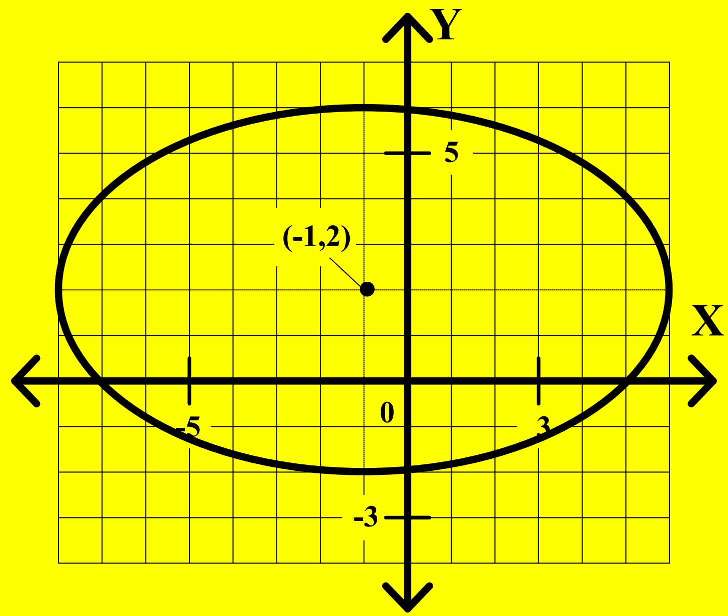

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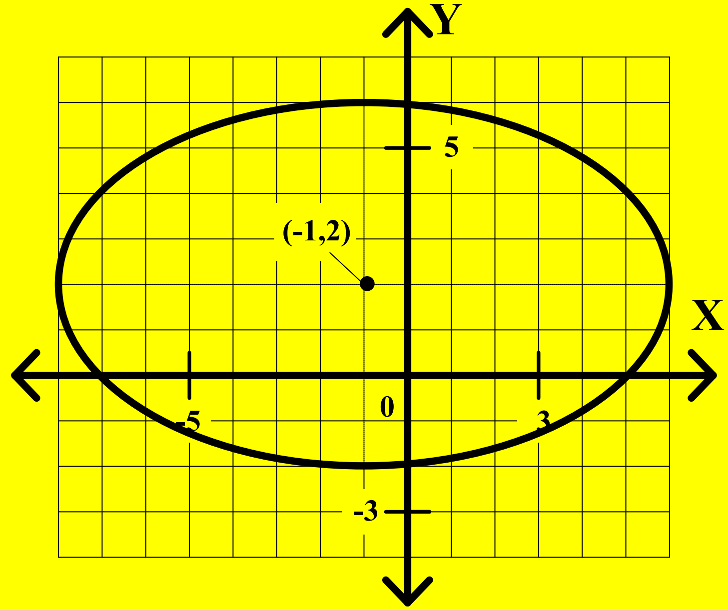

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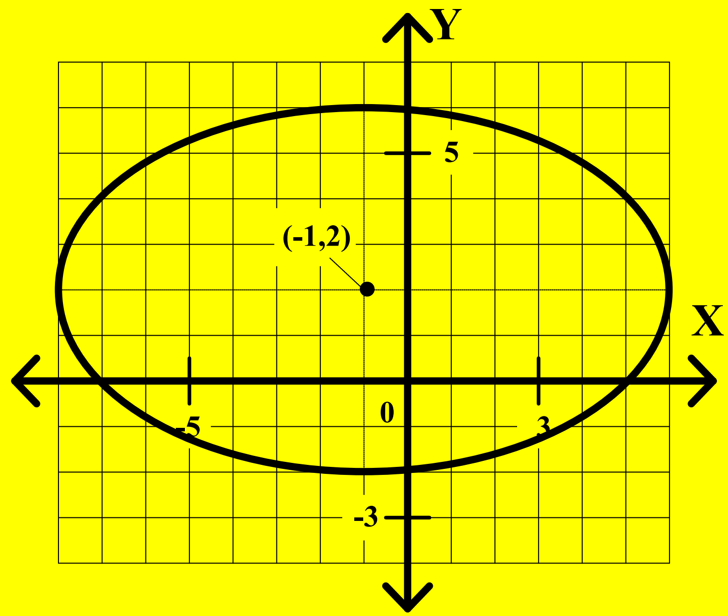

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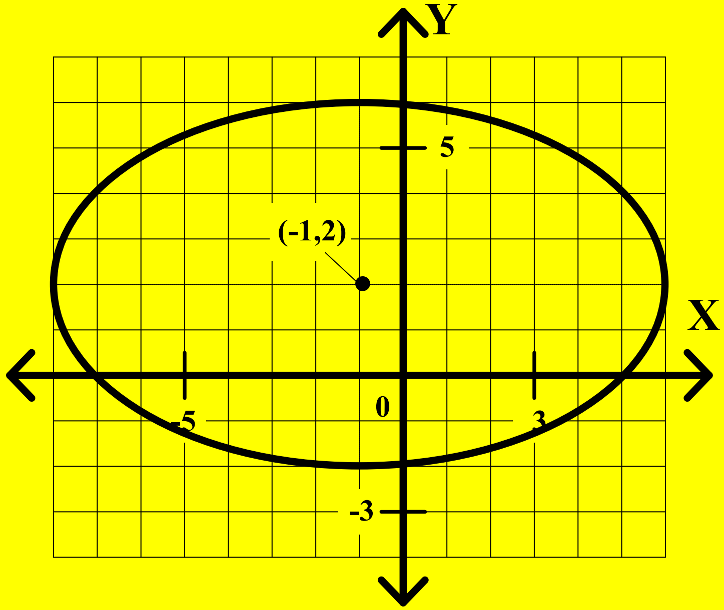

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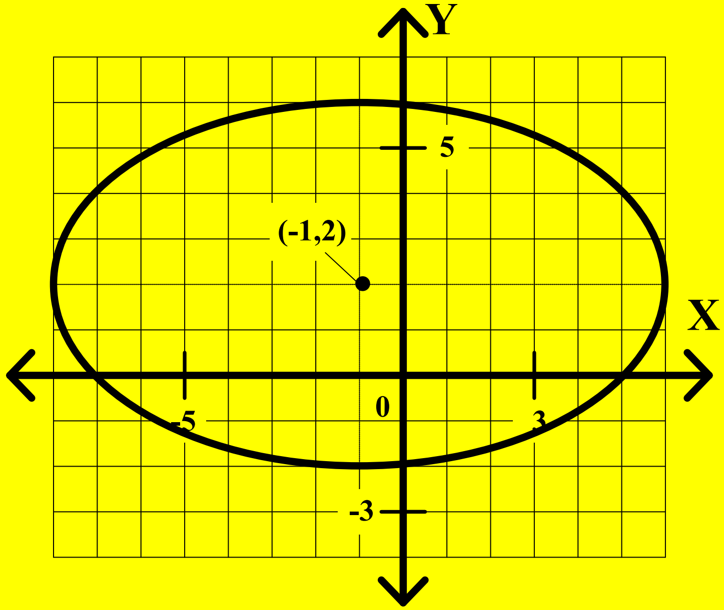

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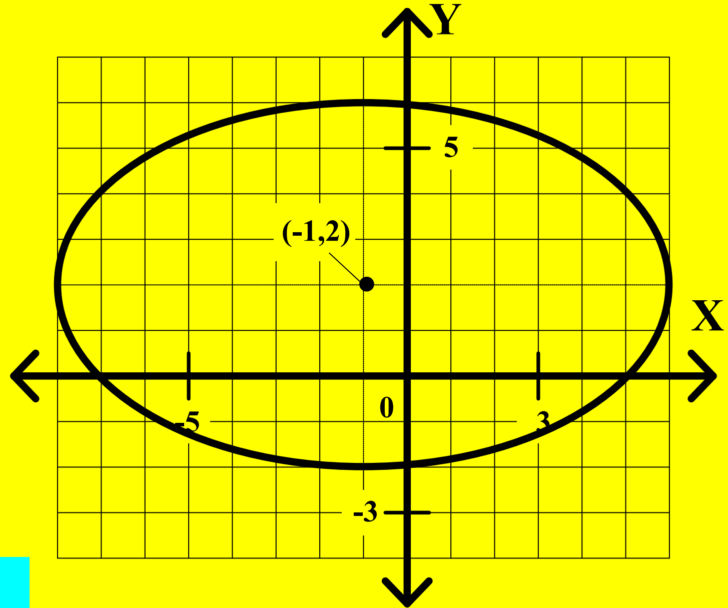

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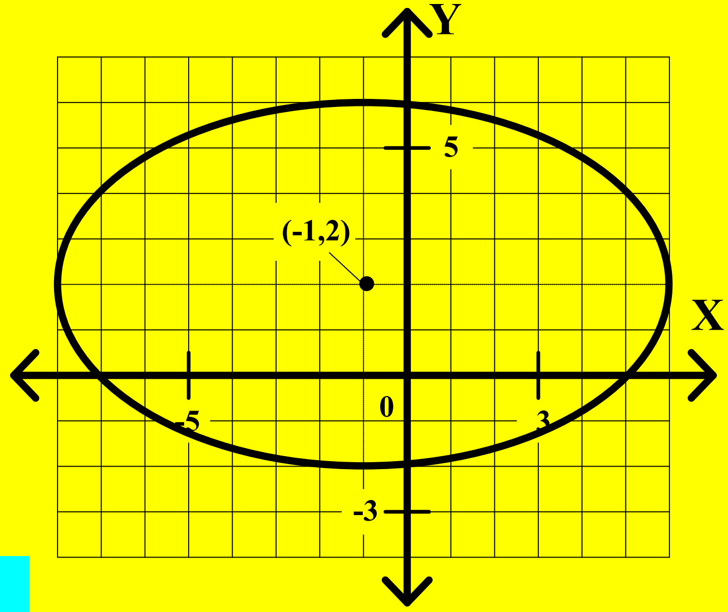

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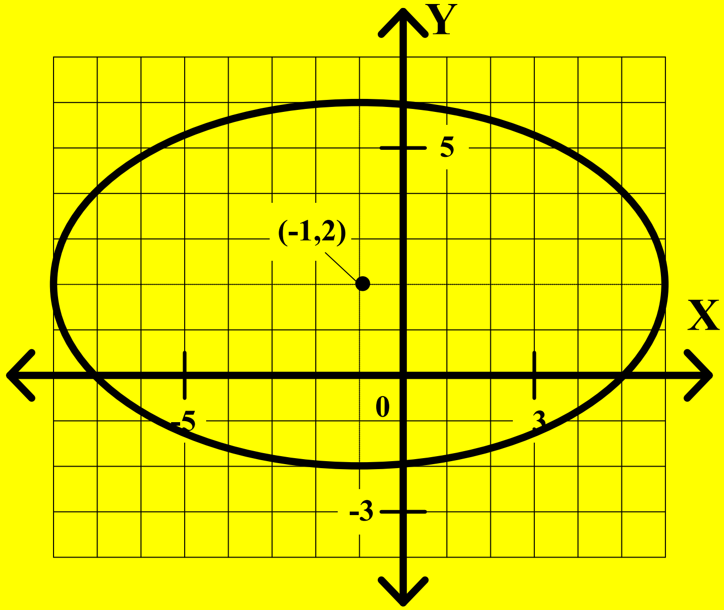

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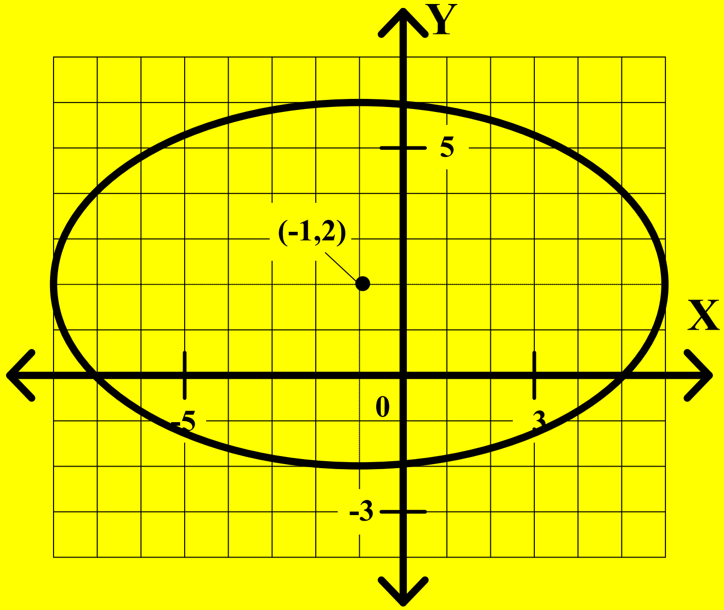

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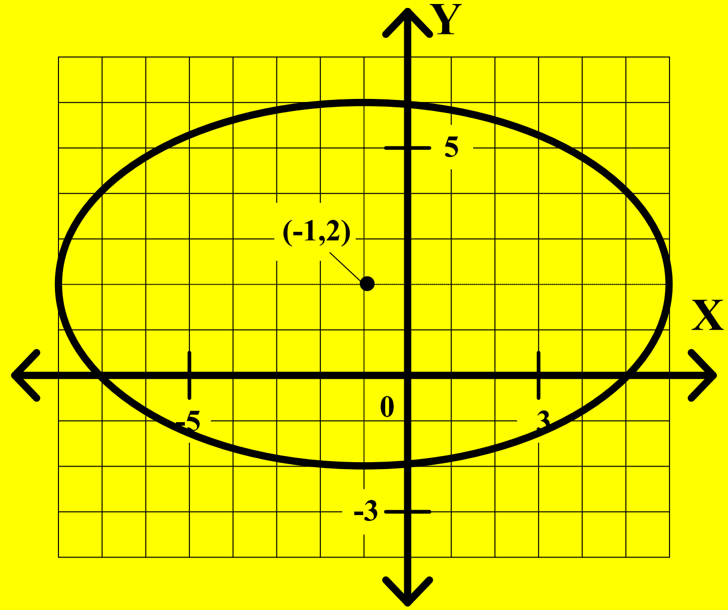

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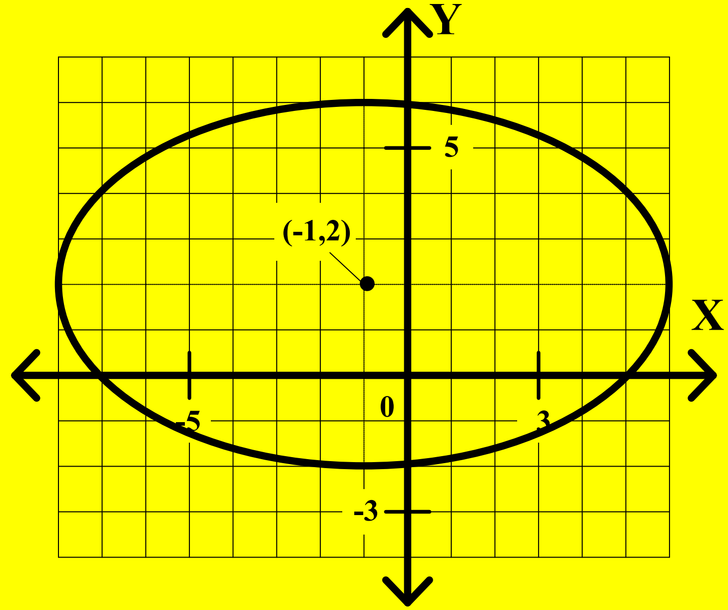

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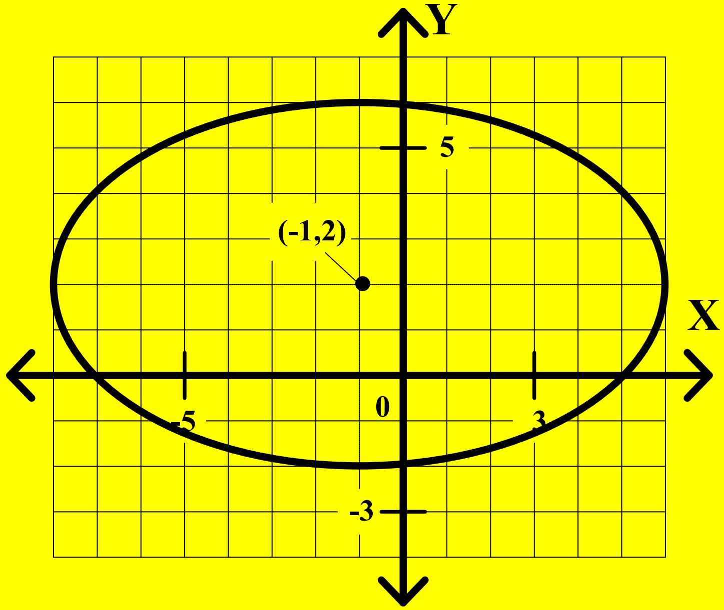

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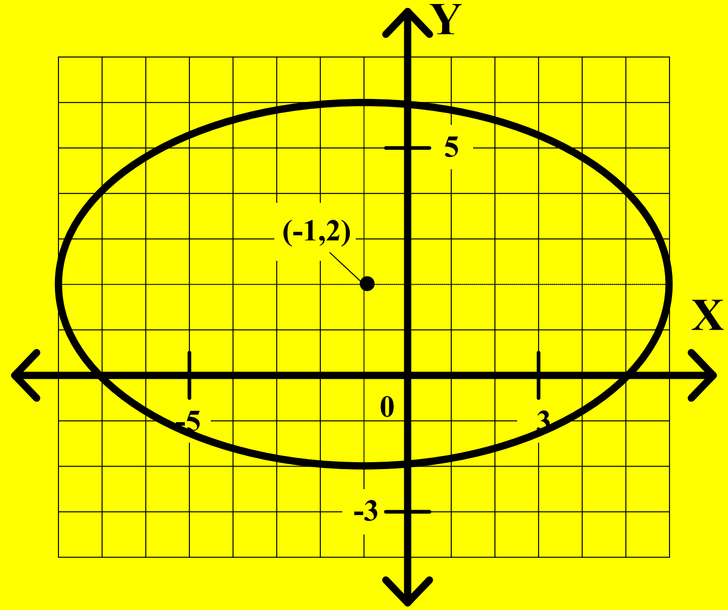

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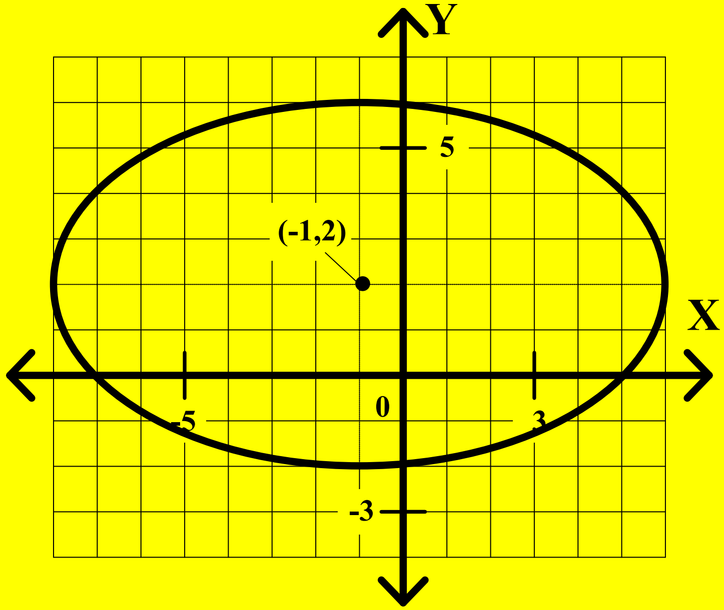

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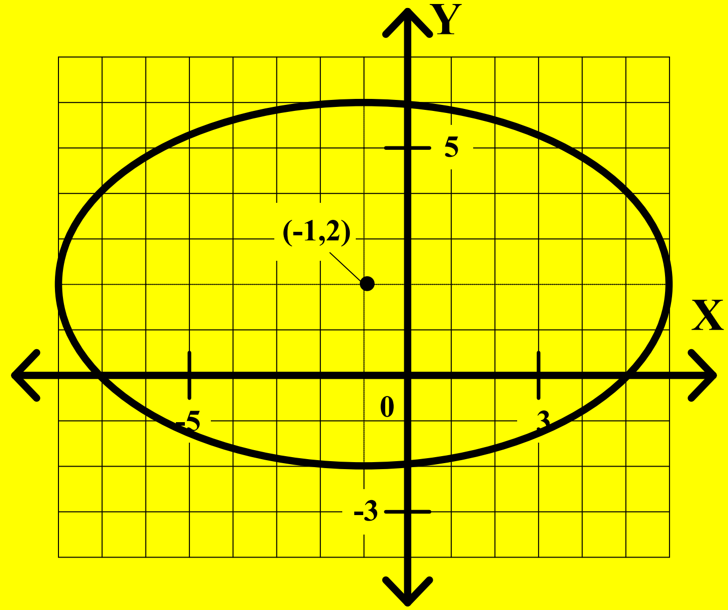

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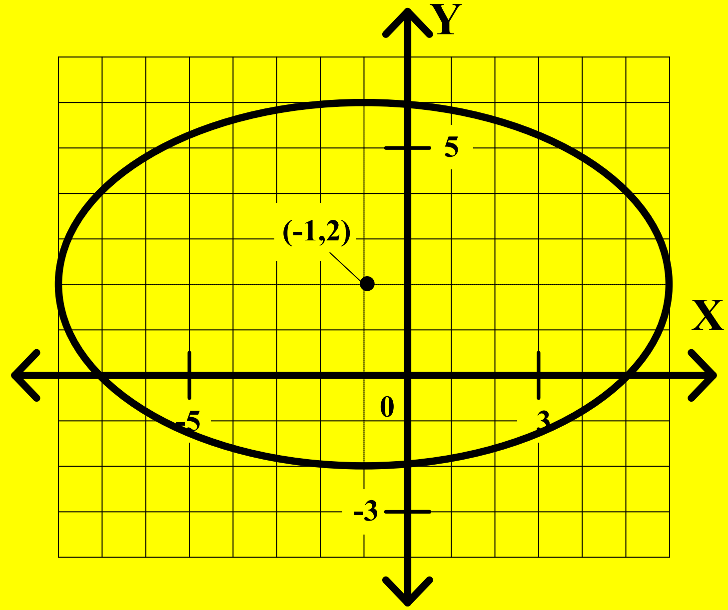

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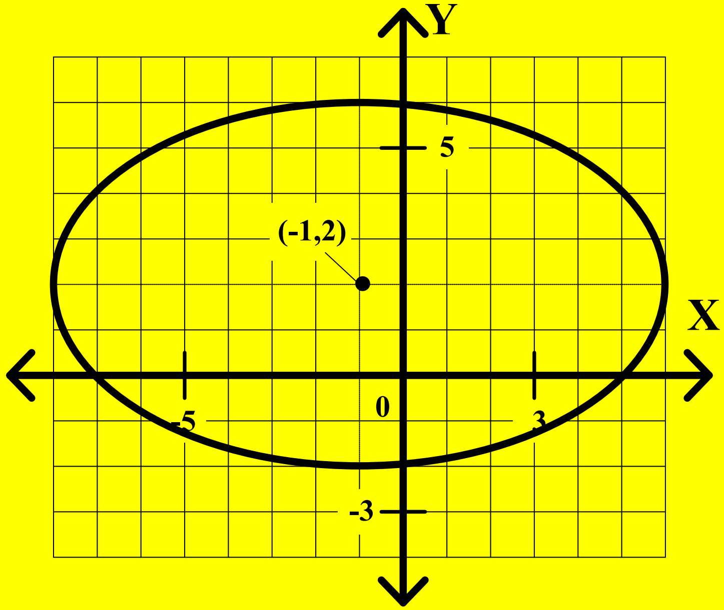

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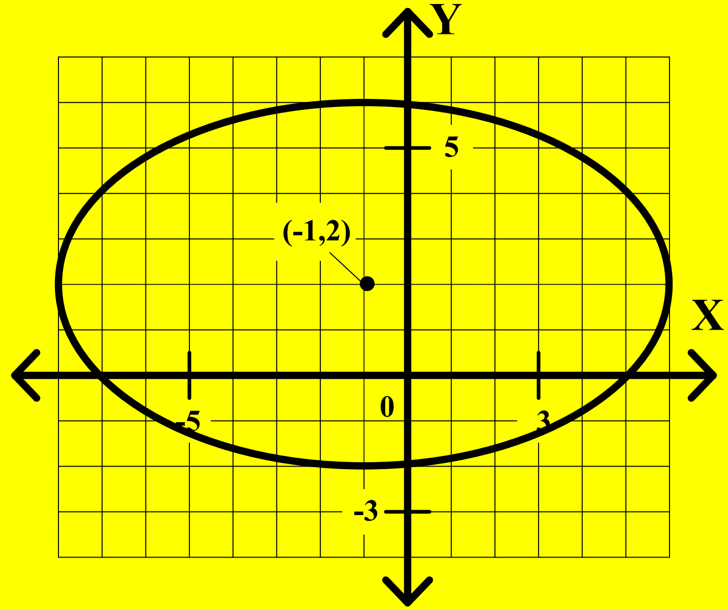

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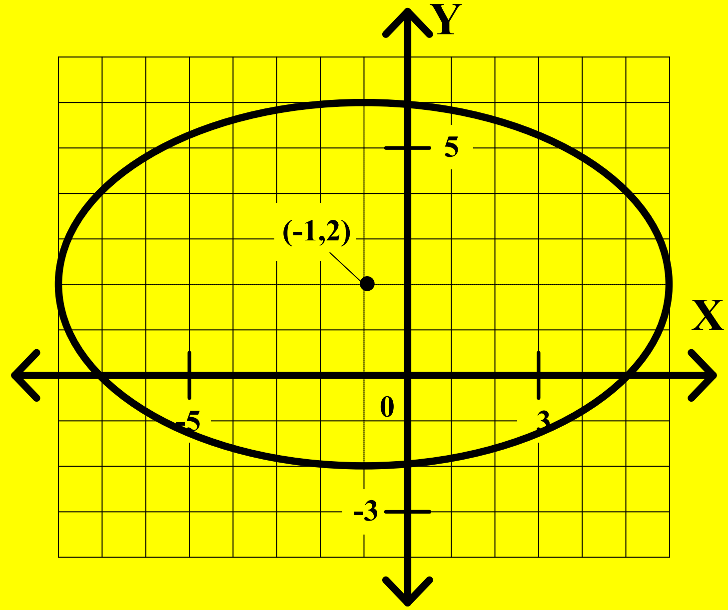

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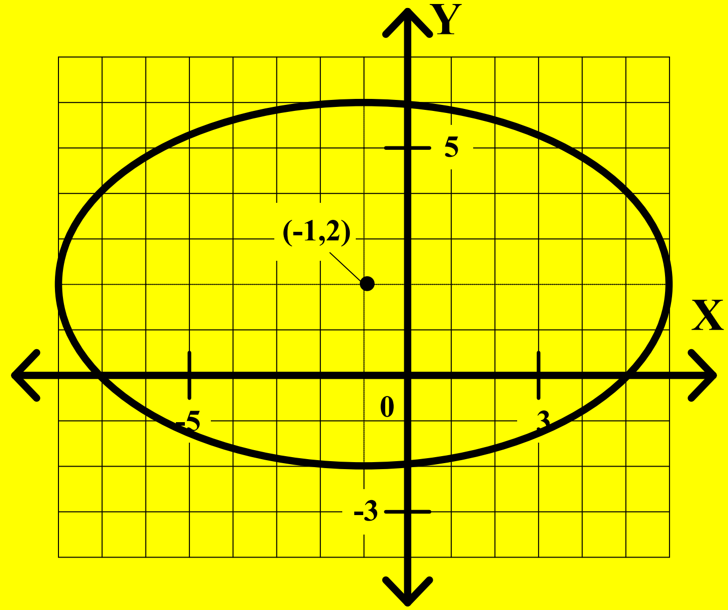

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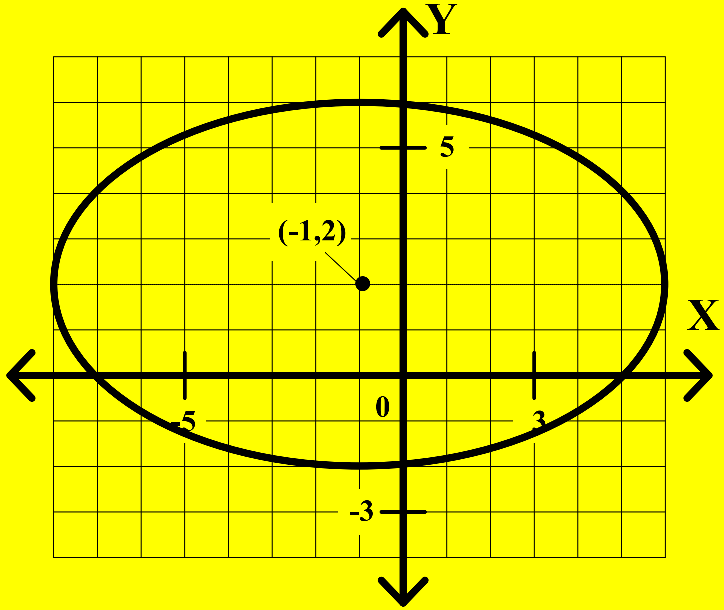

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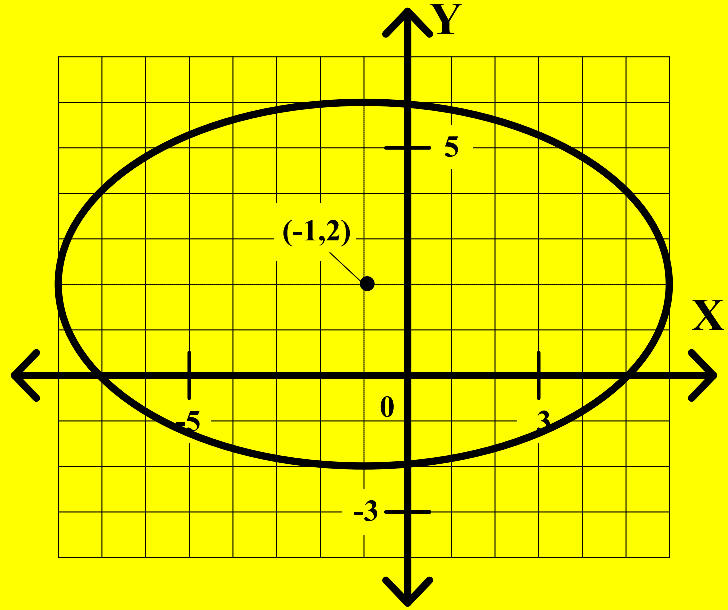

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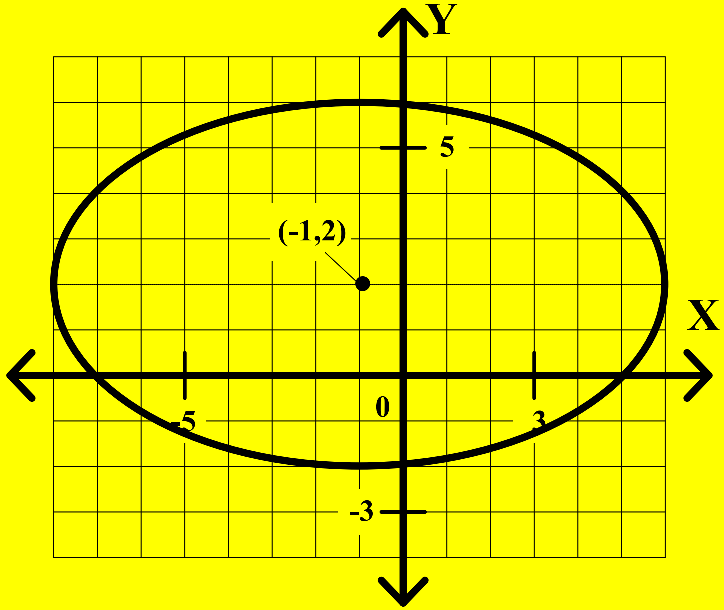

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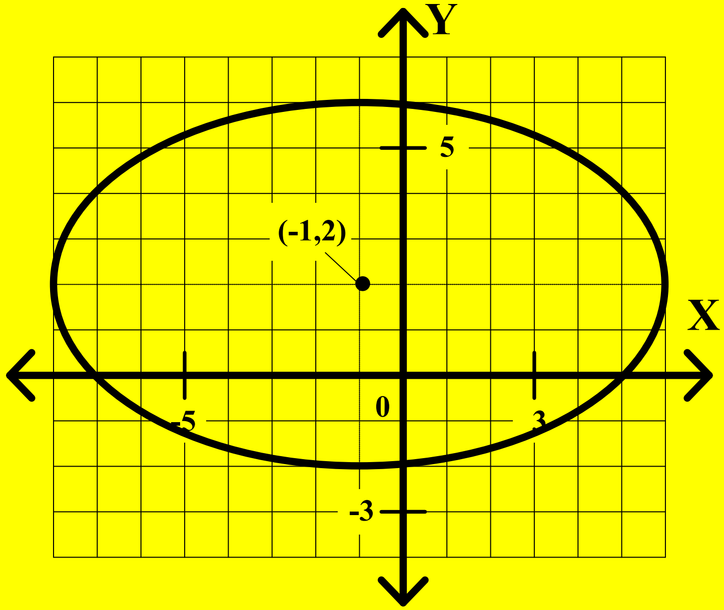

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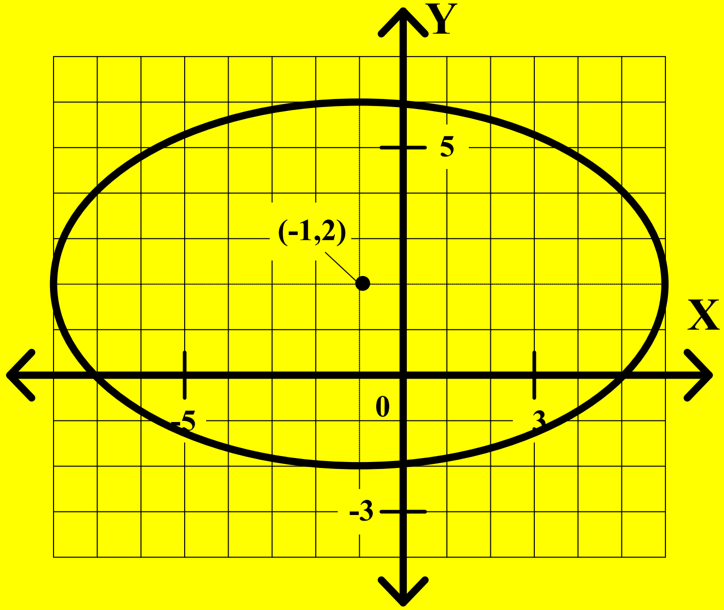

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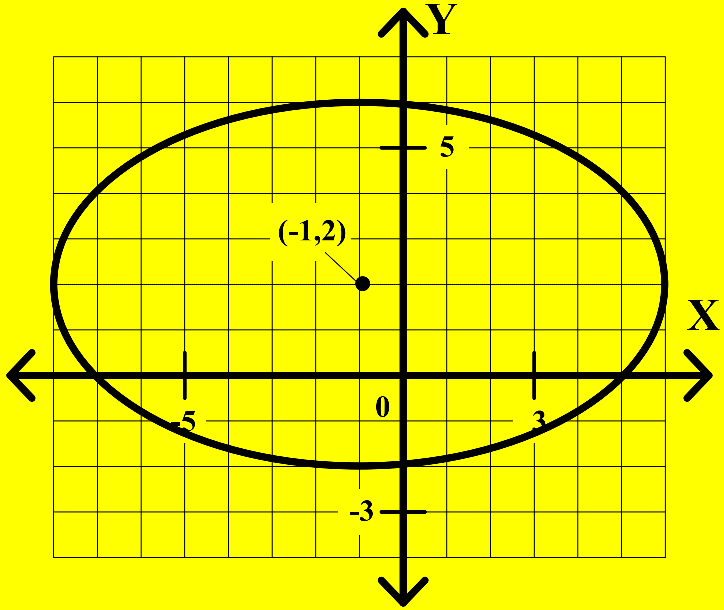

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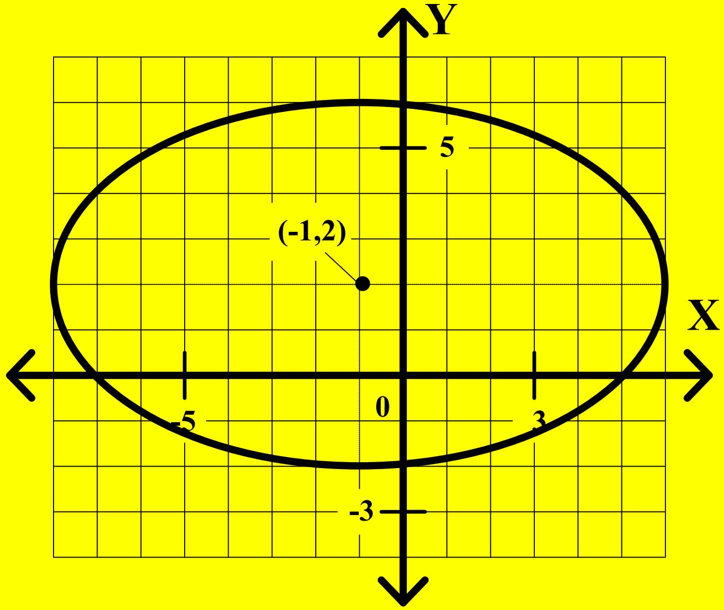

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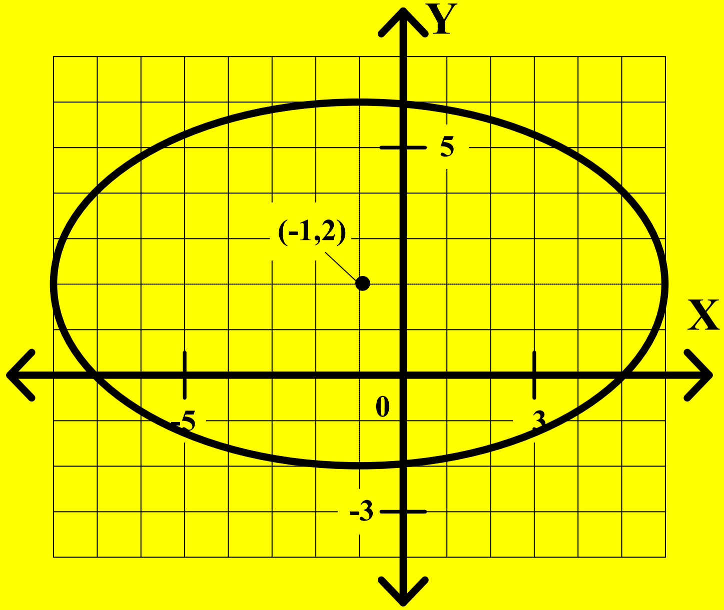

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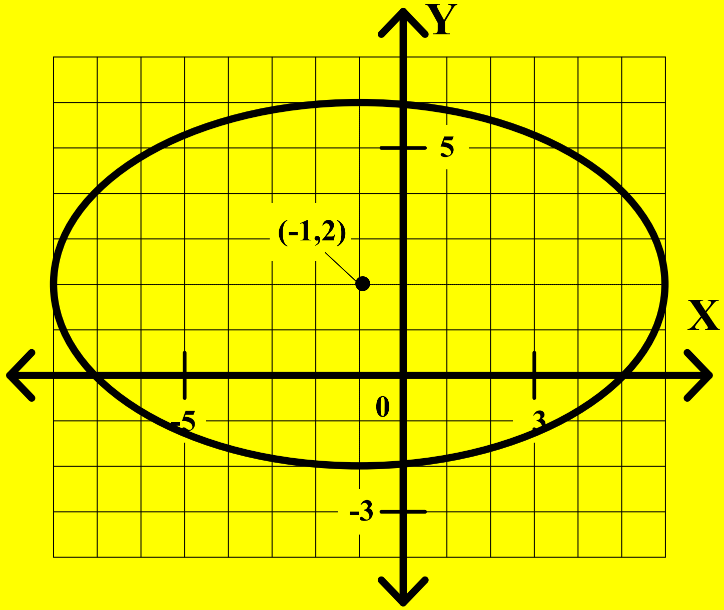

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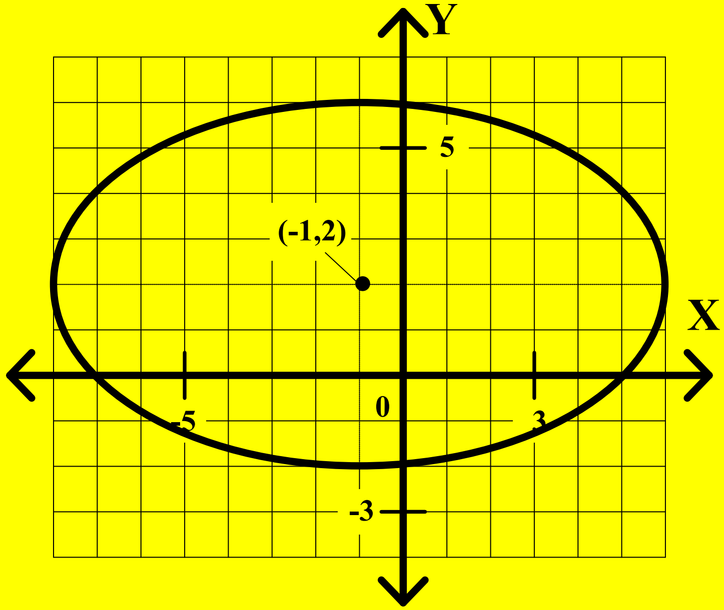

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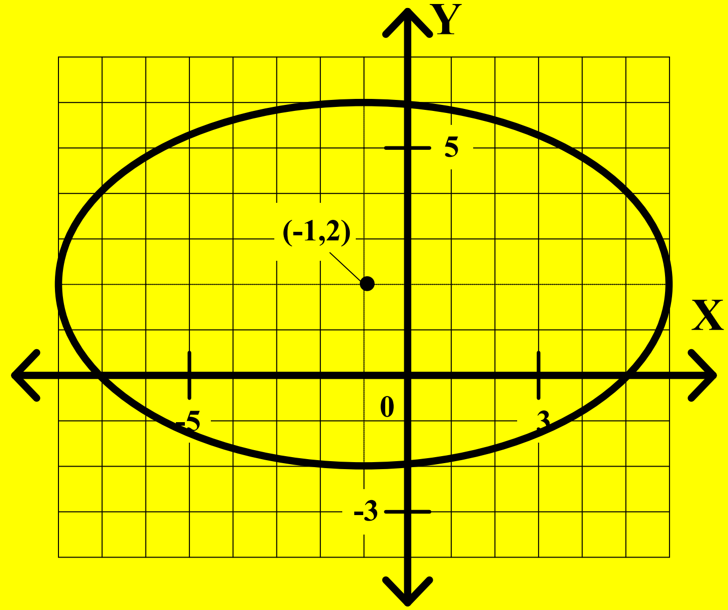

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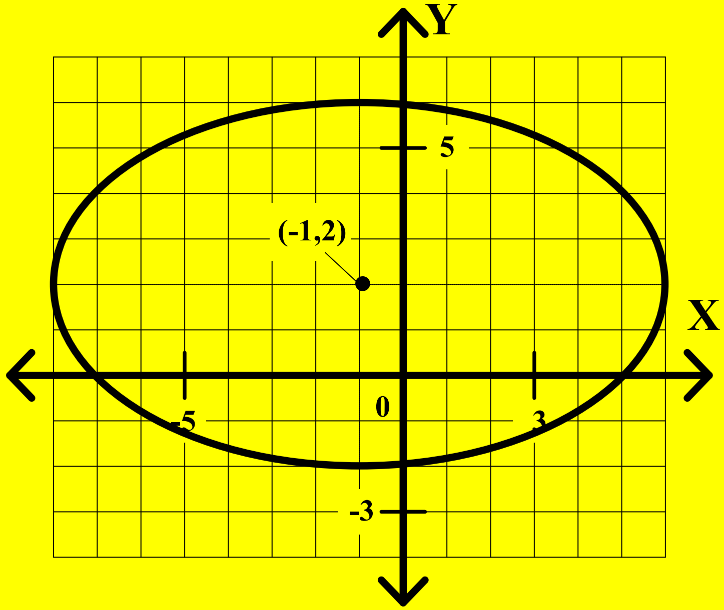

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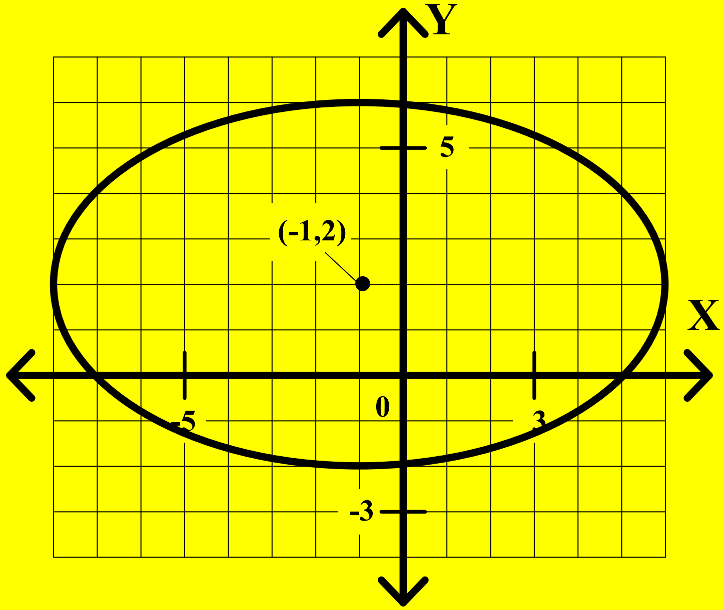

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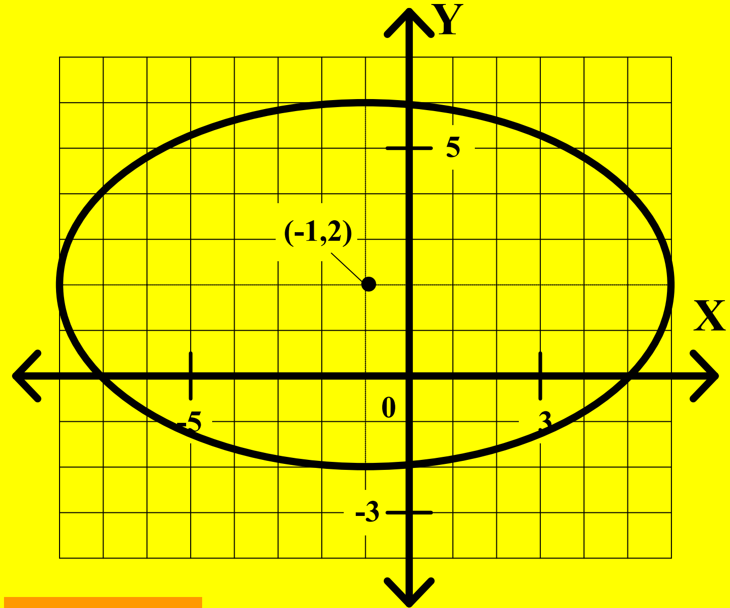

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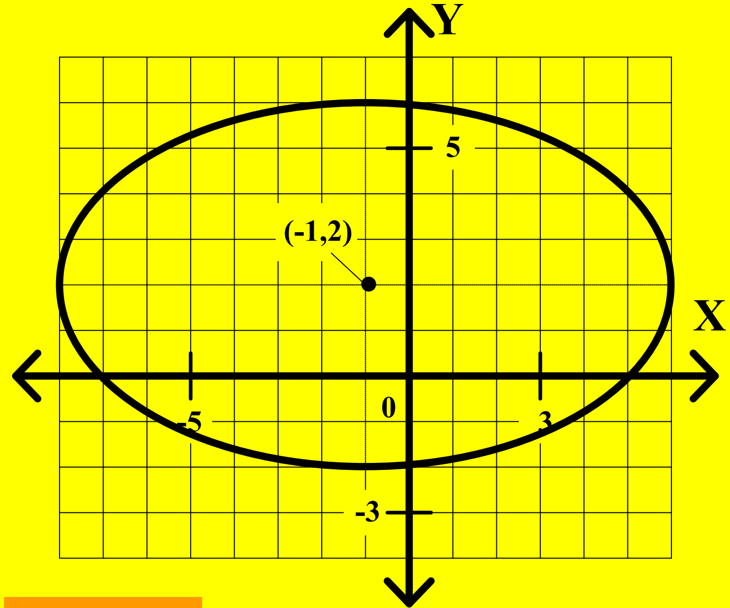

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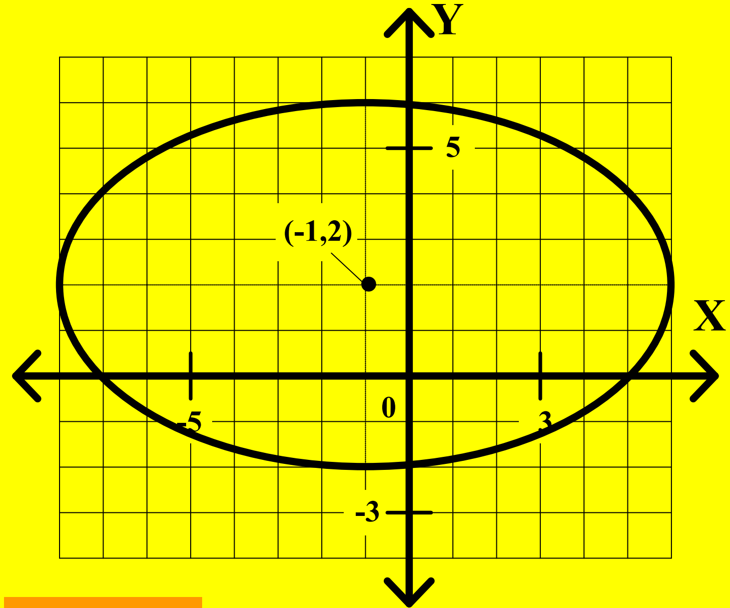

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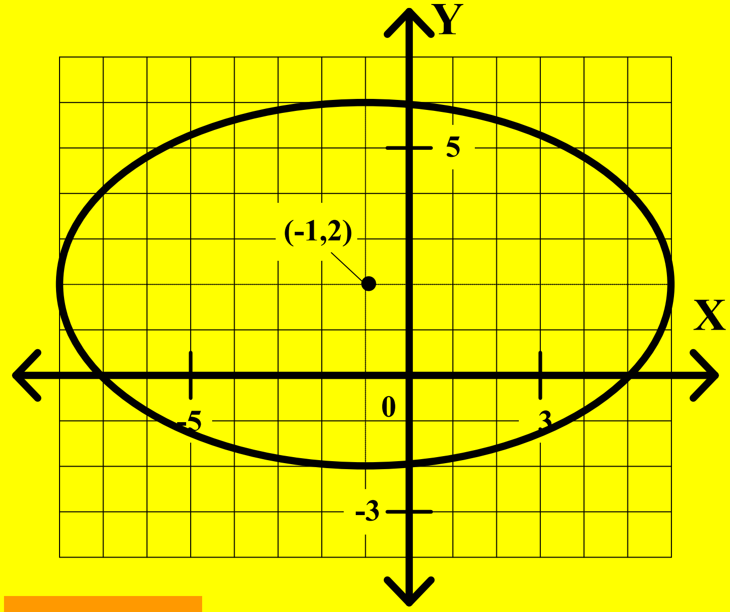

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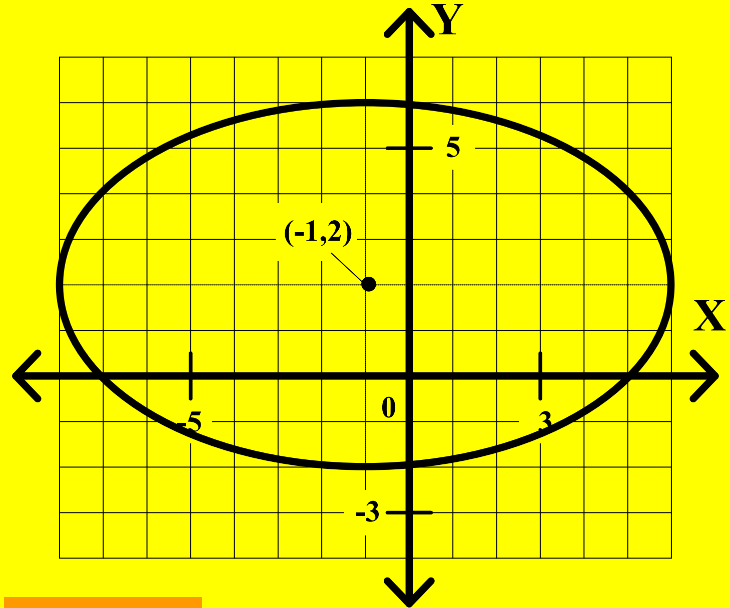

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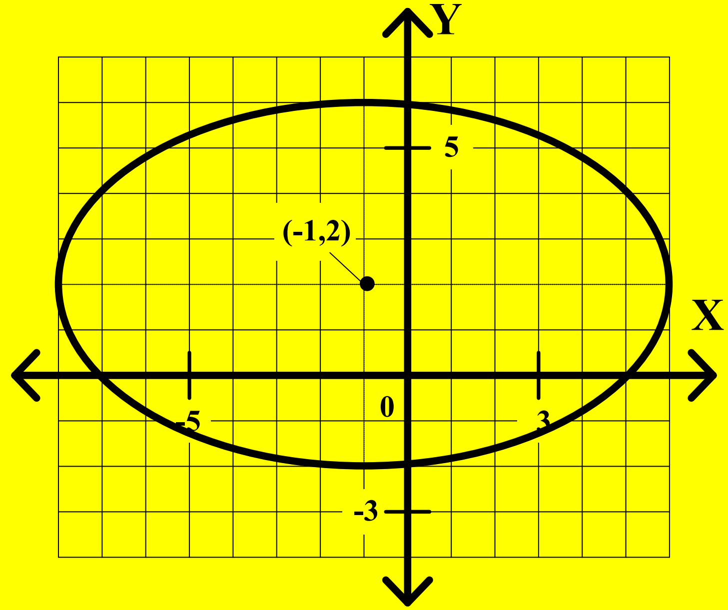

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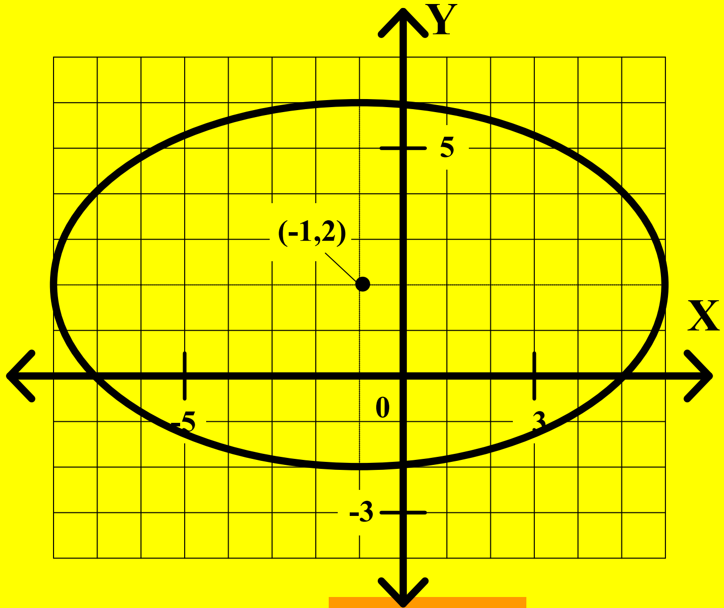

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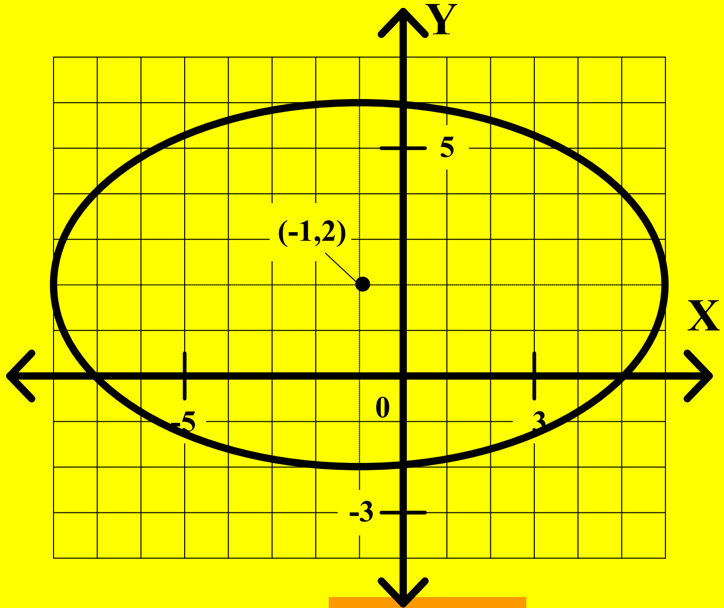

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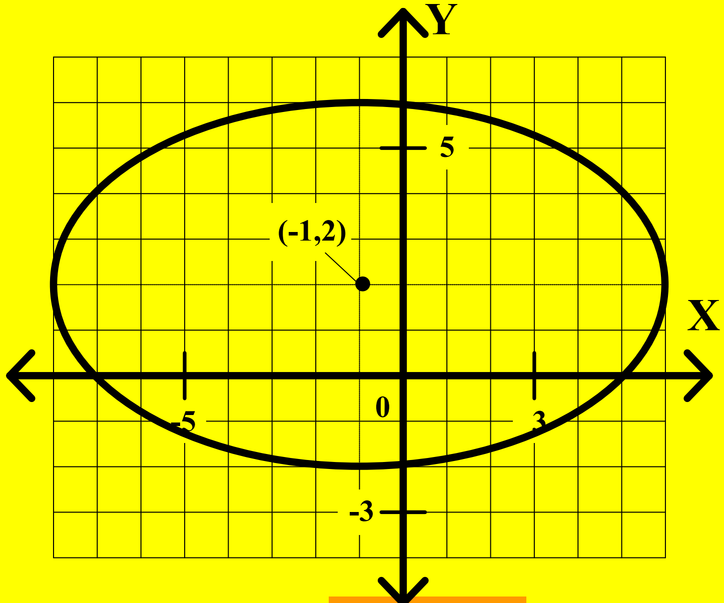

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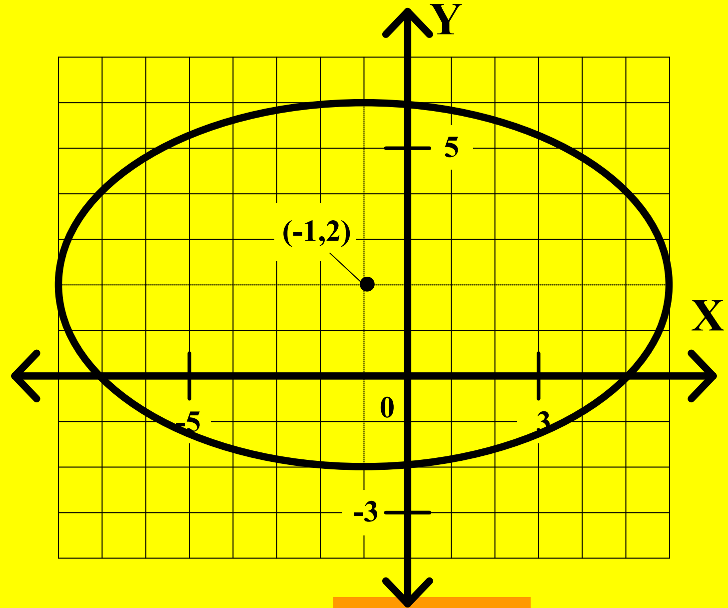

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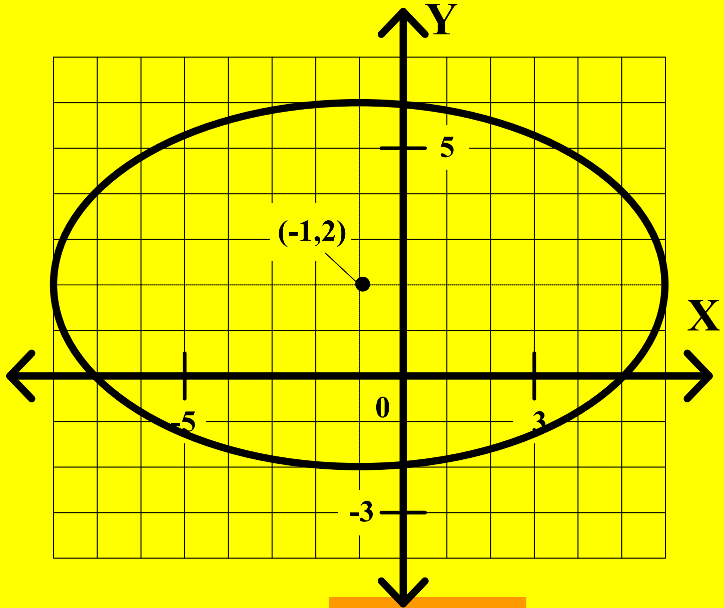

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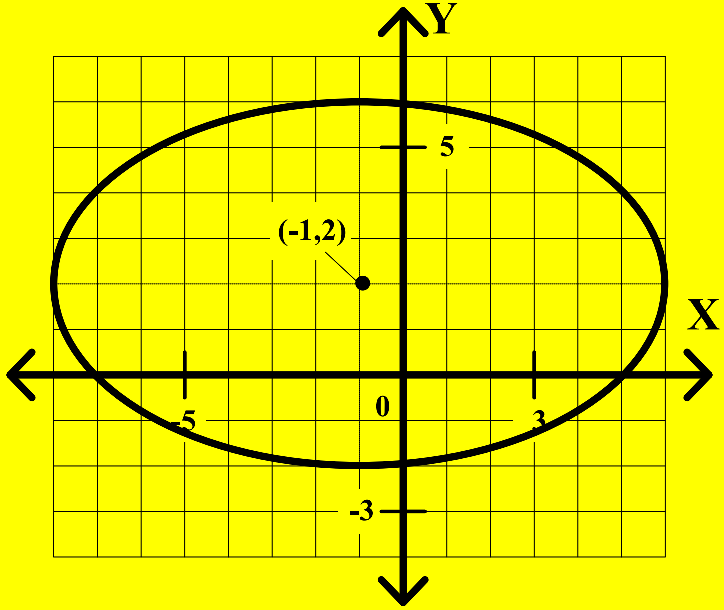

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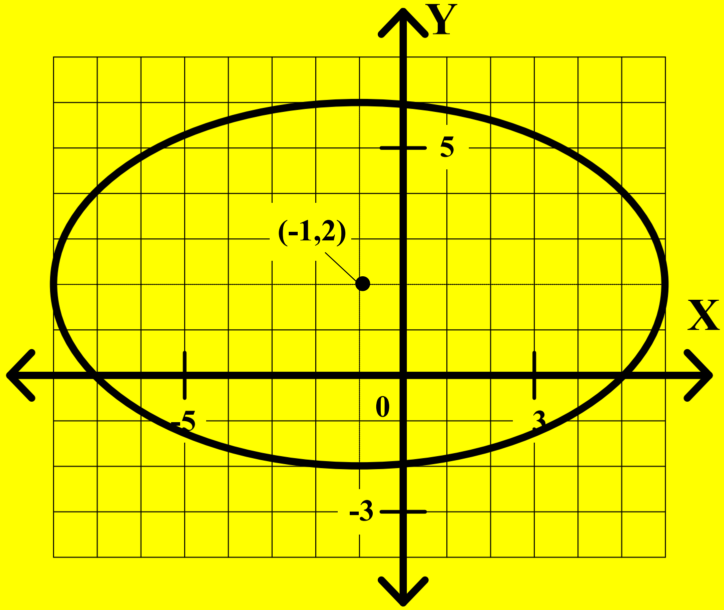

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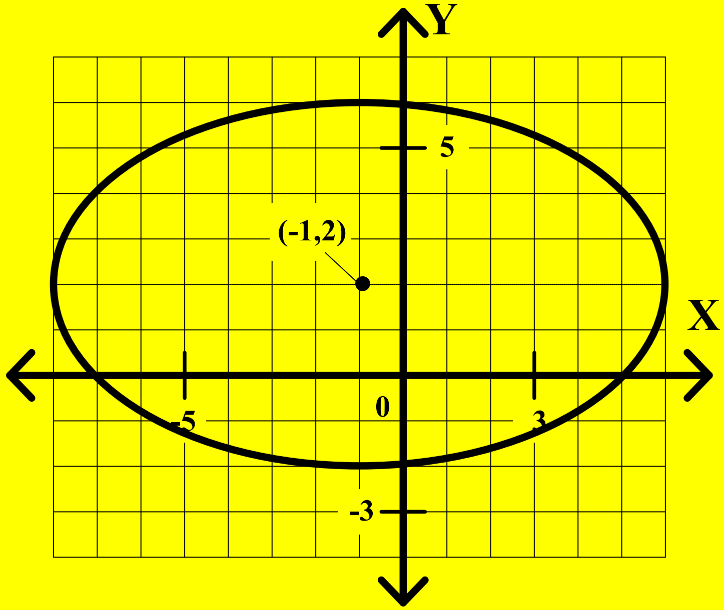

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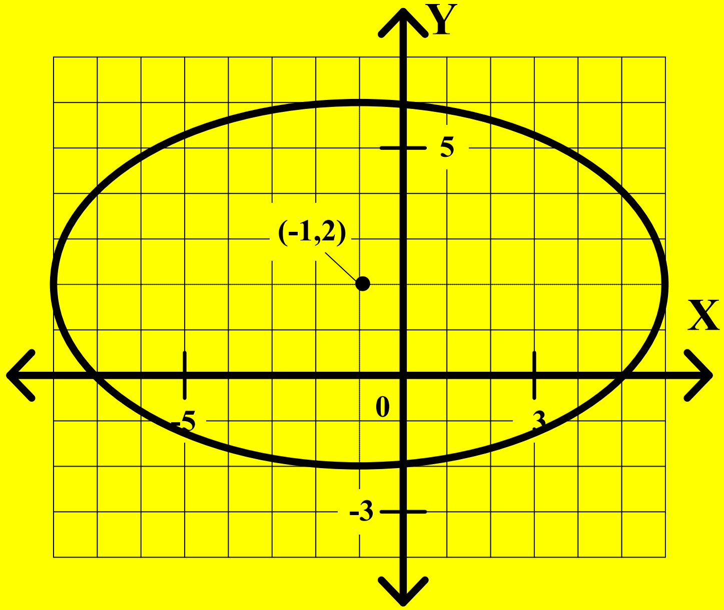

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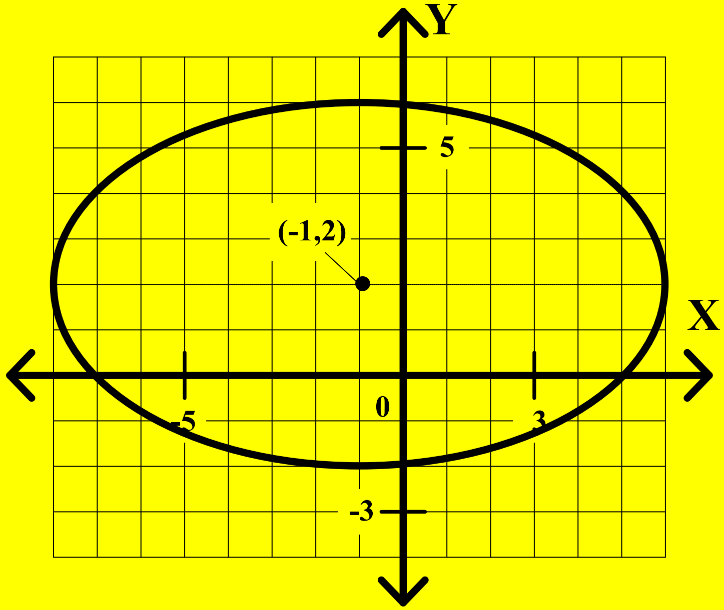

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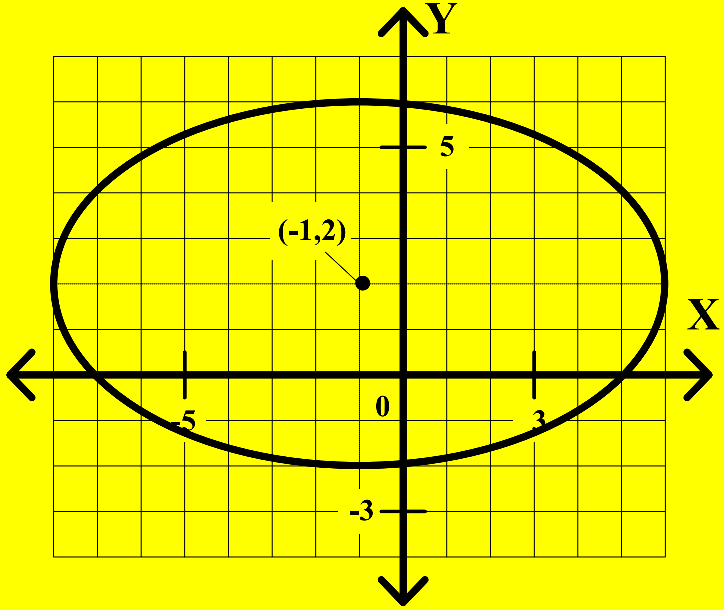

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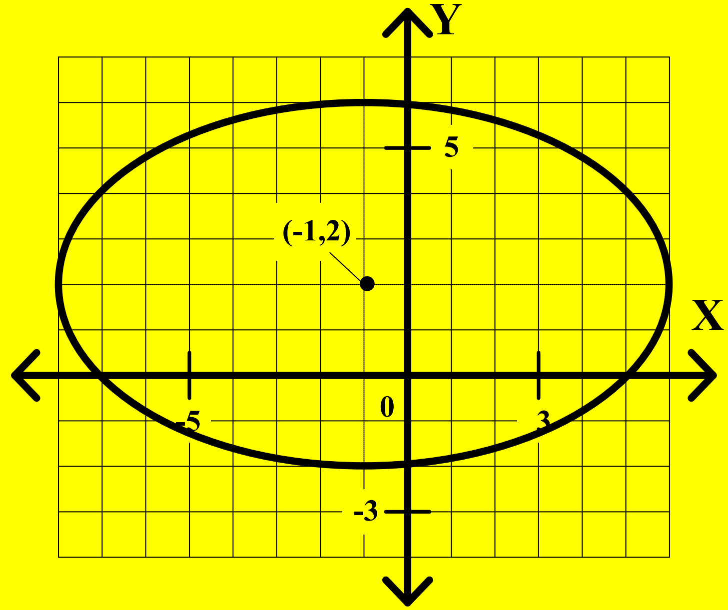

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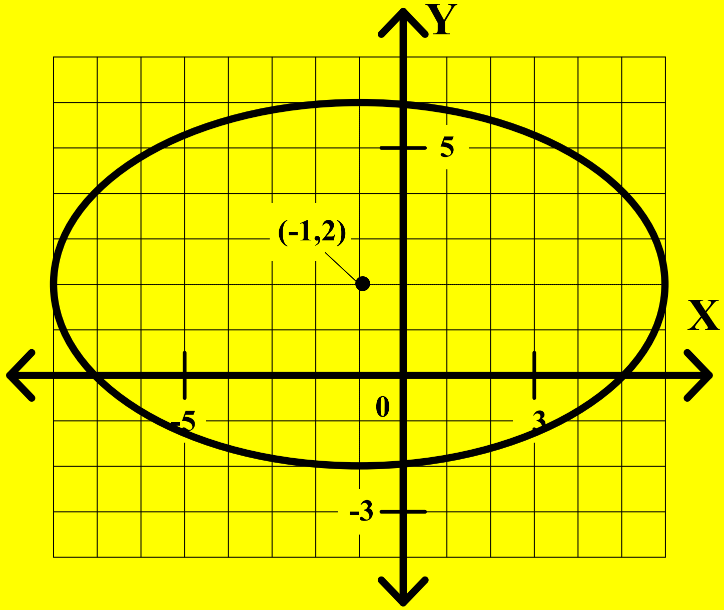

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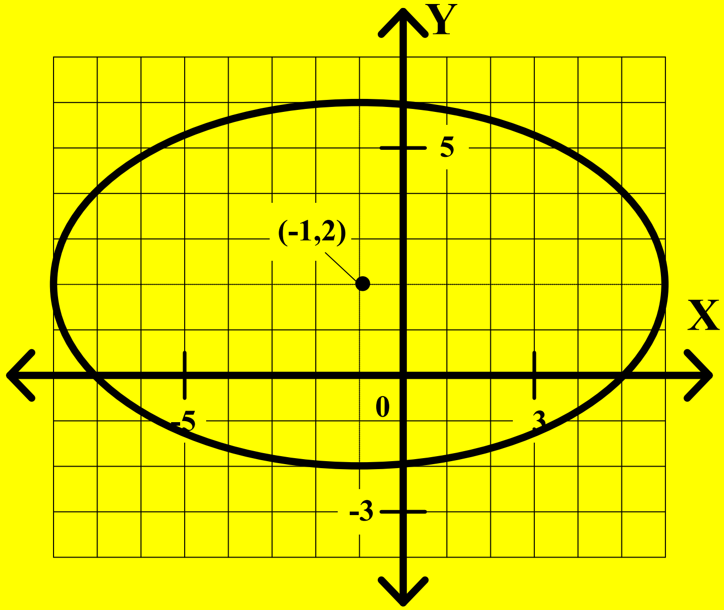

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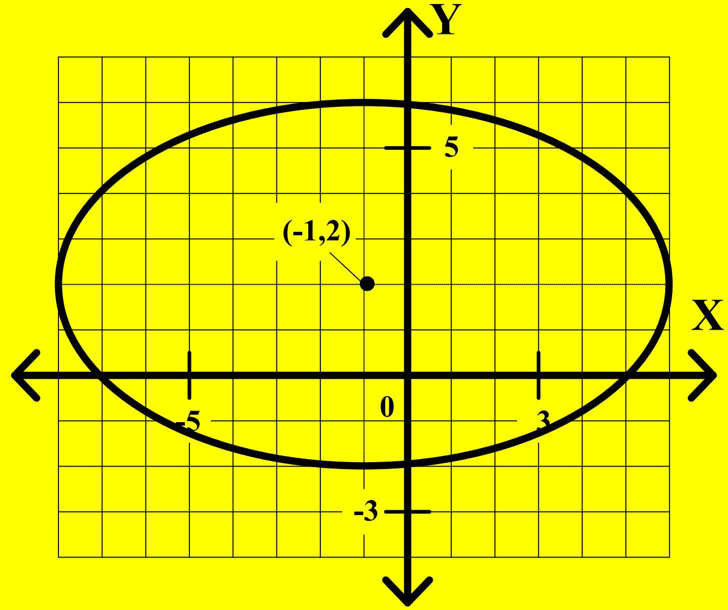

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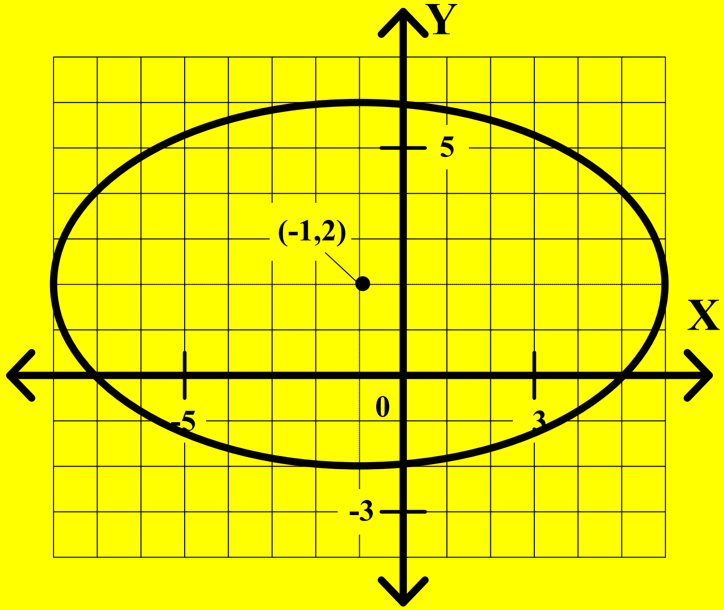

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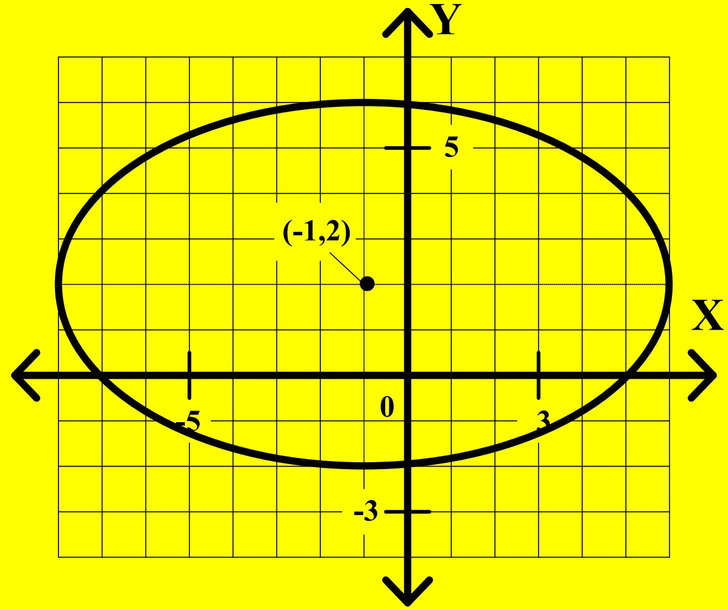

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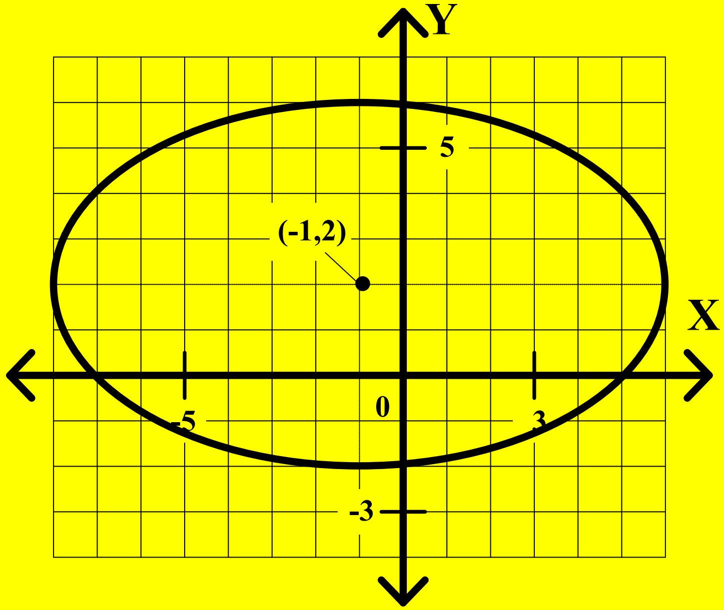

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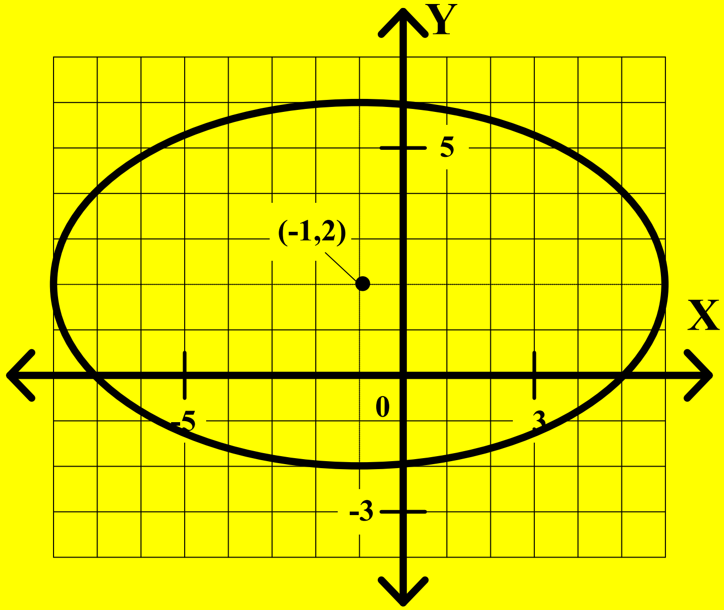

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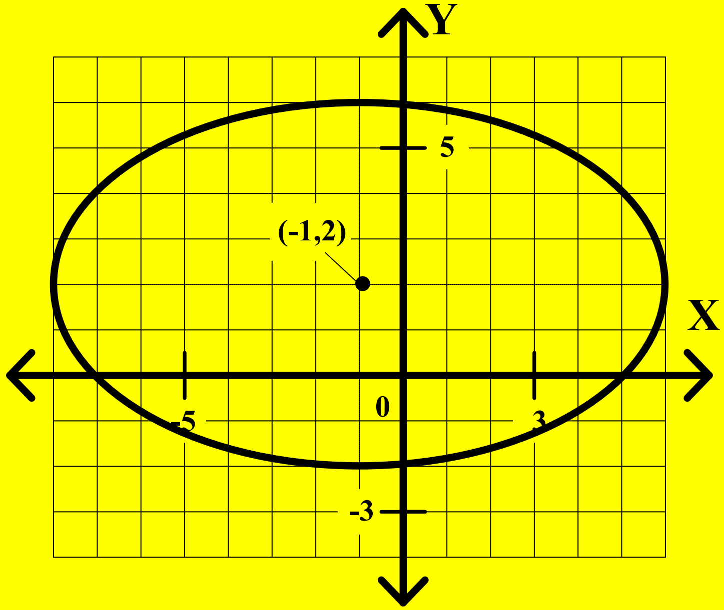

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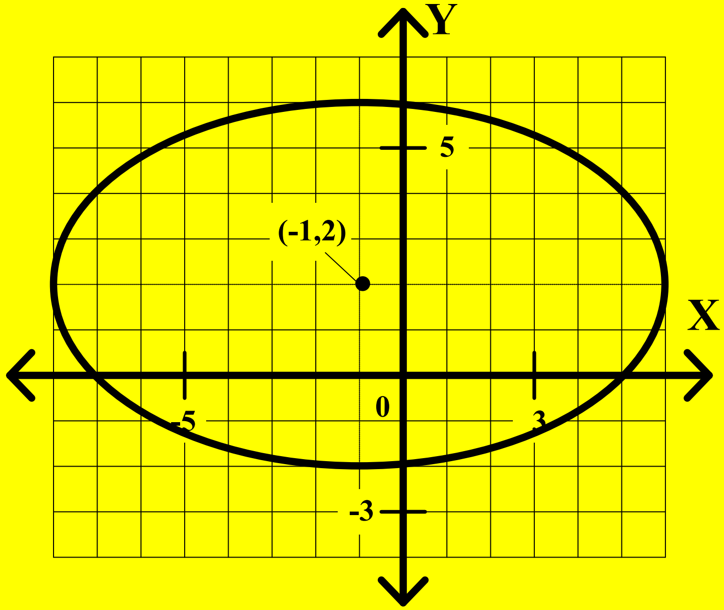

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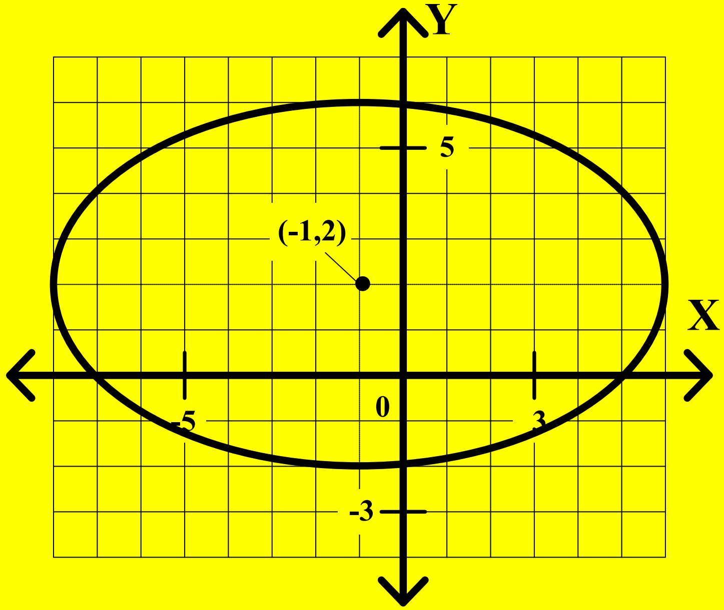

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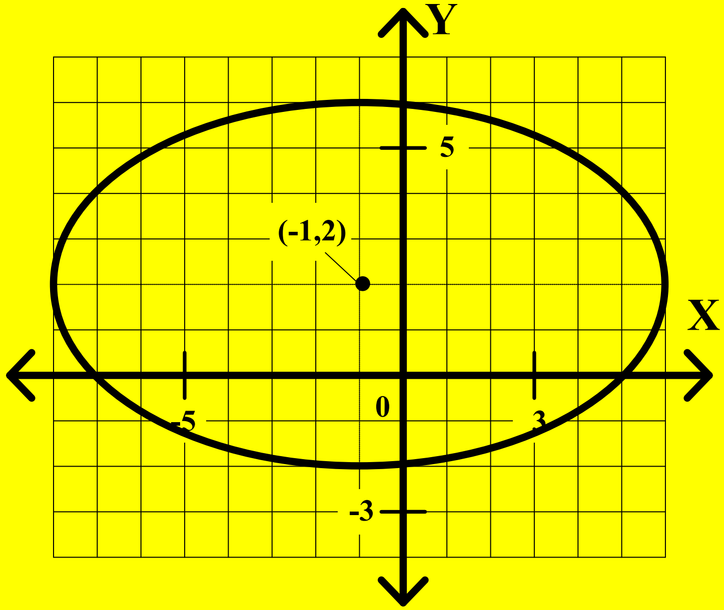

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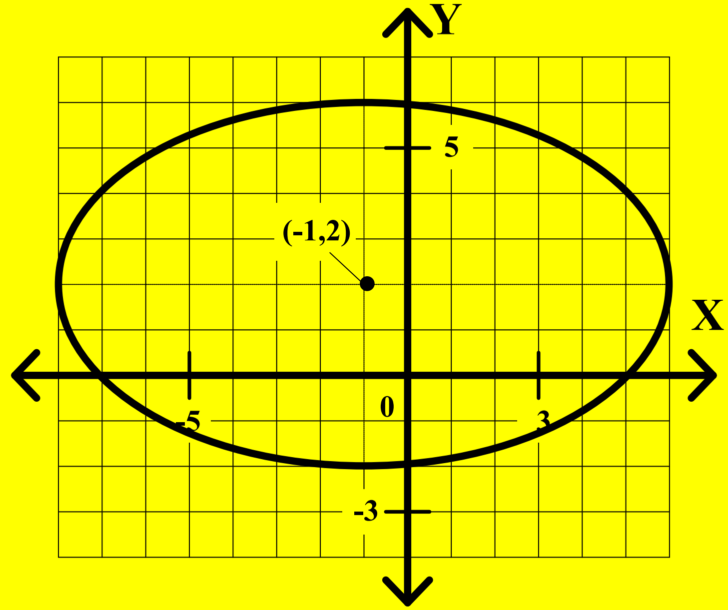

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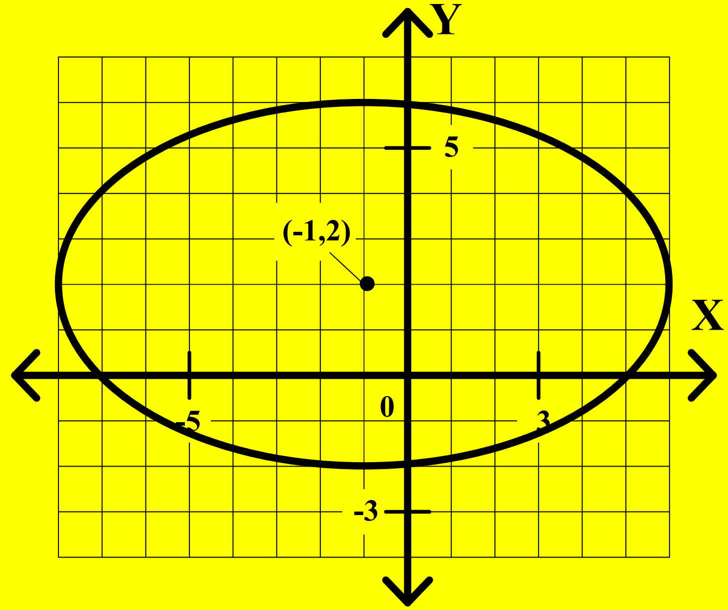

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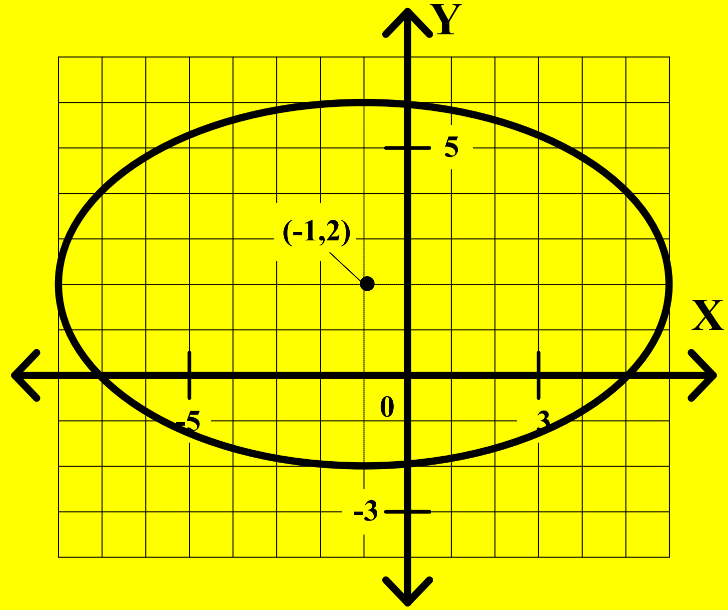

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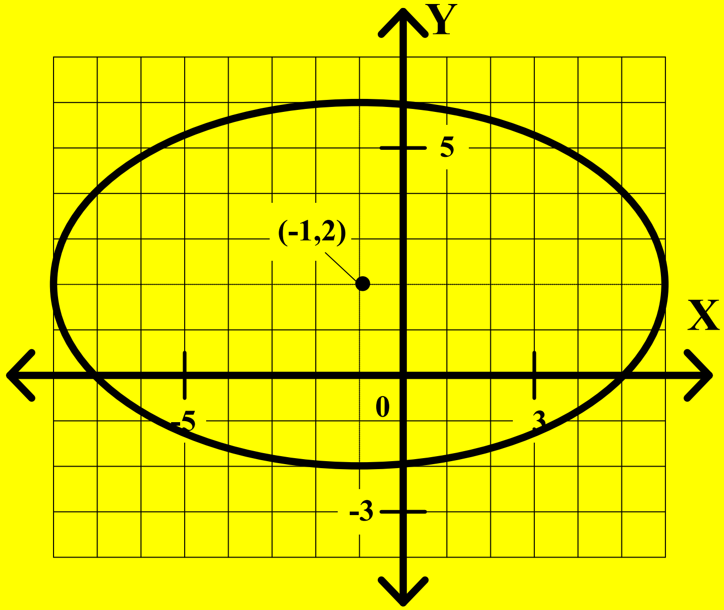

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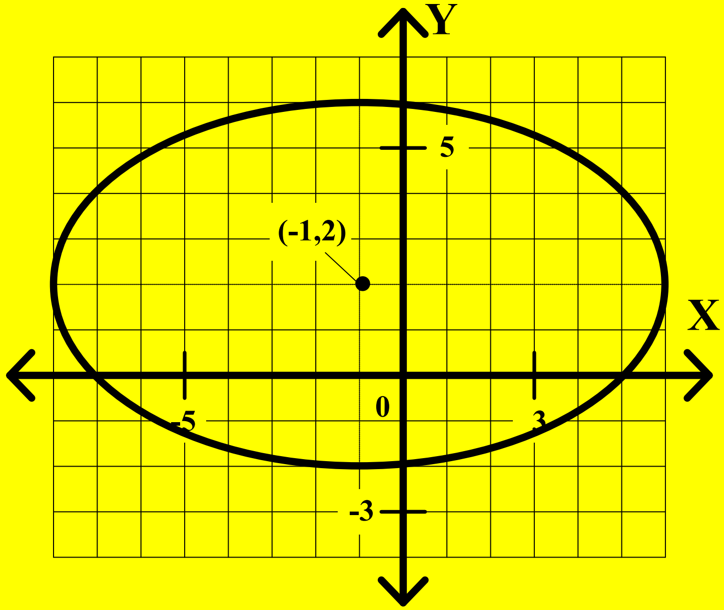

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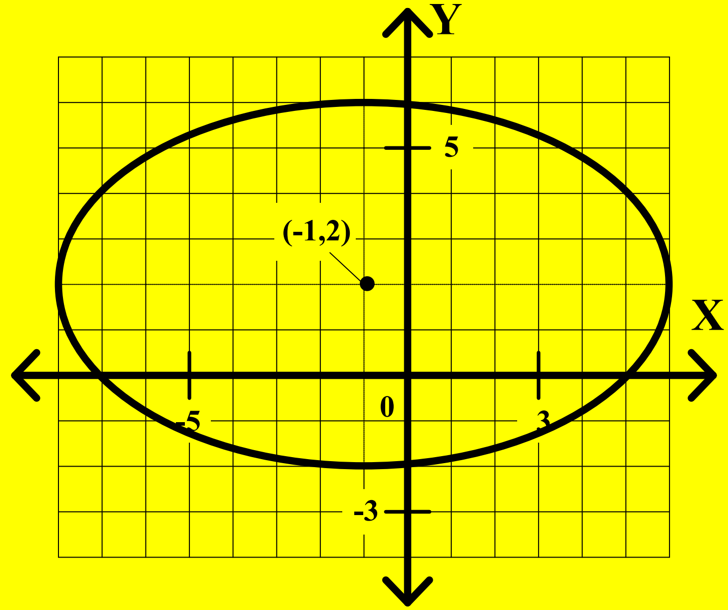

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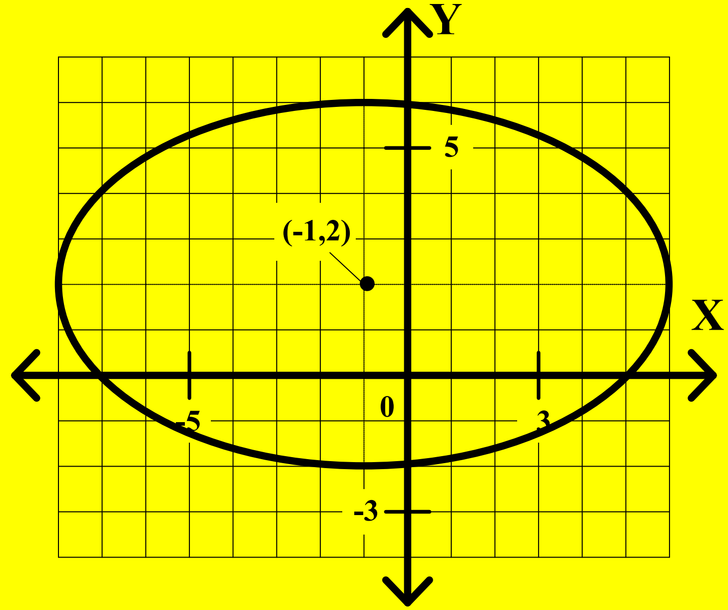

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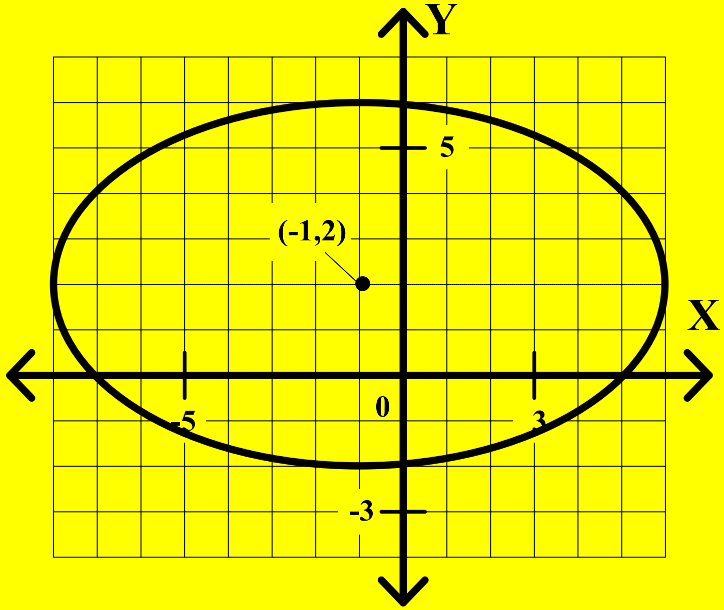

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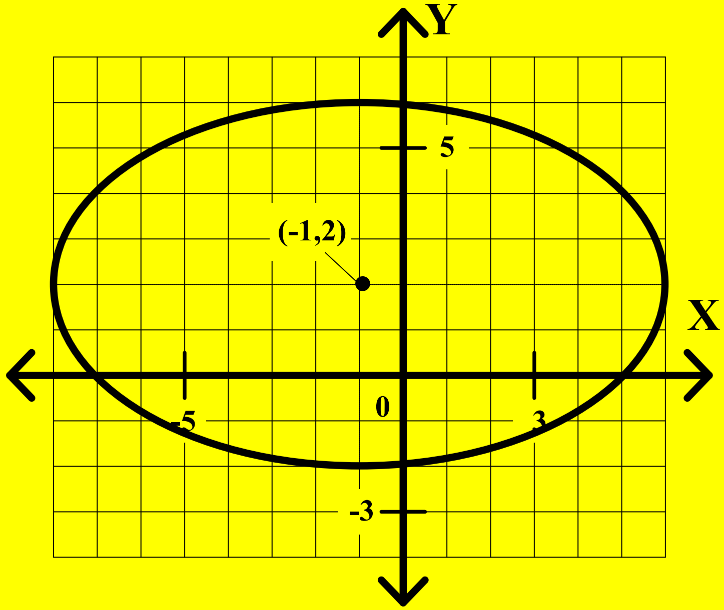

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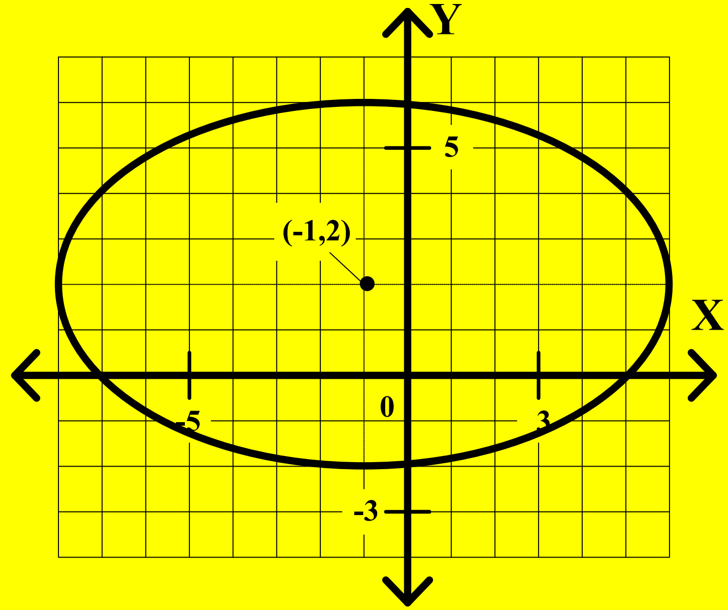

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Step 5: Subtract 784 from both sides.

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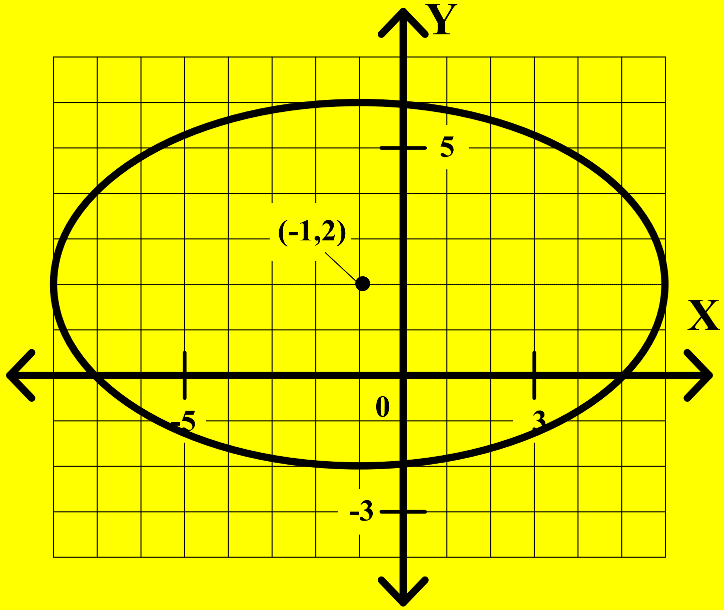

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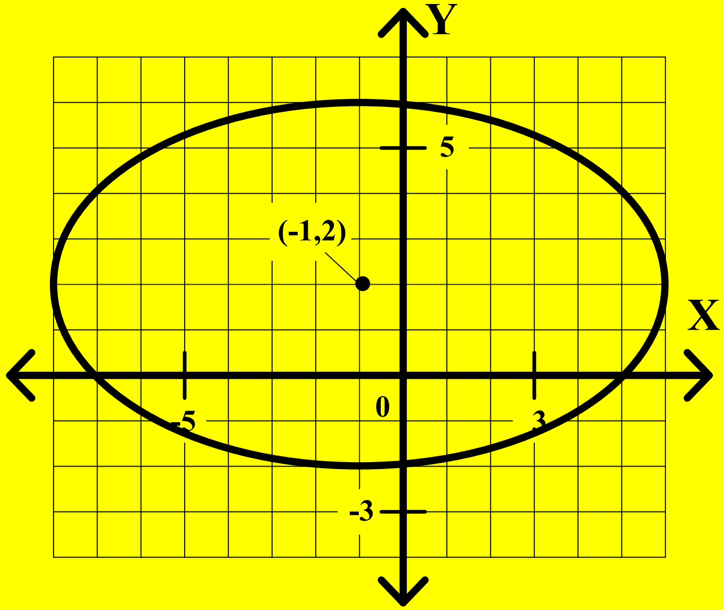

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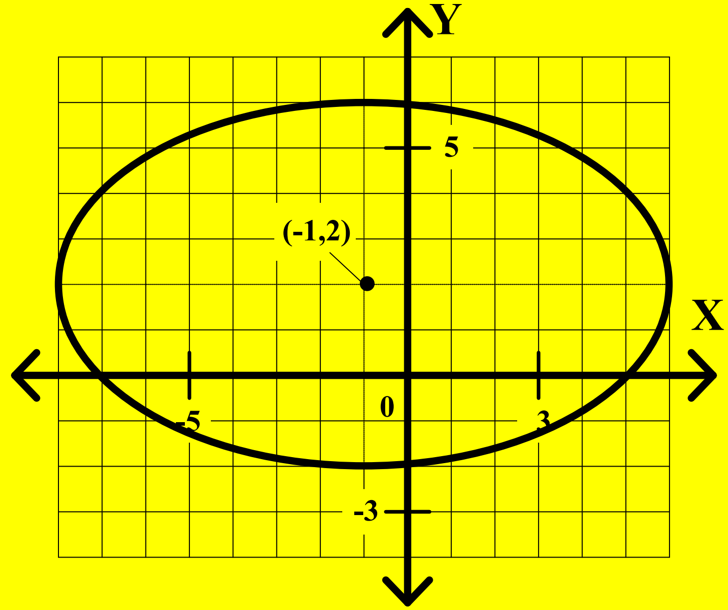

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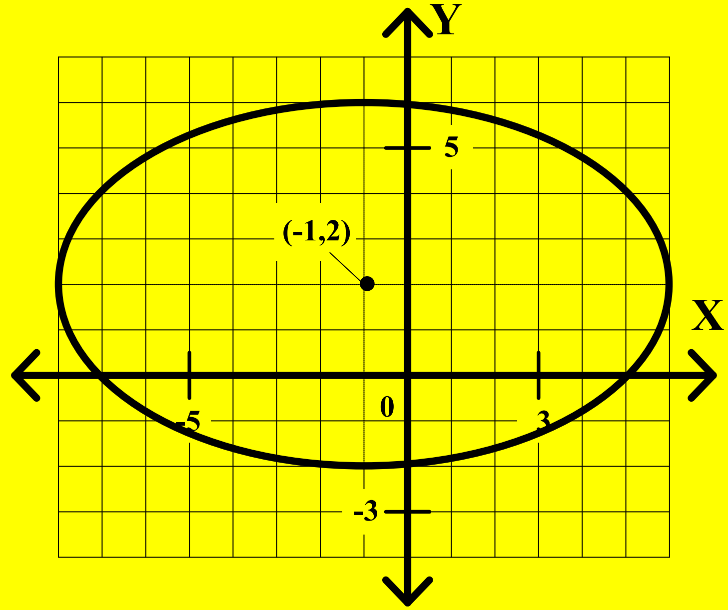

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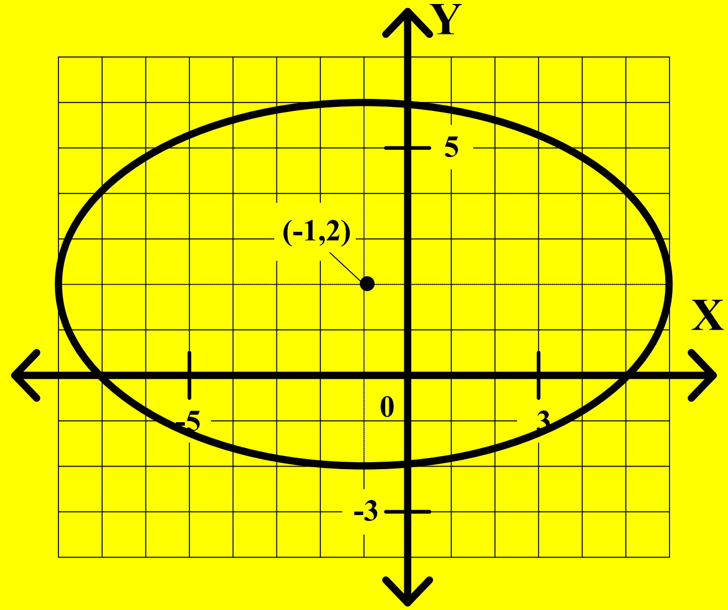

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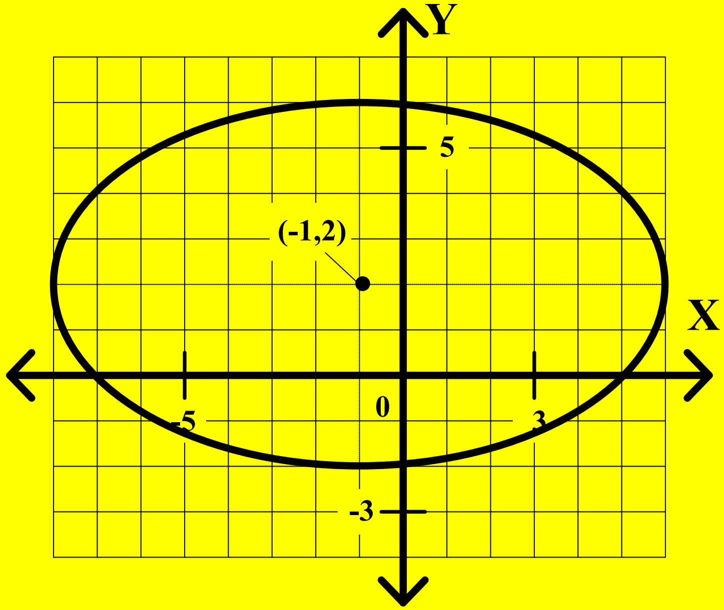

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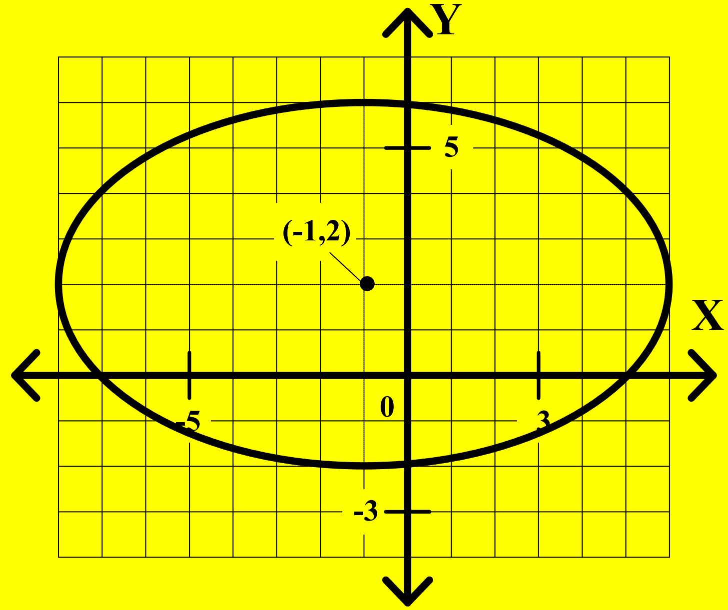

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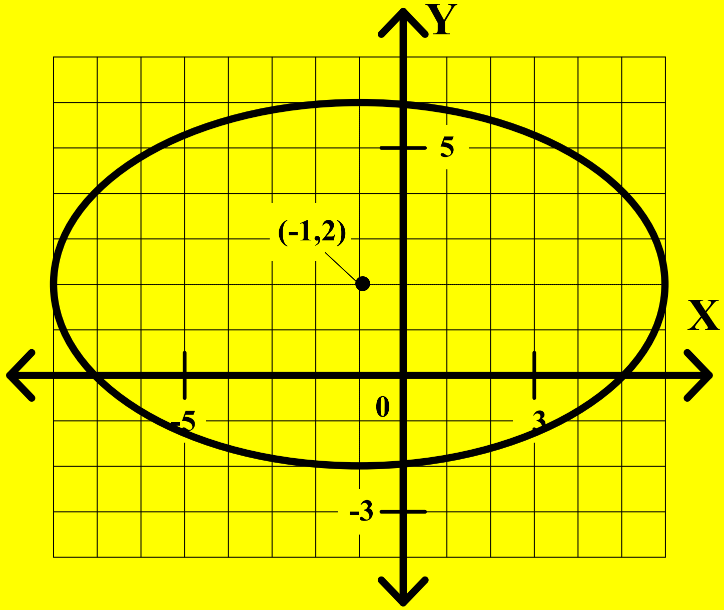

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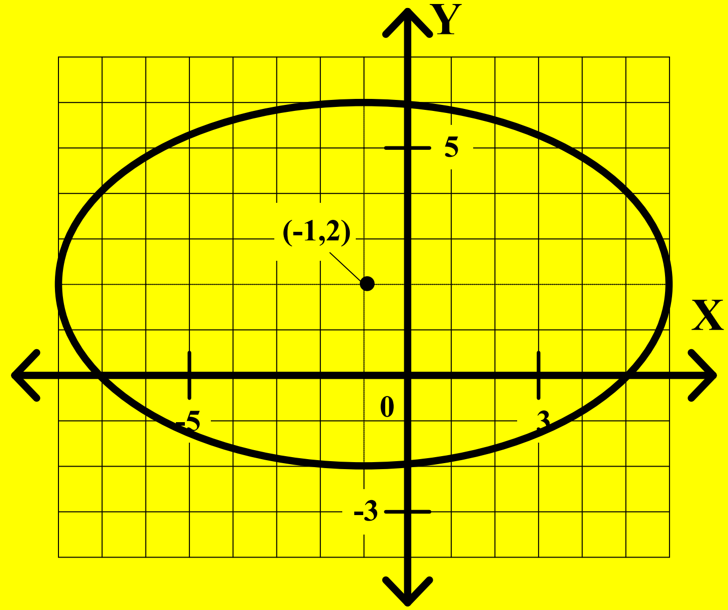

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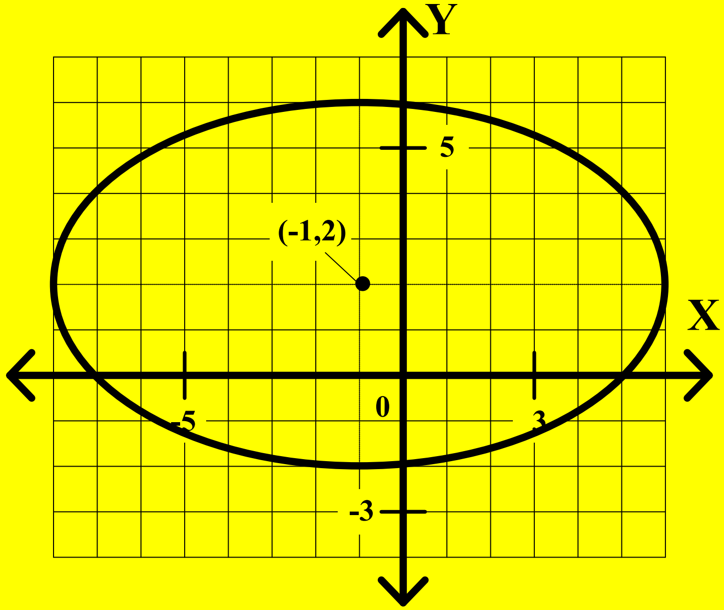

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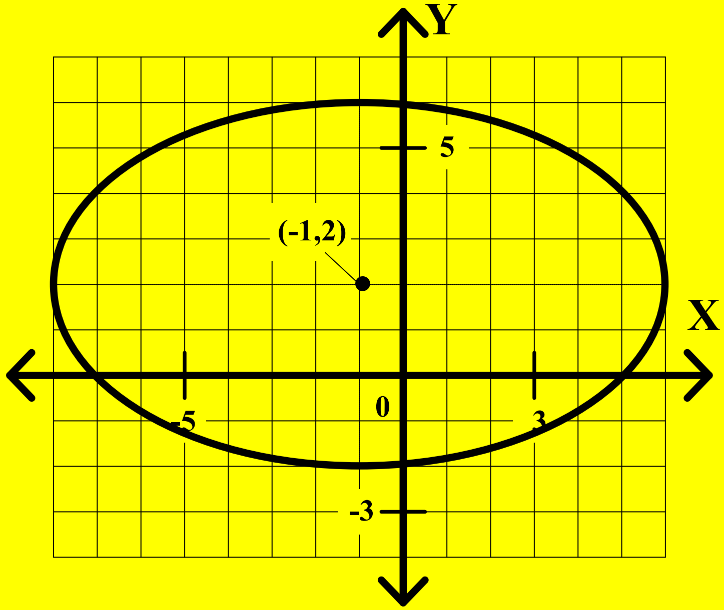

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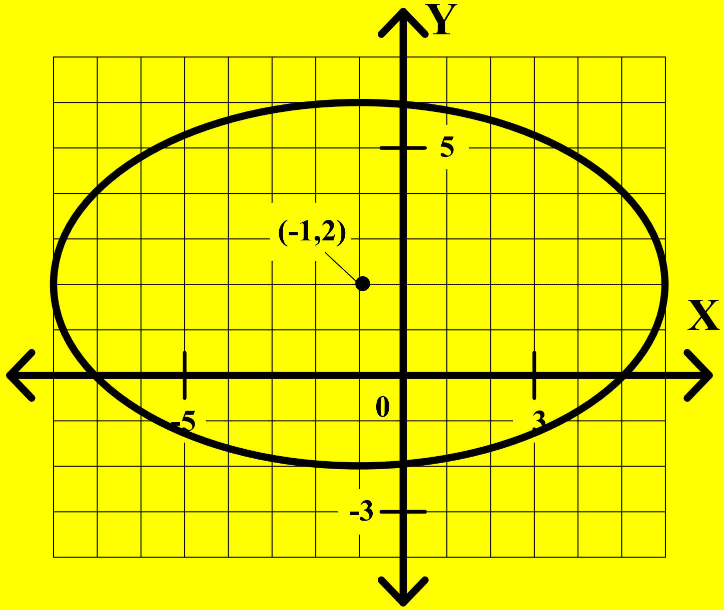

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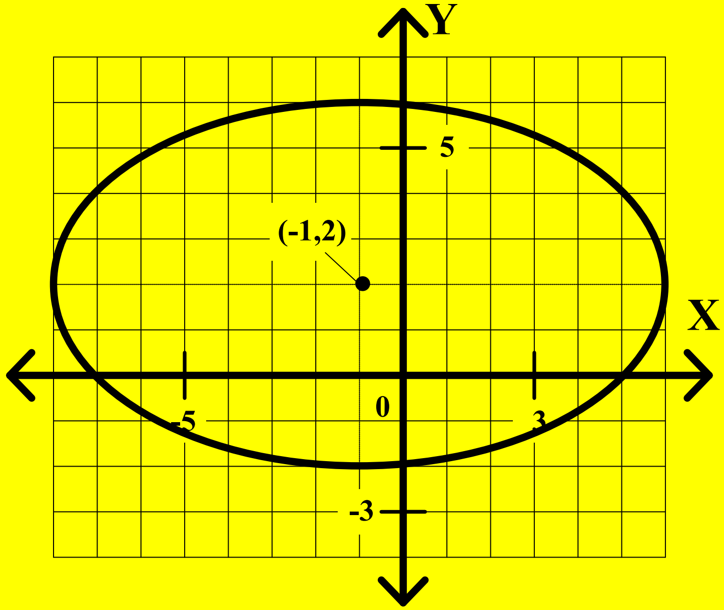

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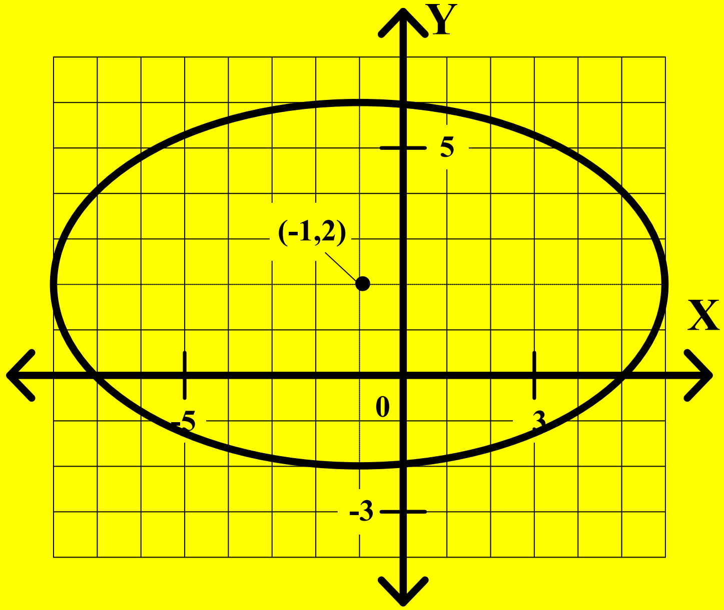

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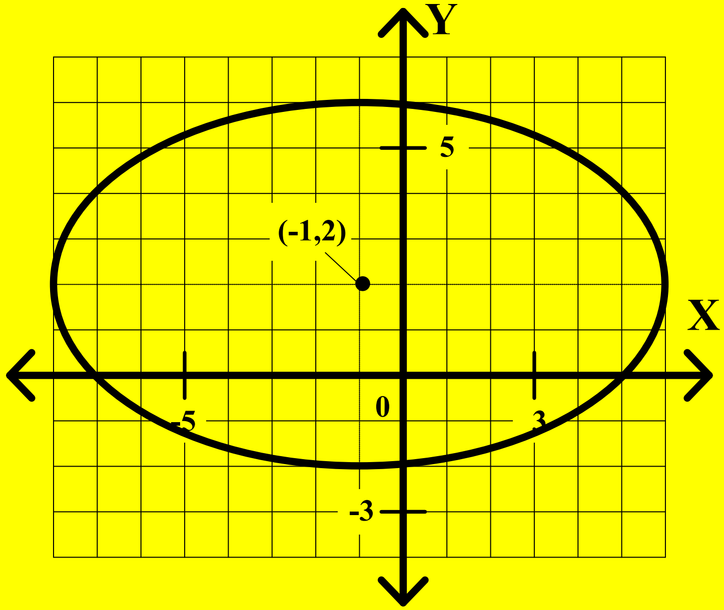

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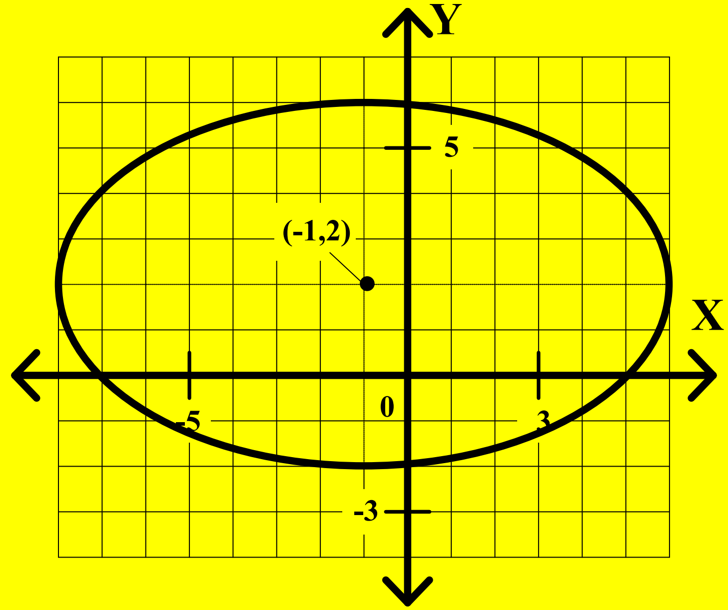

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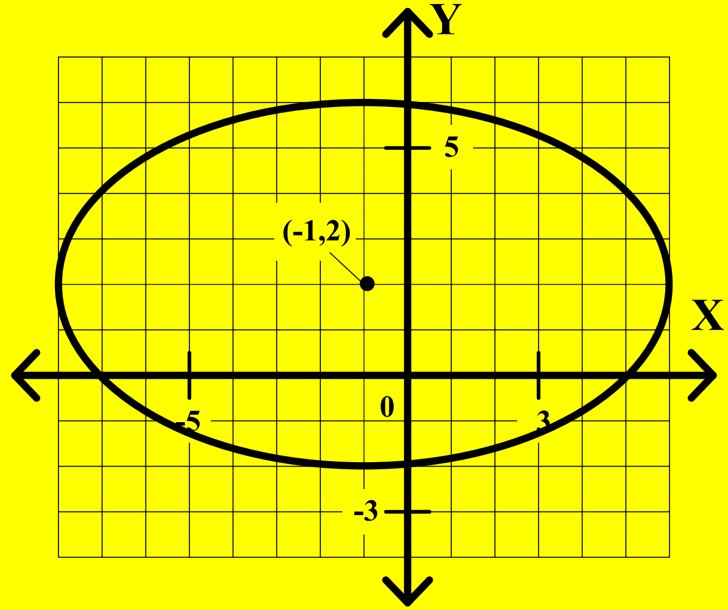

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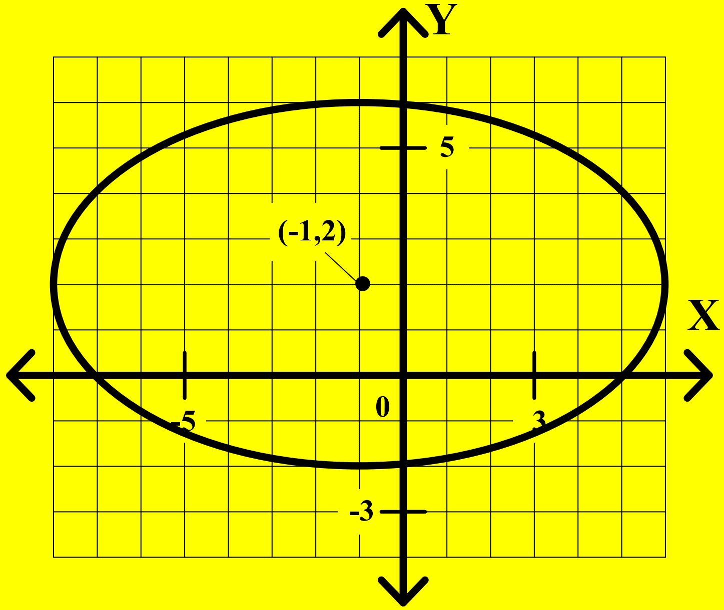

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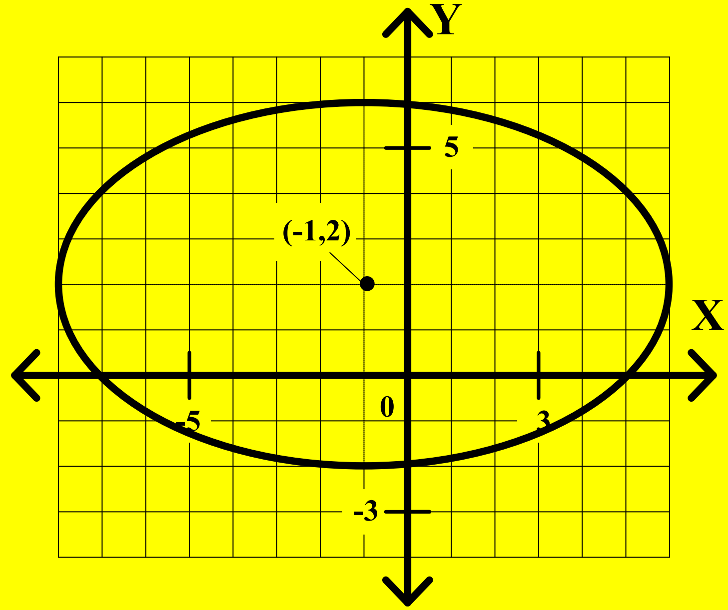

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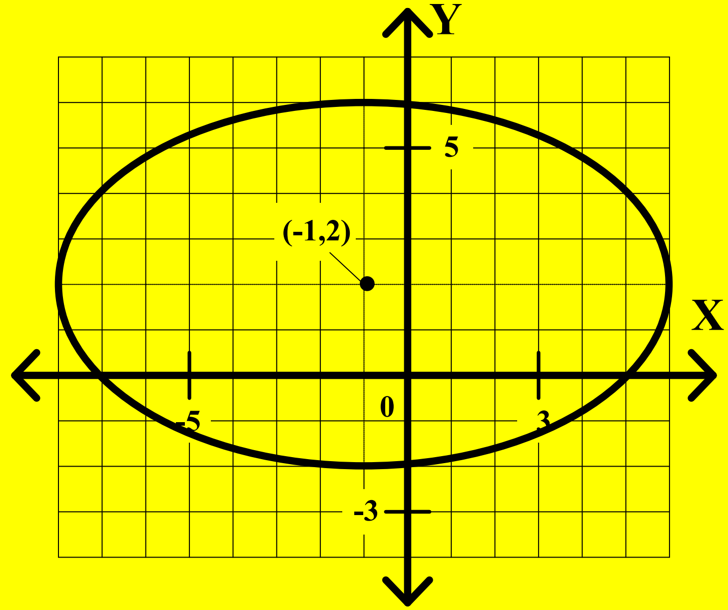

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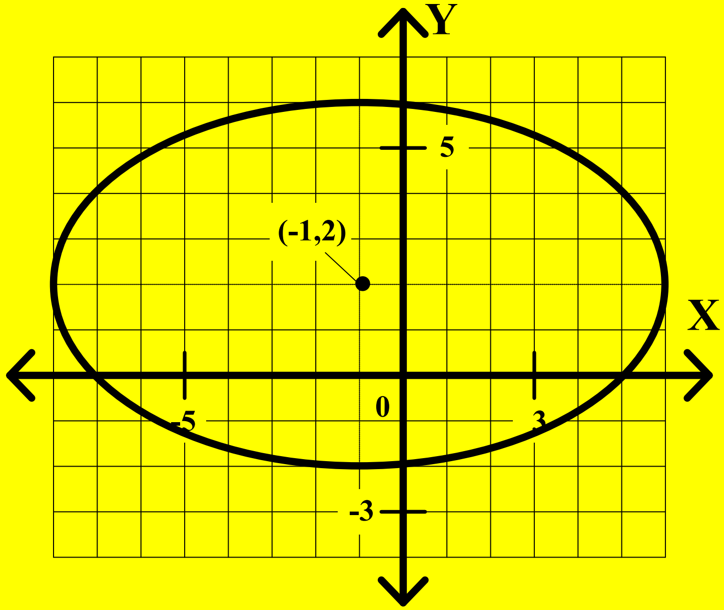

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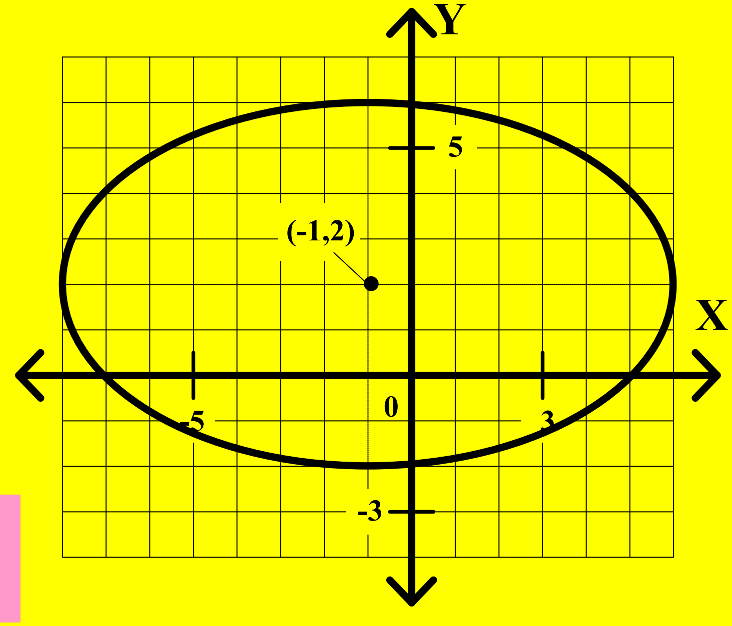

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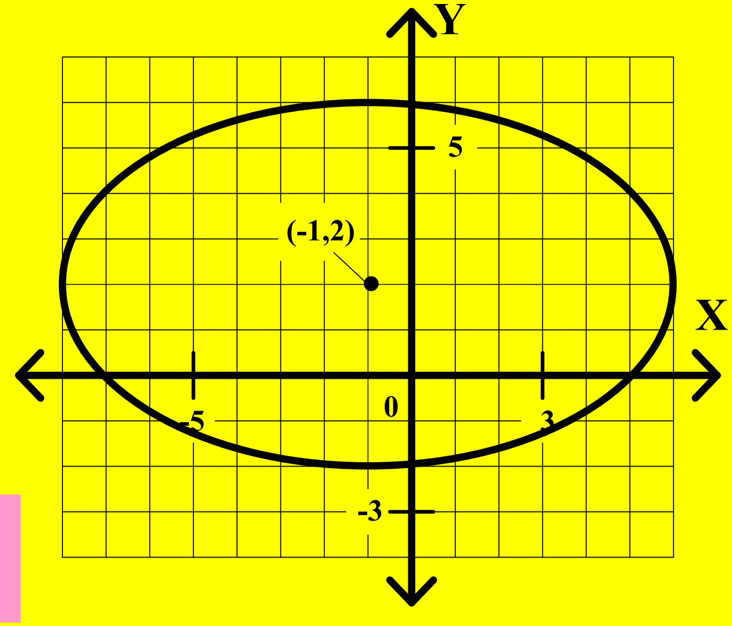

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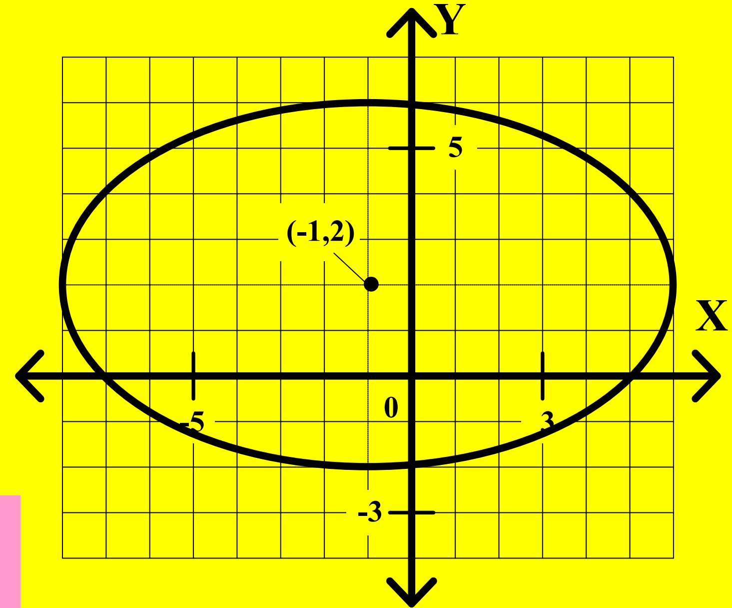

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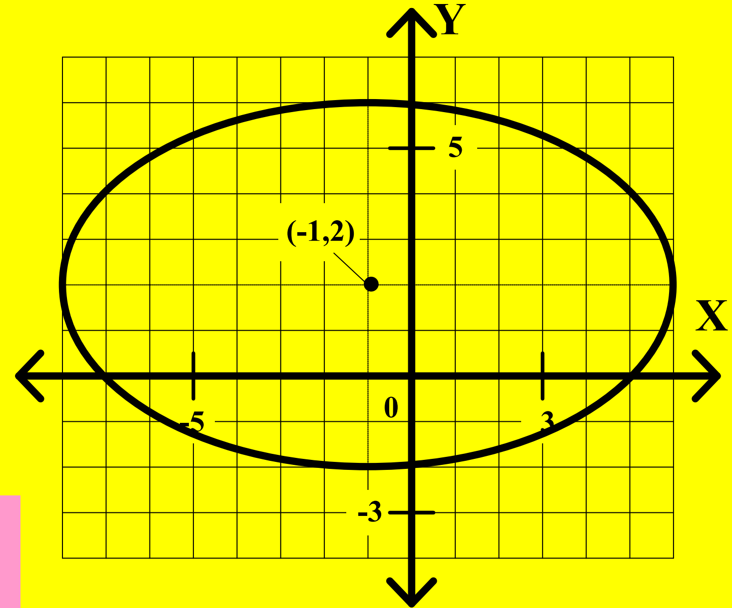

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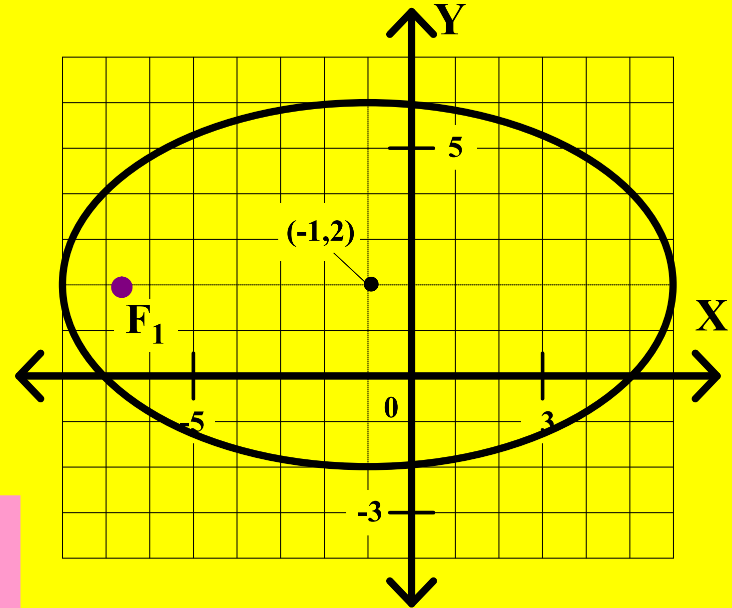

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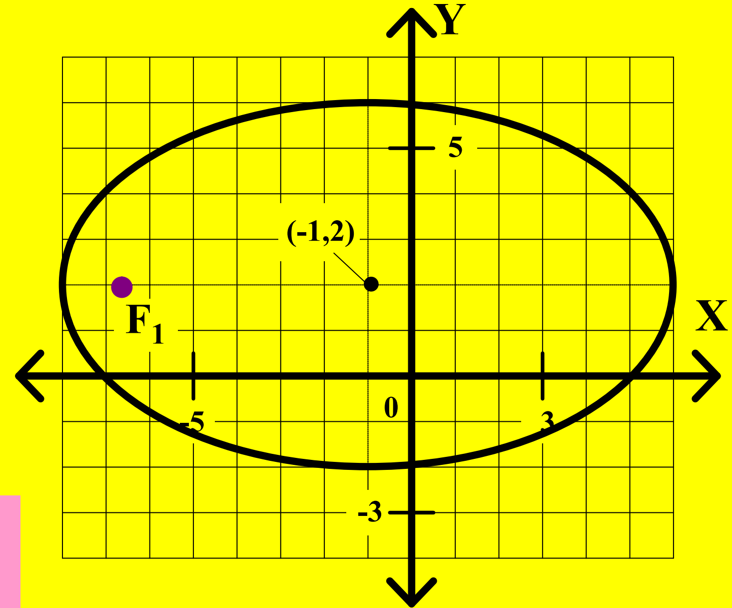

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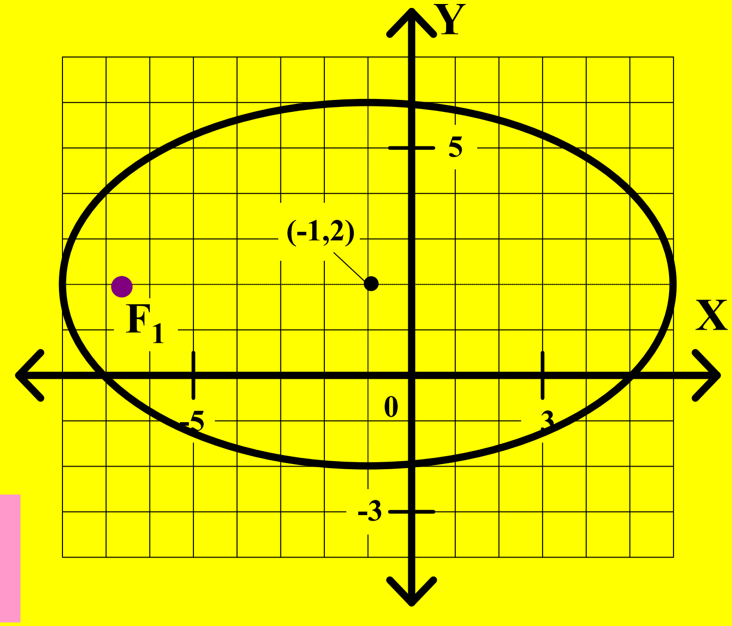

General Form Equation

$$16x^2 + 49y^2 + 32x - 196y - 572 = 0$$

$F_1(-1 - \sqrt{33}, 2)$ $F_2(-1$

Each focus is on the major axis, c units from the center where

$$c = \sqrt{a^2 - b^2}$$

$$c = \sqrt{49 - 16} = \sqrt{33} \approx 5.7$$

Class Worksheet #2

Write the equation in standard form and the equation in general form for each ellipse. Then locate and label foci F_1 and F_2.

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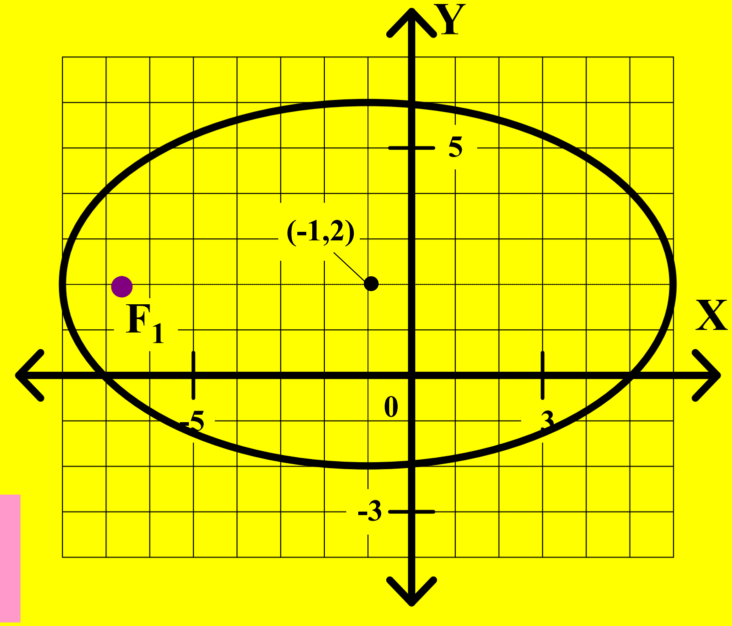

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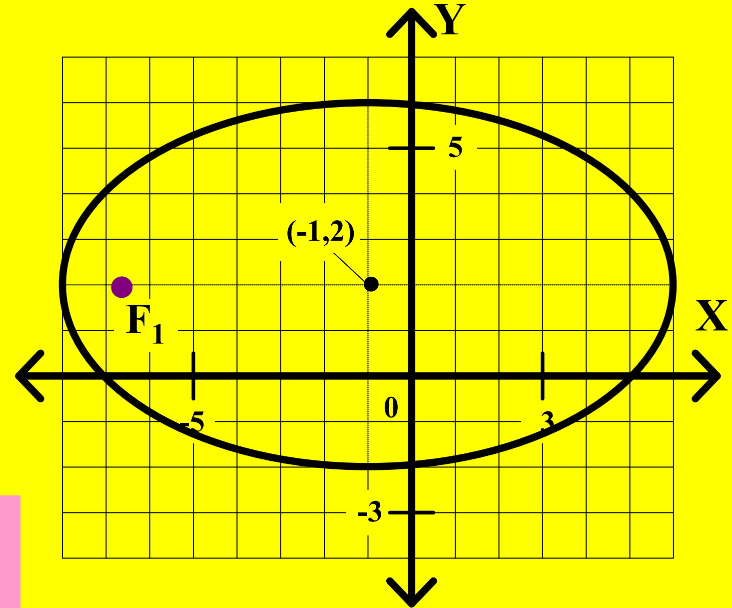

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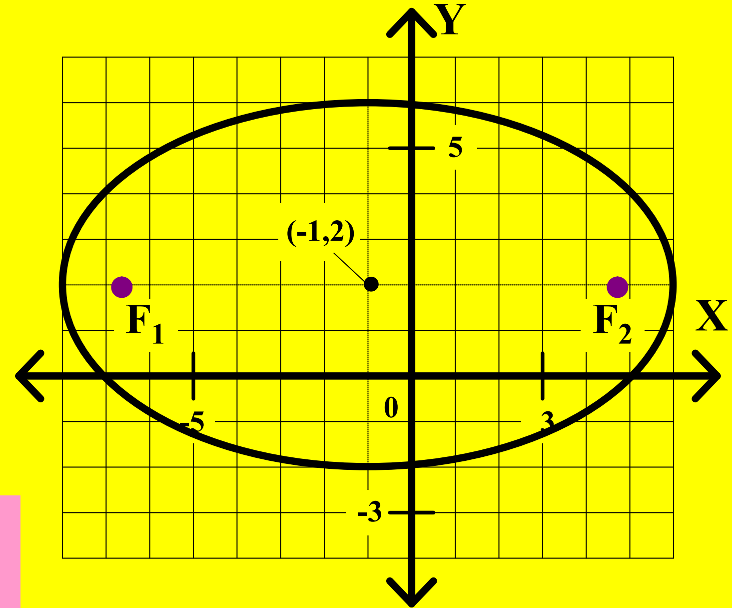

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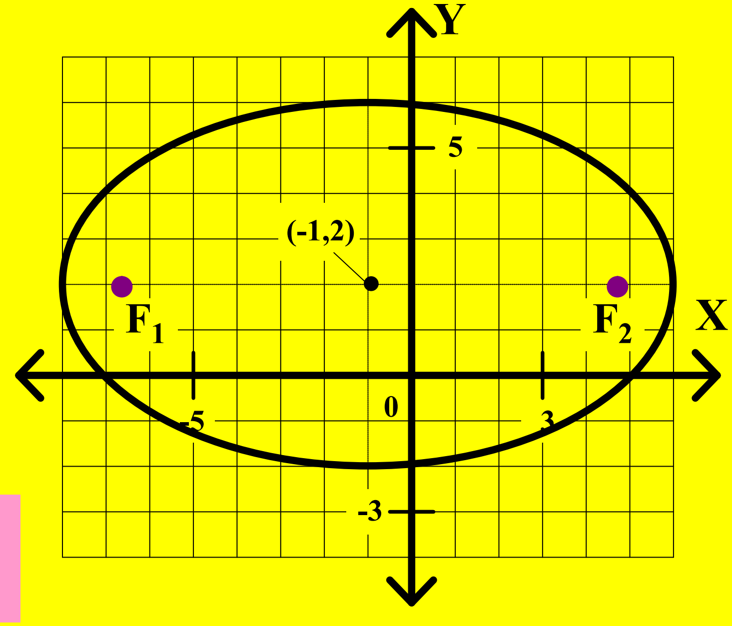

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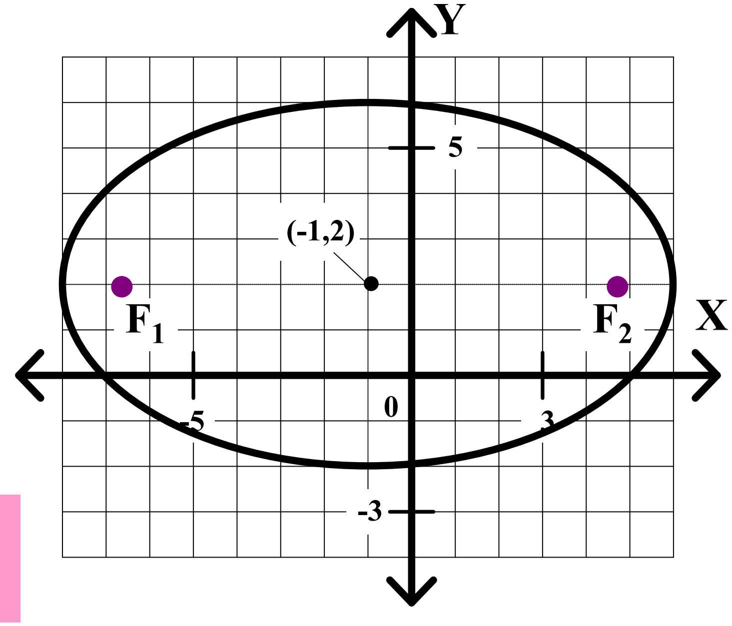

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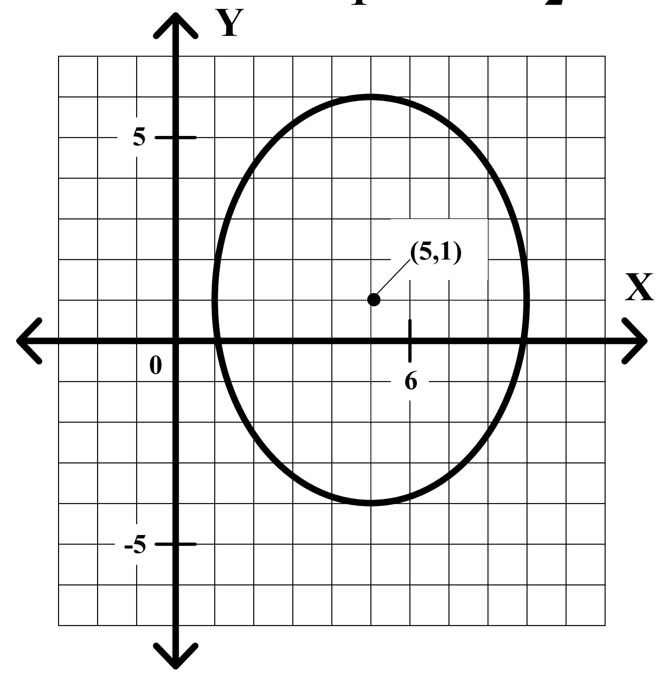

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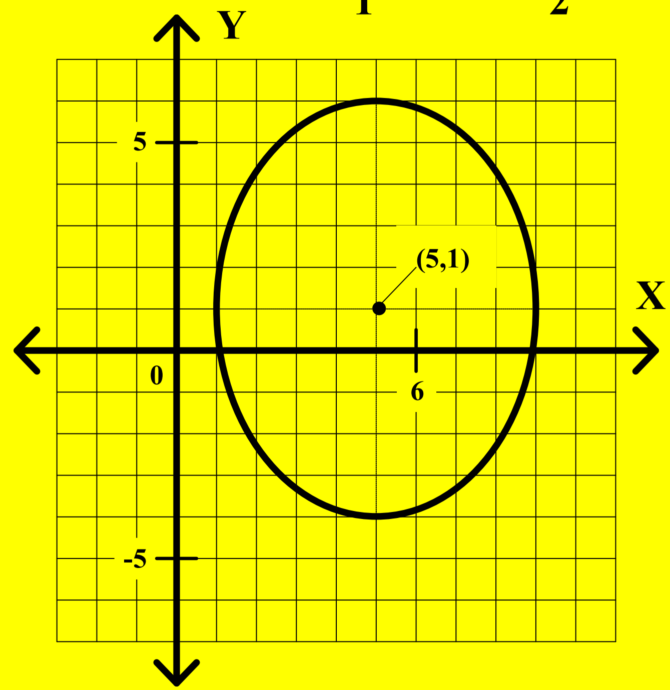

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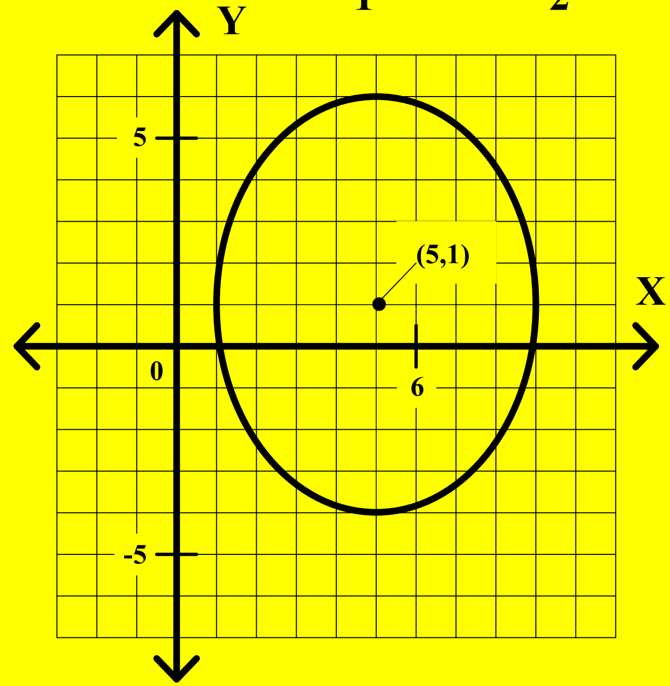

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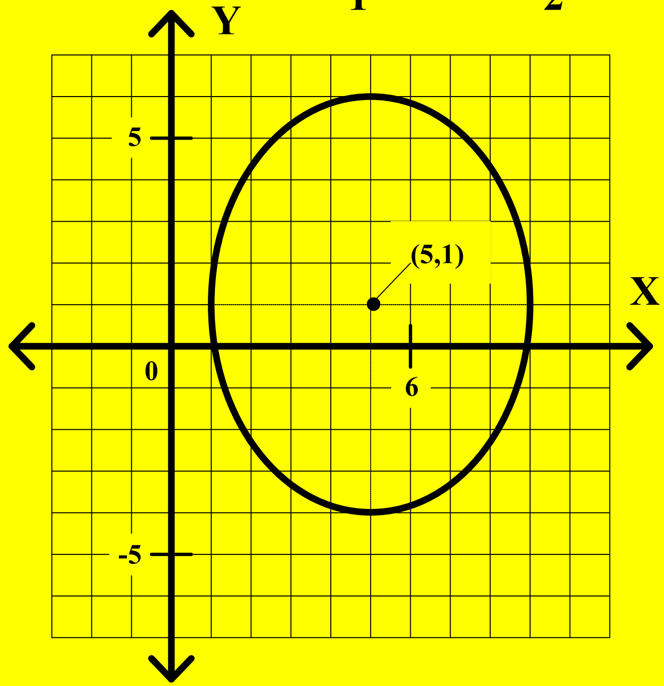

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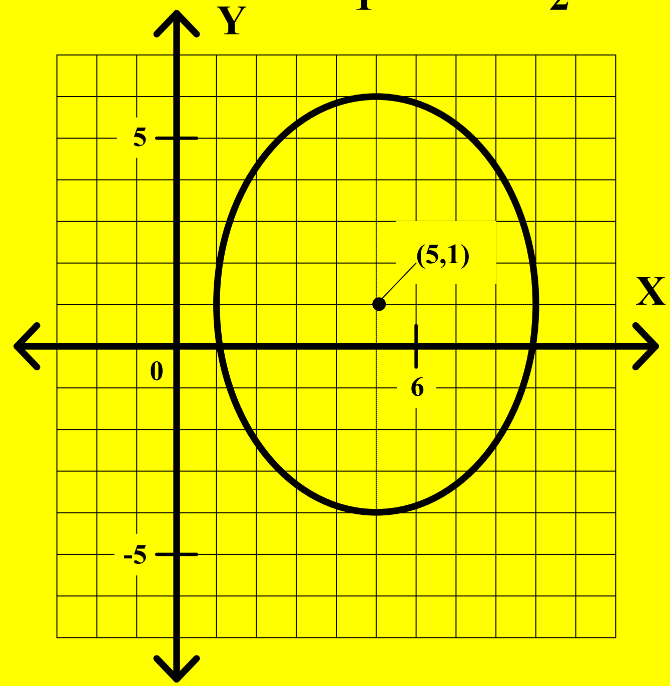
The major axis is vertical.



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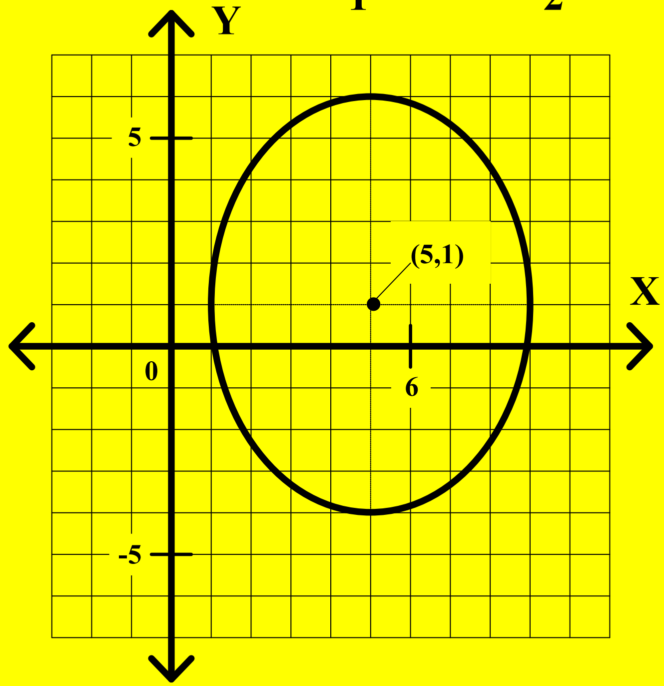

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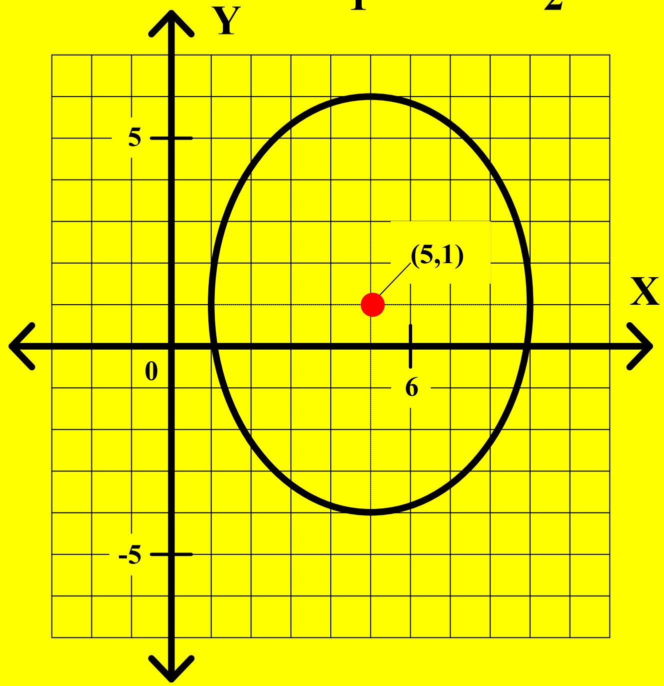

Center:

Class Worksheet #2

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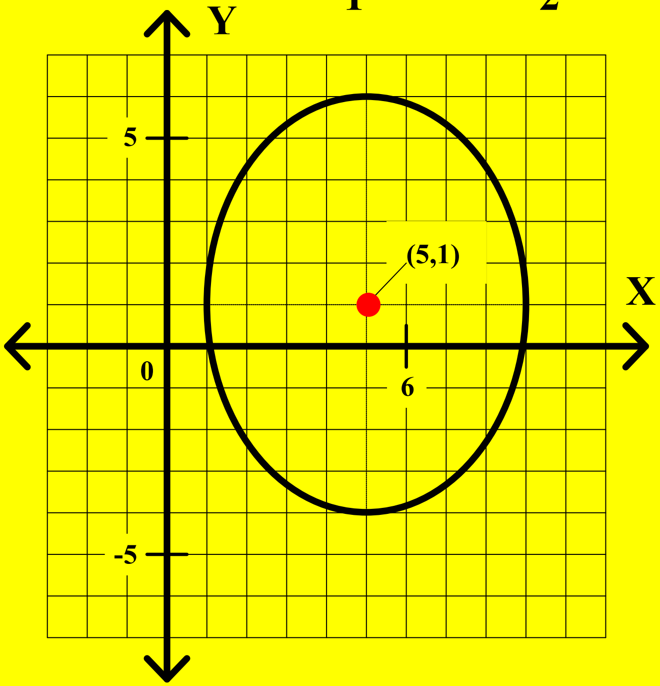
$$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$$

Center: (5, 1)



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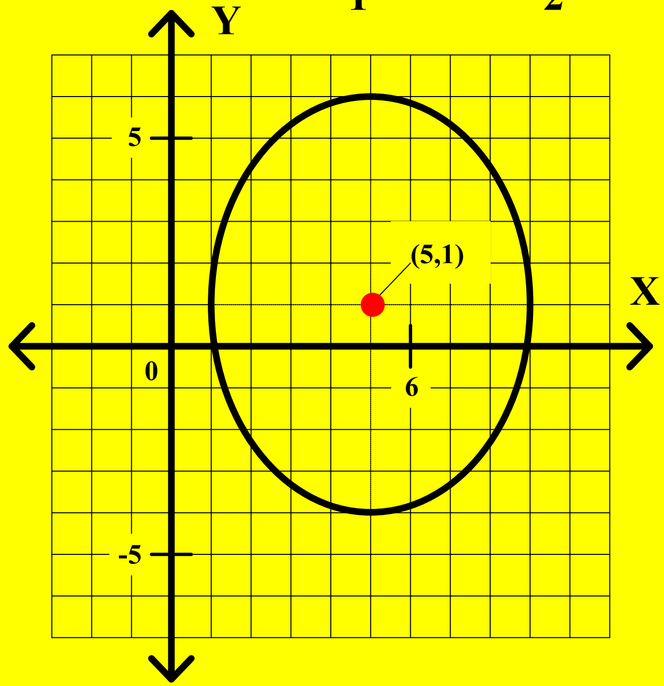

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Center: (5, 1) ⇨ h =

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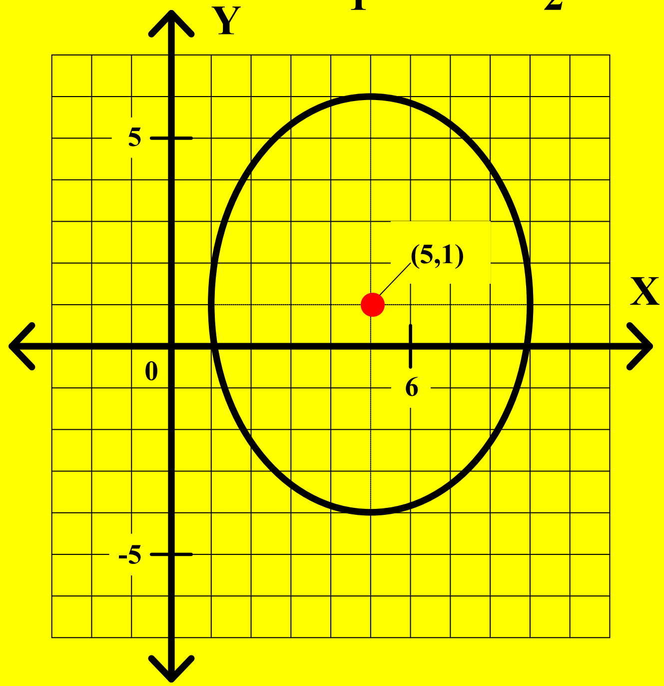

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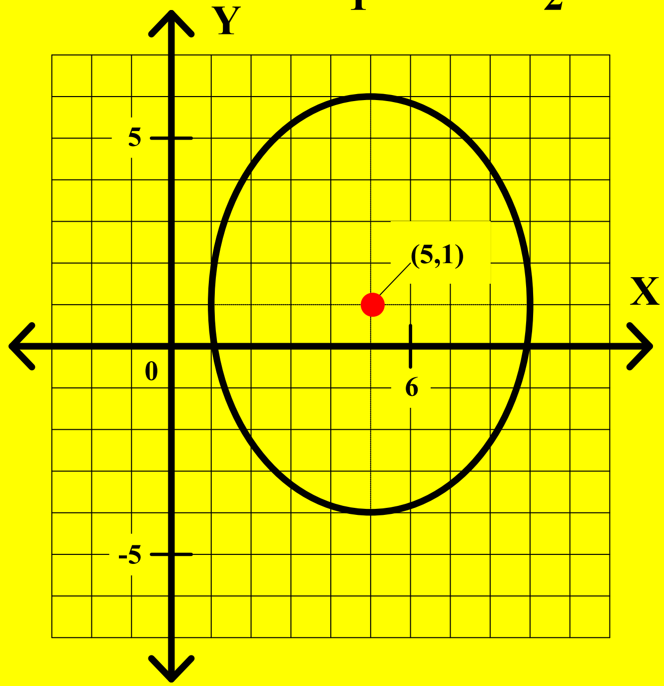

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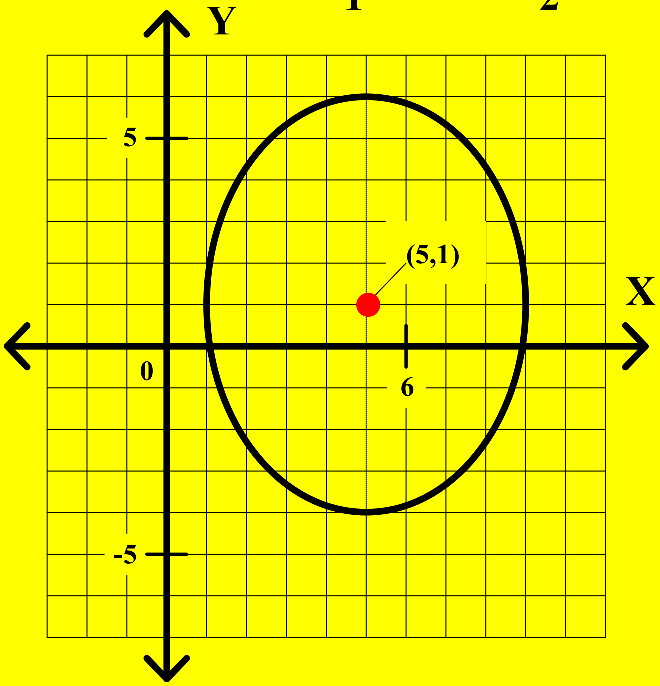

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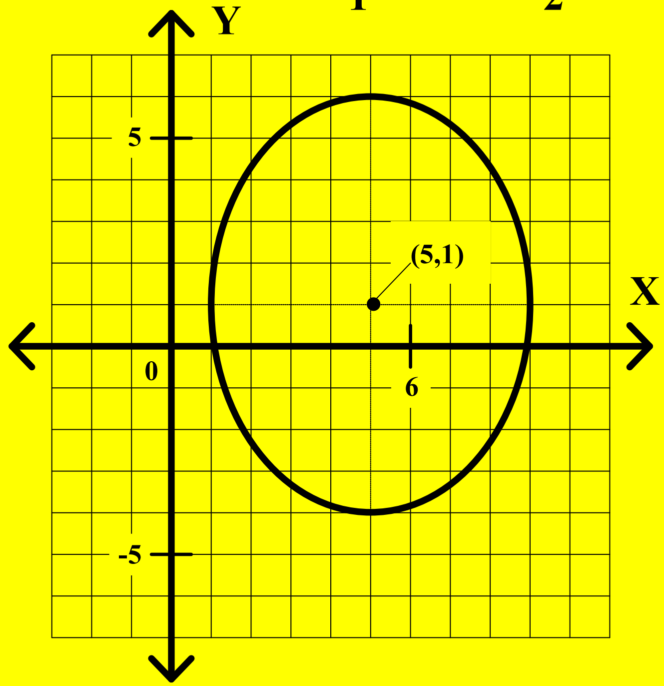

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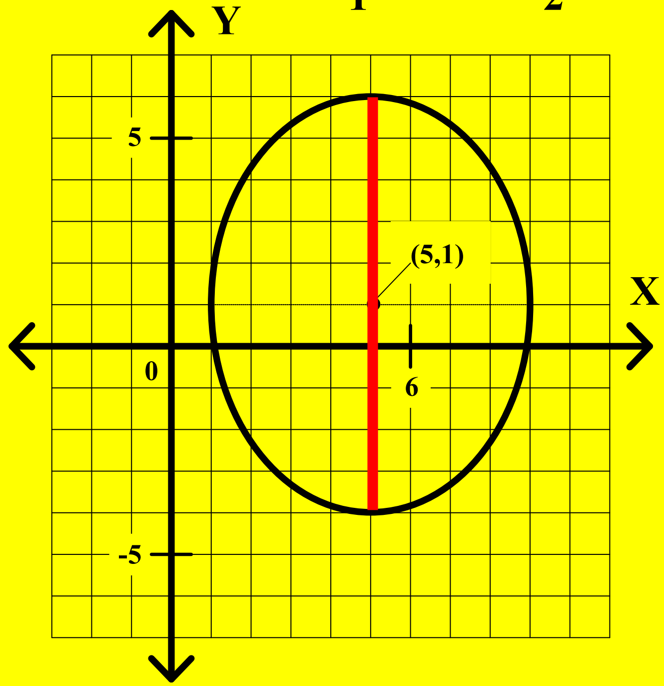

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Major Axis:

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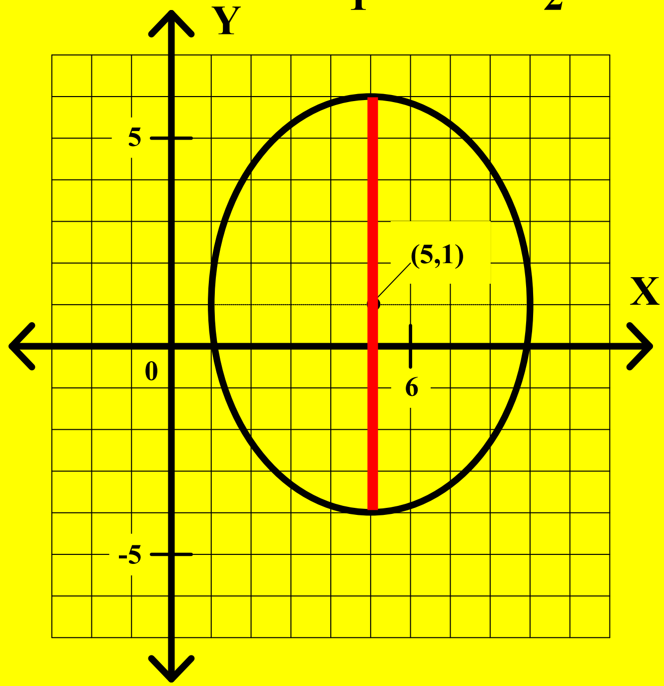
Center: (5, 1) ⇨ h = 5 and k = 1

Major Axis: 2a units long



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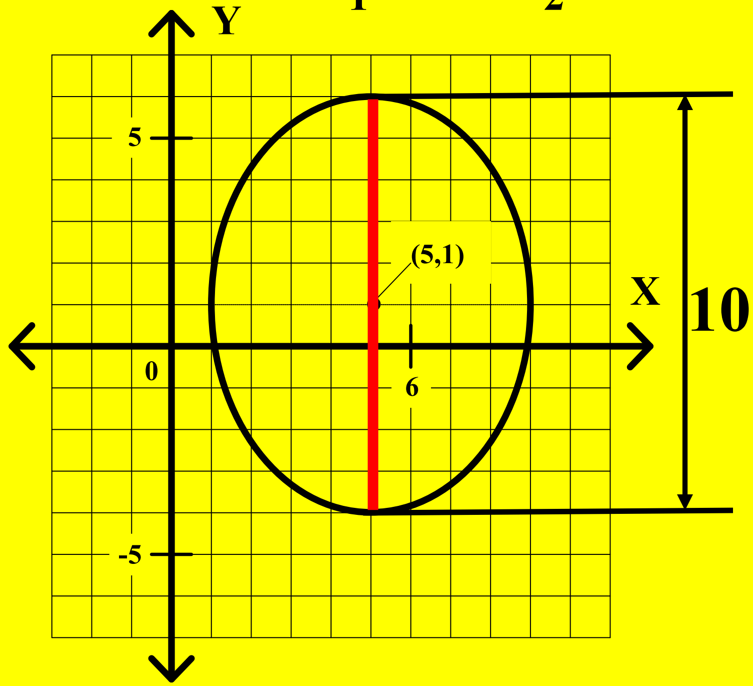

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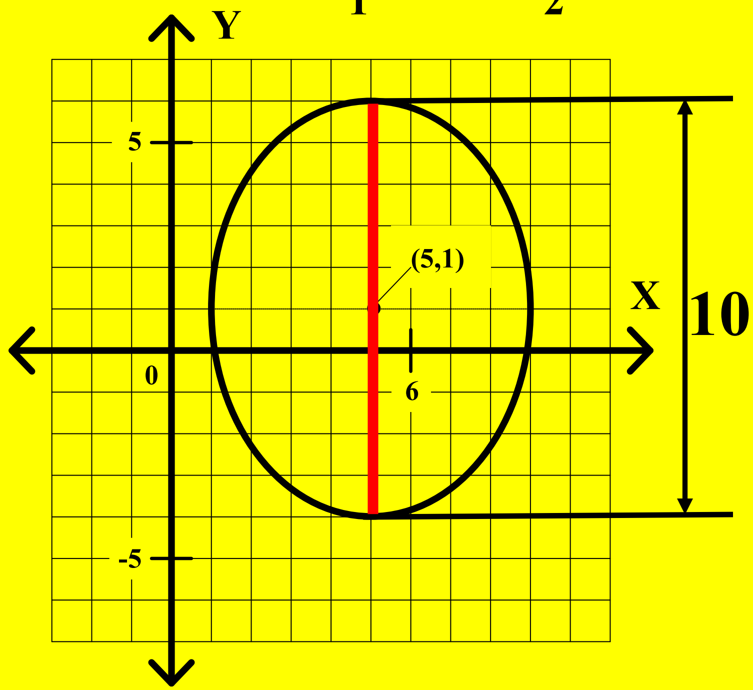

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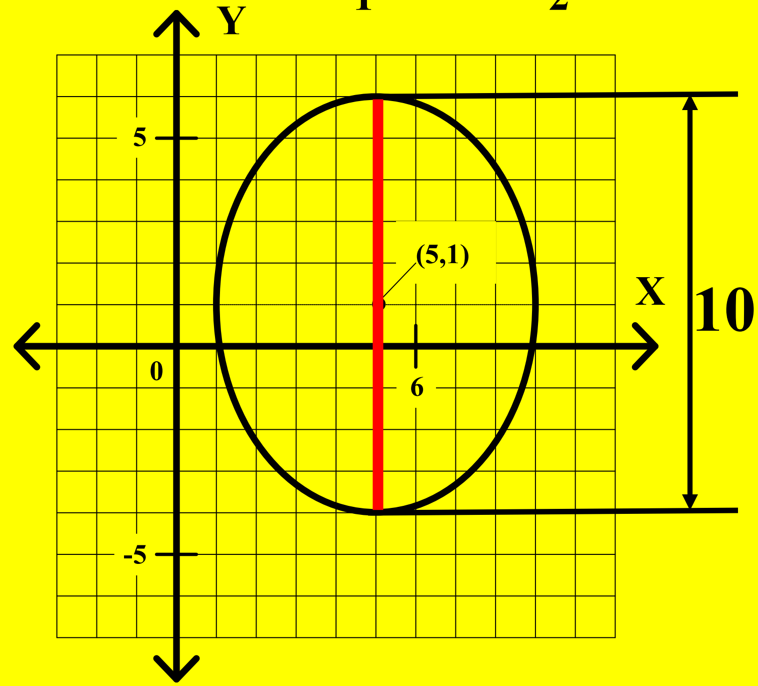
2a =



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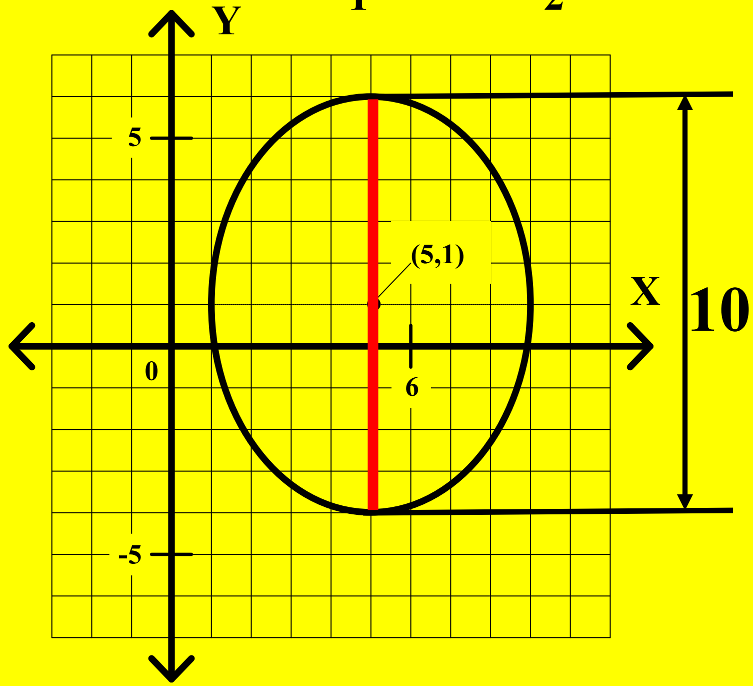
Major Axis: 2a units long

2a = 10



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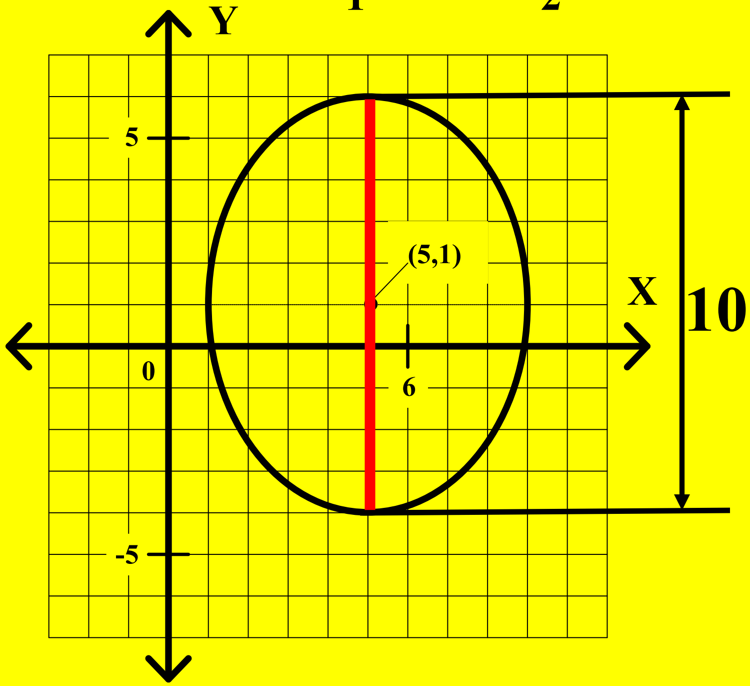

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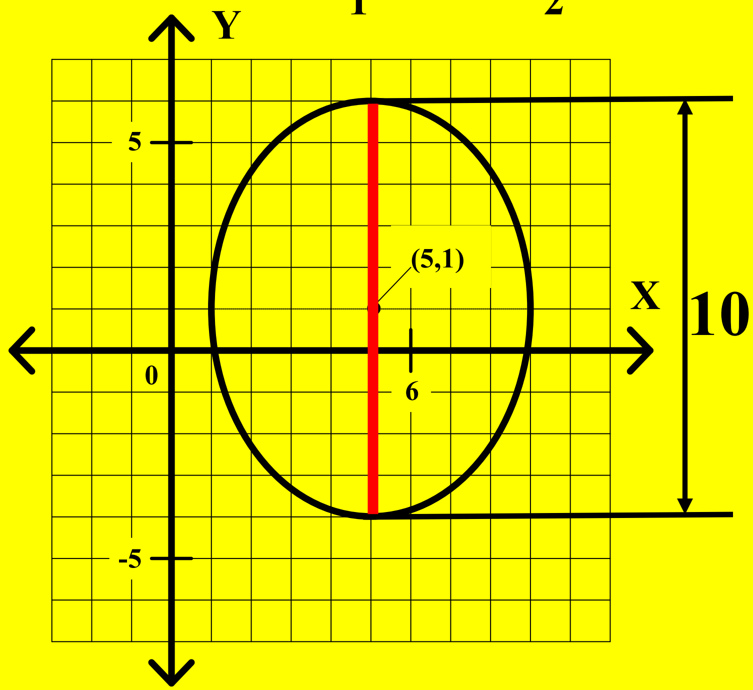

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Major Axis: 2a units long

$$2a = 10$$
$$a =$$

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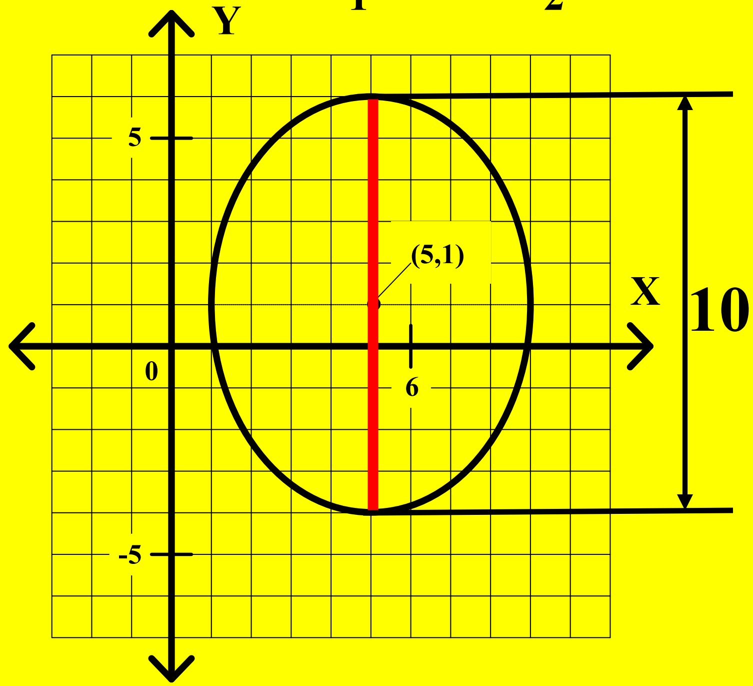

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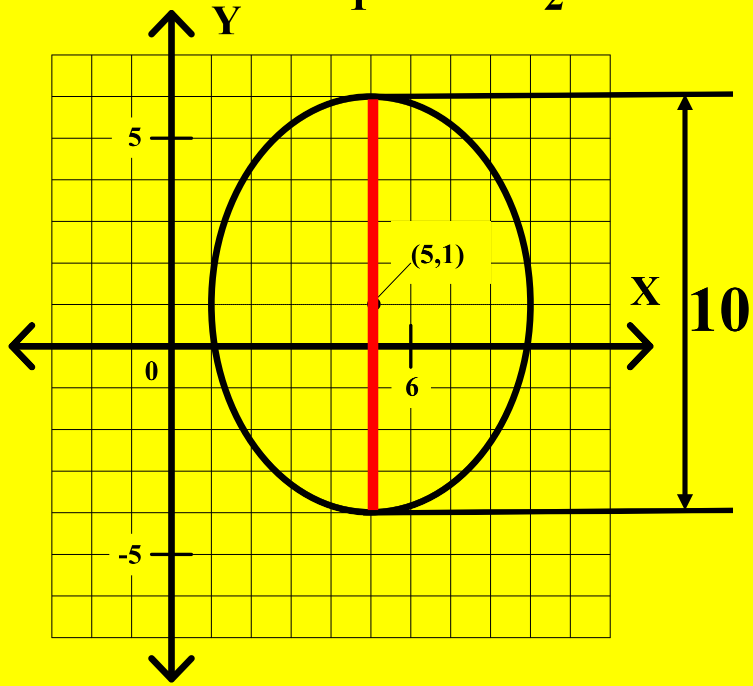

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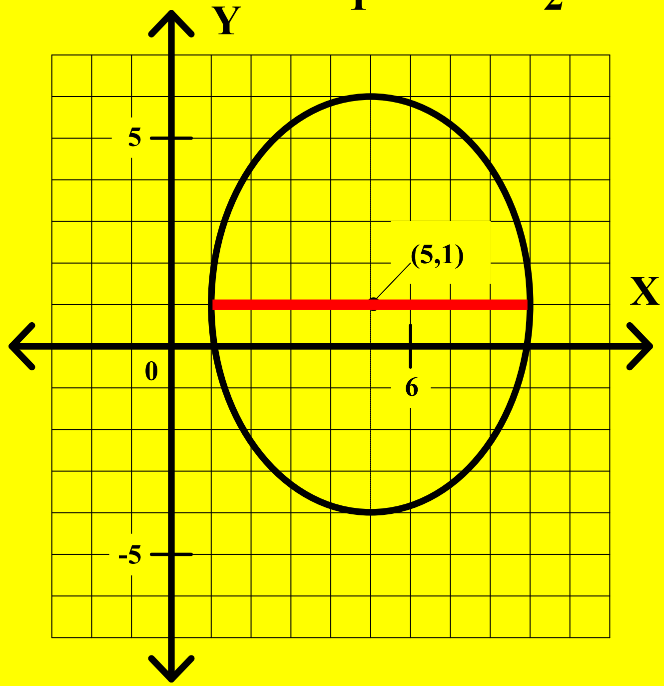

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Minor Axis:

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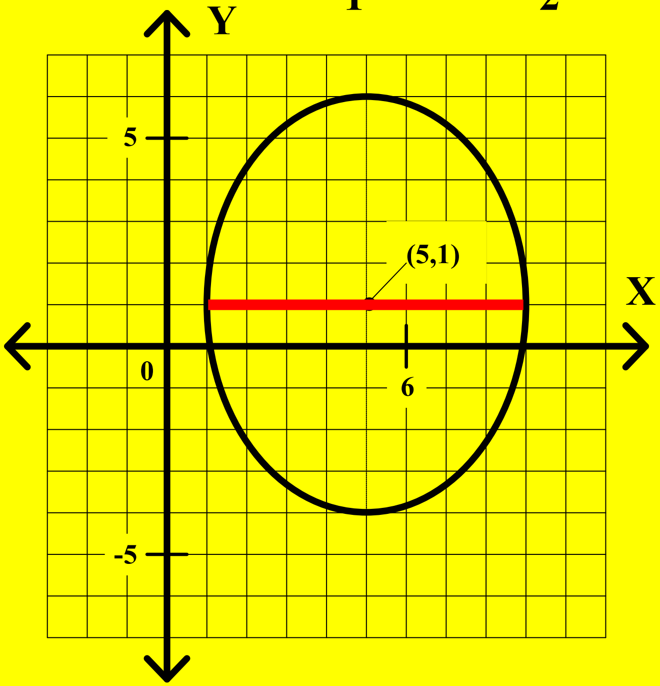

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Major Axis: 10 units long ⇨ a = 5

Minor Axis: 2b units long

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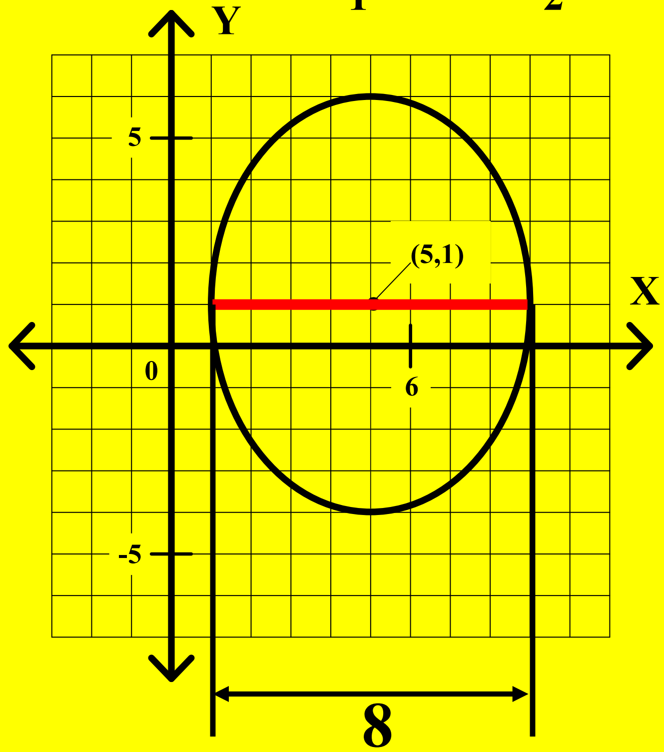

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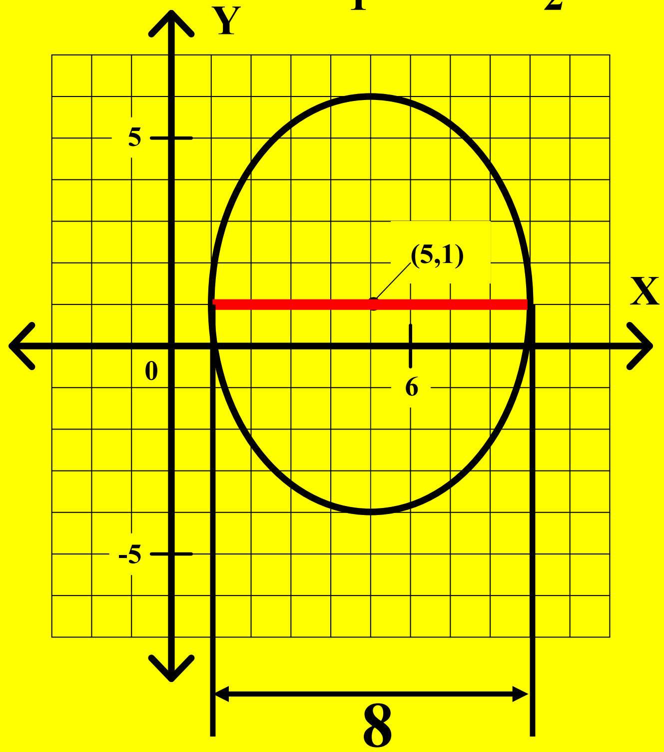
2b



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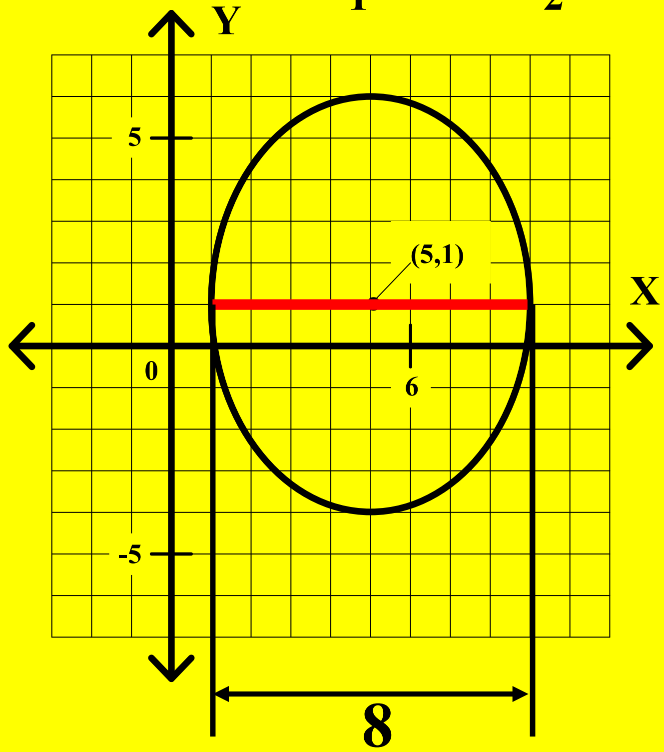

Center: (5, 1) ⇨ h = 5 and k = 1

Major Axis: 10 units long ⇨ a = 5

Minor Axis: 2b units long

2b =

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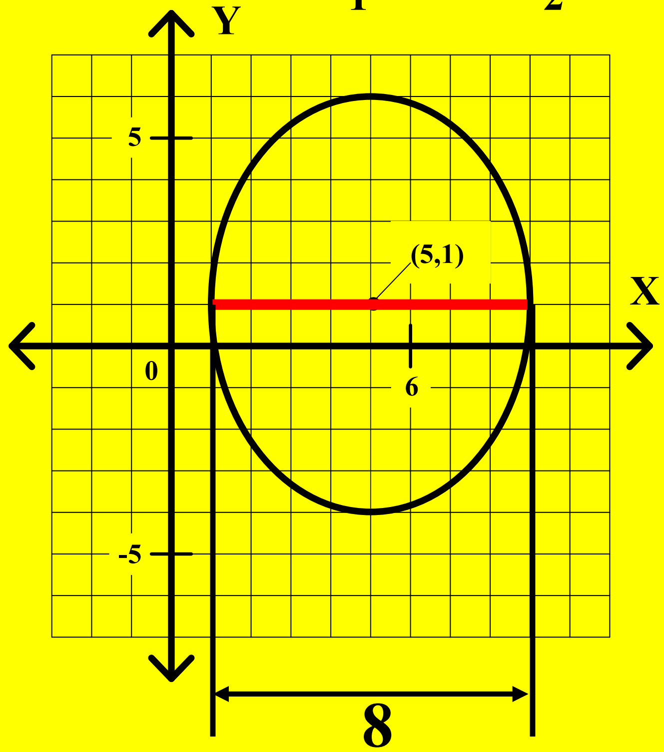

Center: (5, 1) ⇨ h = 5 and k = 1

Major Axis: 10 units long ⇨ a = 5

Minor Axis: 2b units long

2b = 8

Class Worksheet #2

Write the equation in standard form and the equation in general form for each ellipse. Then locate and label foci F_1 and F_2.

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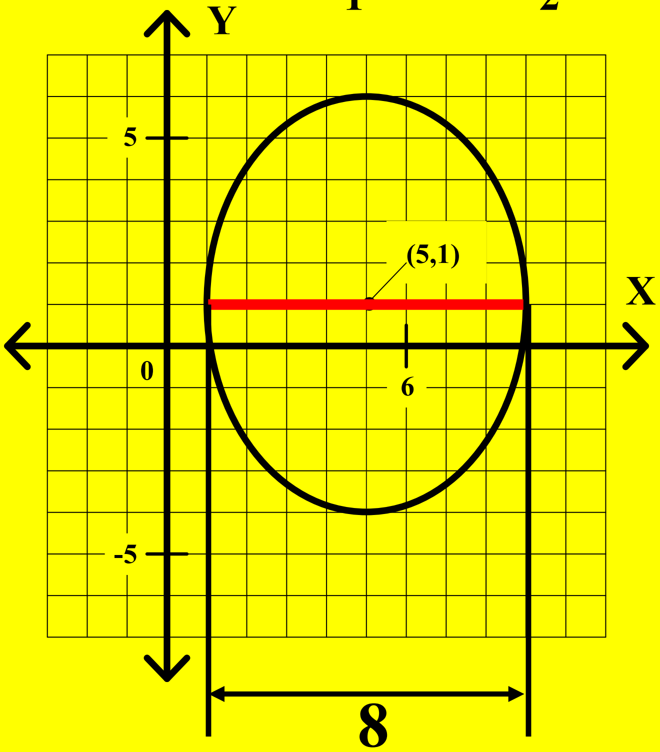

Center: (5, 1) ⇨ h = 5 and k = 1

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2b = 8

b

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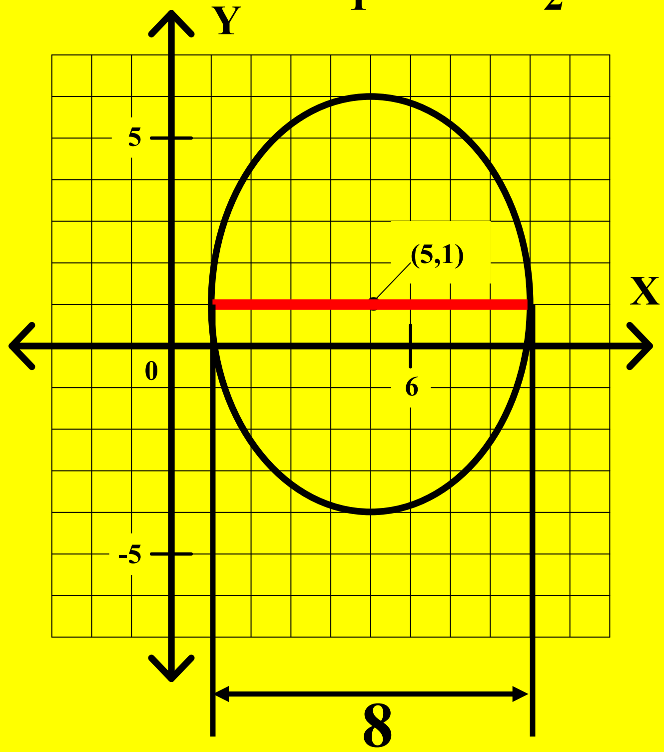

Center: (5, 1) ⇨ h = 5 and k = 1

Major Axis: 10 units long ⇨ a = 5

Minor Axis: 2b units long

$2b = 8$

$b =$

Class Worksheet #2

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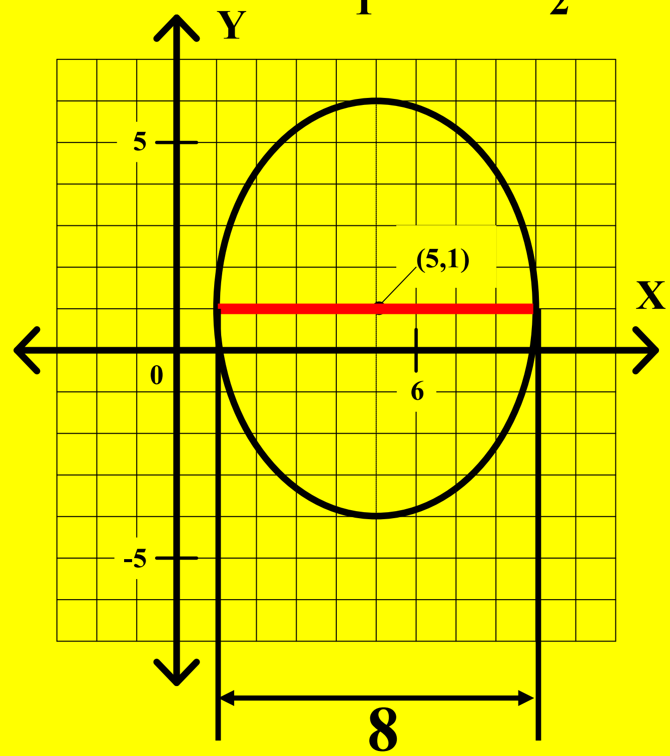

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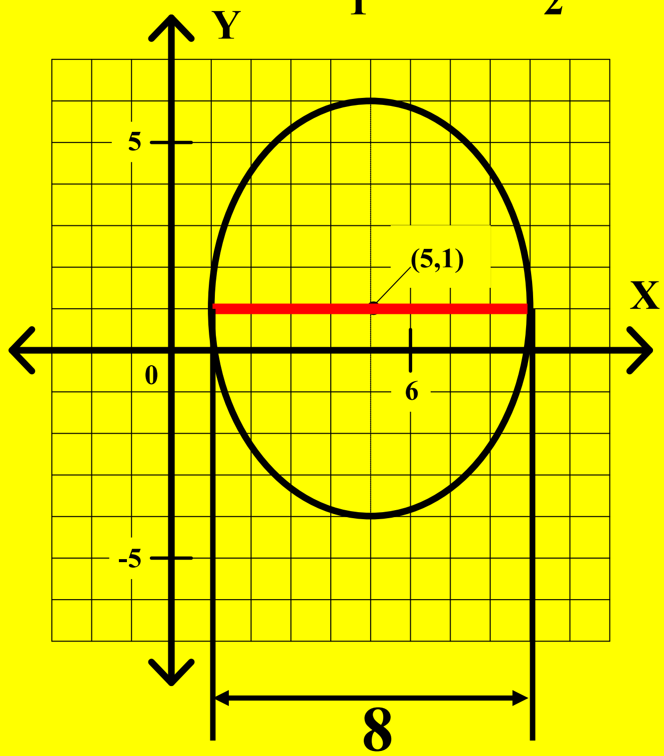

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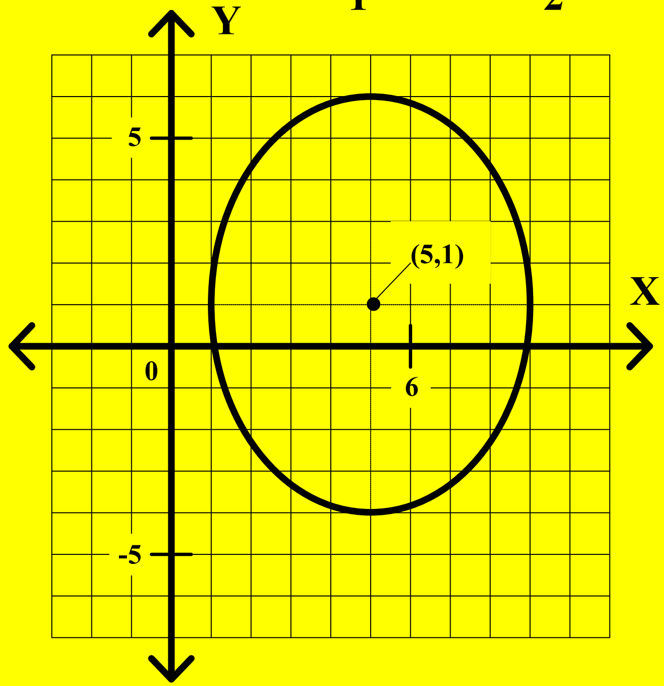

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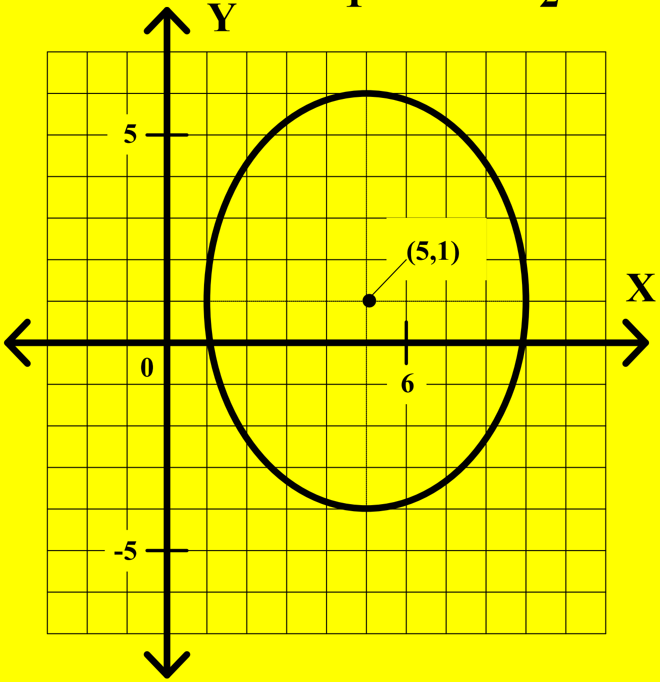

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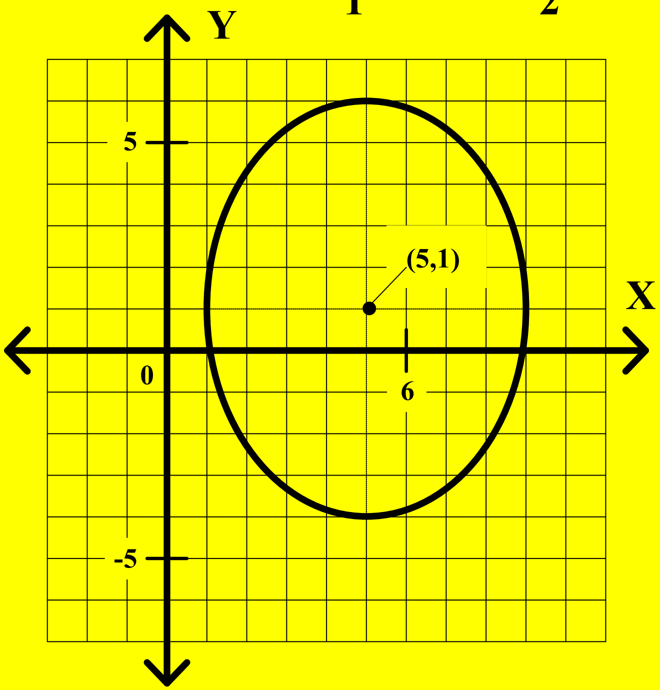

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$$\frac{(x -}{\quad}$$

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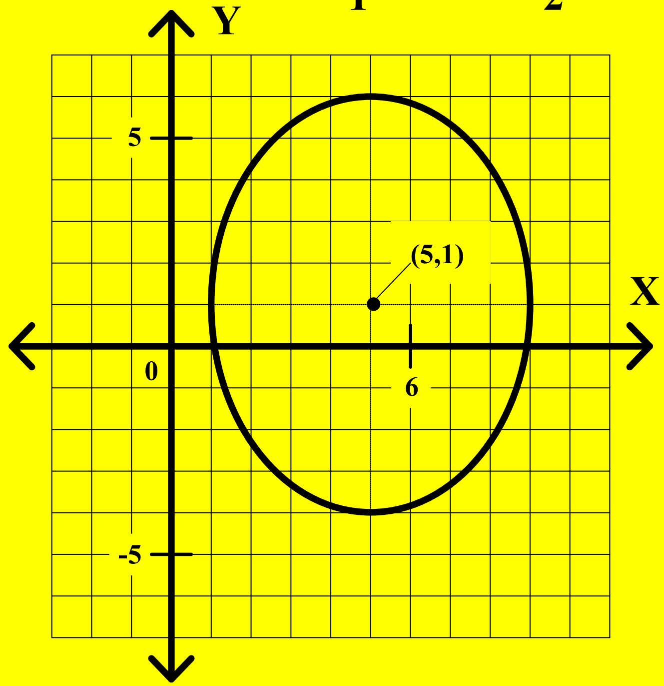

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$\frac{(x-5)}{}$

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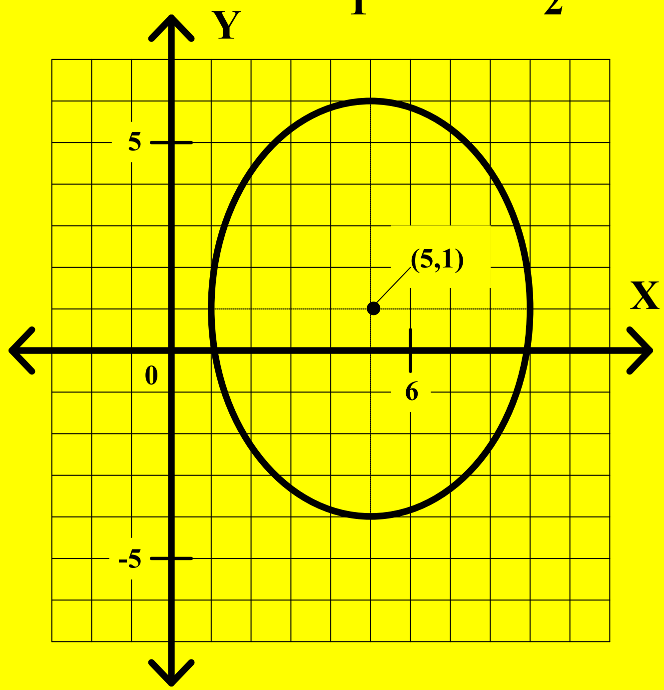

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$$\frac{(x-5)^2}{}$$

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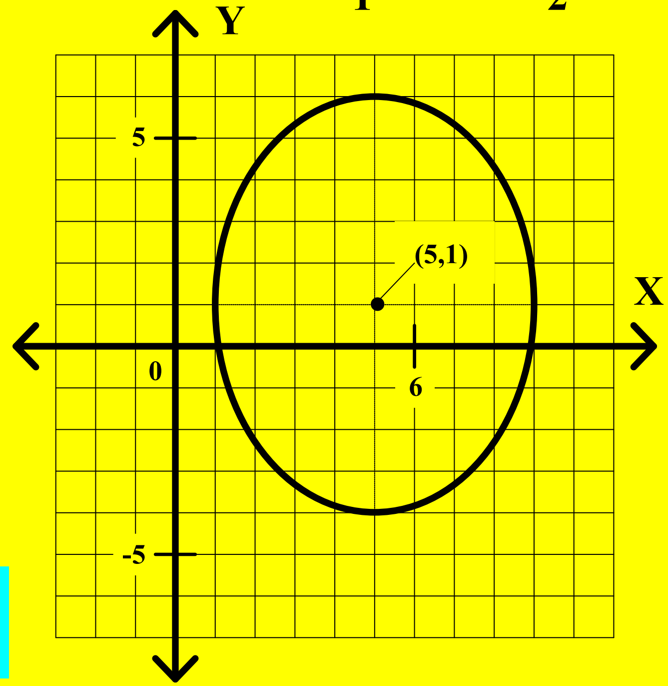

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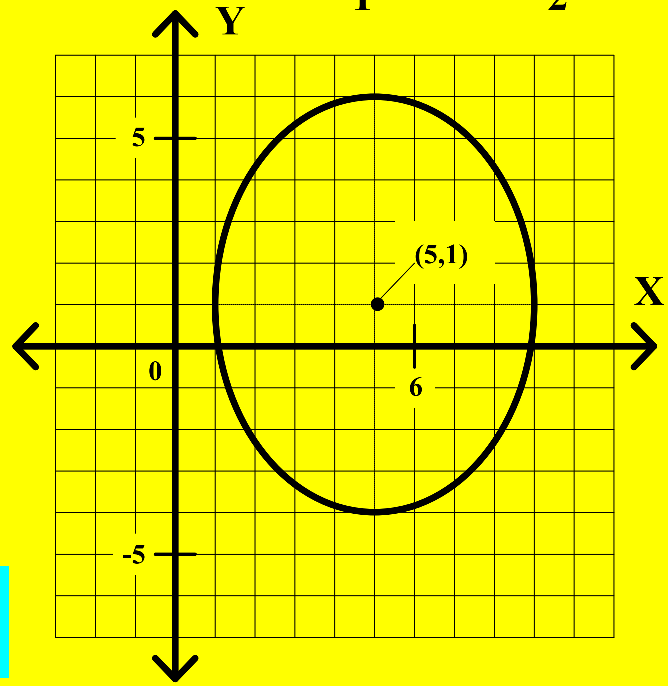

$$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$$

Center: (5, 1) ⇨ **h = 5 and k = 1**

Major Axis: 10 units long ⇨ **a = 5**

Minor Axis: 8 units long ⇨ **b = 4**

$$\frac{(x-5)^2}{4^2}$$

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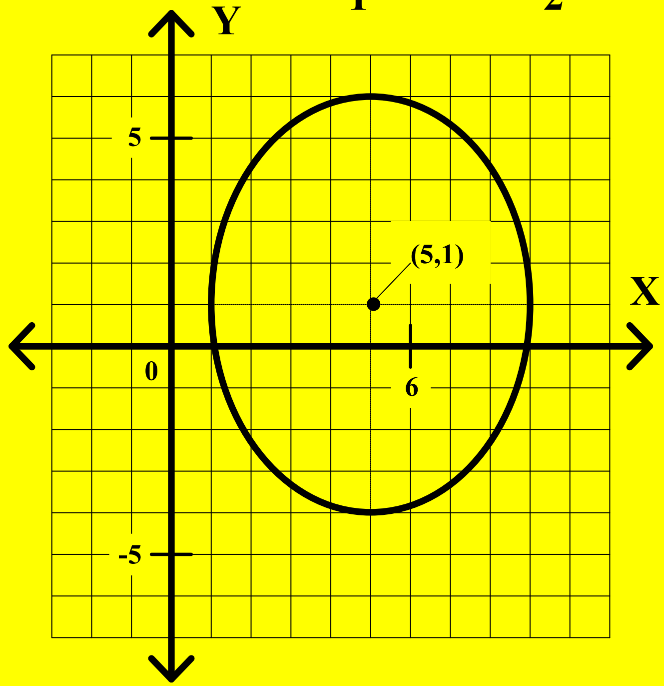

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$$\frac{(x-5)^2}{4^2} +$$

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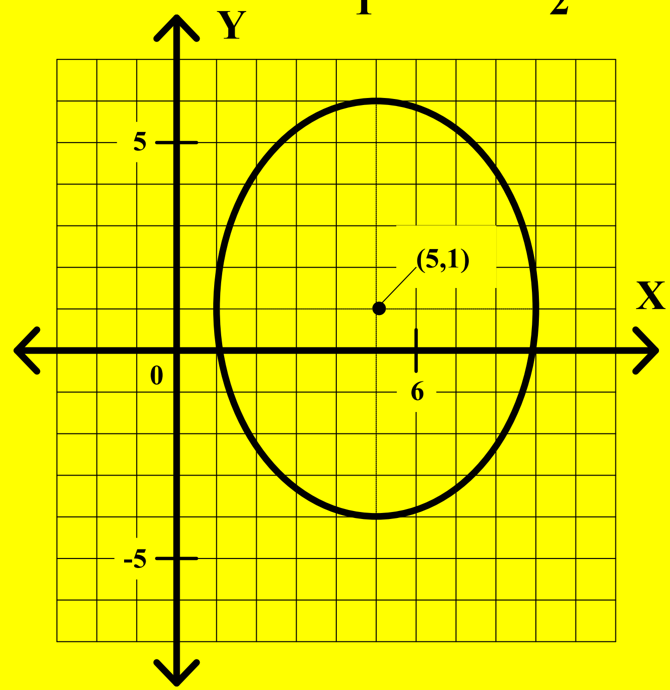

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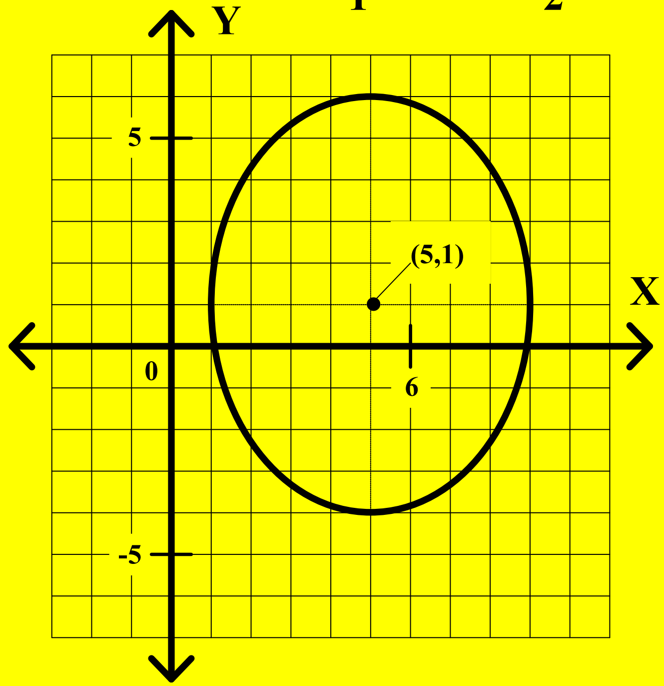

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$$\frac{(x-5)^2}{4^2} + \frac{(y-}{}$$

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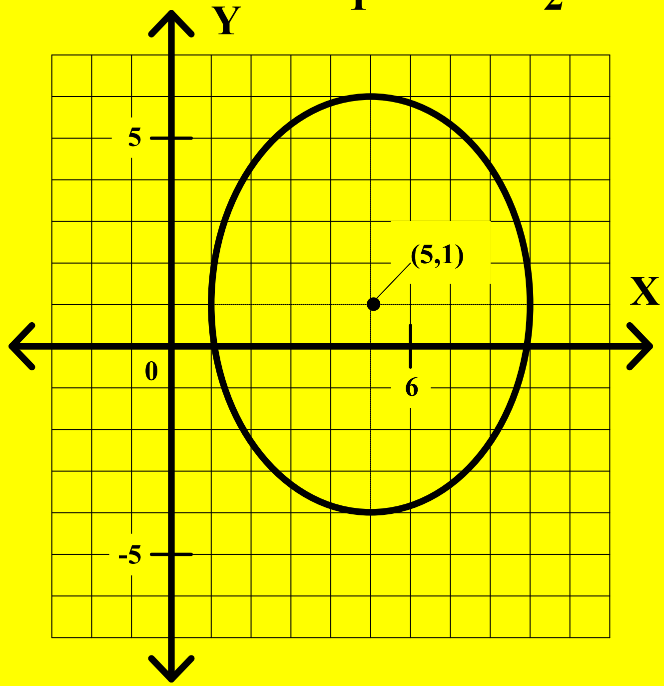

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$$\frac{(x-5)^2}{4^2} + \frac{(y-1)}{}$$

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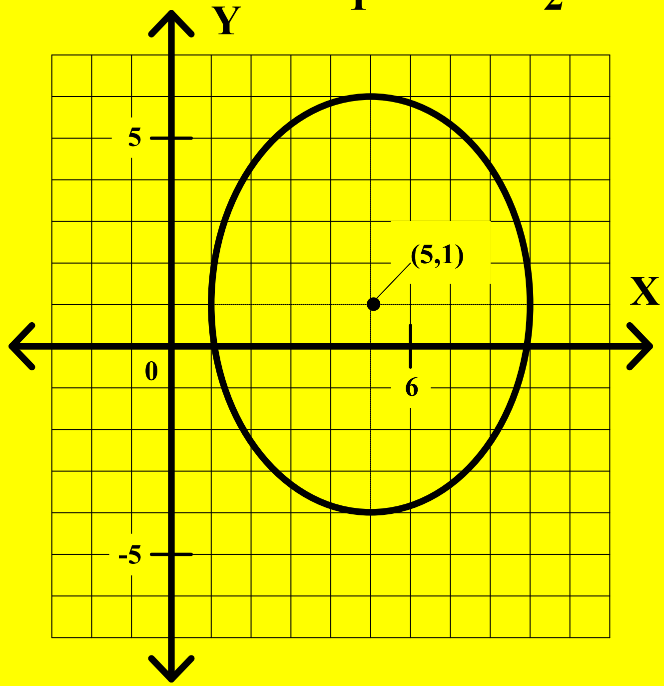

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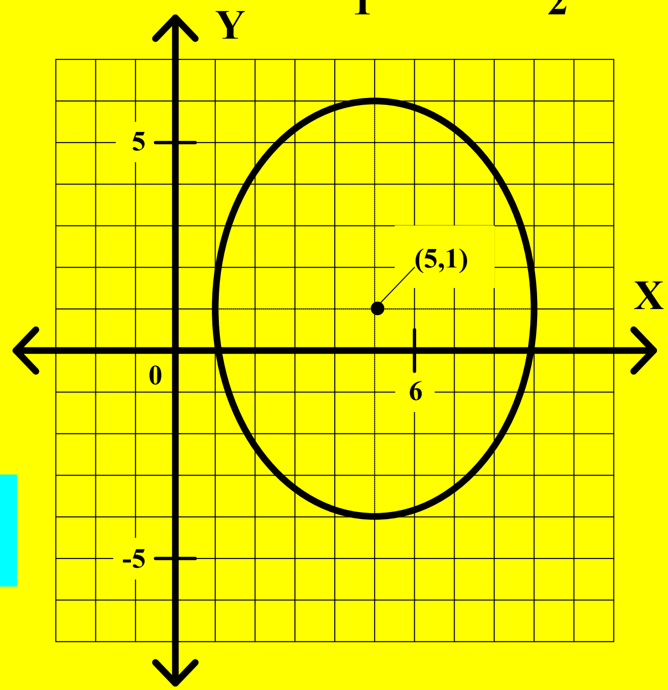

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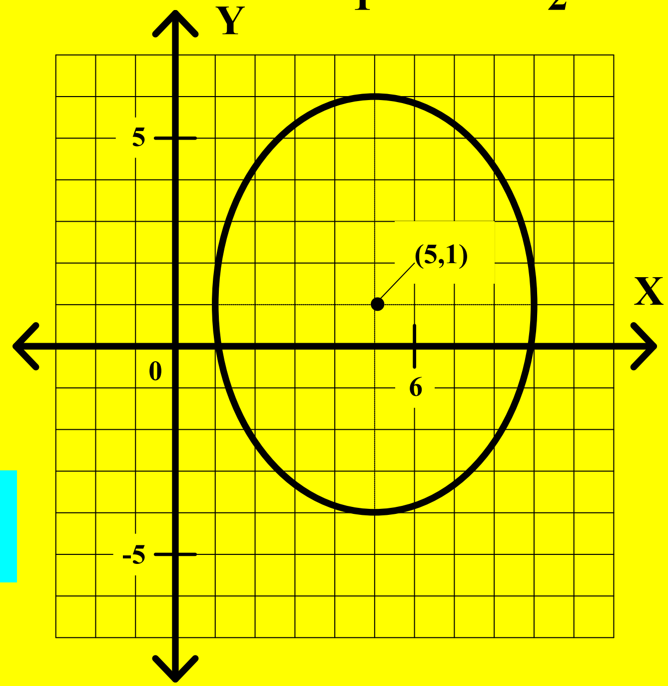

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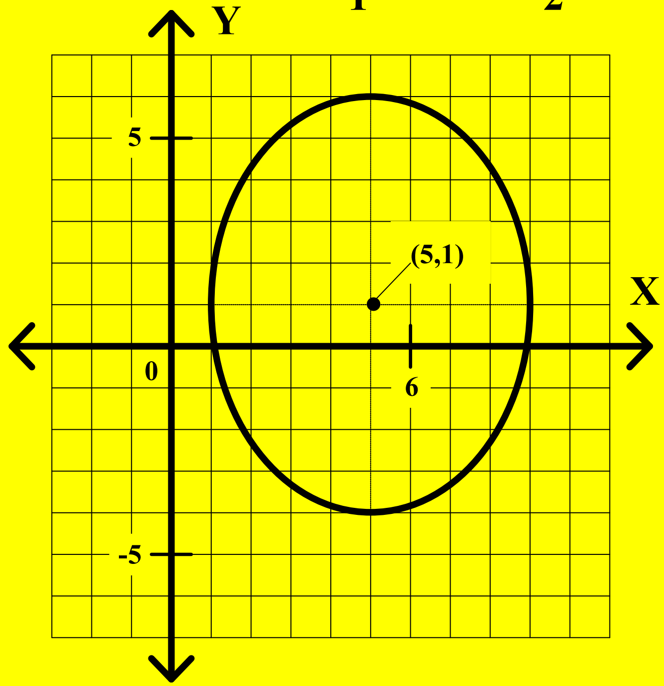

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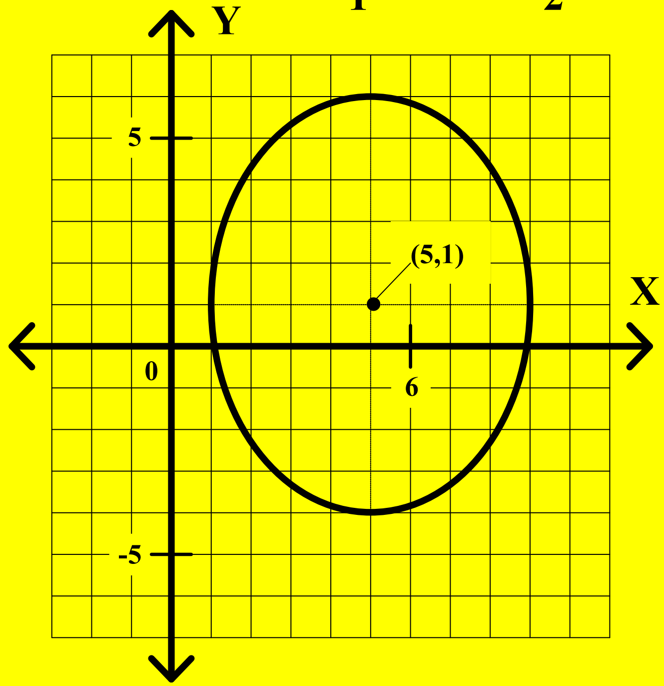

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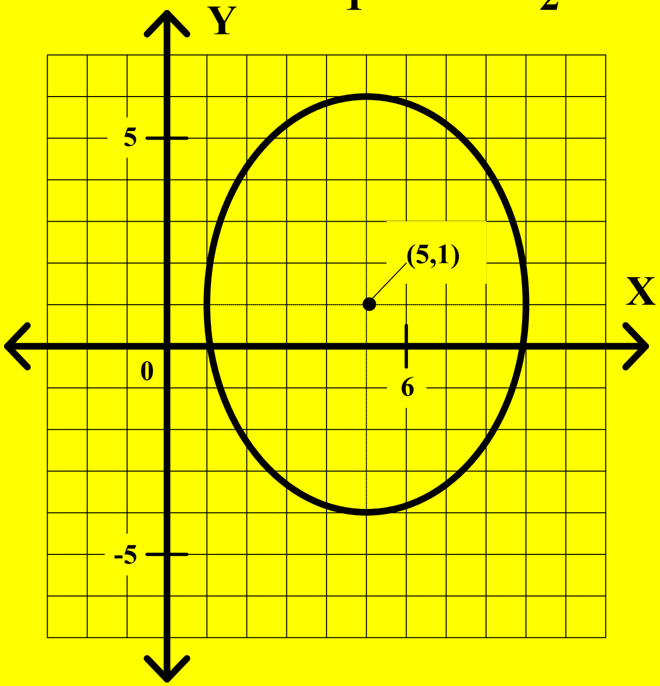

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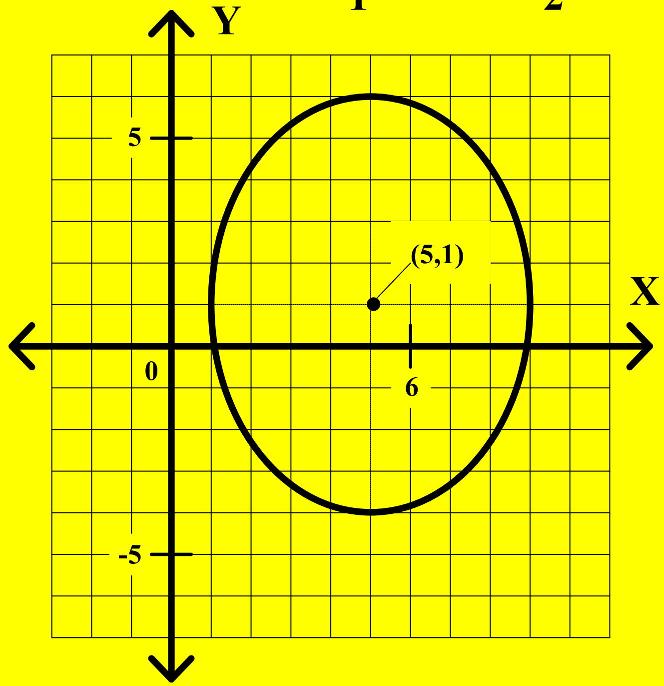

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$$\frac{(x-5)^2}{16}$$

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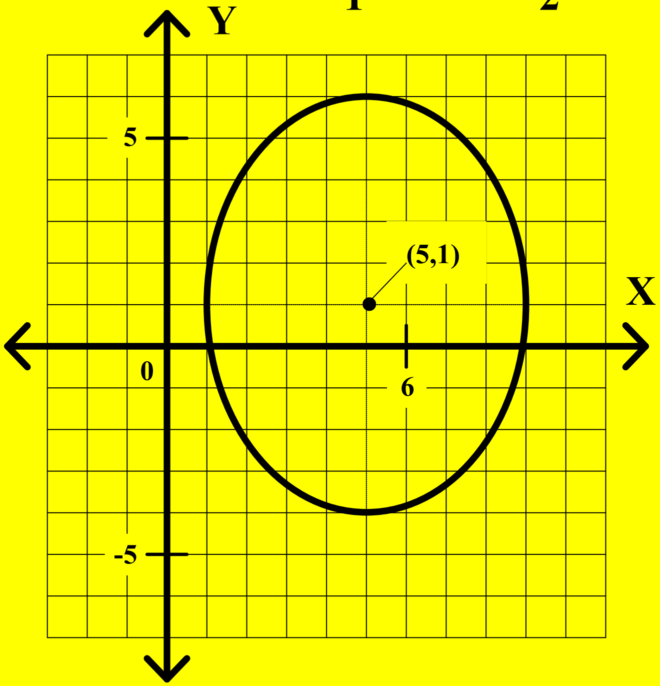

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$$\frac{(x-5)^2}{16} +$$

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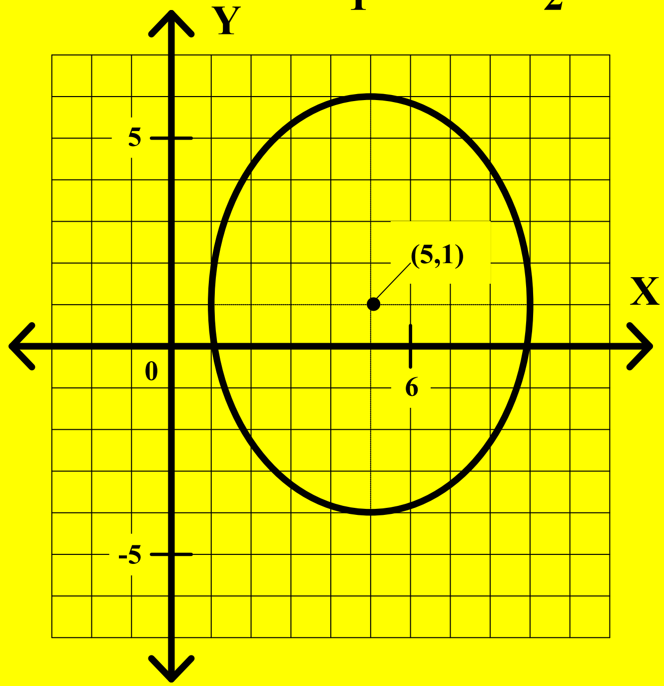

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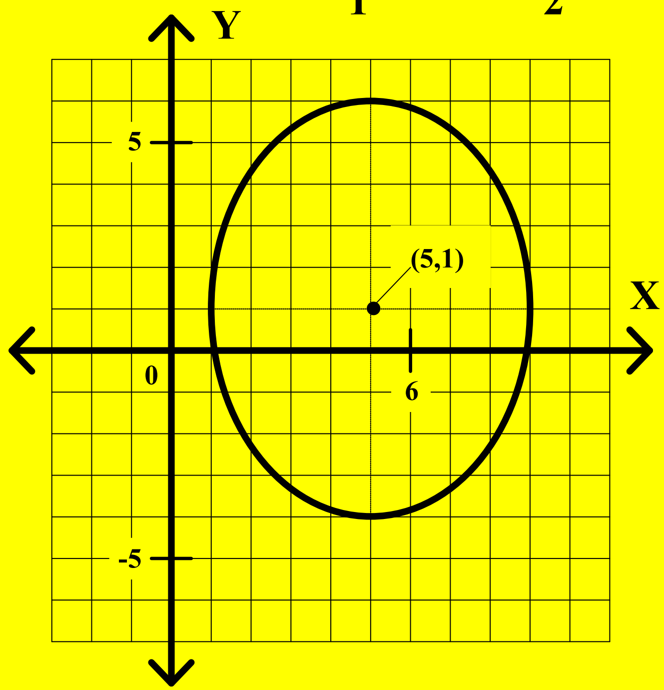

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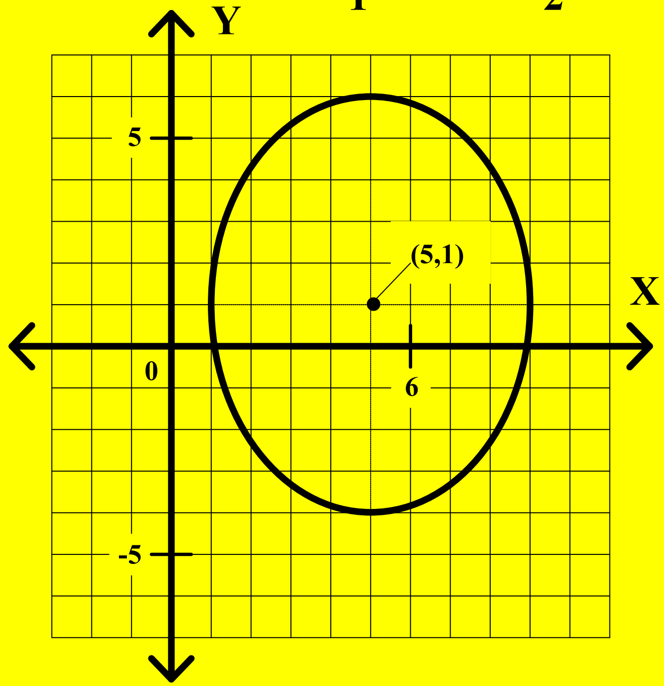

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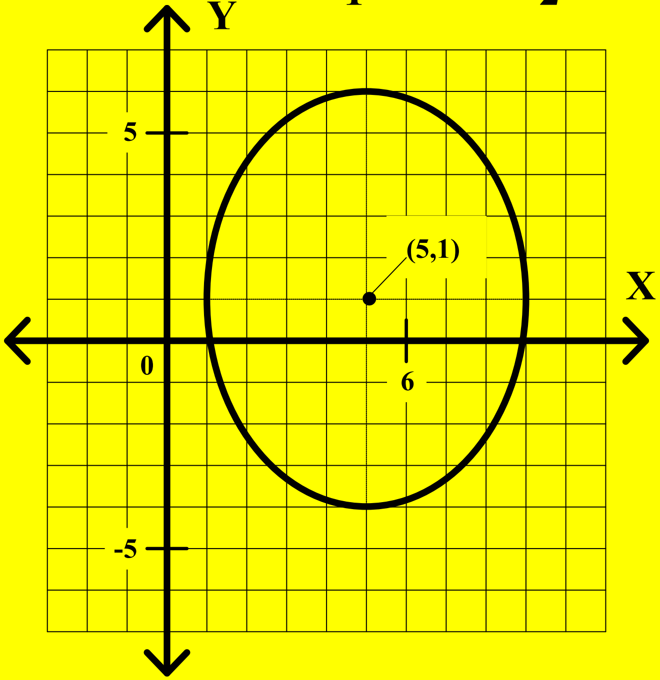
Class Worksheet #2

Write the equation in standard form and the equation in general form for each ellipse. Then locate and label foci F_1 and F_2.

2.

Standard Form Equation

$$\frac{(x-5)^2}{16} + \frac{(y-1)^2}{25} = 1$$



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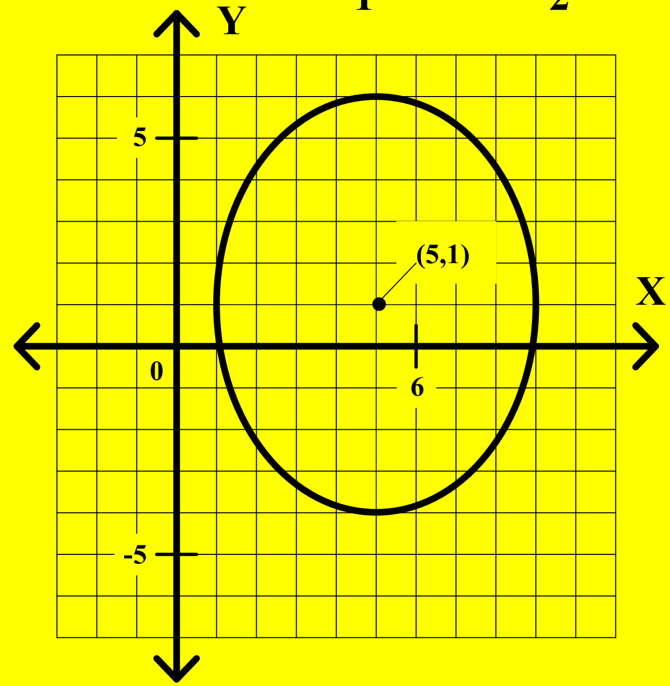

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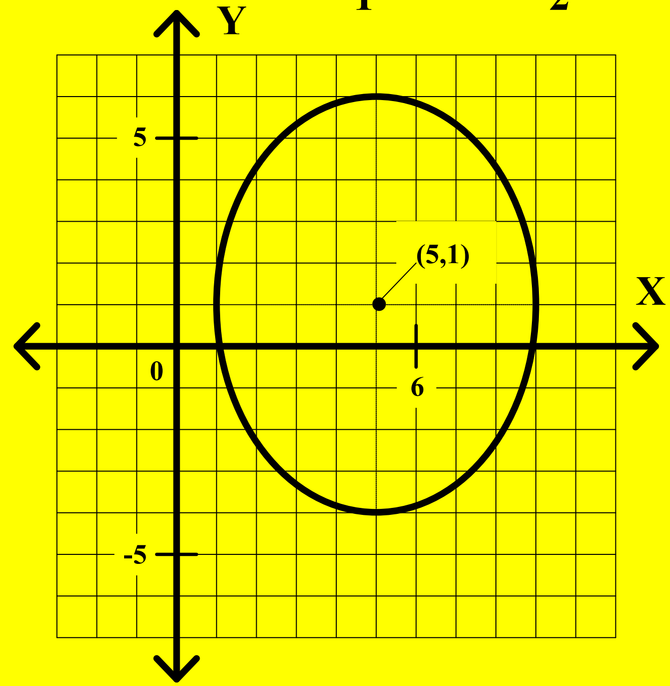

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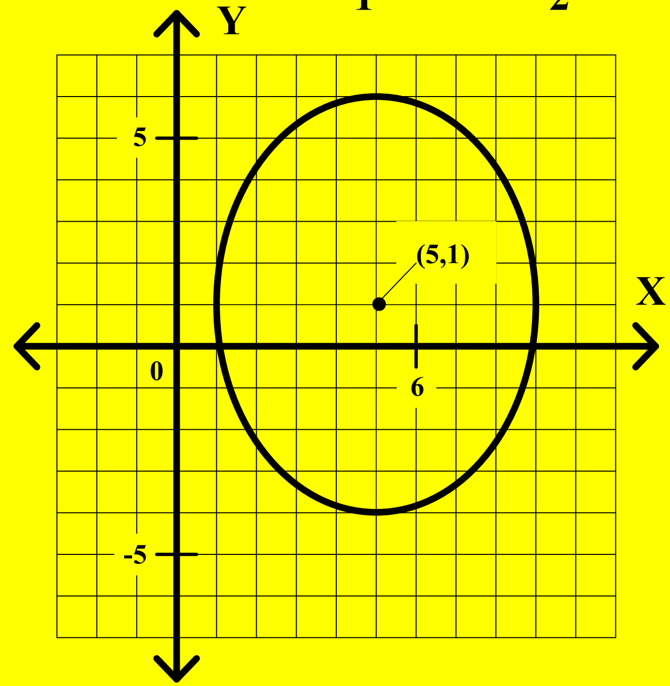

General Form Equation of an Ellipse

$$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

where $A \neq C$ and $AC > 0$

Class Worksheet #2

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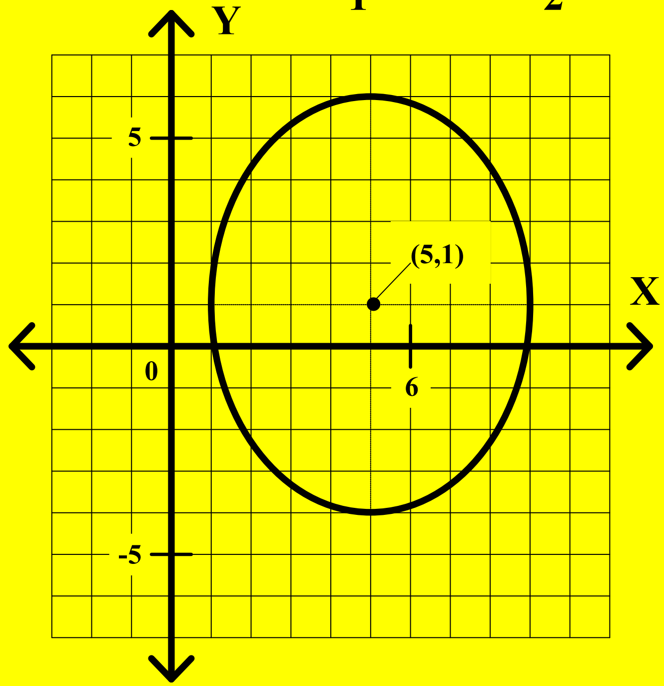

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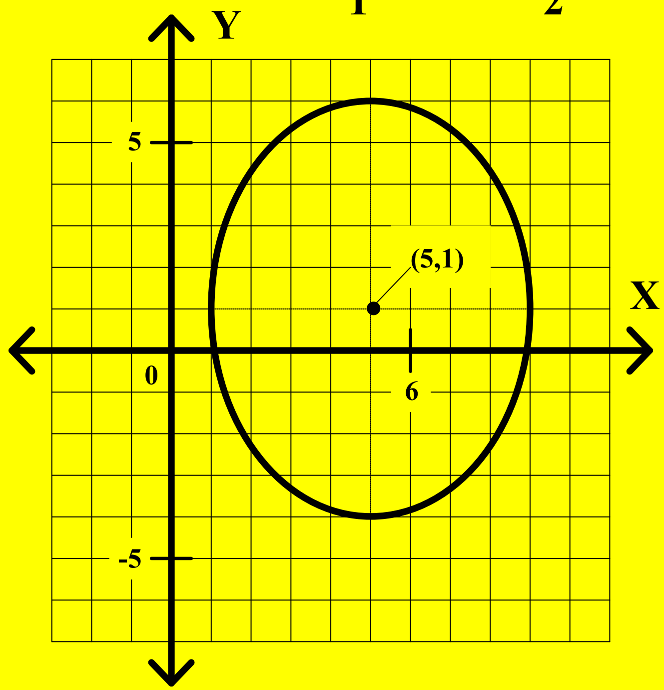

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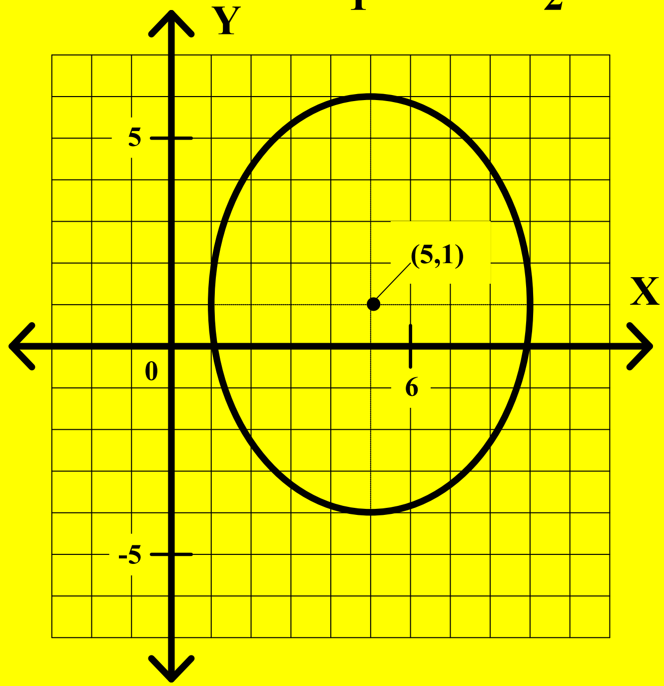
$$\frac{(x-5)^2}{16} + \frac{(y-1)^2}{25} = 1$$

General Form Equation of an Ellipse

$$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

where $A \neq C$ and $AC > 0$



$$\frac{(x-5)^2}{16} + \frac{(y-1)^2}{25} = 1$$

Step 1: Clear the fractions.

Multiply both sides of the equation by 400, which is (16)(25).

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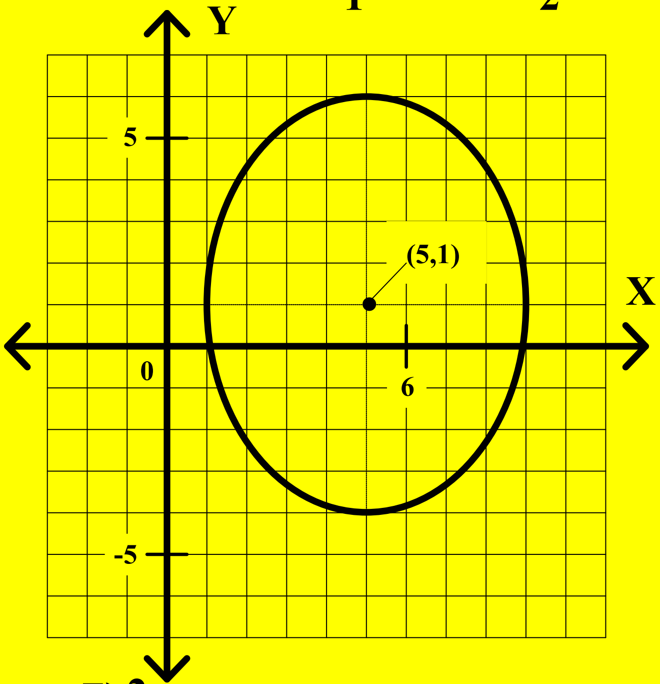

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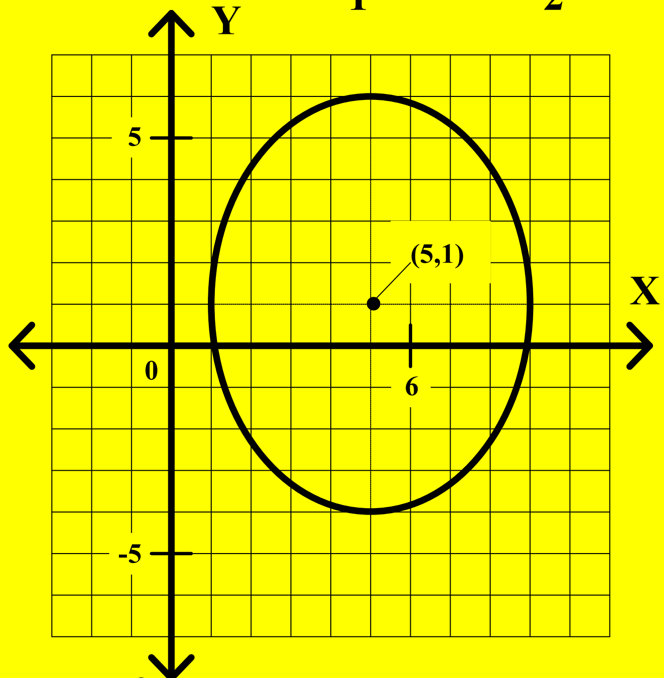

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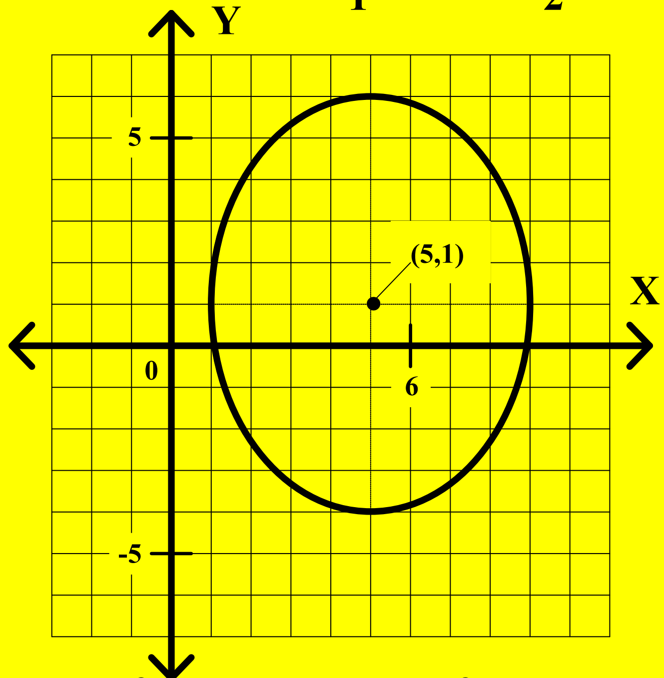

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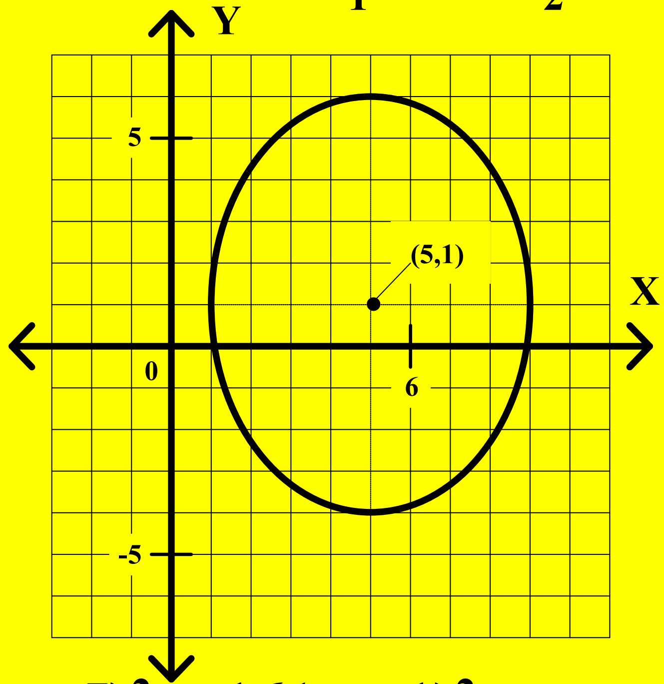

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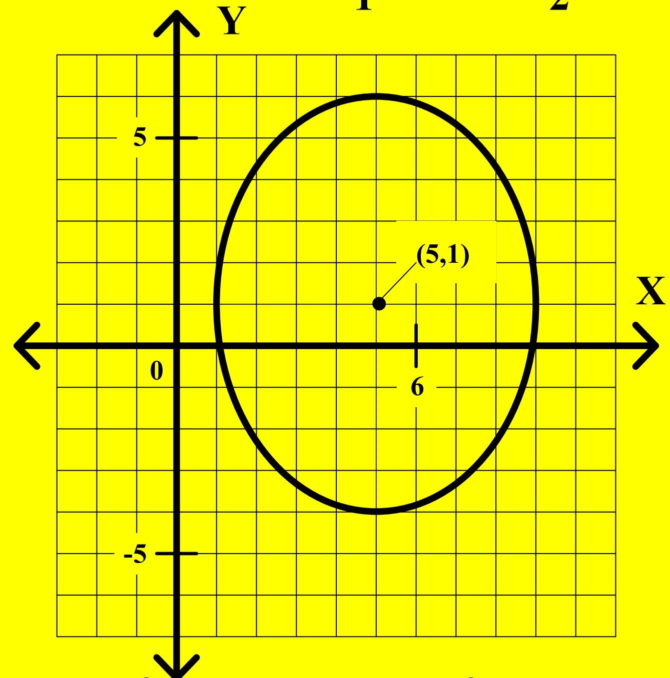

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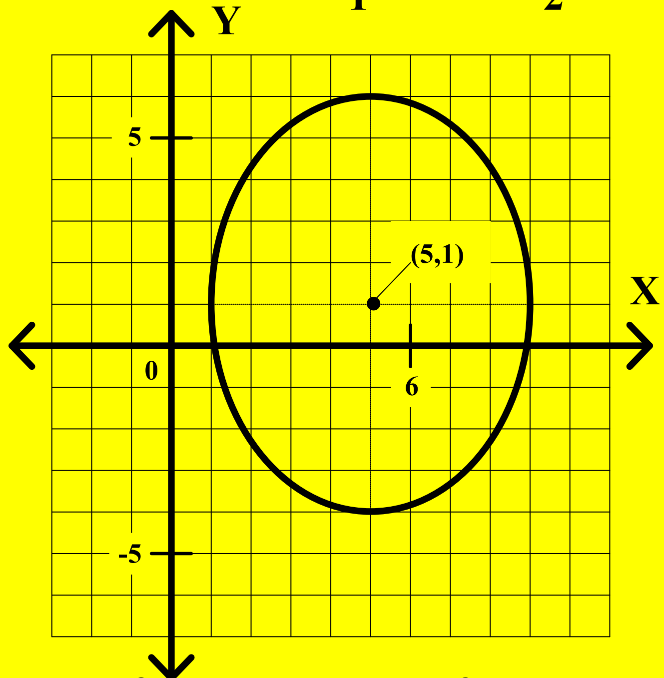

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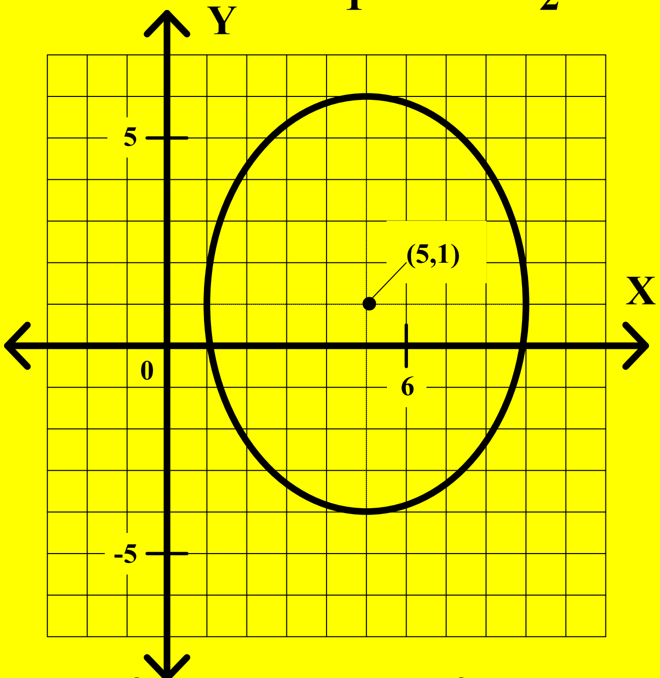

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Step 2: Square the binomials.

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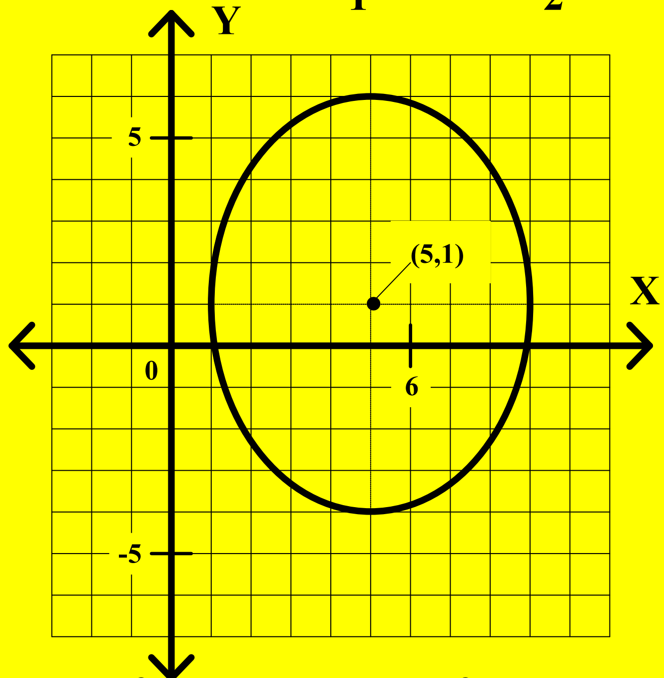

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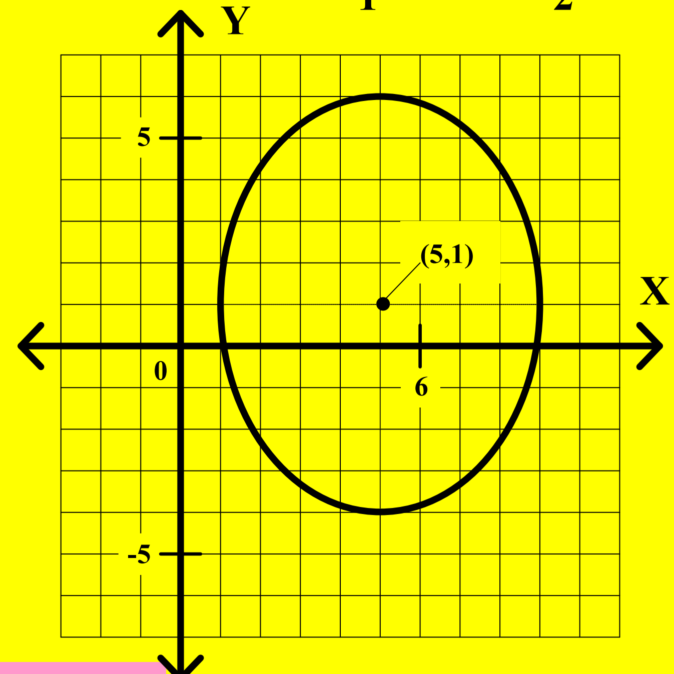

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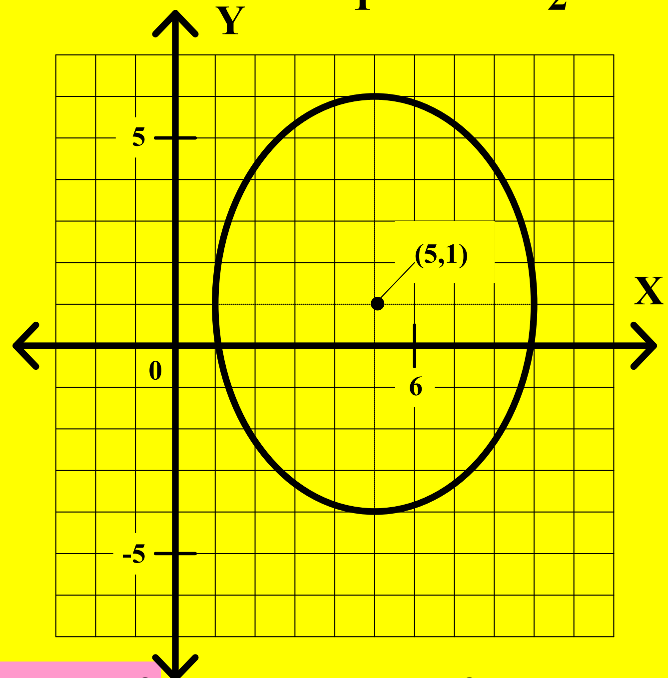

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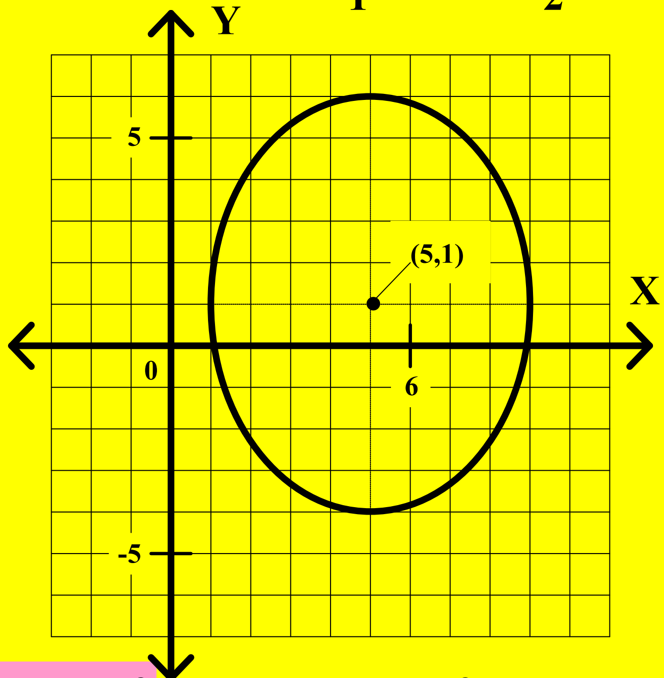

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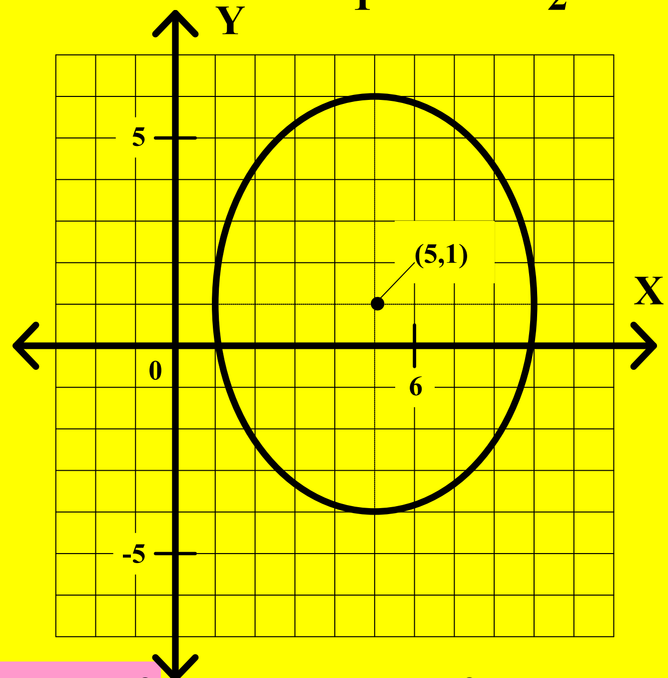

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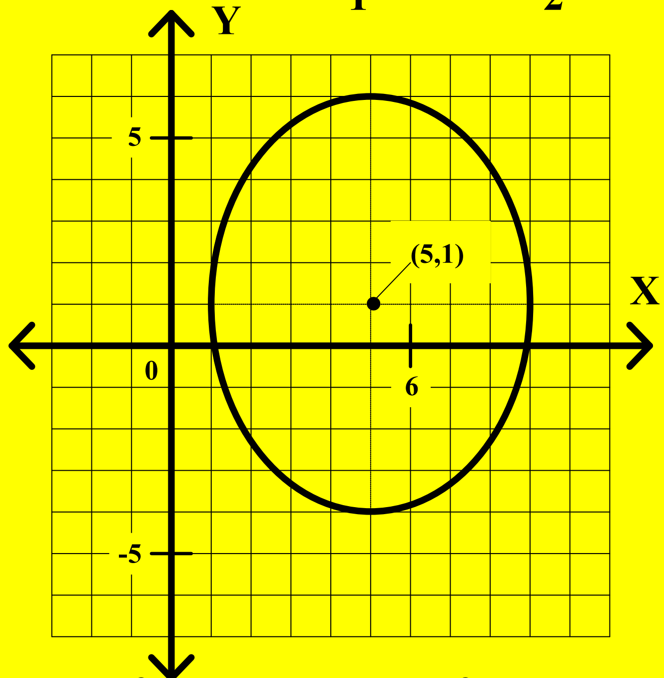

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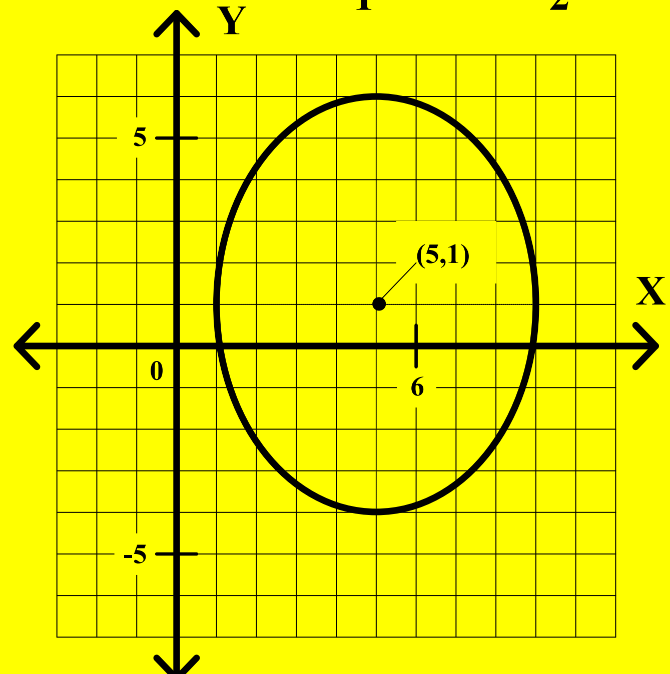

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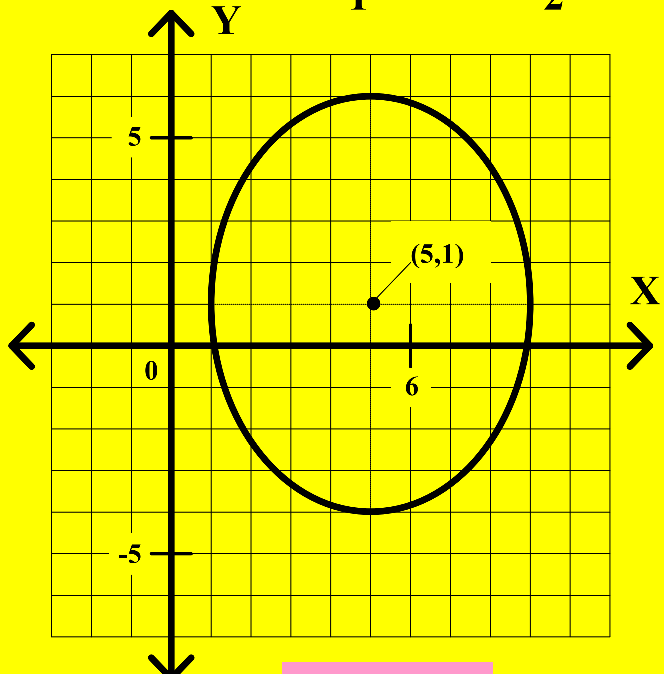

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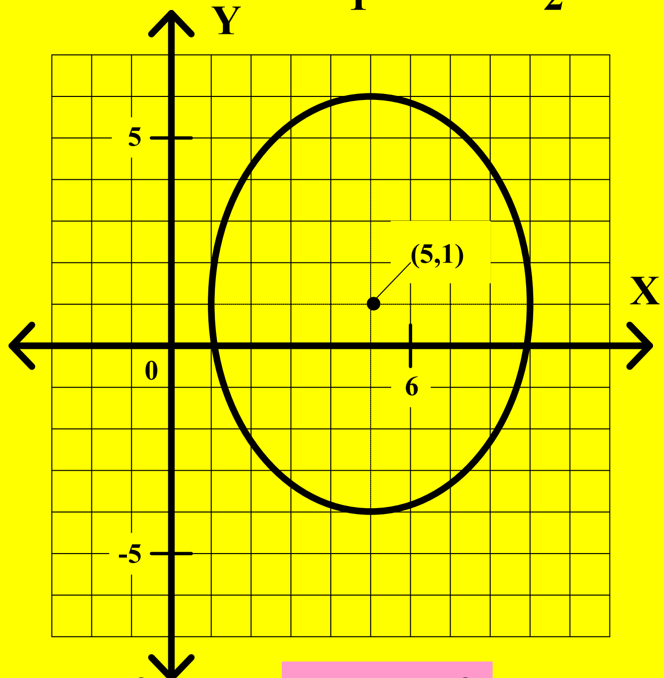

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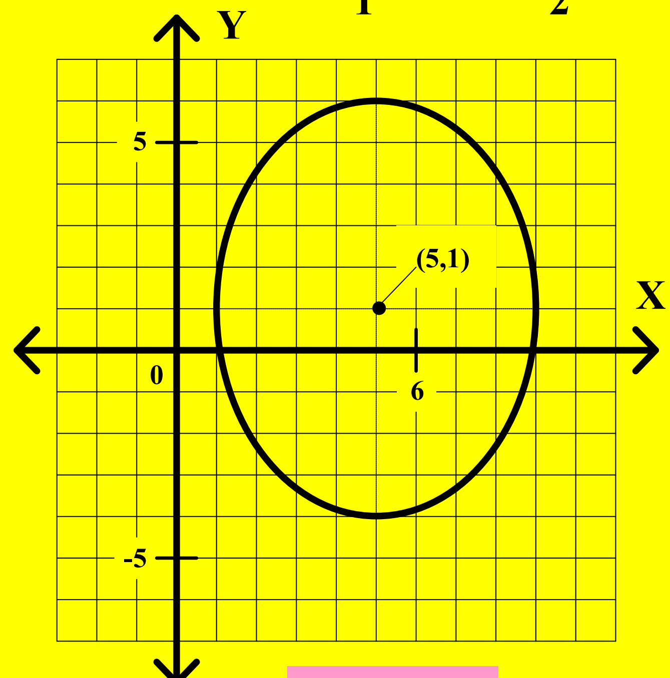

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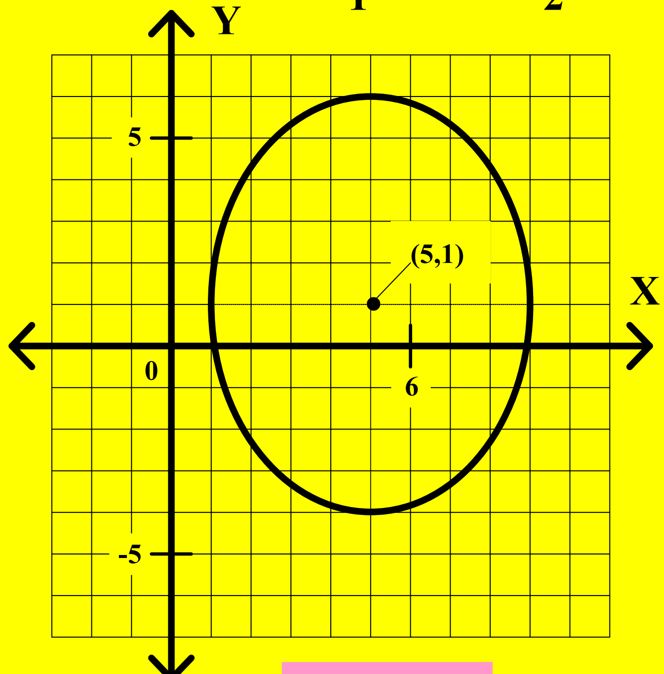

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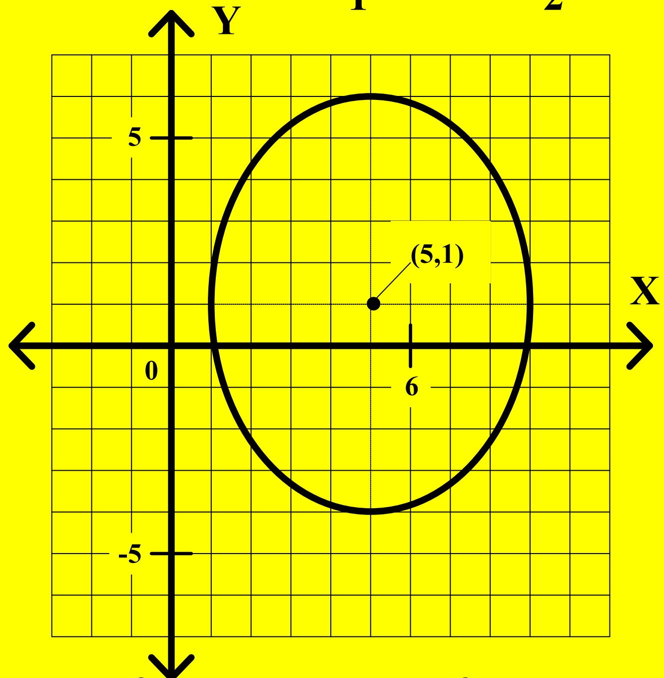

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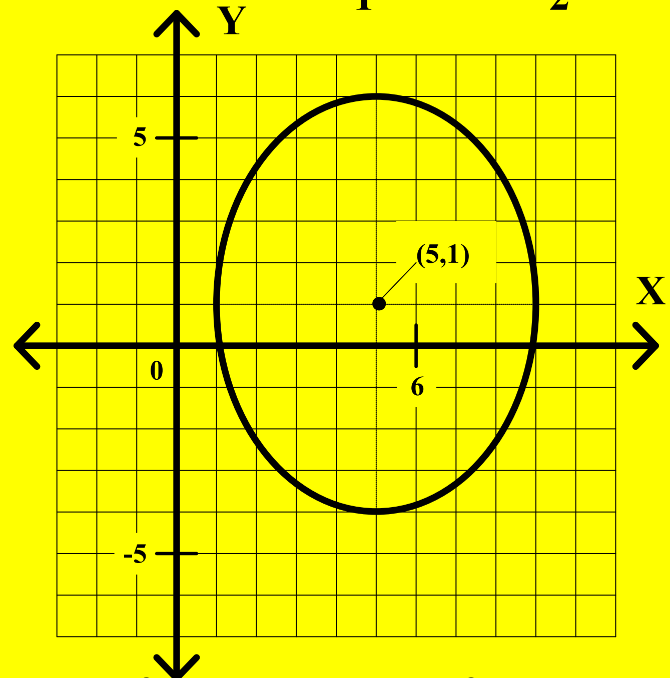

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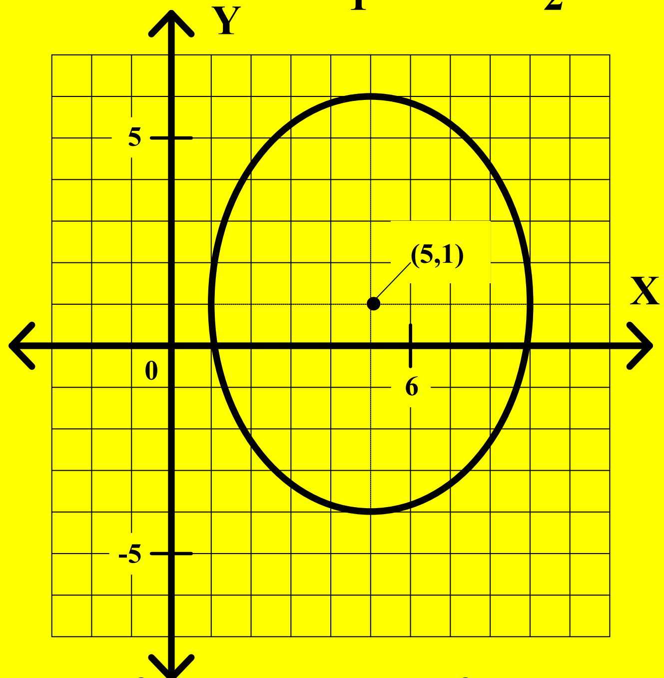

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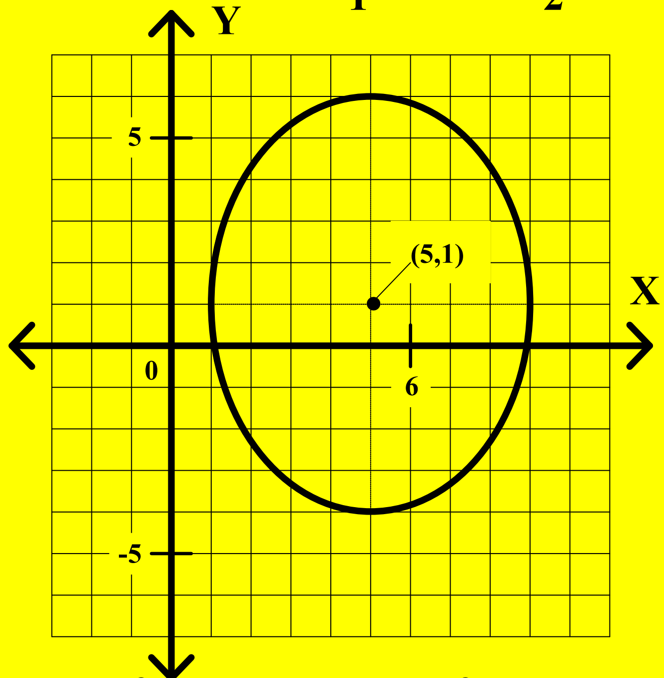

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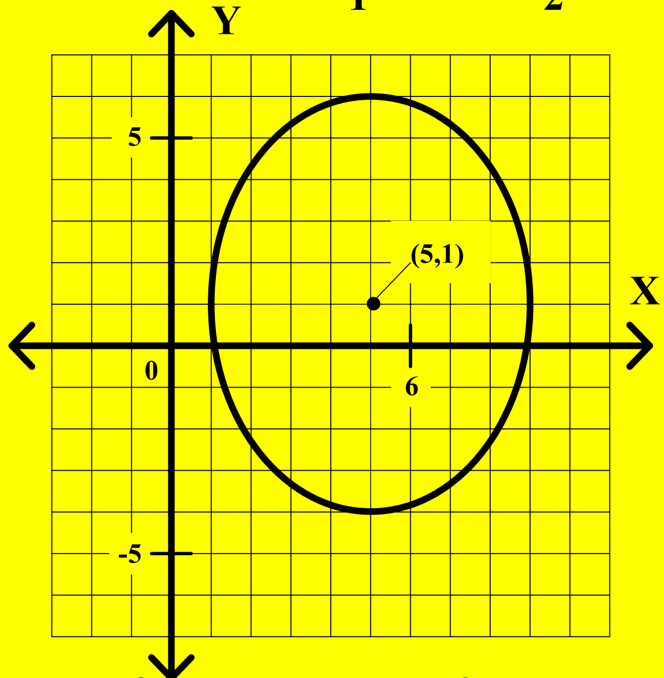

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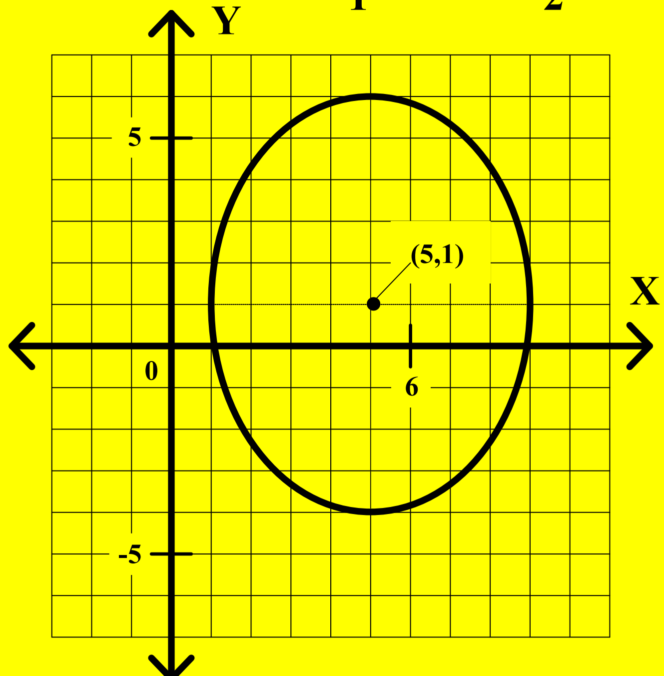

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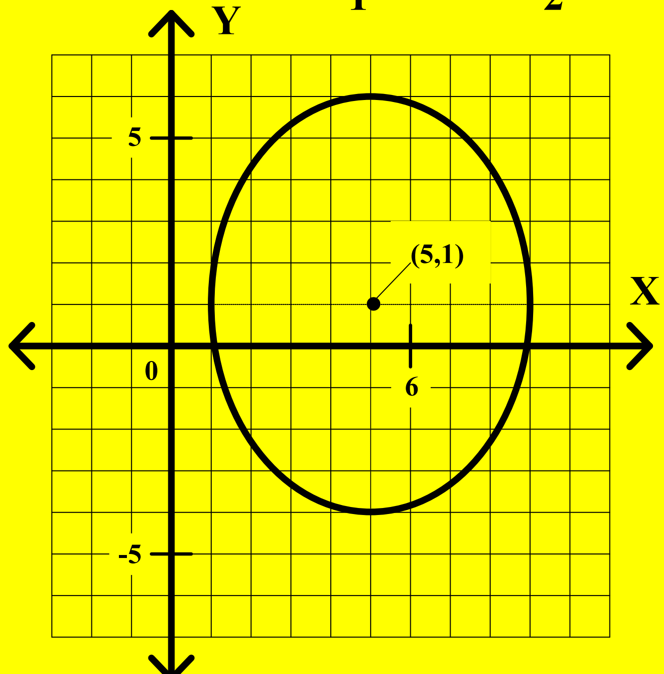

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$$25x^2 - 250x$$

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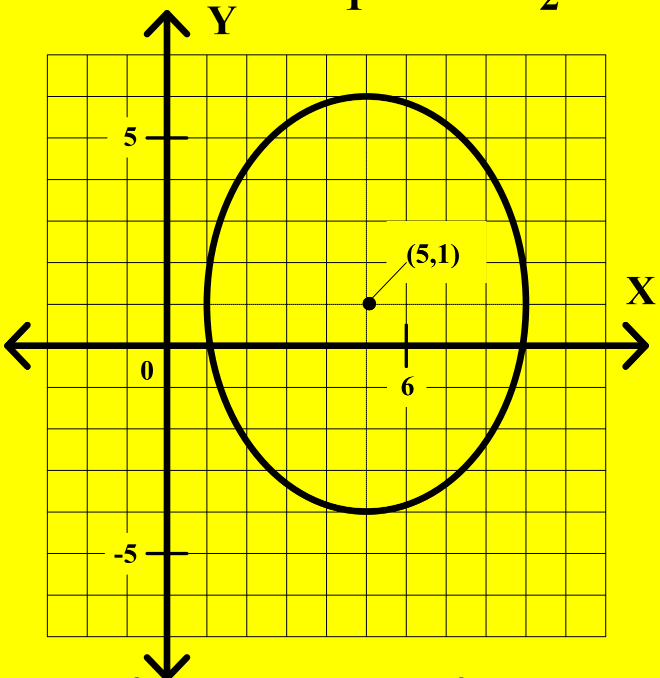

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$$25x^2 - 250x + 625$$

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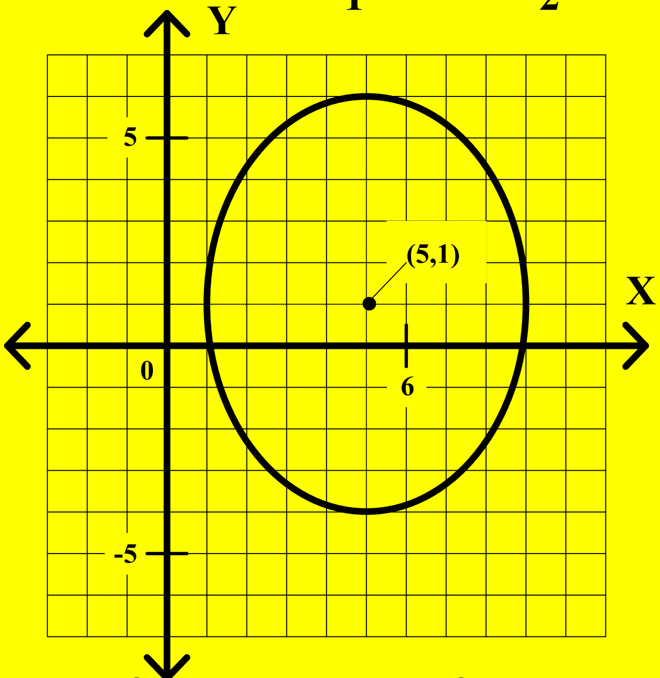

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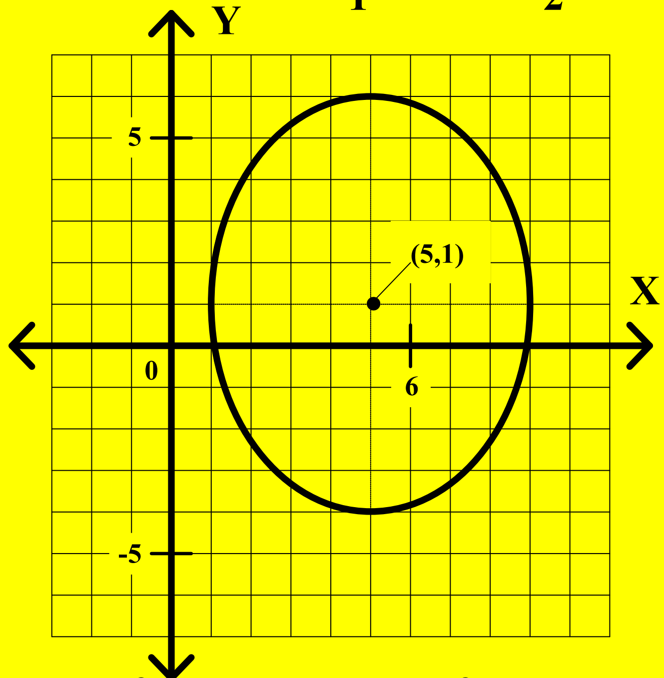

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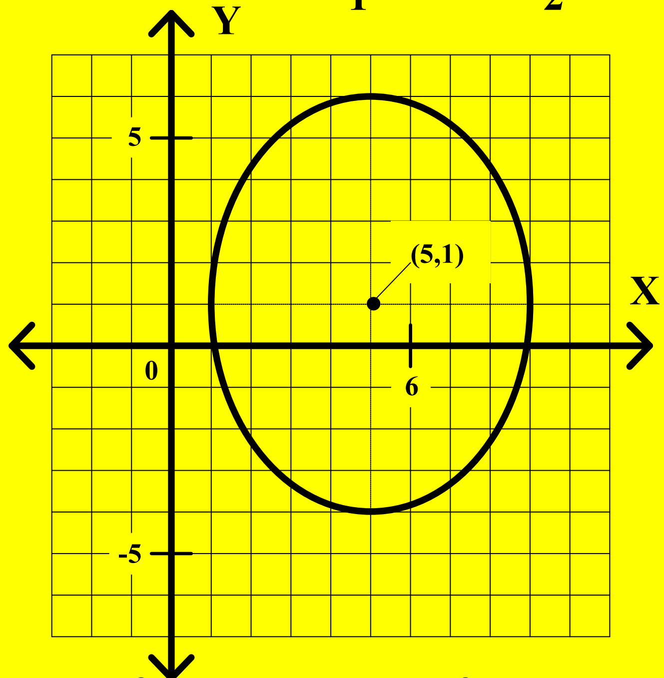

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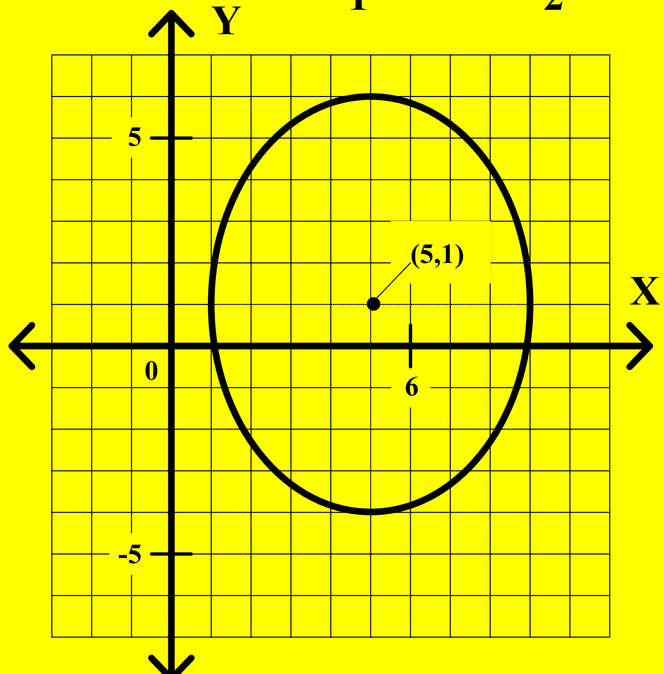

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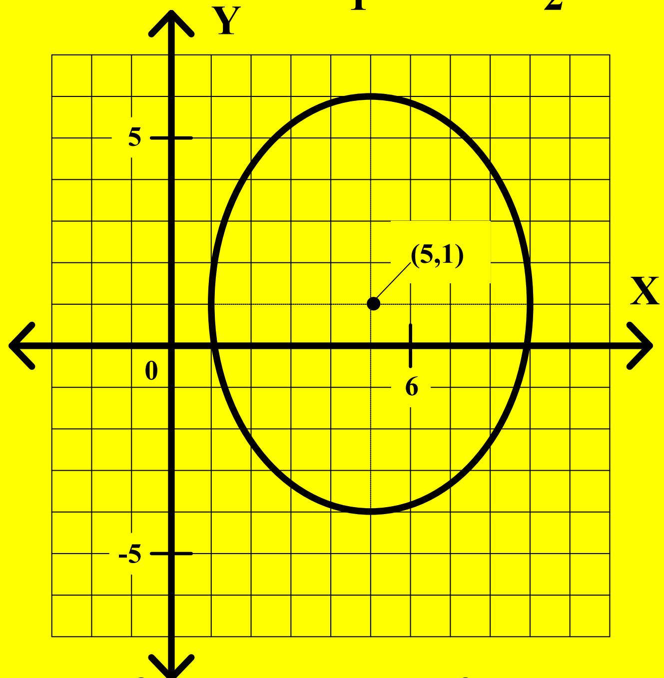

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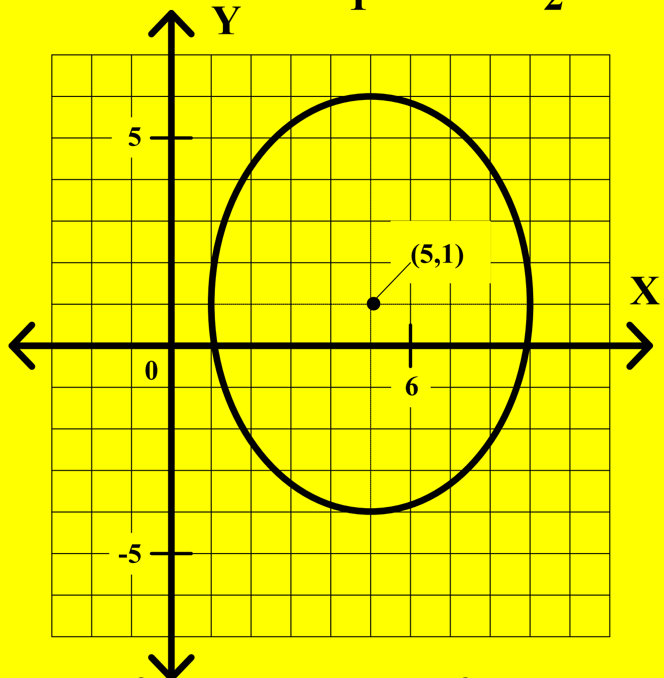

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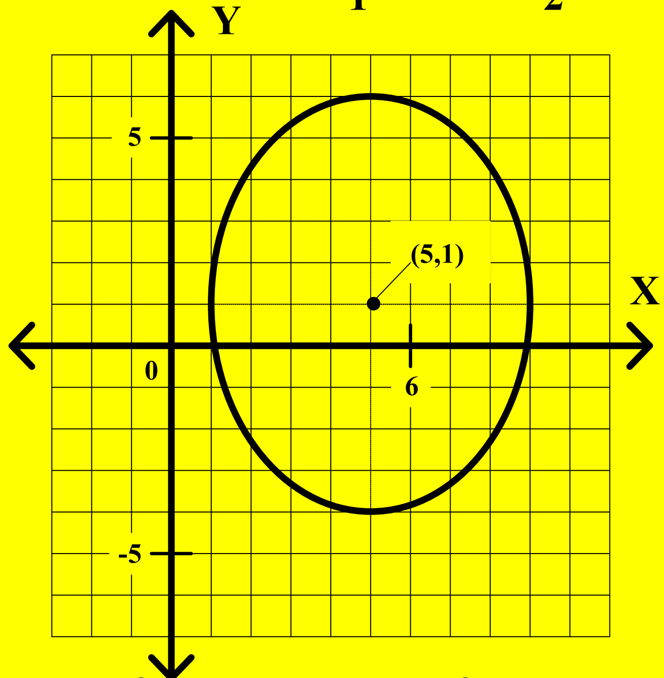

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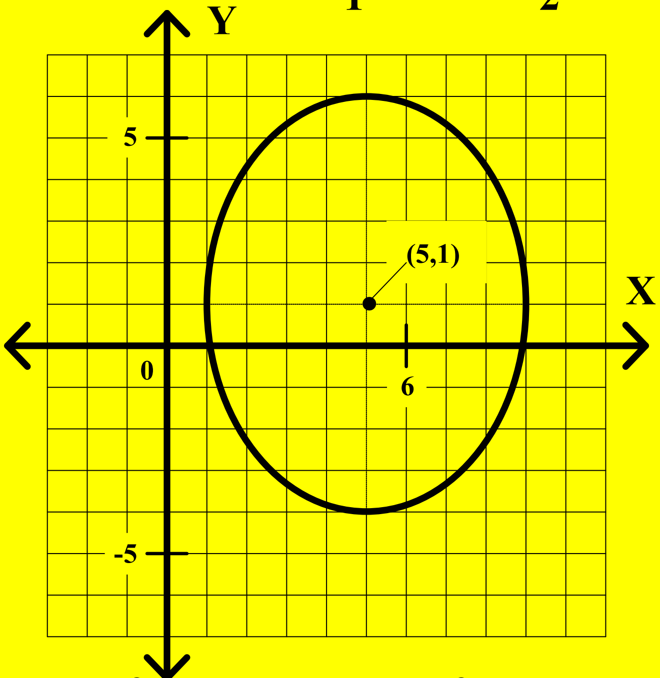

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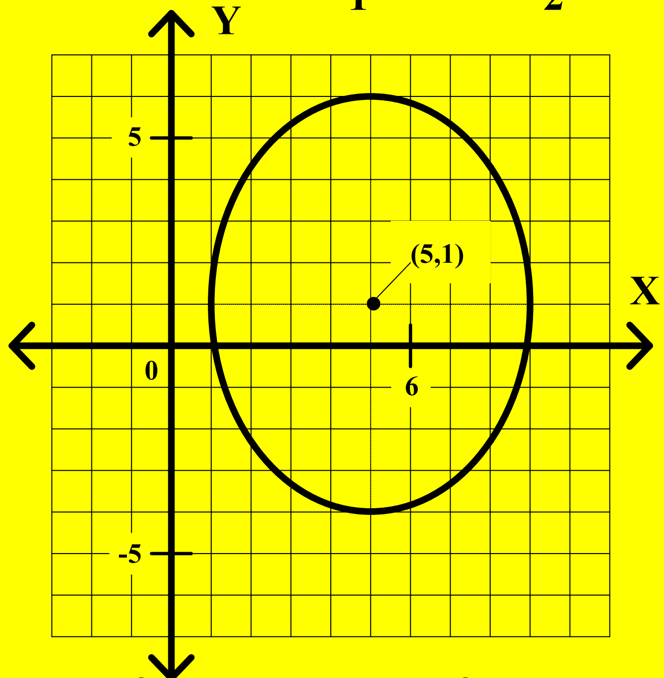

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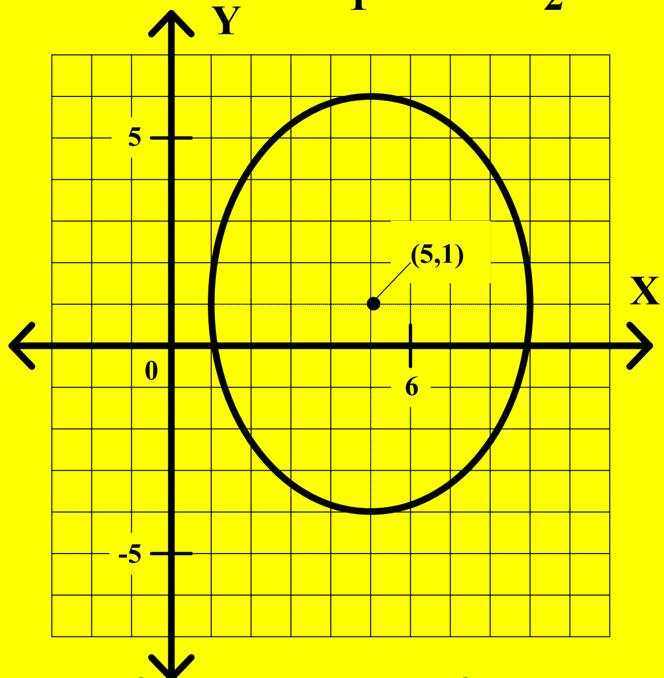

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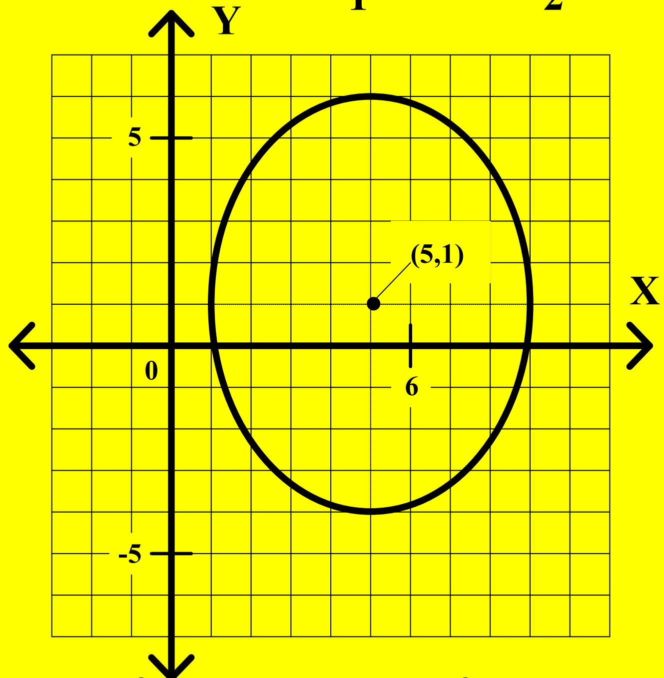

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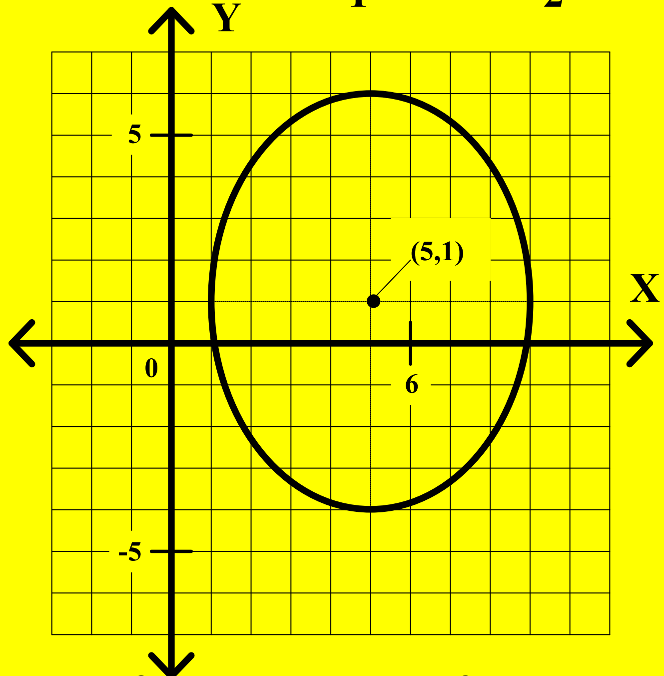

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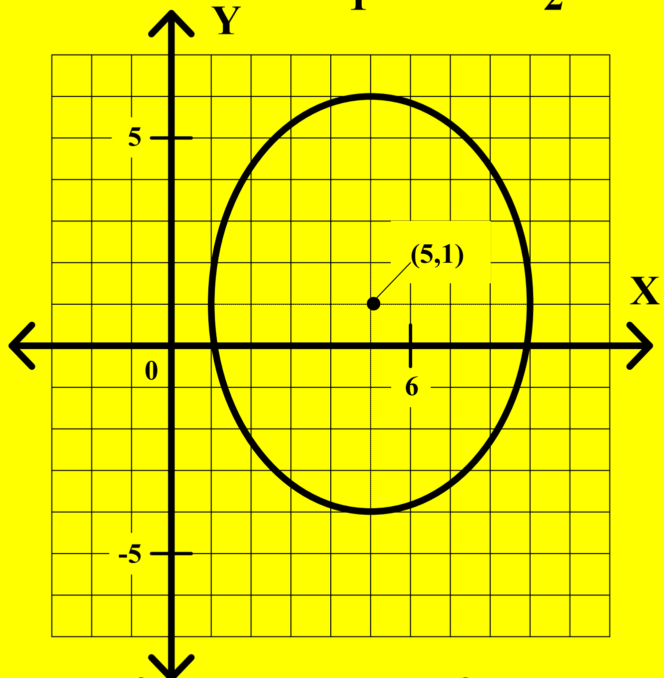

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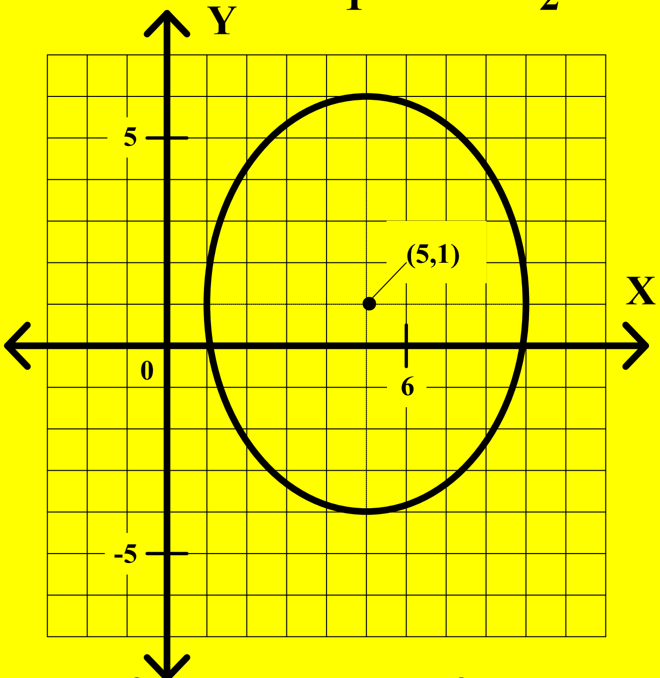

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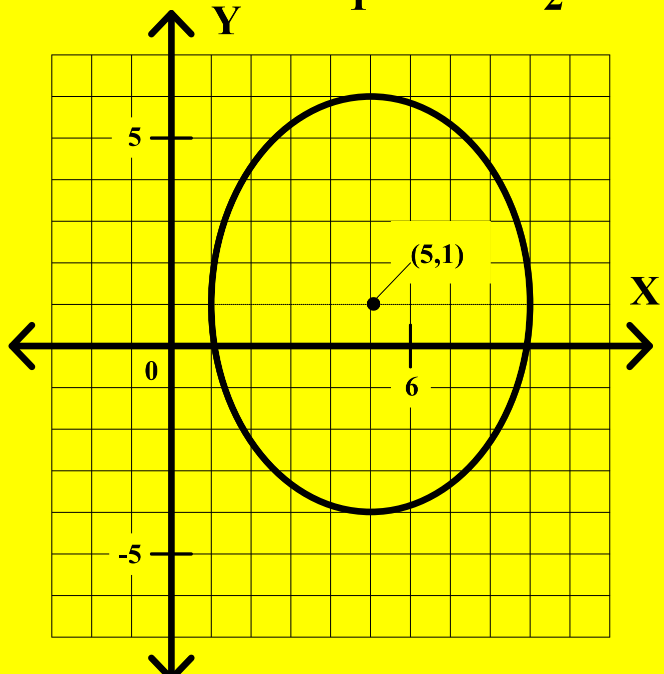

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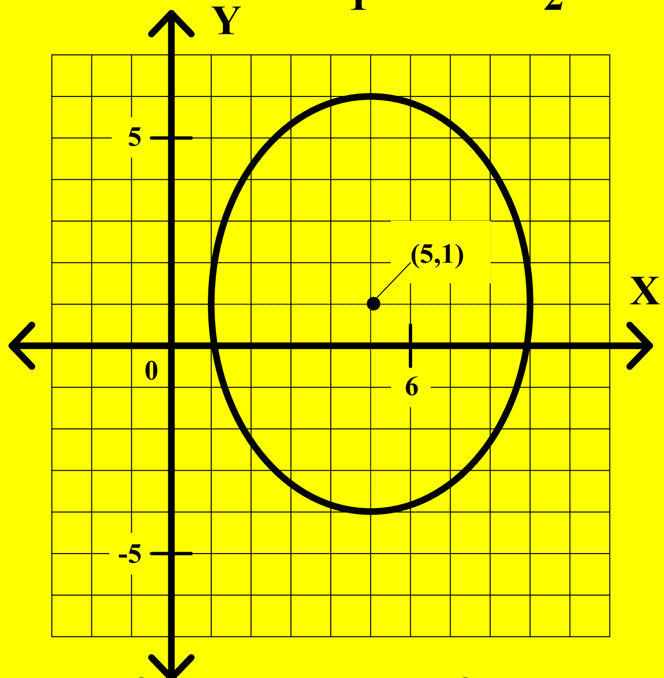

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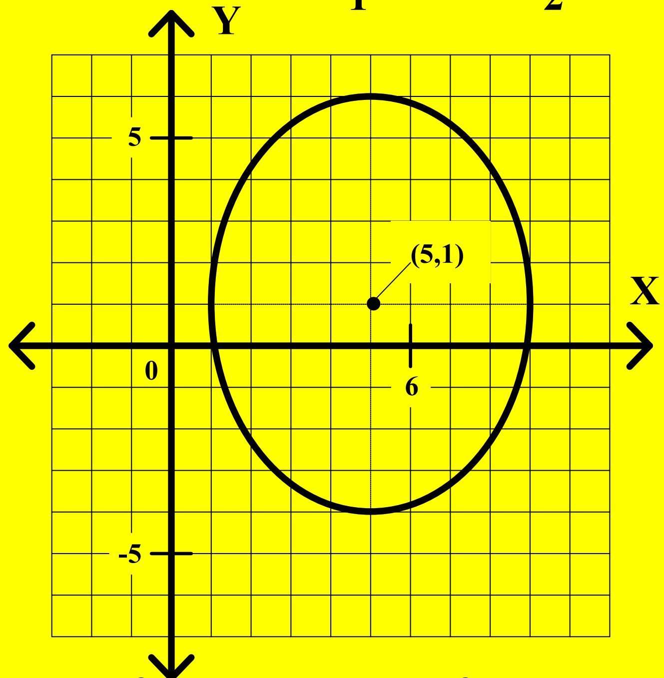

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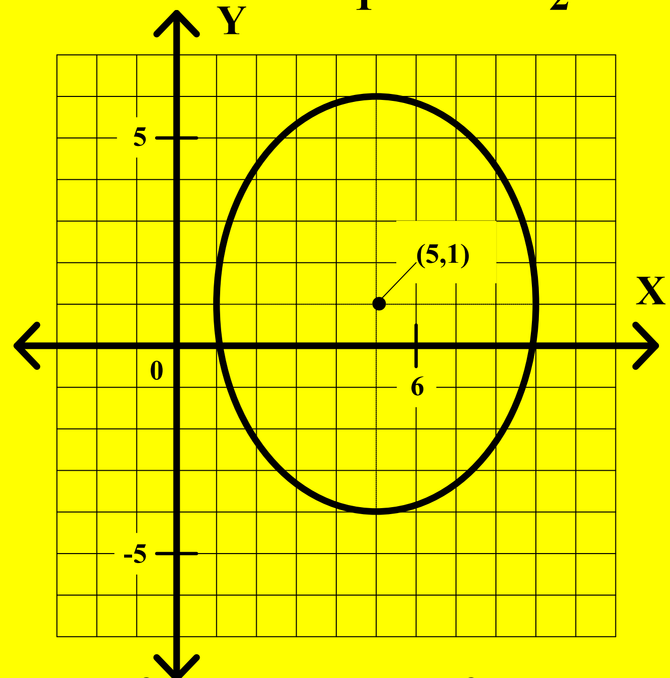

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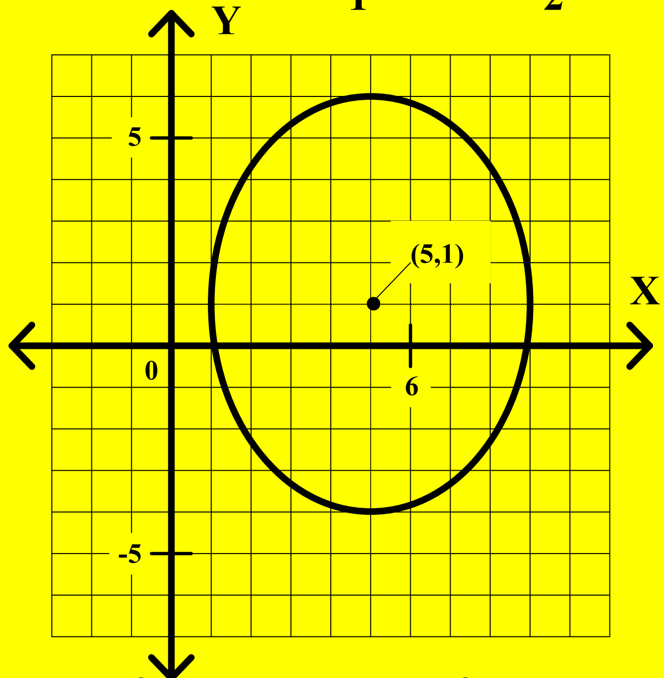

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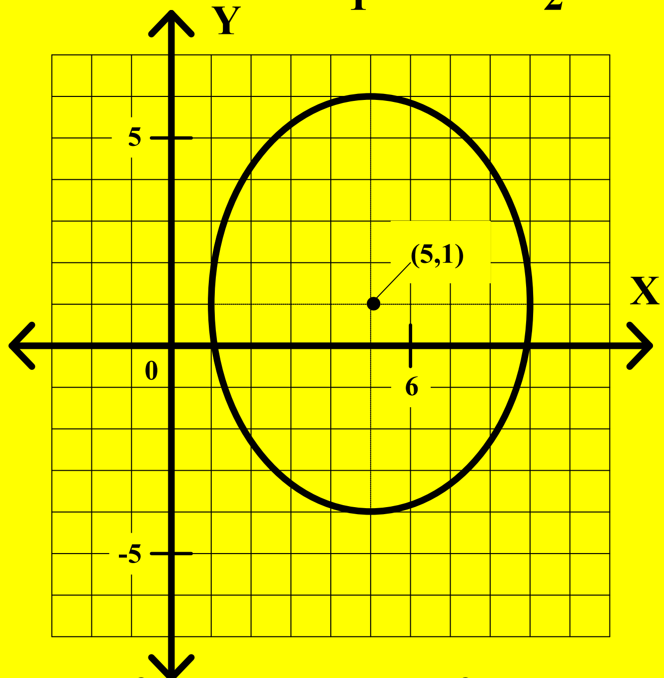

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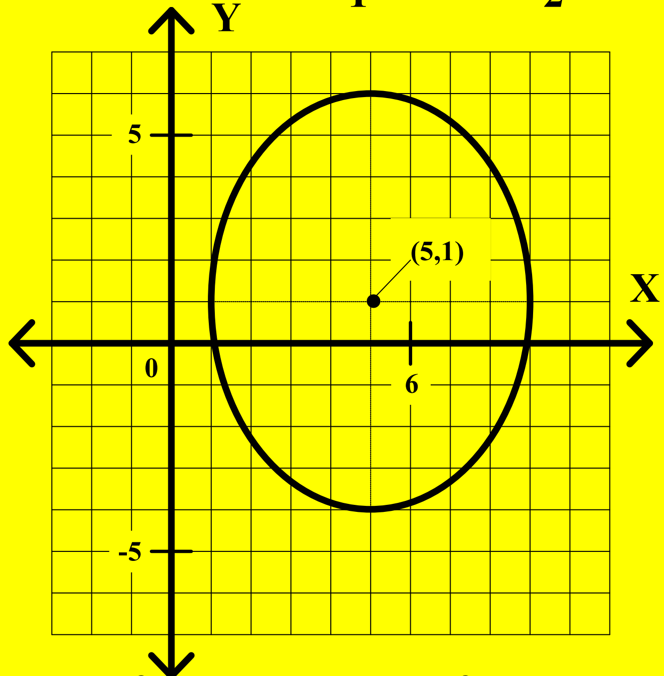

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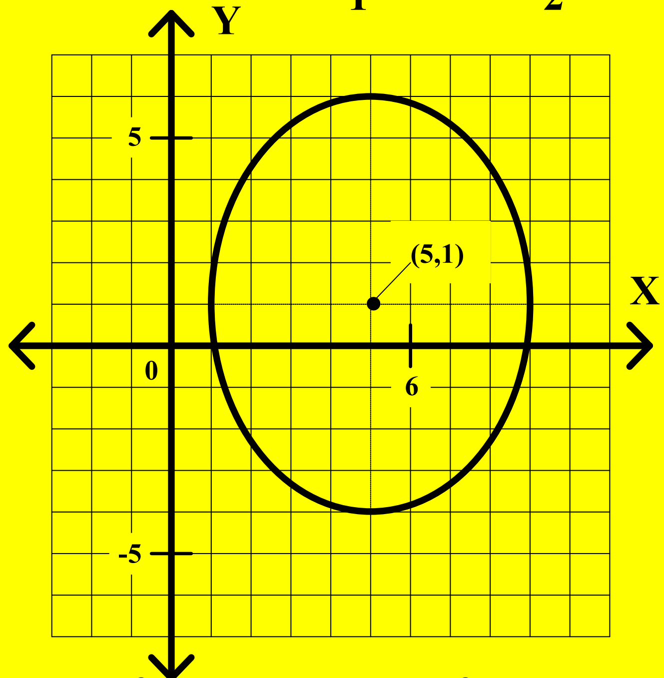

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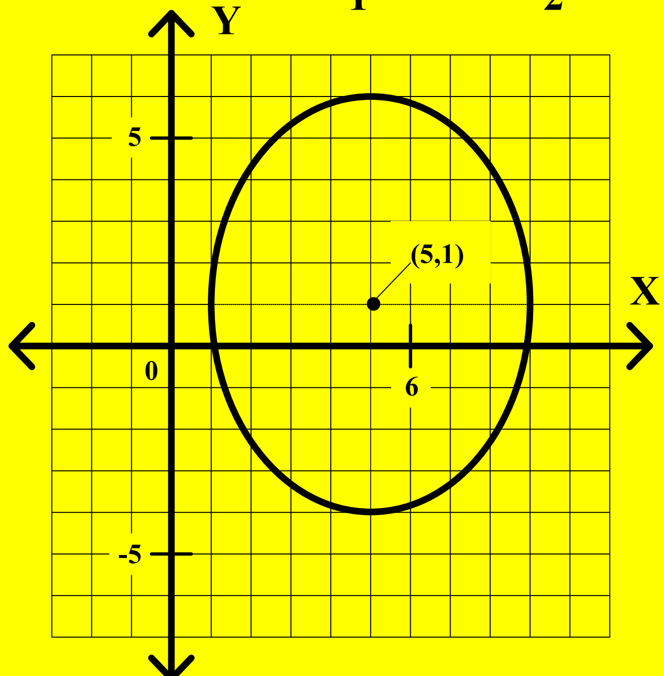

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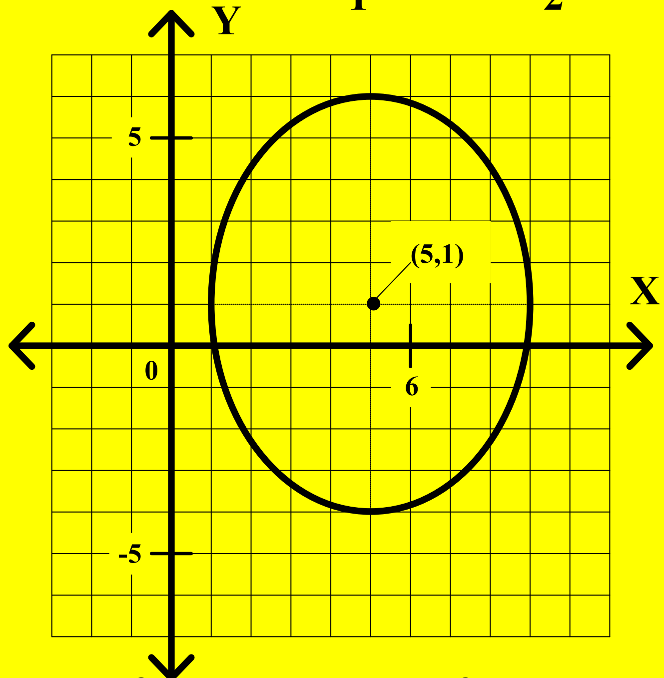
General Form Equation of an Ellipse

$$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

where $A \neq C$ and $AC > 0$



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$$25(x-5)^2 + 16(y-1)^2 = 400$$

$$25(x^2 - 10x + 25) + 16(y^2 - 2y + 1) = 400$$

$$25x^2 - 250x + 625 + 16y^2 - 32y + 16 = 400$$

$$25x^2 + 16y^2 - 250x - 32y + 641 = 400$$

$$25x^2 + 16y^2 - 250x - 32y + 241$$

Step 5: Subtract 400 from each side.

Class Worksheet #2

Write the equation in standard form and the equation in general form for each ellipse. Then locate and label foci F_1 and F_2.

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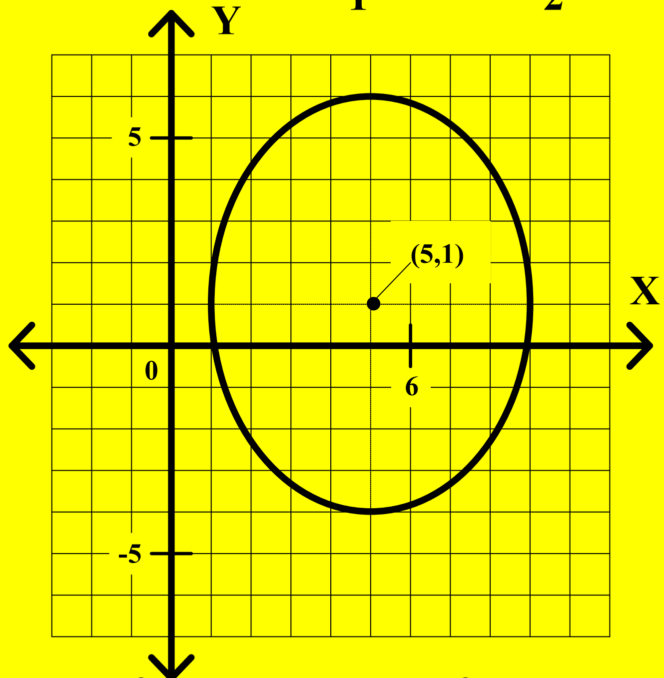

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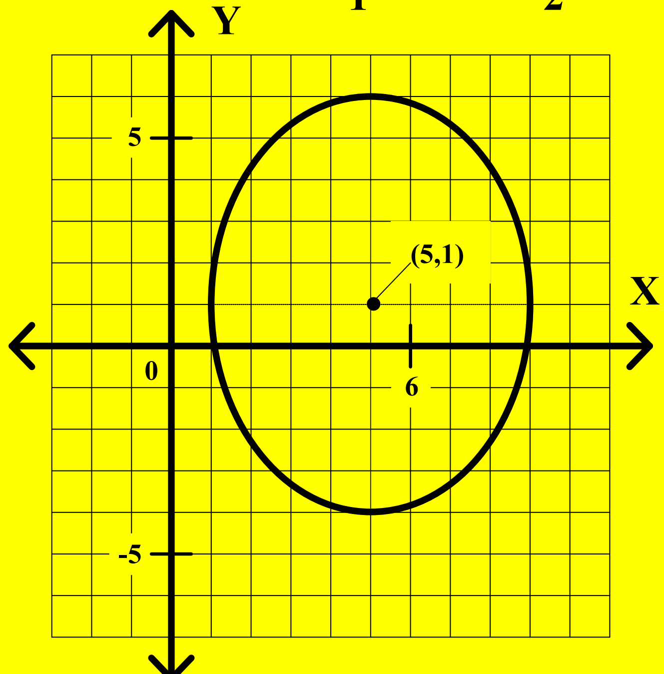

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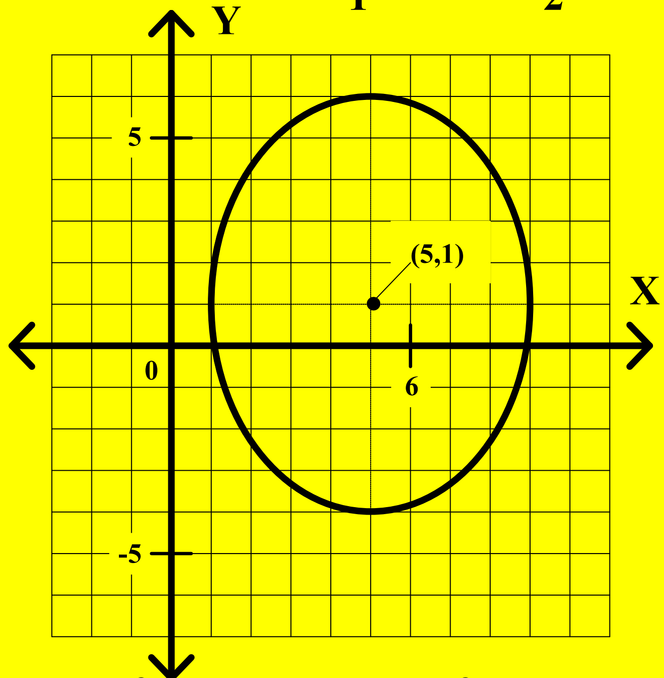

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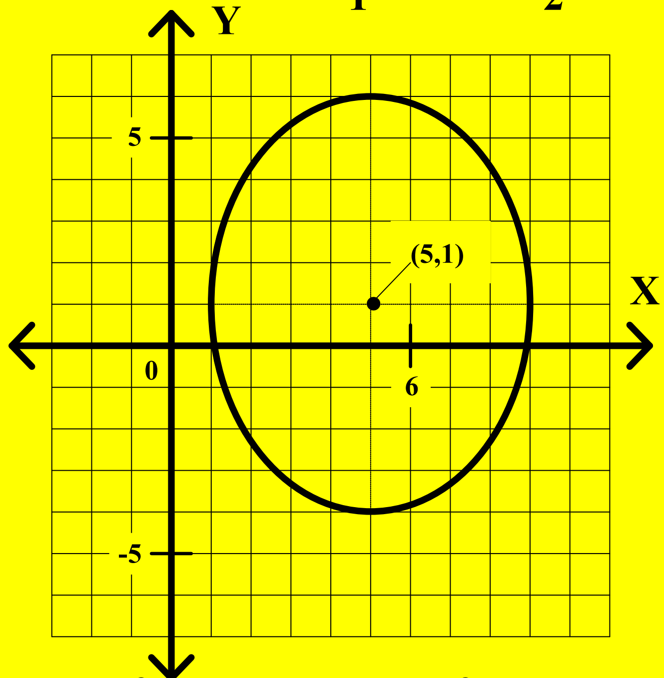

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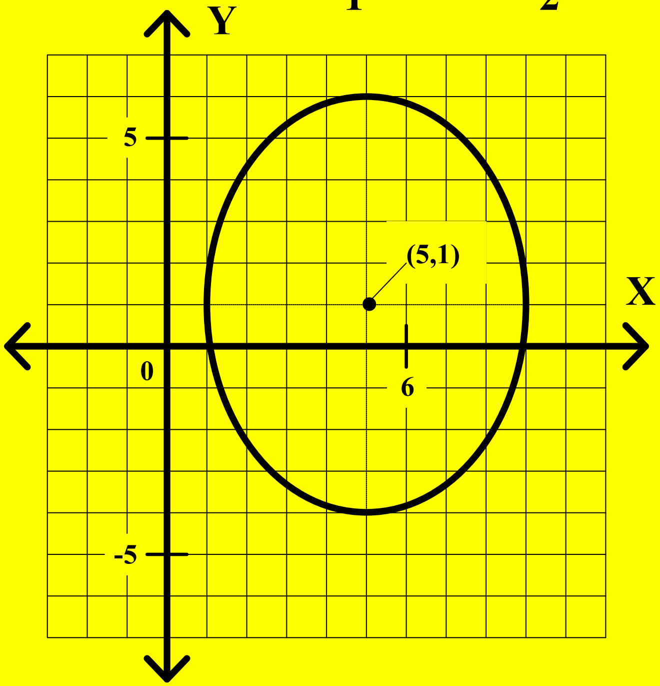

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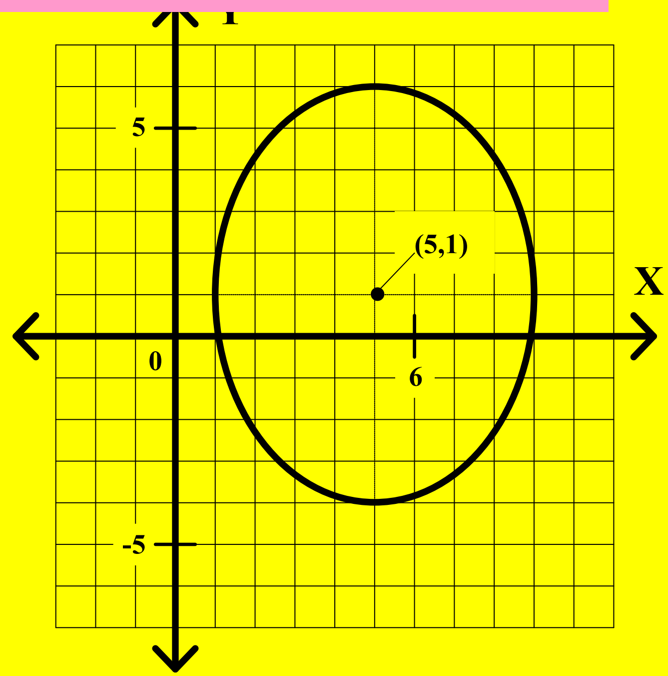

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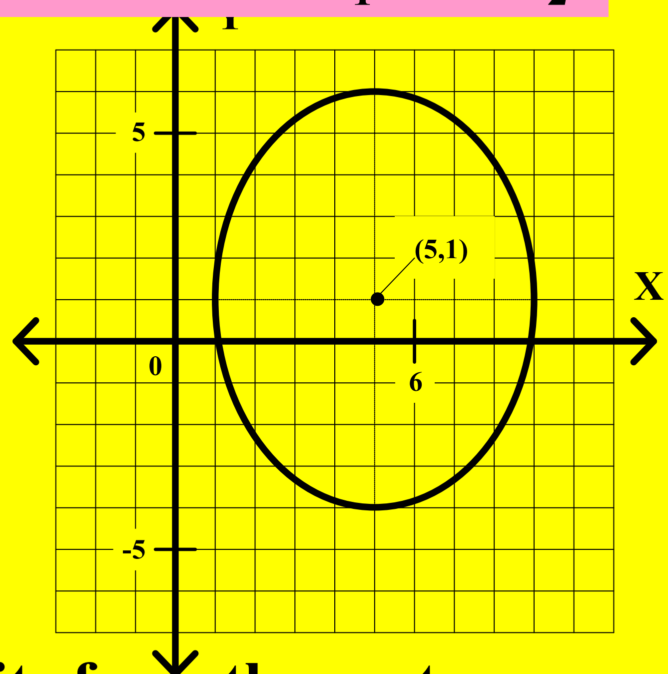

Each focus is on the major axis, c units from the center

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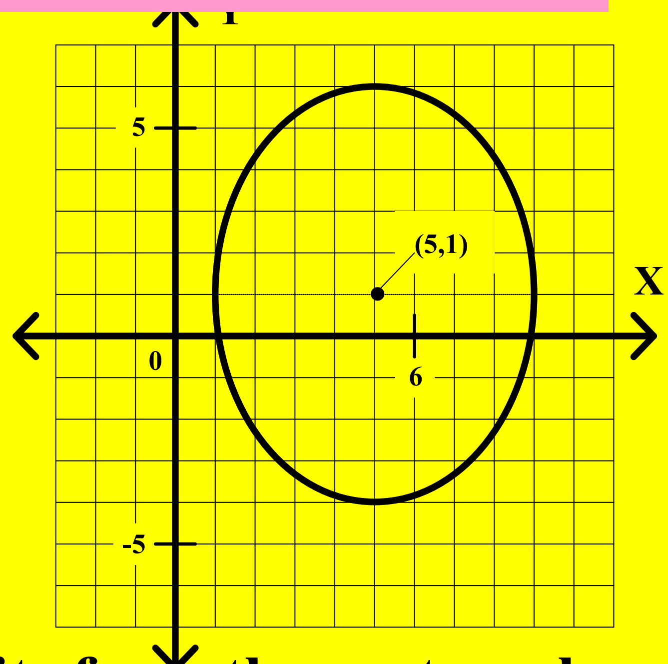

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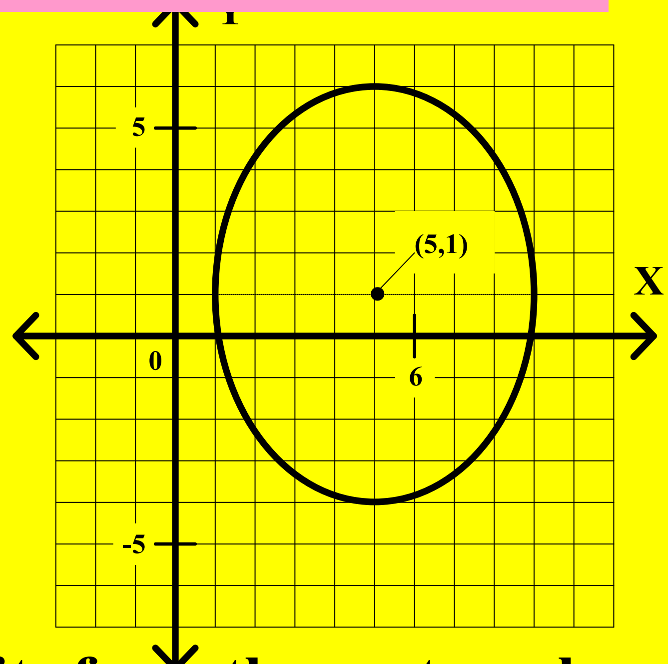

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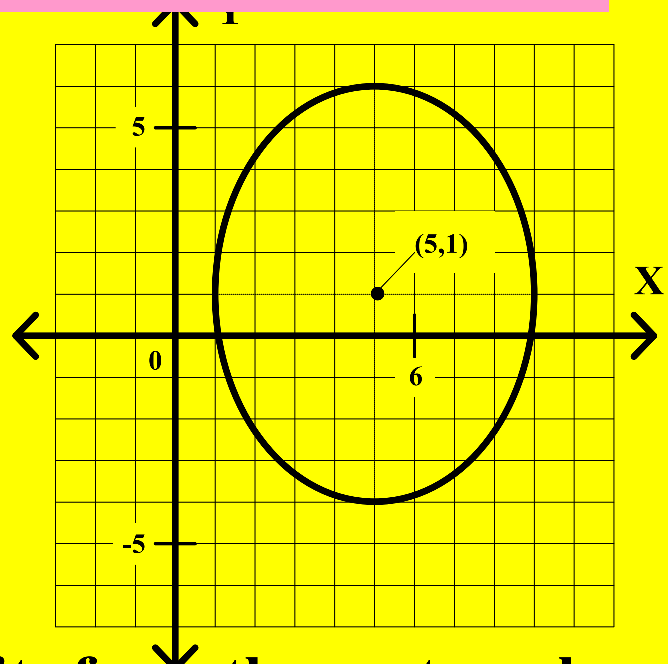

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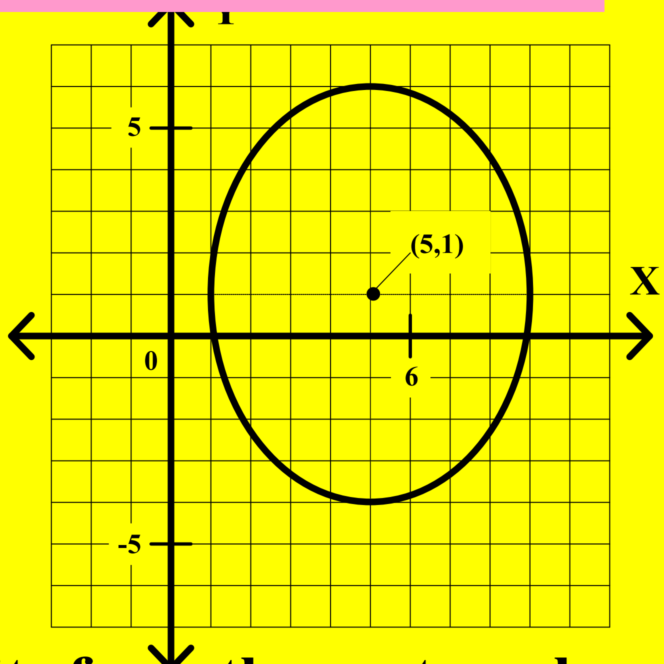

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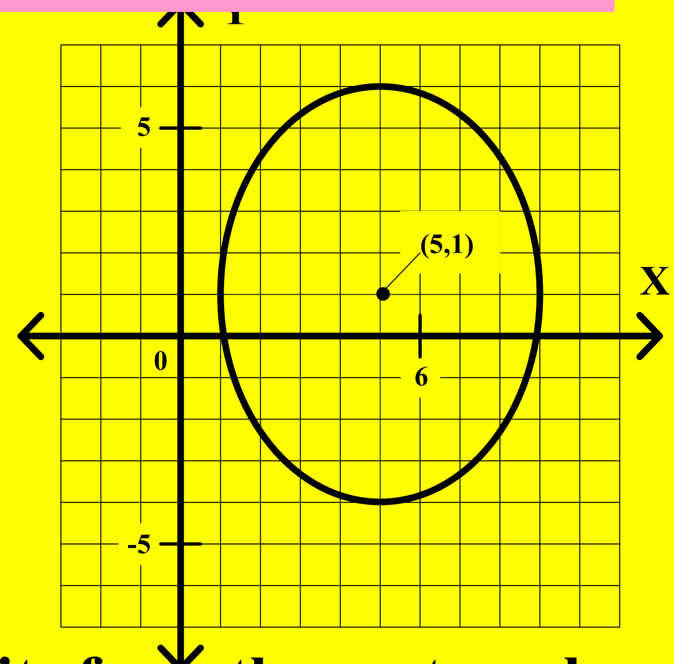

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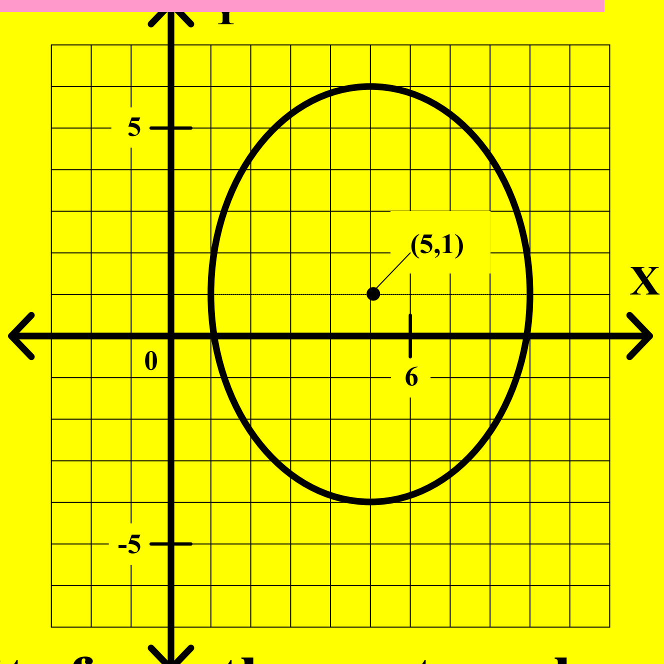

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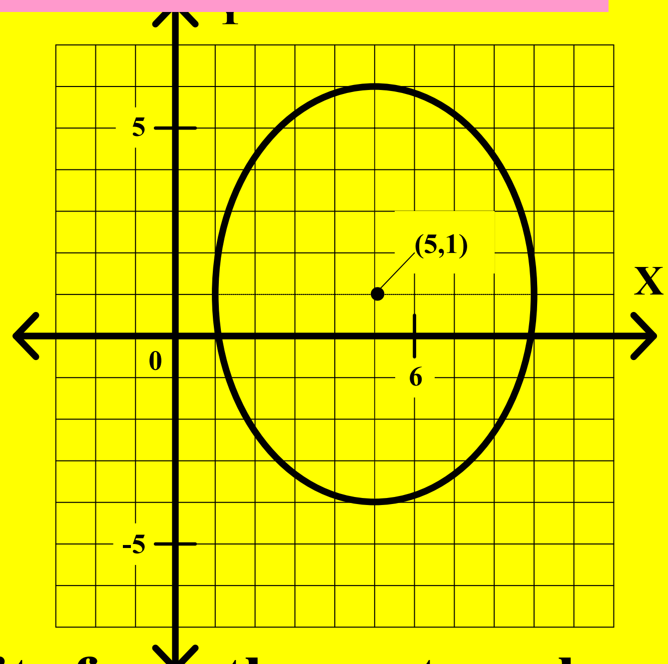

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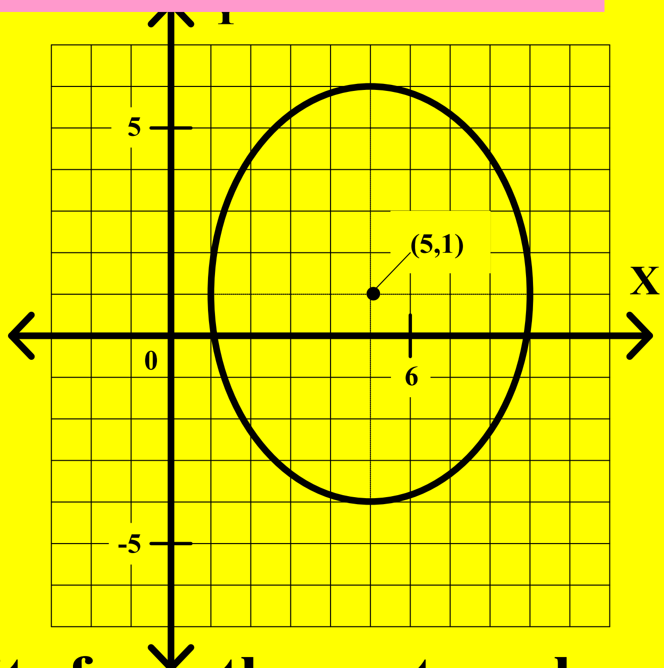

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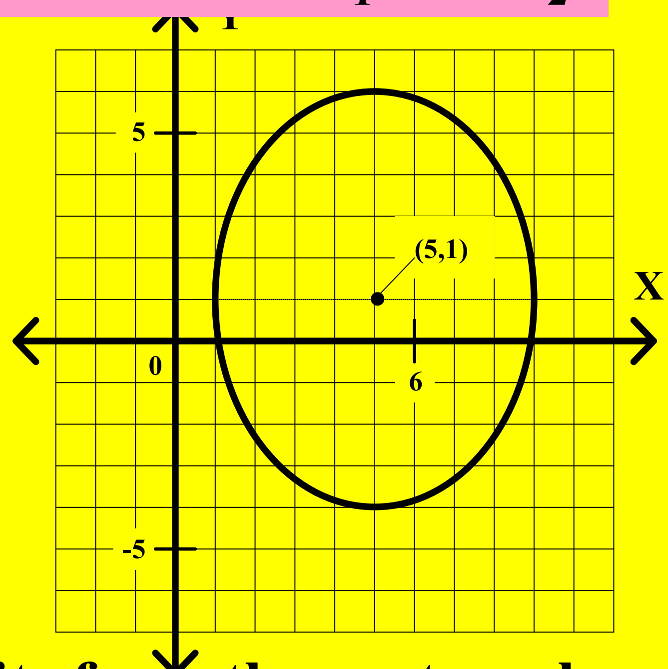

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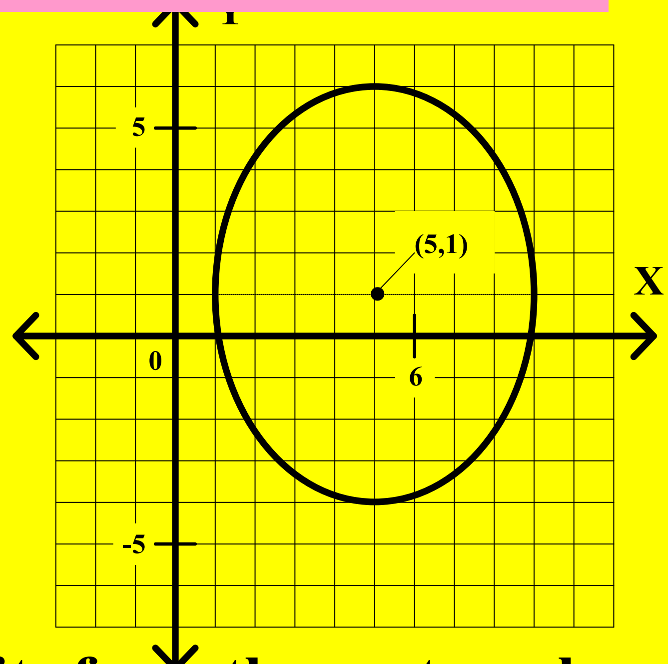

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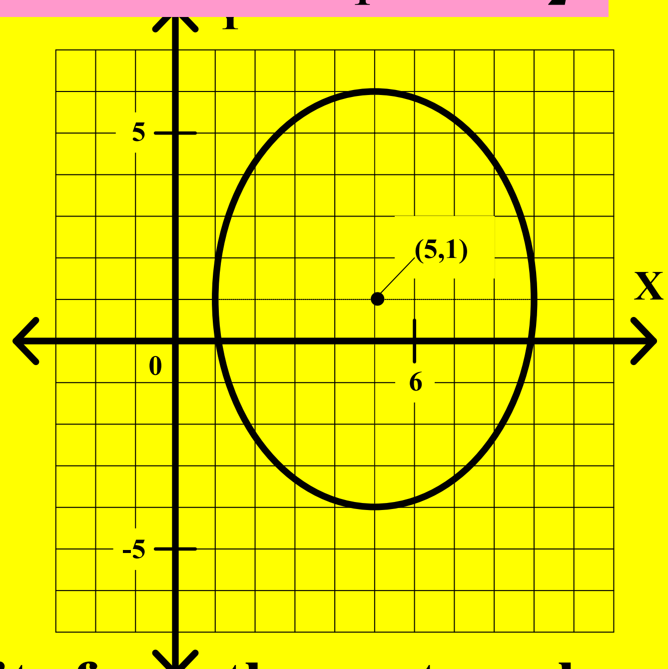

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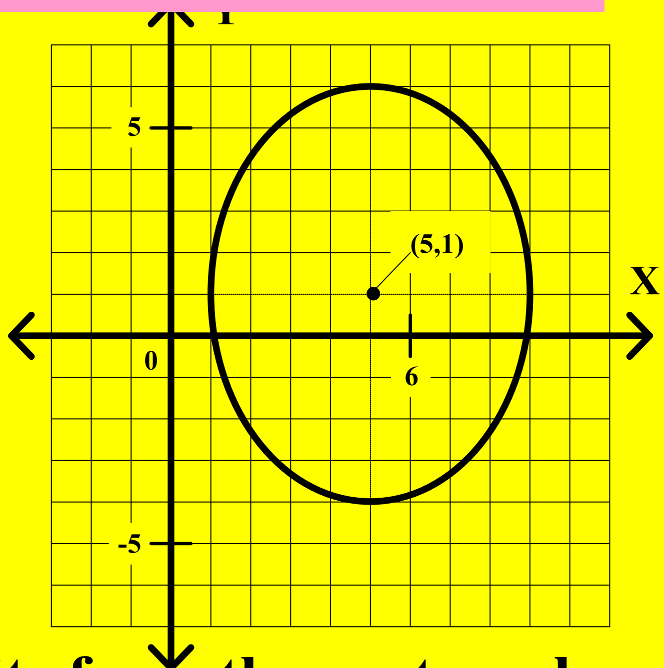

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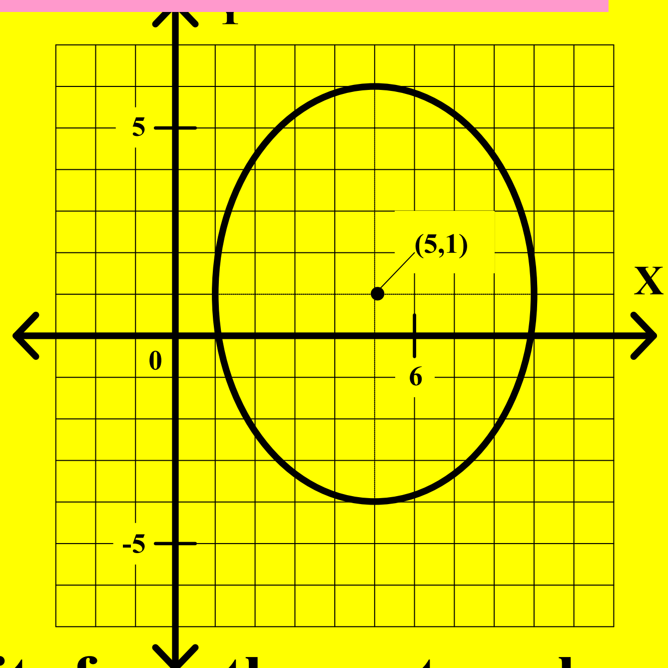

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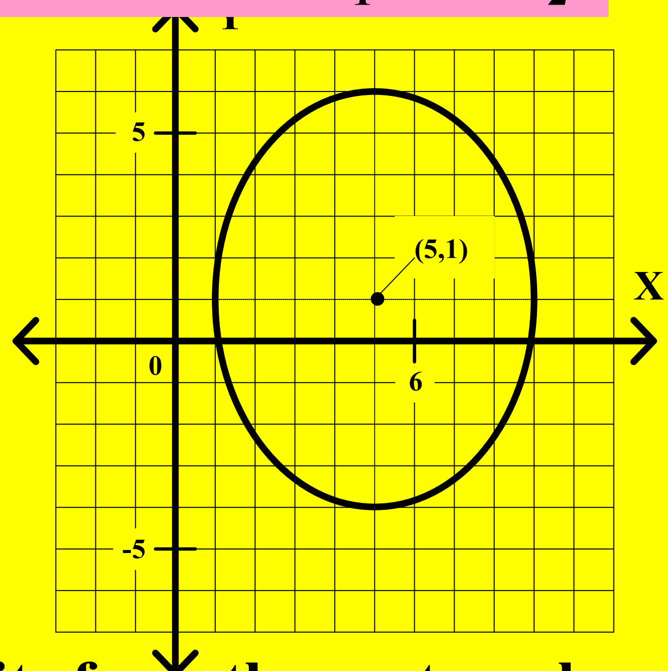

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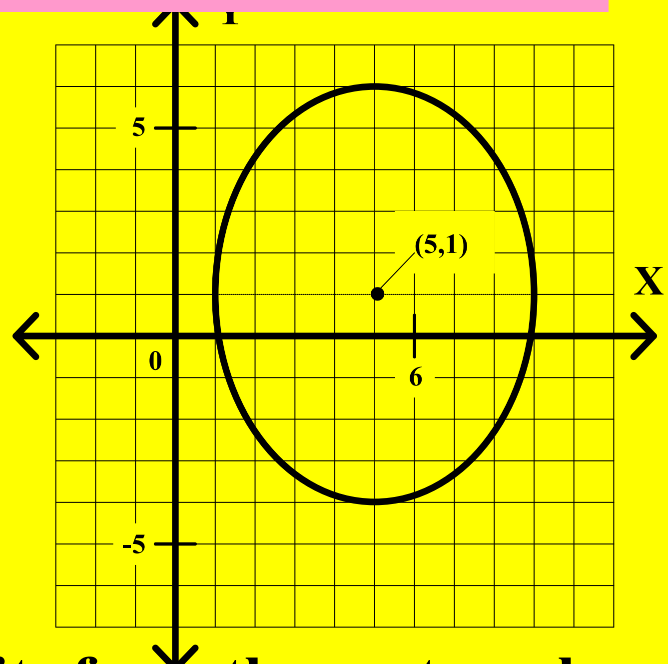

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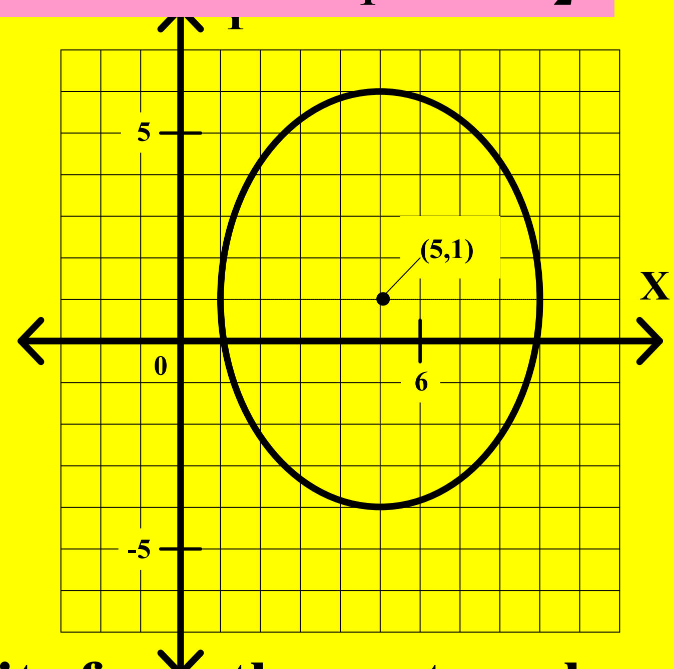

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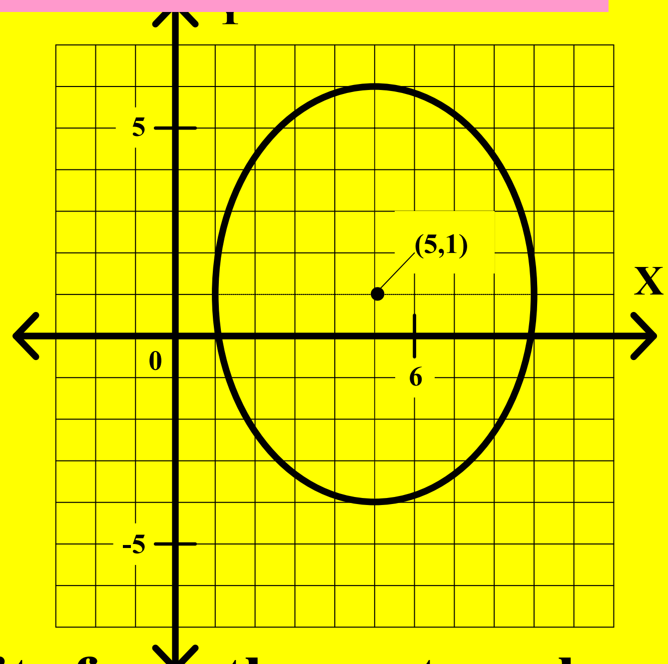

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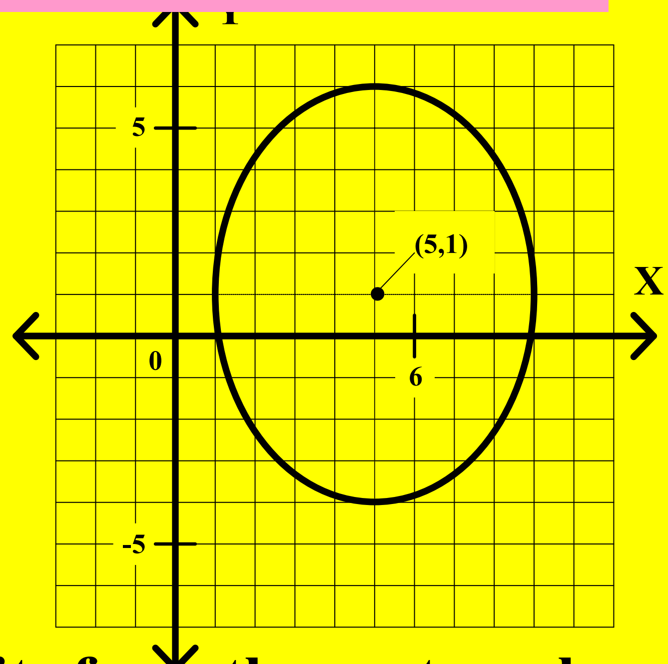

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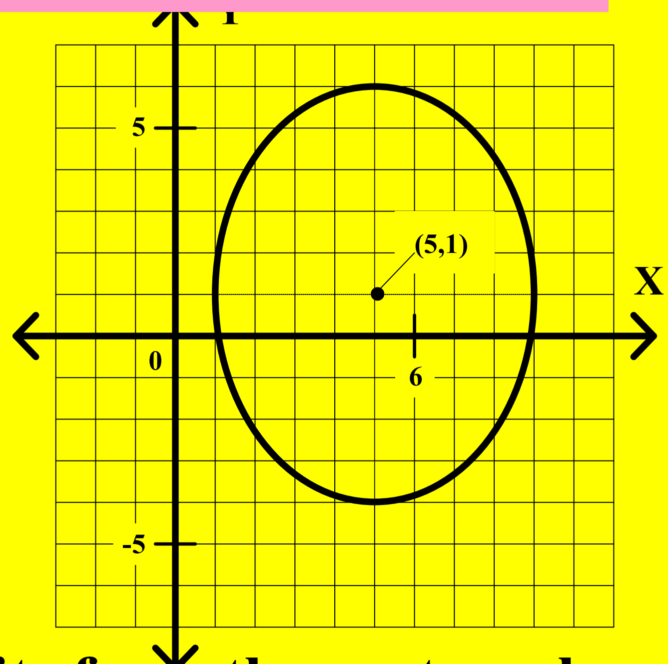

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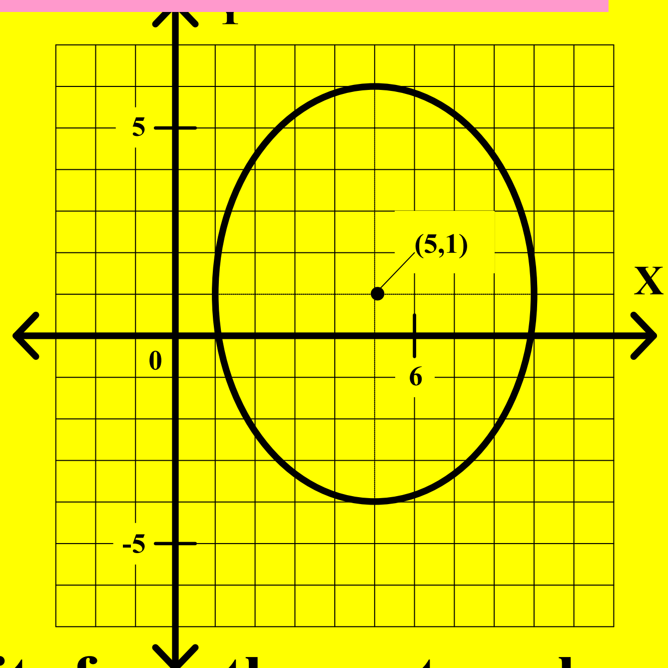
$F_1(5\ ,\ 1 + 3)$



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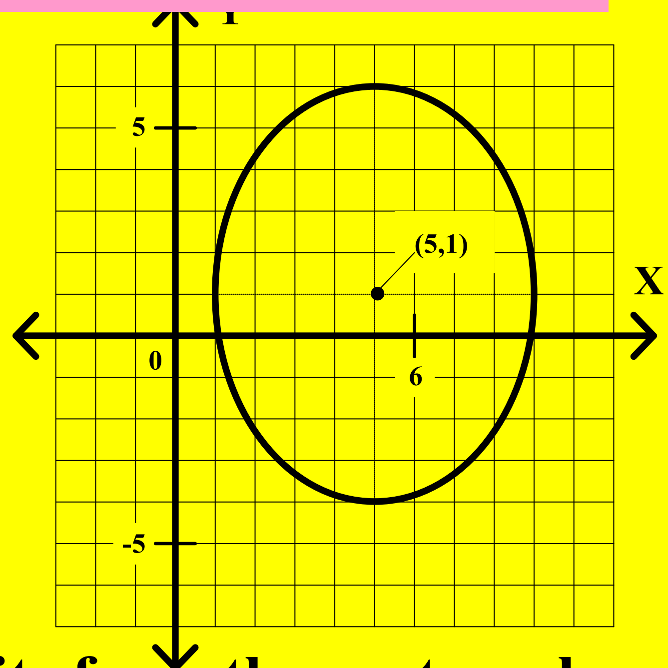

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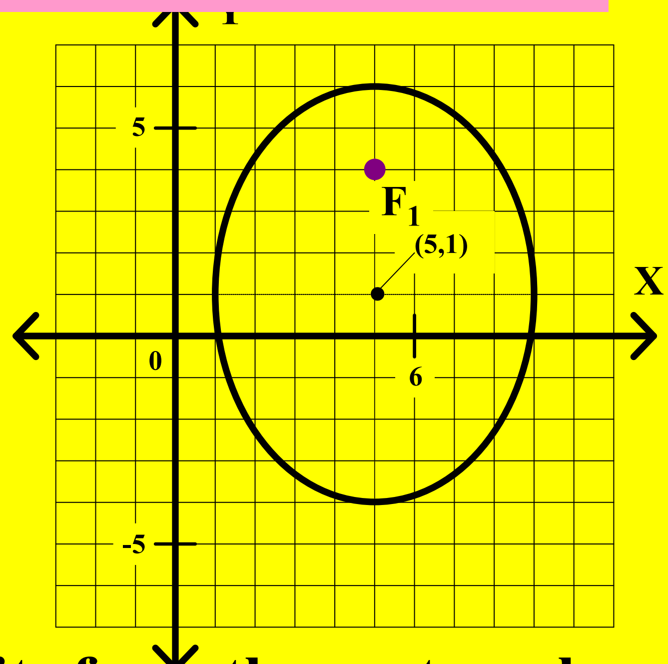

General Form Equation

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$F_1(5, 4)$

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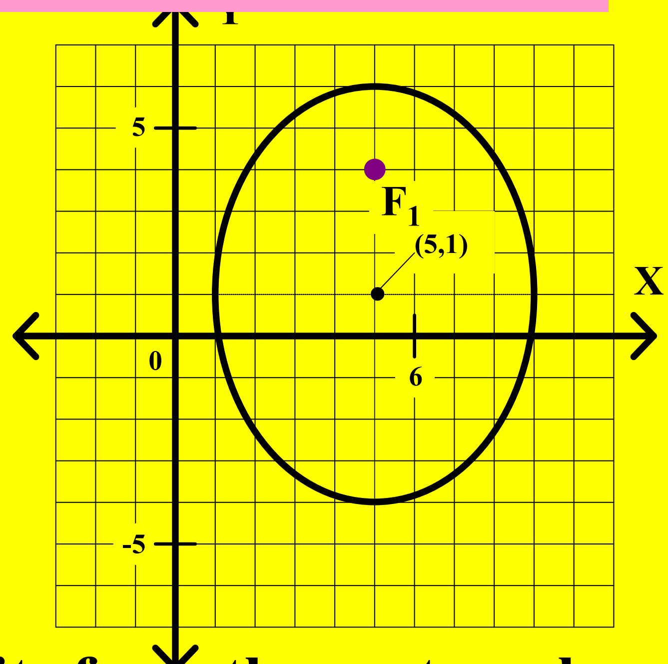
$F_1(5, 4)$ $F_2($



Each focus is on the major axis, c units from the center where

$$c = \sqrt{a^2 - b^2}$$

$$c = \sqrt{25 - 16} = \sqrt{9} = 3$$

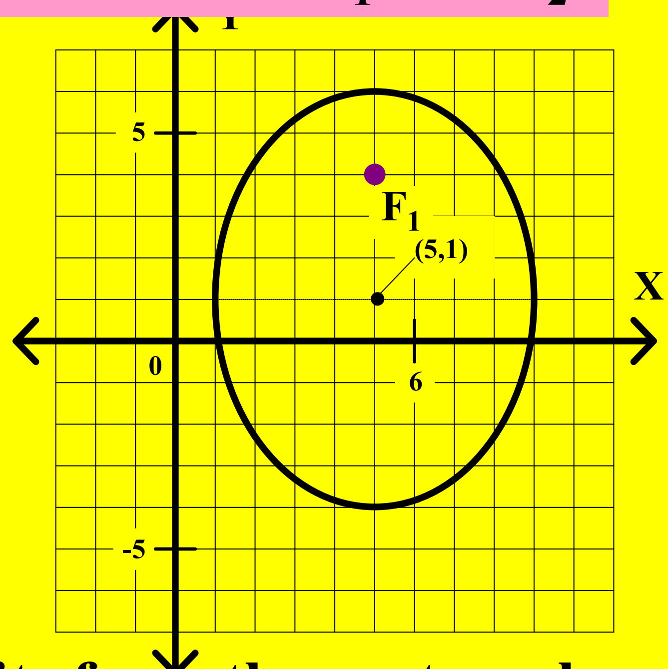
Class Worksheet #2

Write the equation in standard form and the equation in general form for each ellipse. Then locate and label foci F_1 and F_2.

2.

Standard Form Equation

$$\frac{(x-5)^2}{16} + \frac{(y-1)^2}{25} = 1$$



General Form Equation

$$25x^2 + 16y^2 - 250x - 32y + 241 = 0$$

$F_1(5, 4)$ $F_2(5$

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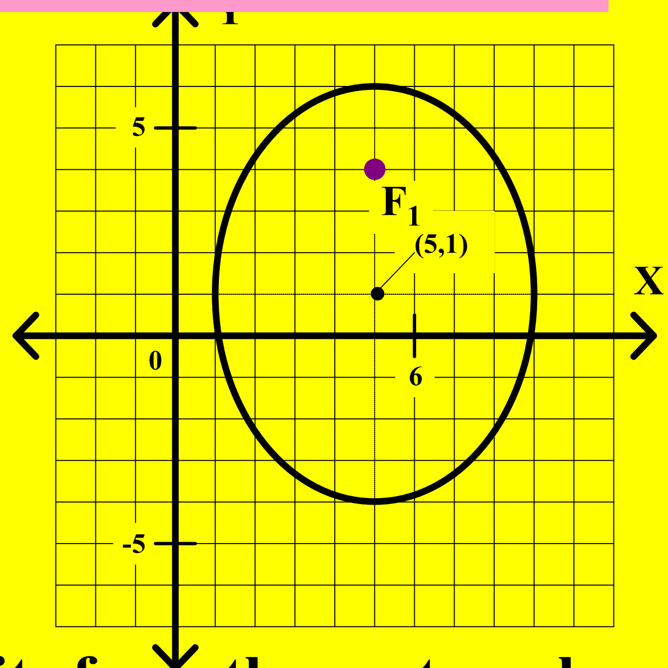

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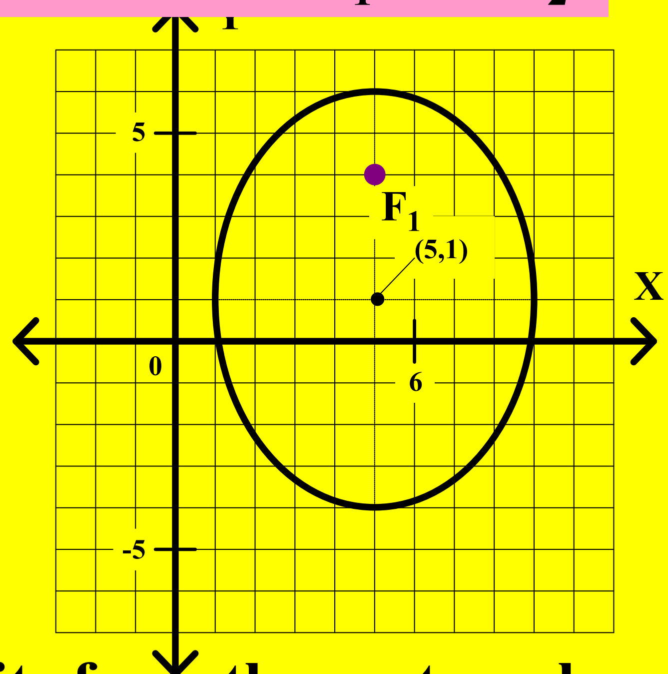

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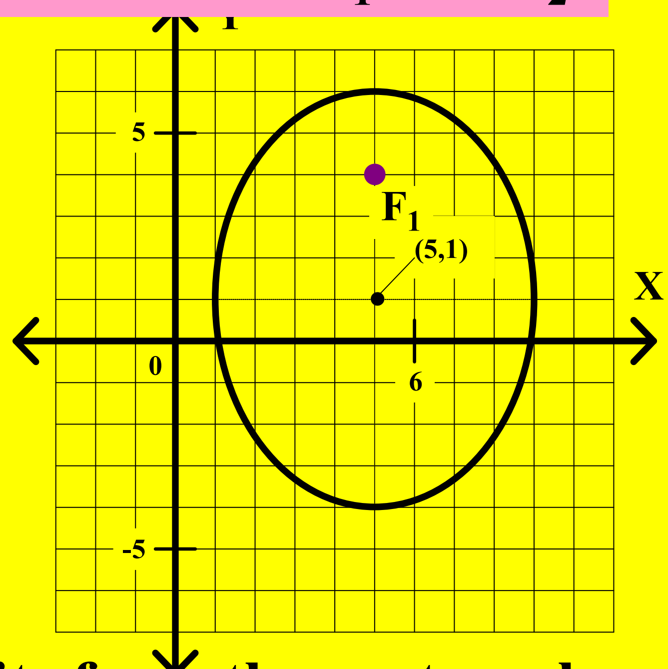

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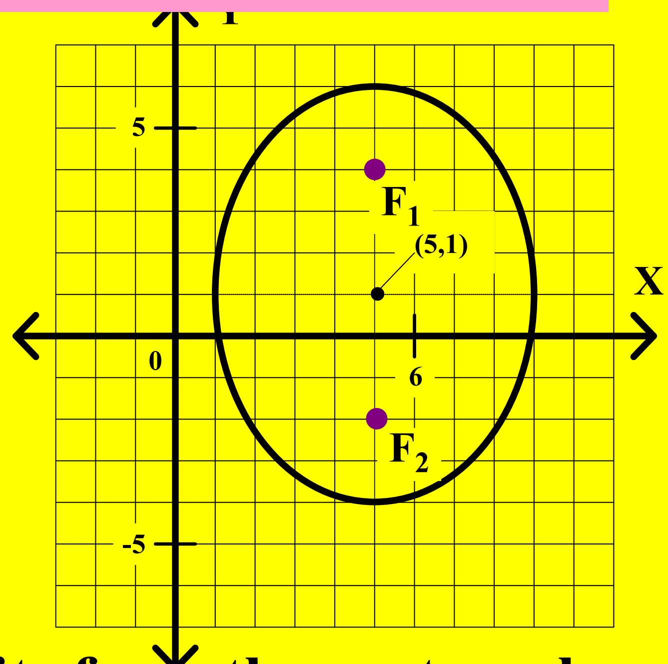

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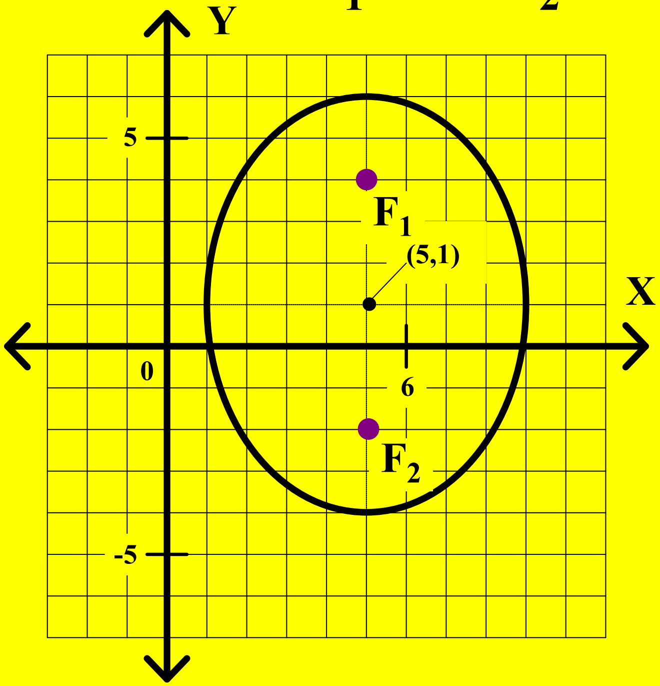

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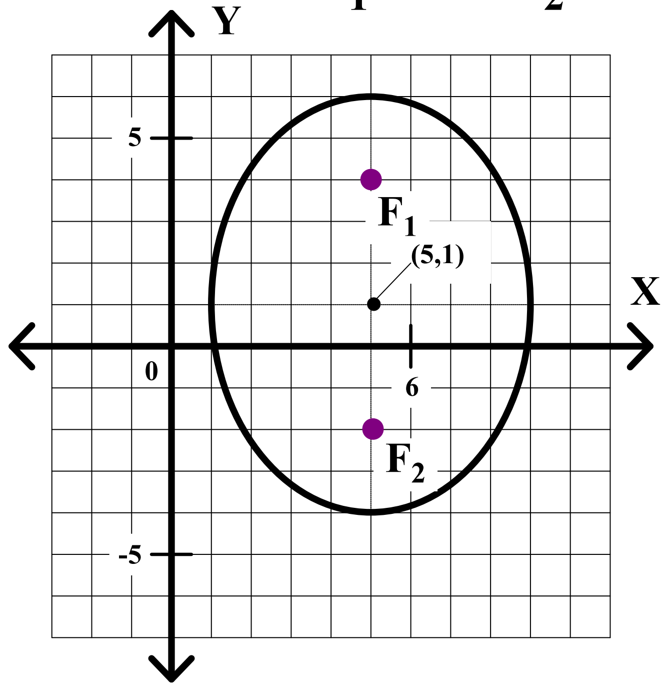

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Step 1: Rearrange the terms.

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Step 2: Factor out the 9.

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Step 3: Complete the square.

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$9(x^2 + 4x) + 25y^2 = 189$

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$9(x + 2)^2 + 25y^2 = 225$

Step 3: Complete the square.

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$$9(x + 2)^2 + 25y^2 = 225$$

Step 4: Divide both sides by 225

Class Worksheet #2

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$$9(x + 2)^2 + 25y^2 = 225$$

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

Step 4: Divide both sides by 225

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$$9(x + 2)^2 + 25y^2 = 225$$

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

Step 4: Divide both sides by 225 and reduce to lowest terms.

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$$\frac{(x + 2)^2}{25} + \frac{y^2}{9}$$

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Type 1 Ellipse

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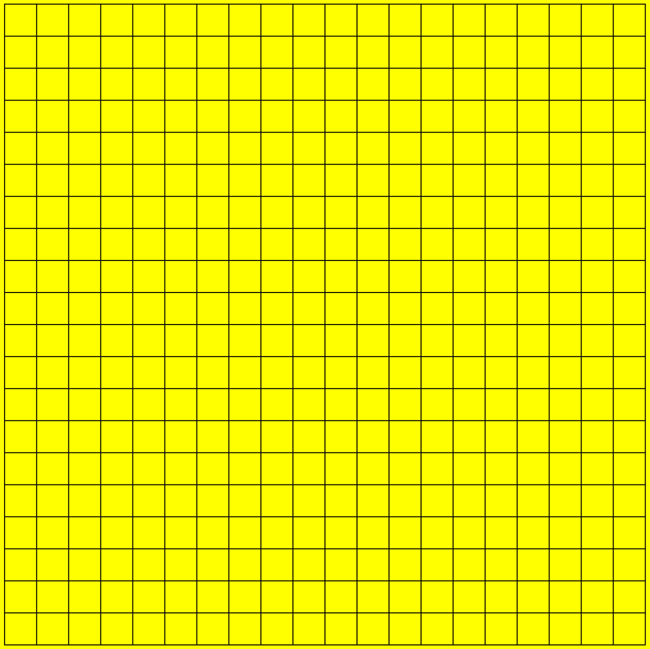

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$$\frac{(x - -2)^2}{}$$

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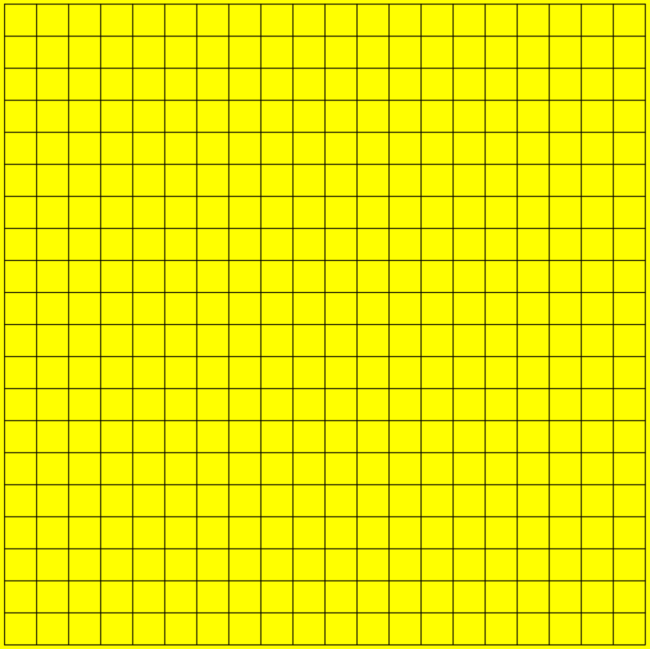

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$$\frac{(x - -2)^2}{5^2}$$

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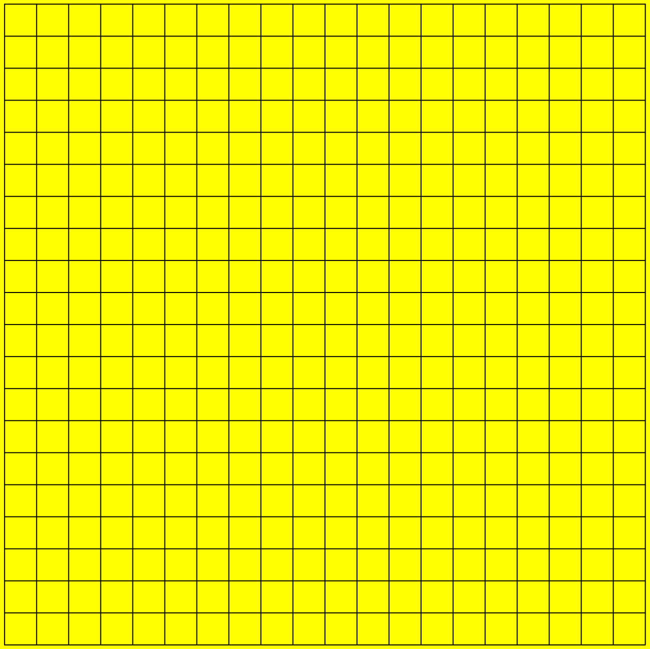

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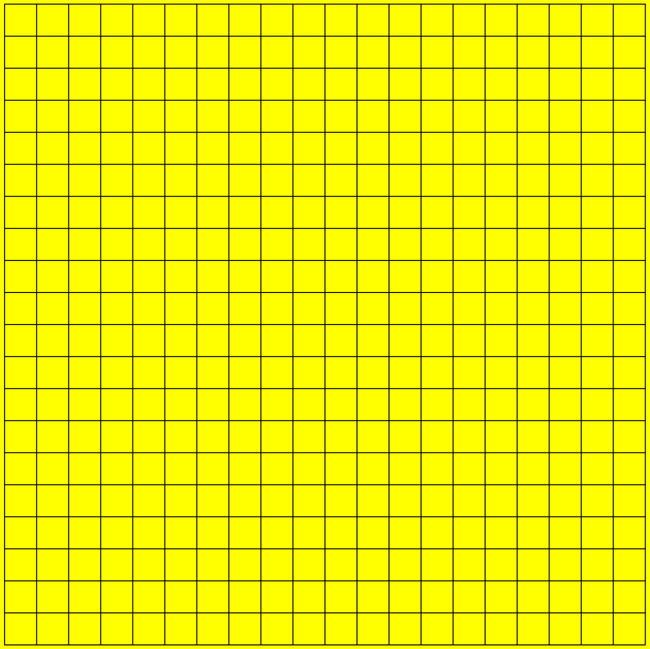

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Center (

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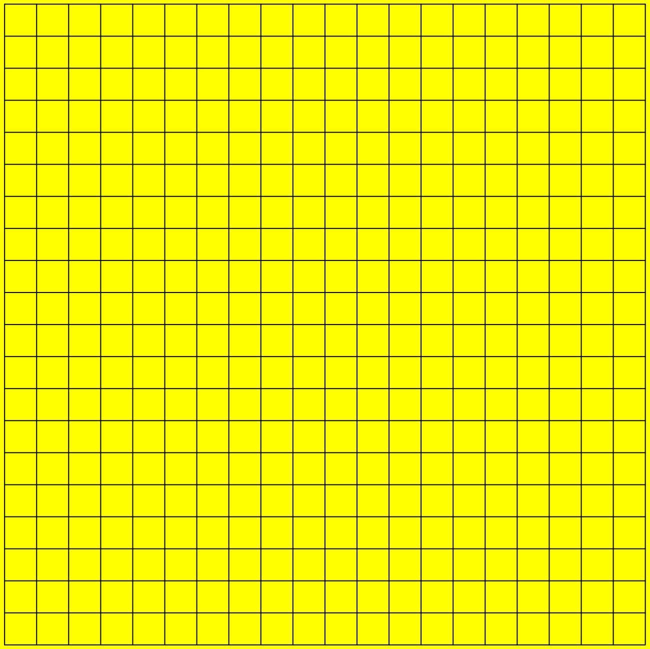
Center (-2,



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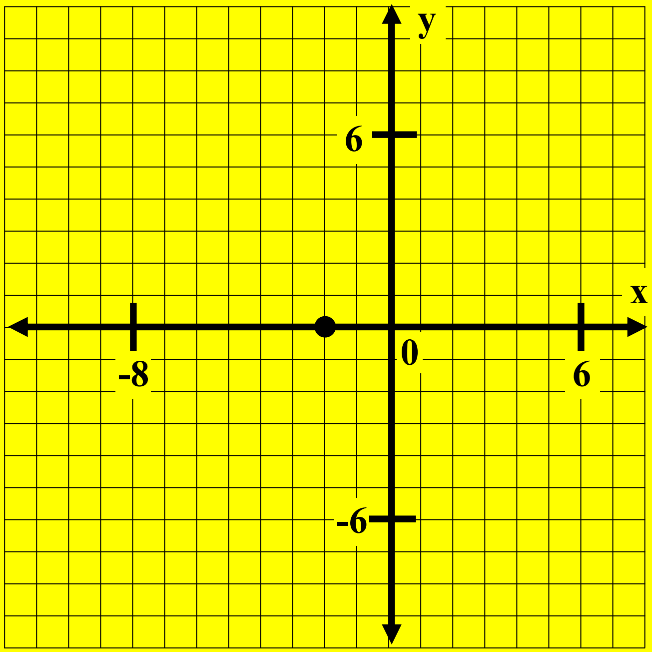

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Express each equation using standard form and sketch a graph.

3. $9x^2 + 25y^2 + 36x - 189 = 0$

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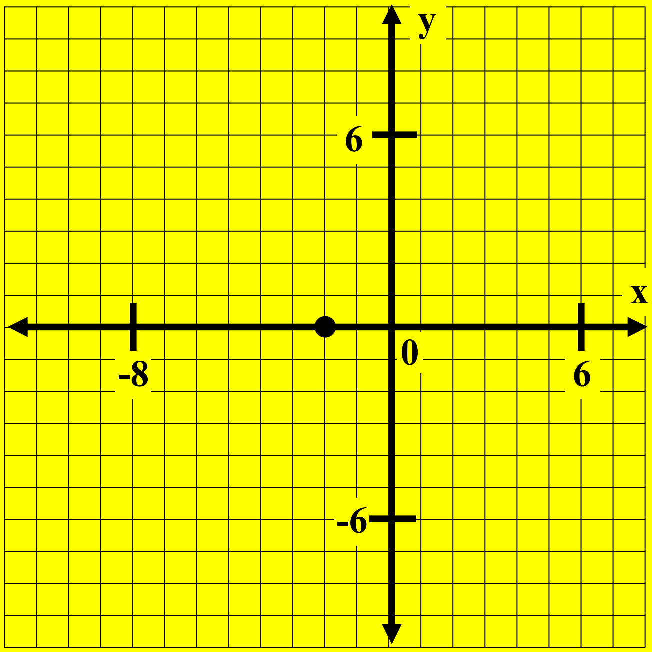

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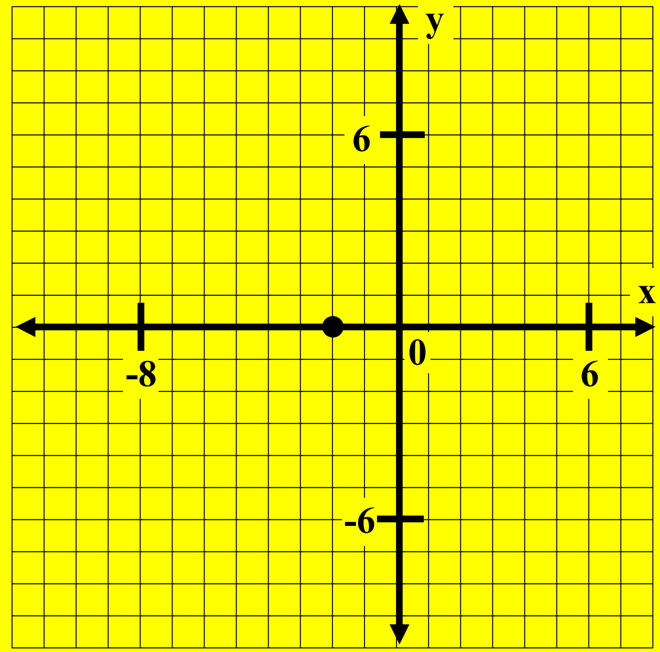

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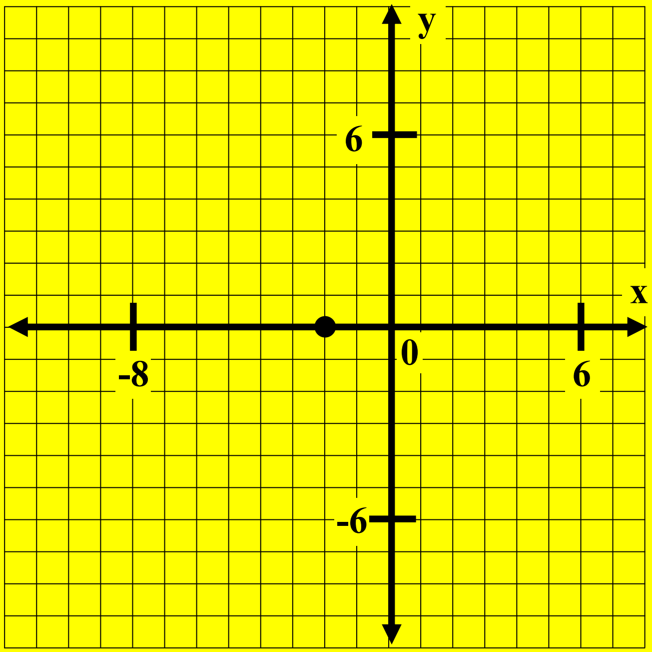

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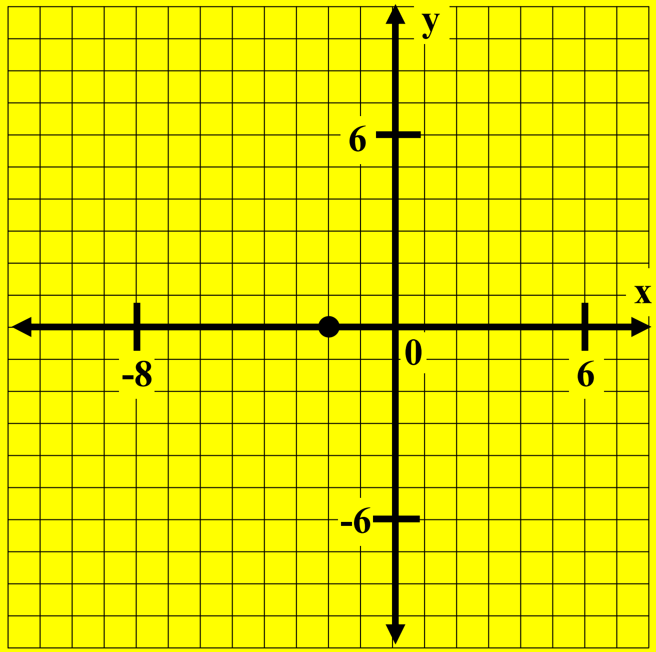

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a = 5

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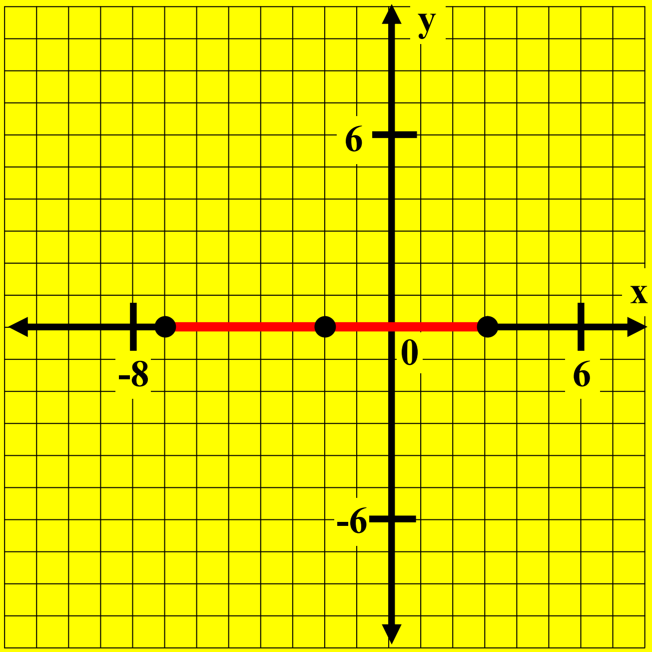

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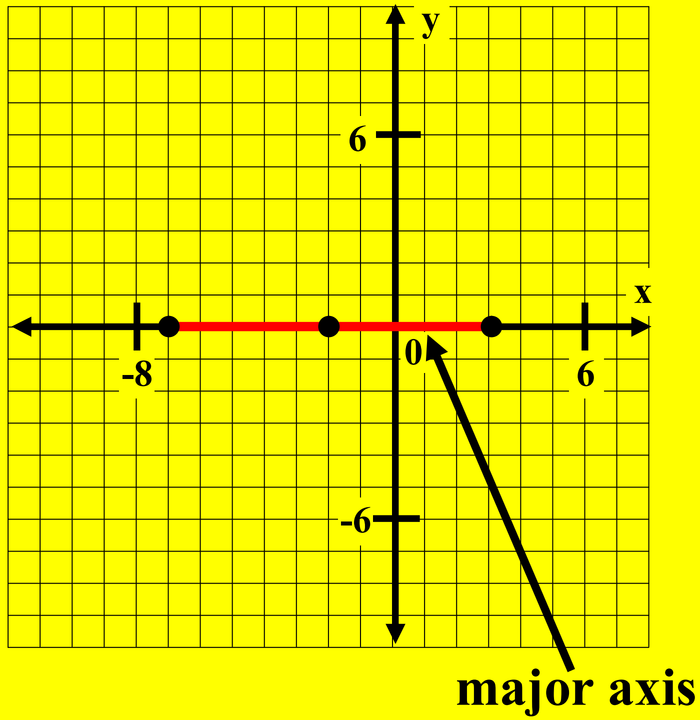

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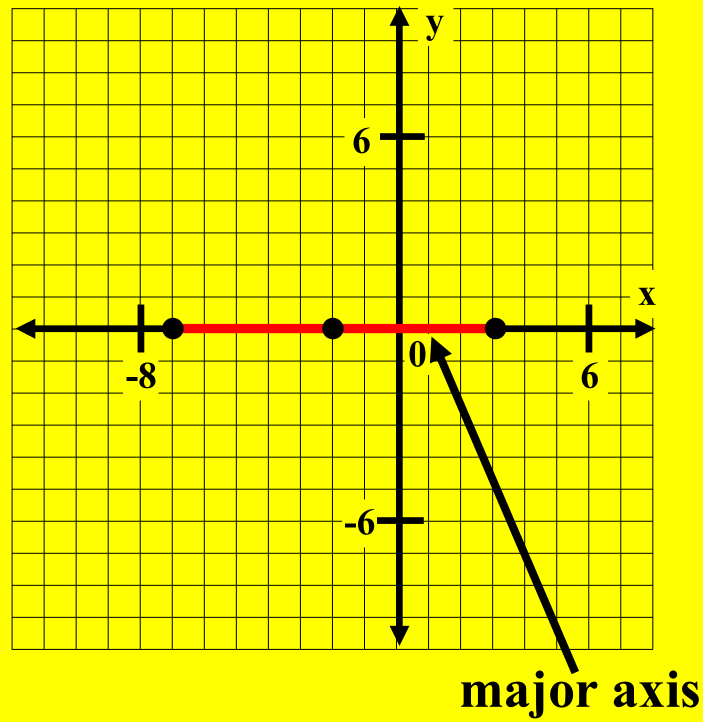

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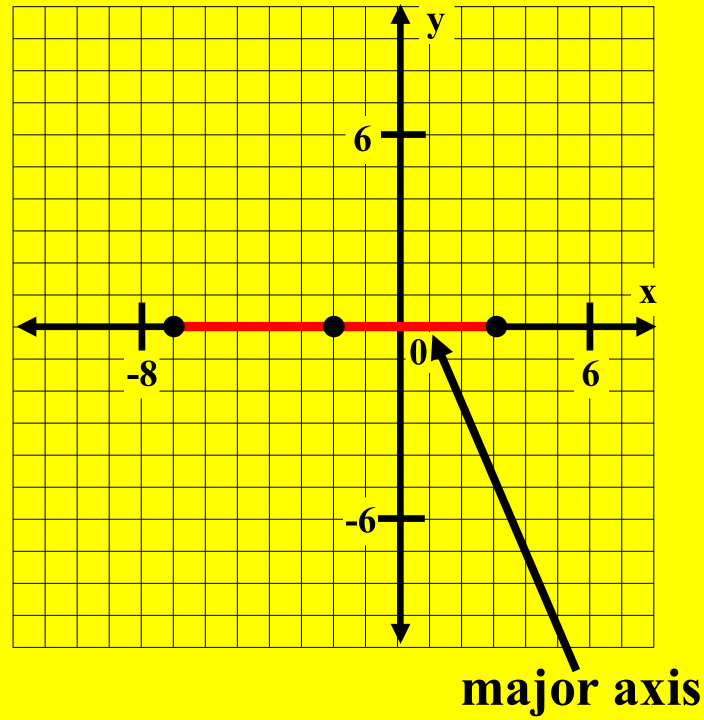

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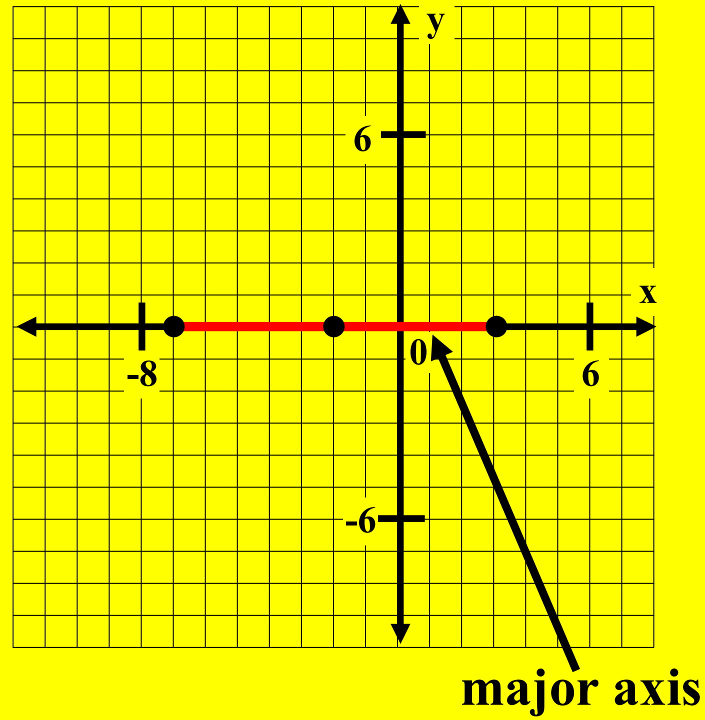
Center (-2, 0)

a = 5   b = 3



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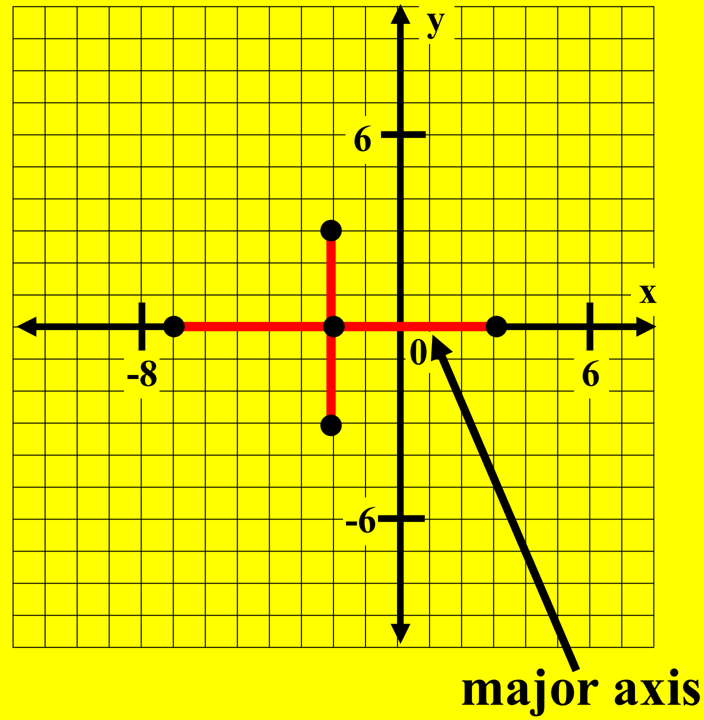

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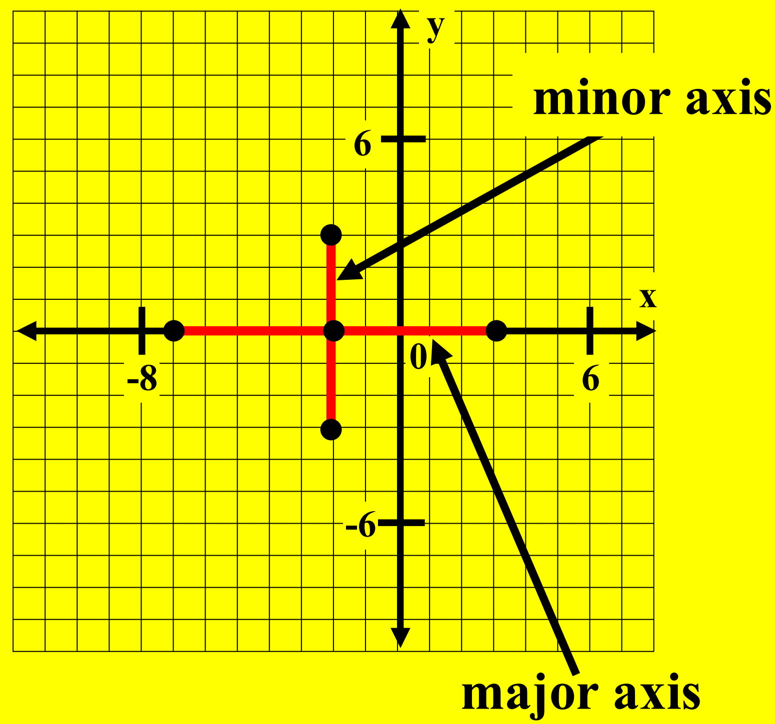

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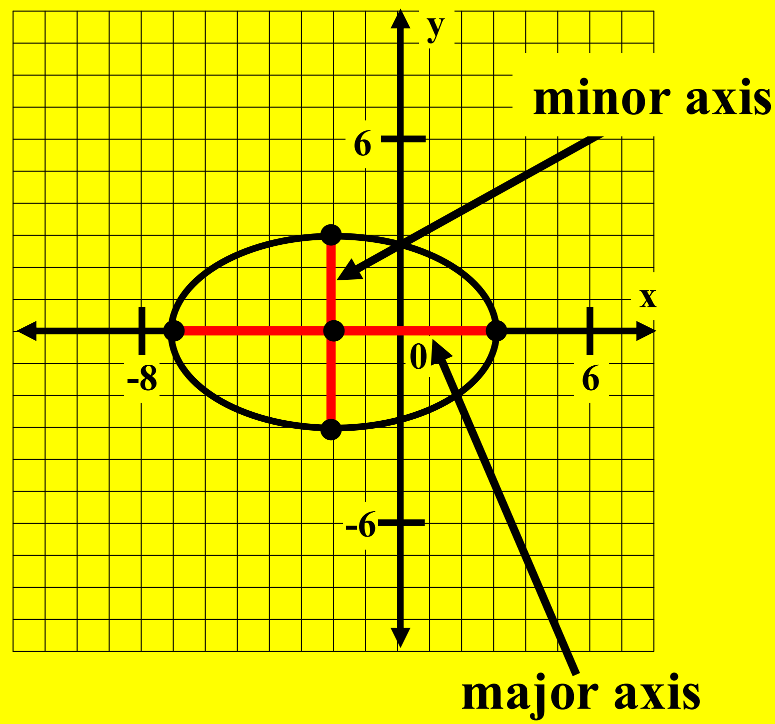

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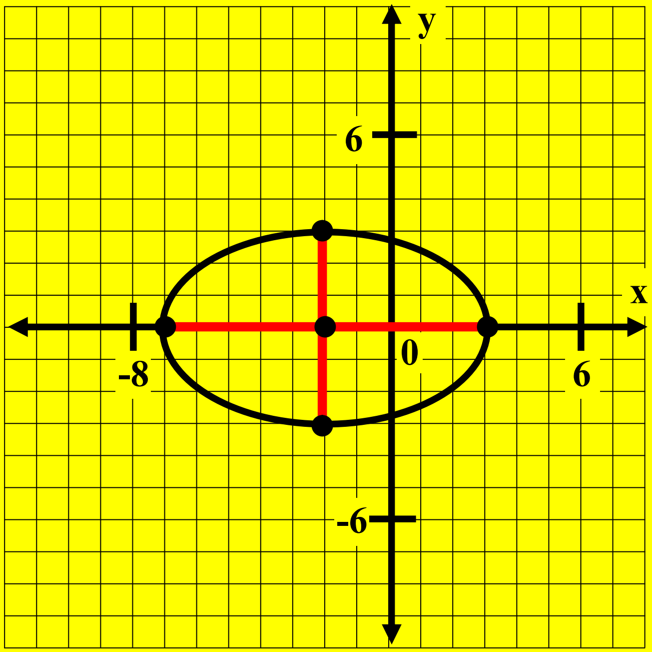

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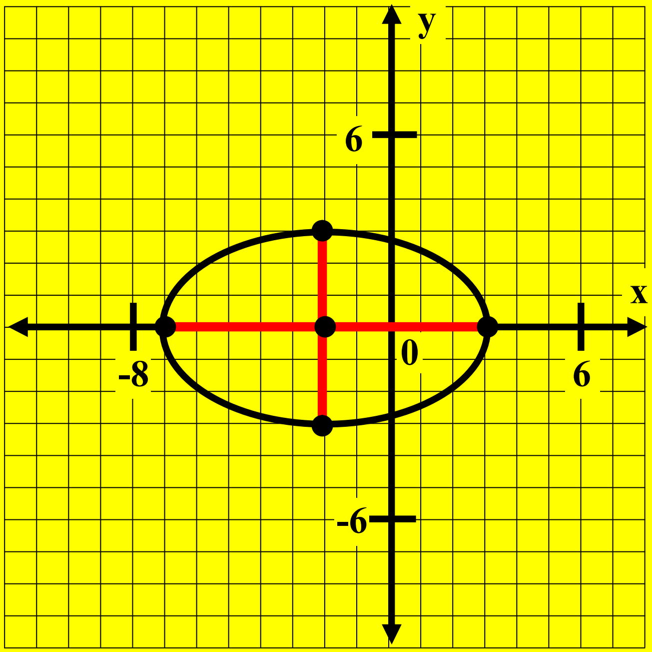

Locate and label foci F_1 and F_2.

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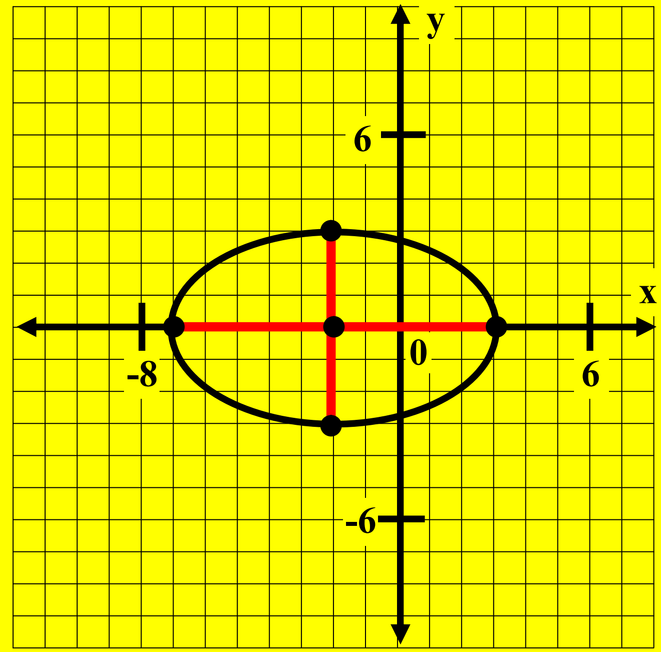

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$$\frac{(x - -2)^2}{5^2} + \frac{(y-0)^2}{3^2} = 1$$

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$$c = \sqrt{a^2 - b^2}$$

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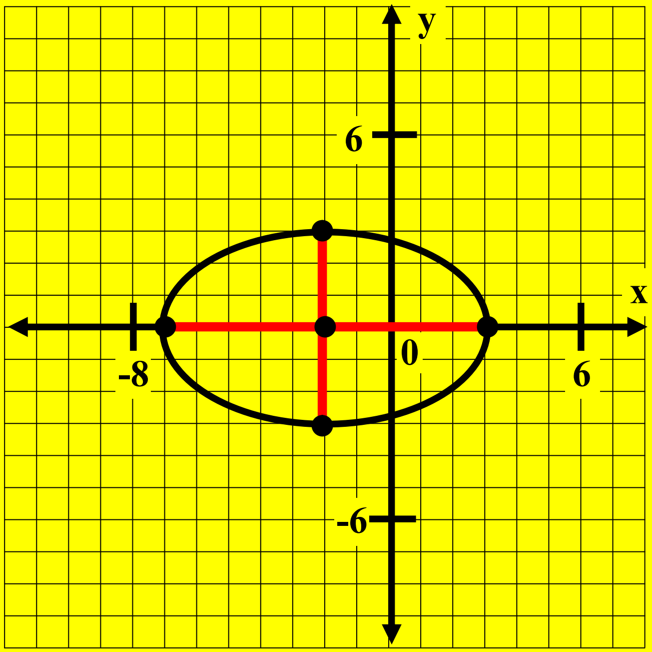

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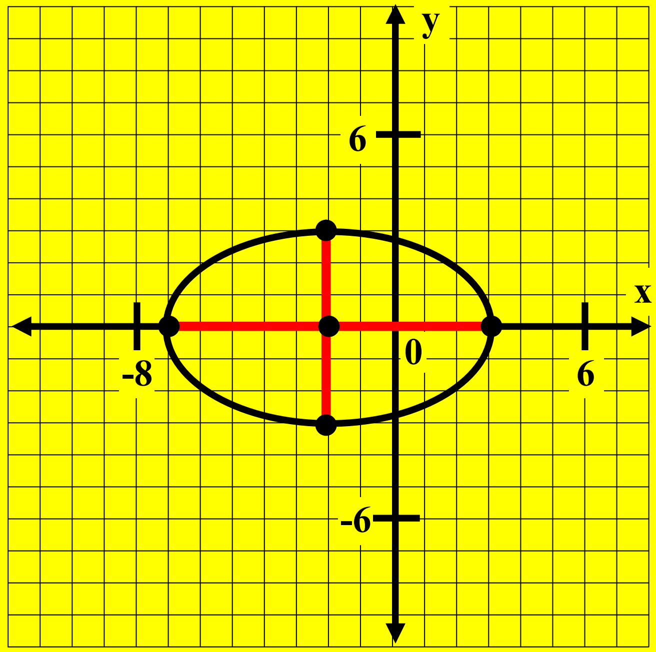

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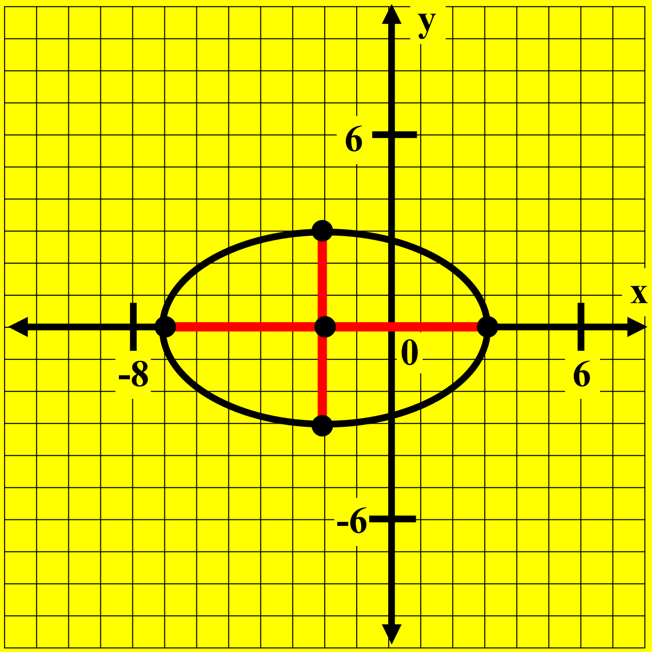

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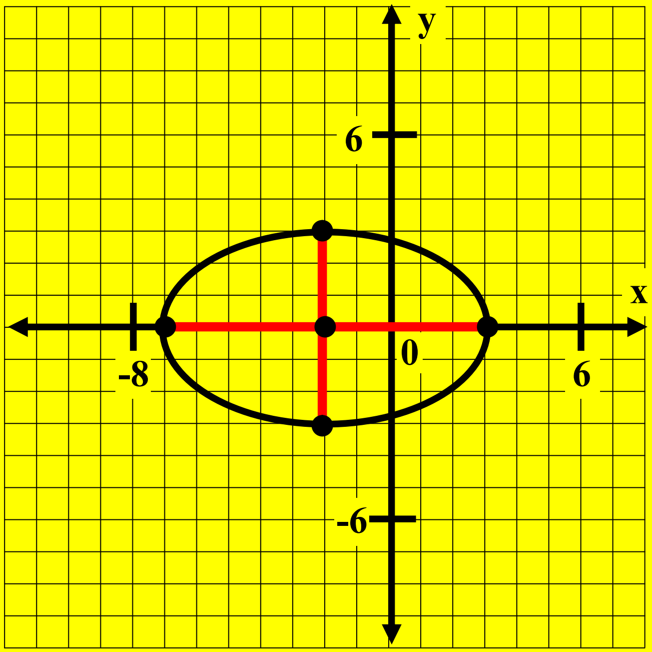

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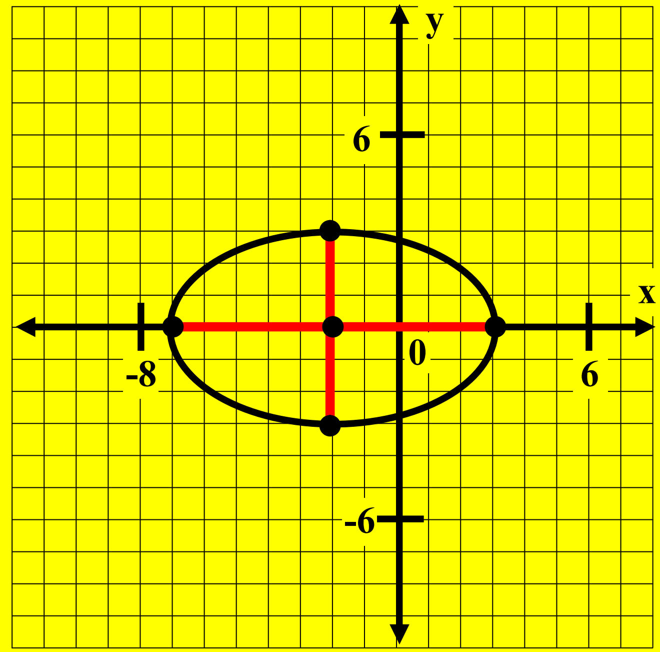

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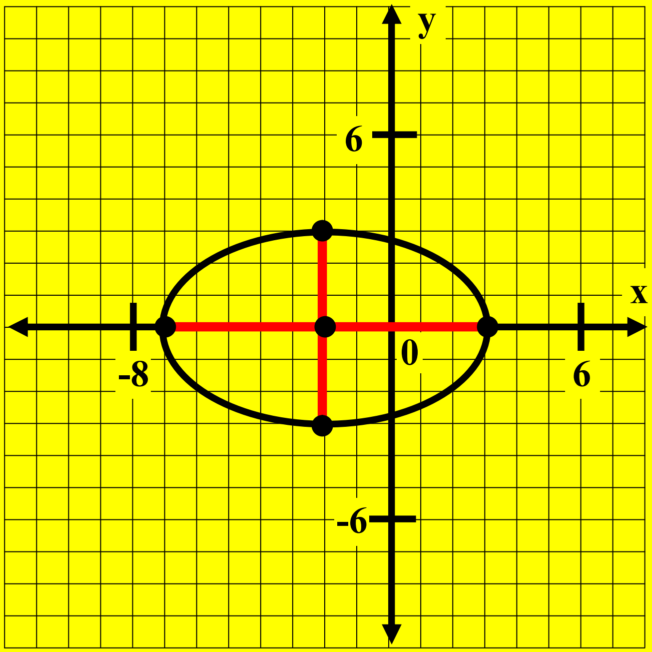

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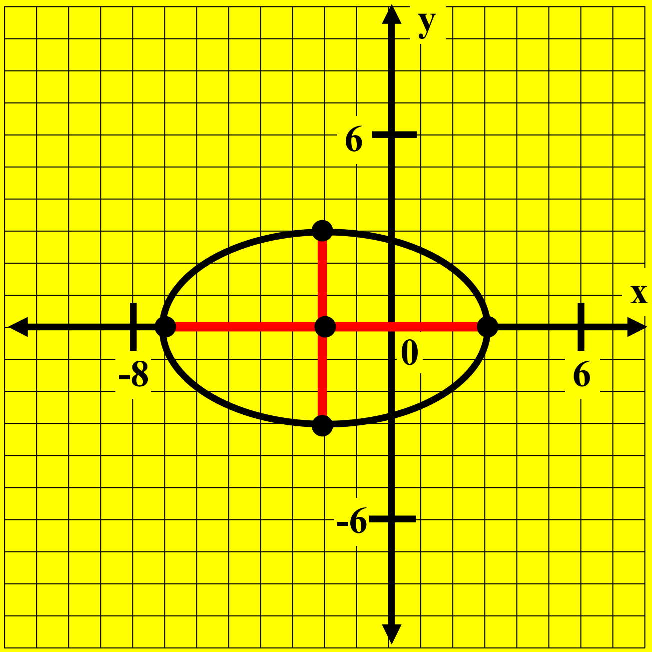

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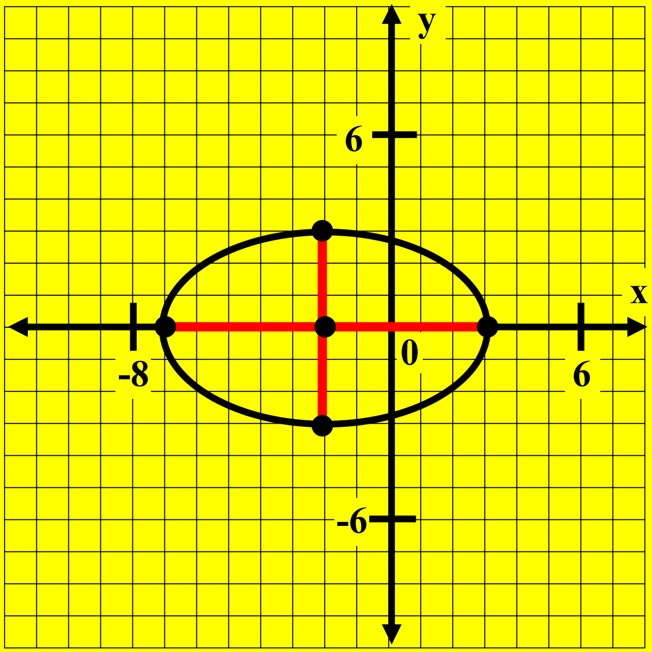

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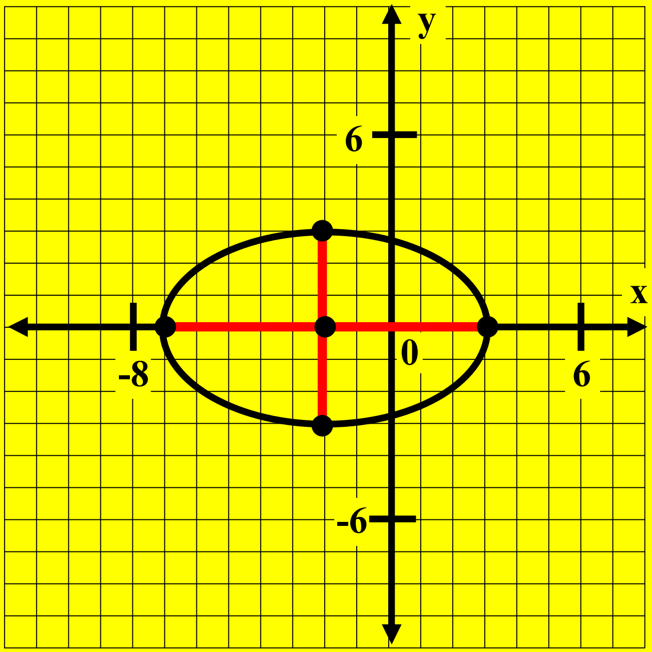

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Each focus is on the major axis 4 units from the center.

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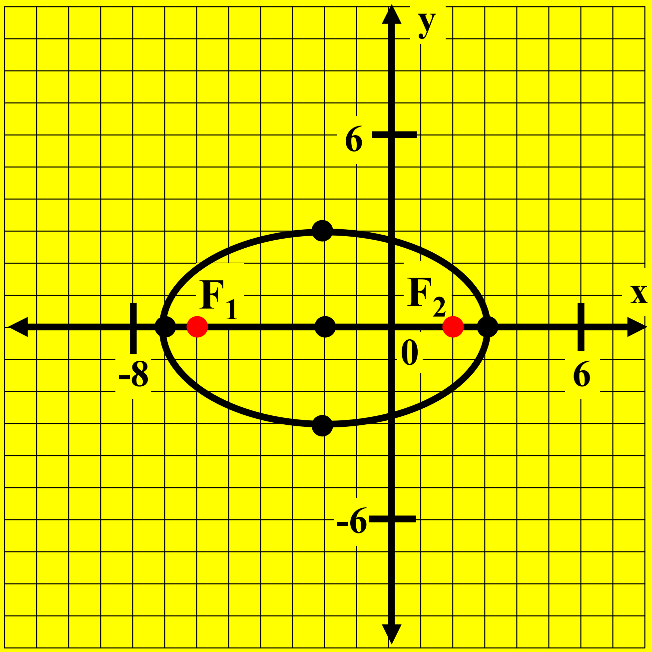

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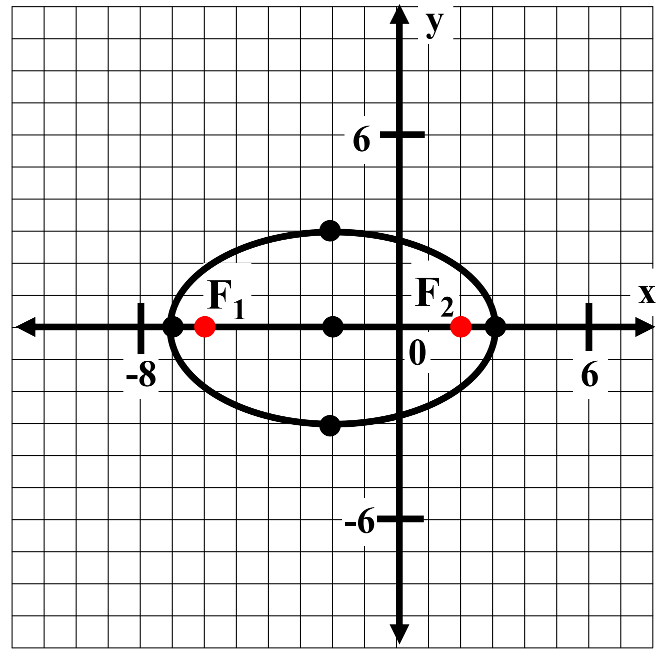

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Express each equation using standard form and sketch a graph.

4. $25x^2 + 16y^2 - 250x - 32y + 241 = 0$

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Step 1: Rearrange the terms.

Class Worksheet #2

Express each equation using standard form and sketch a graph.

4. $25x^2 + 16y^2 - 250x - 32y + 241 = 0$

$(25x^2$

Step 1: Rearrange the terms.

Class Worksheet #2

Express each equation using standard form and sketch a graph.

4. $25x^2 + 16y^2 - 250x - 32y + 241 = 0$

$(25x^2 - 250x)$

Step 1: Rearrange the terms.

Class Worksheet #2

Express each equation using standard form and sketch a graph.

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$(25x^2 - 250x) +$

Step 1: Rearrange the terms.

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$(25x^2 - 250x) + (16y^2$

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$(25x^2 - 250x) + (16y^2 - 32y) = -241$

Step 1: Rearrange the terms.

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$(25x^2 - 250x) + (16y^2 - 32y) = -241$

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Express each equation using standard form and sketch a graph.

4. $$25x^2 + 16y^2 - 250x - 32y + 241 = 0$$

$$(25x^2 - 250x) + (16y^2 - 32y) = -241$$

Step 2: Factor.

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Express each equation using standard form and sketch a graph.

4. $25x^2 + 16y^2 - 250x - 32y + 241 = 0$

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Step 2: Factor. Factor out the 25.

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25(

Step 2: Factor. Factor out the 25.

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$25(x^2$

Step 2: Factor. Factor out the 25.

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$(25x^2 - 250x) + (16y^2 - 32y) = -241$

$25(x^2 - 10x)$

Step 2: Factor. Factor out the 25.

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Express each equation using standard form and sketch a graph.

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$(25x^2 - 250x) + (16y^2 - 32y) = -241$

$25(x^2 - 10x) +$

Step 2: Factor.

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$25(x^2 - 10x) +$

Step 2: Factor. Factor out the 16.

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$(25x^2 - 250x) + (16y^2 - 32y) = -241$

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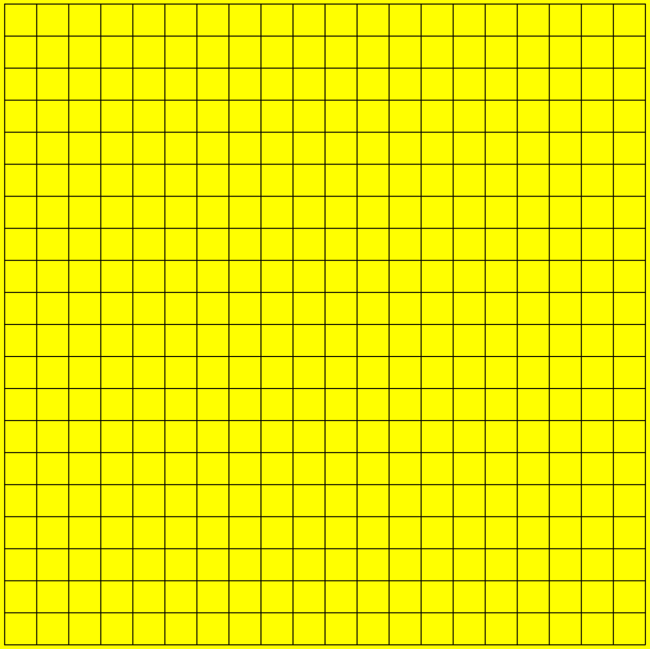

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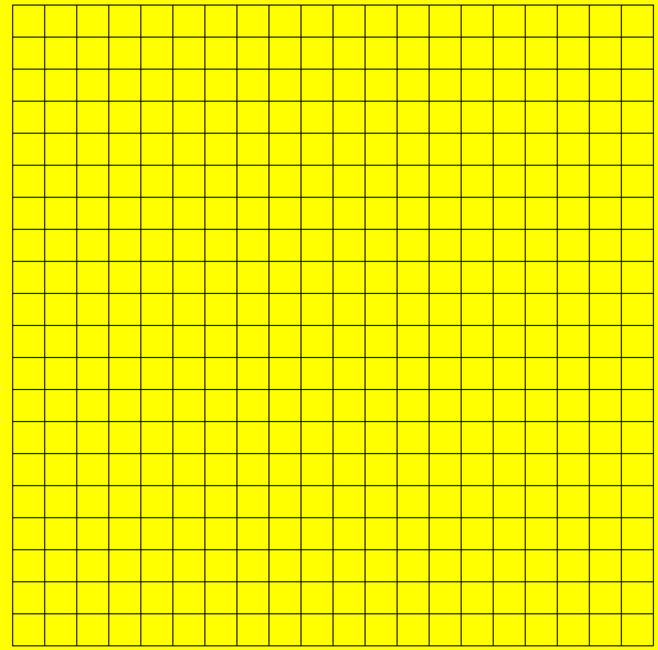

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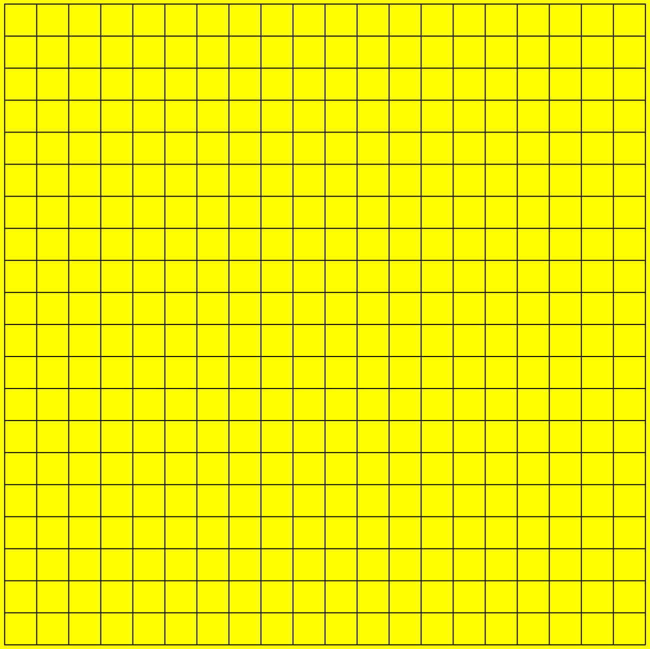

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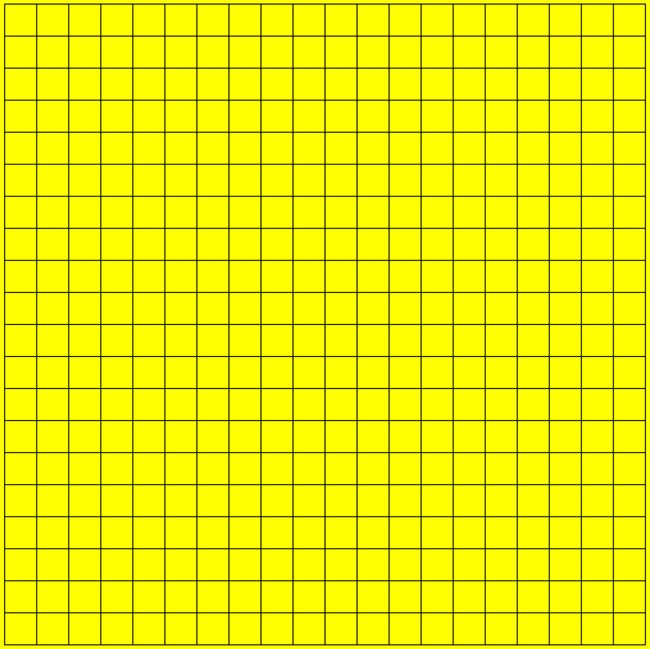

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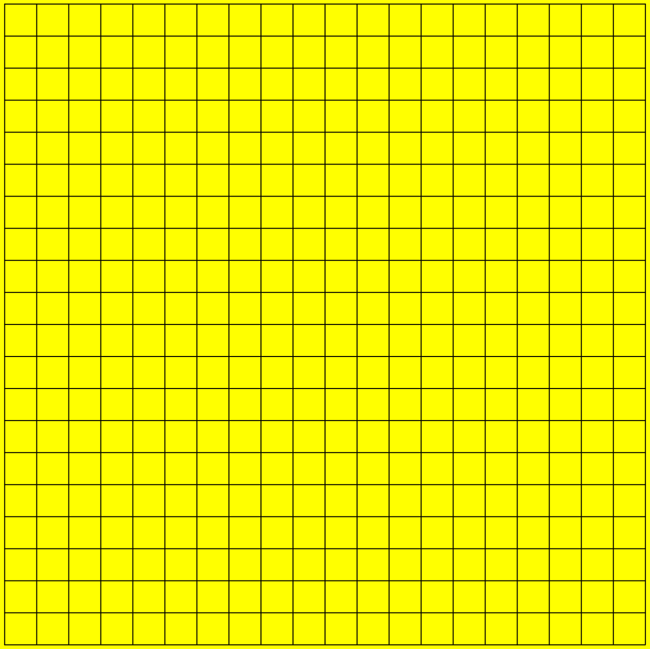

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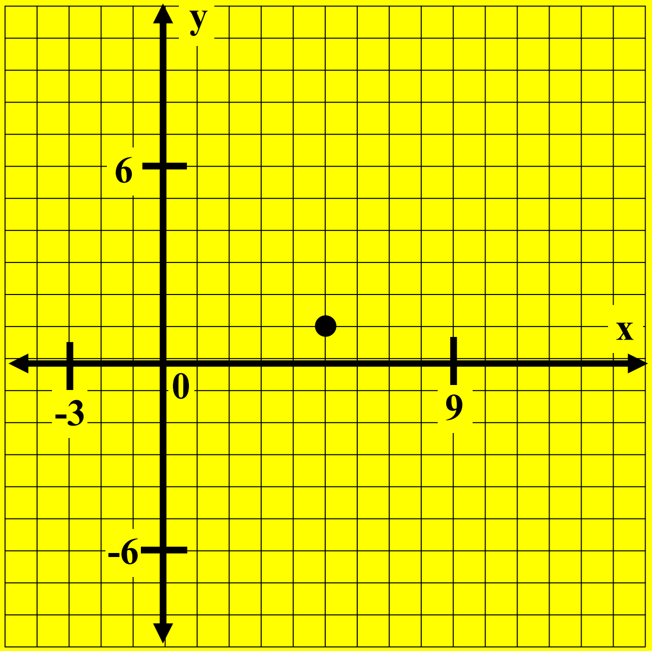

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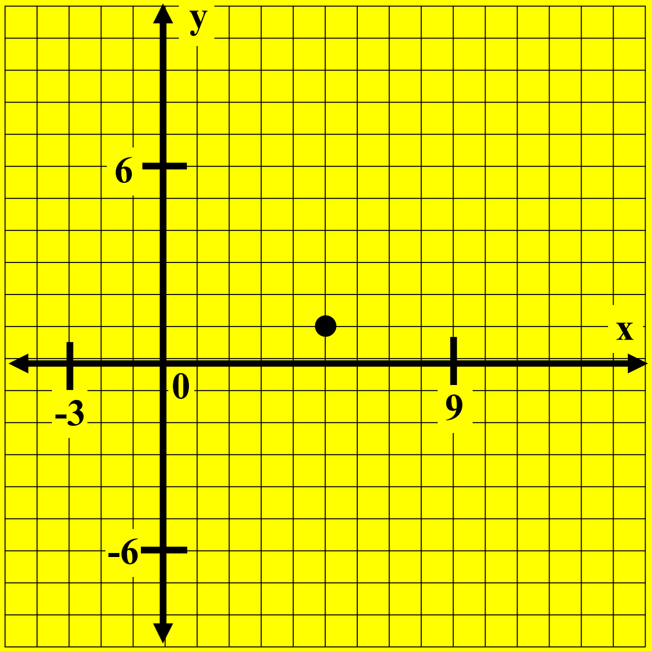

Type 2 Ellipse

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Center (5, 1)

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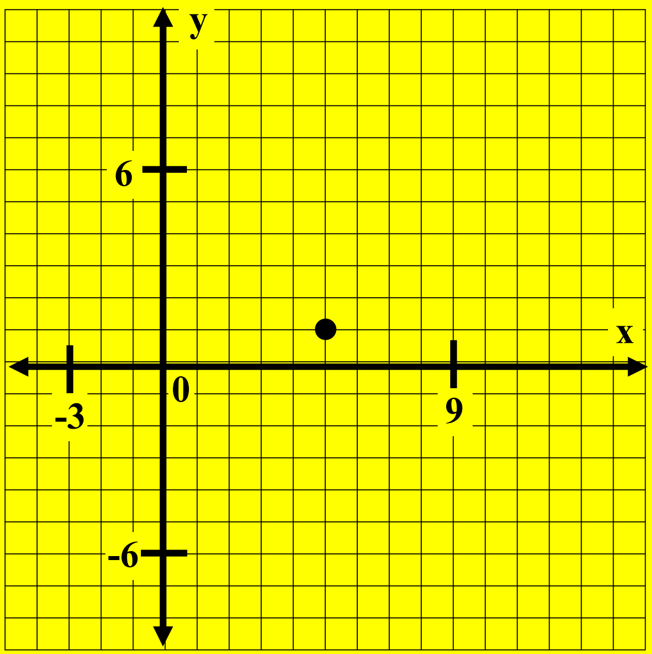

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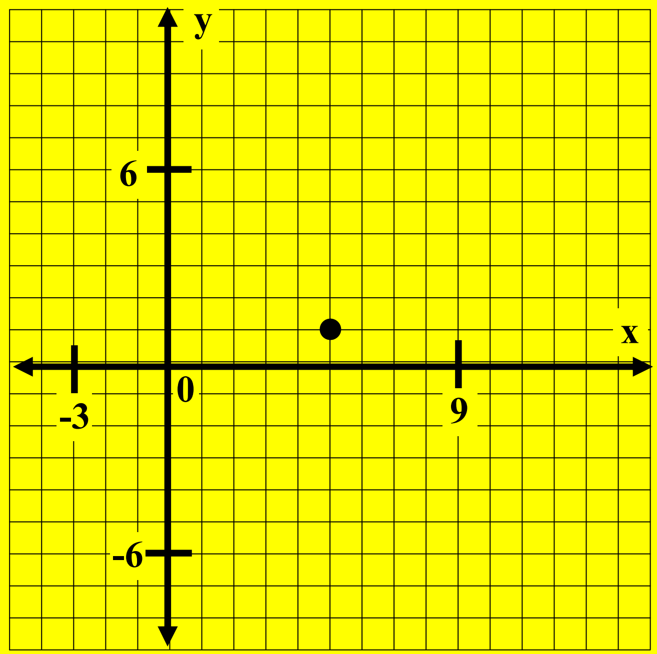

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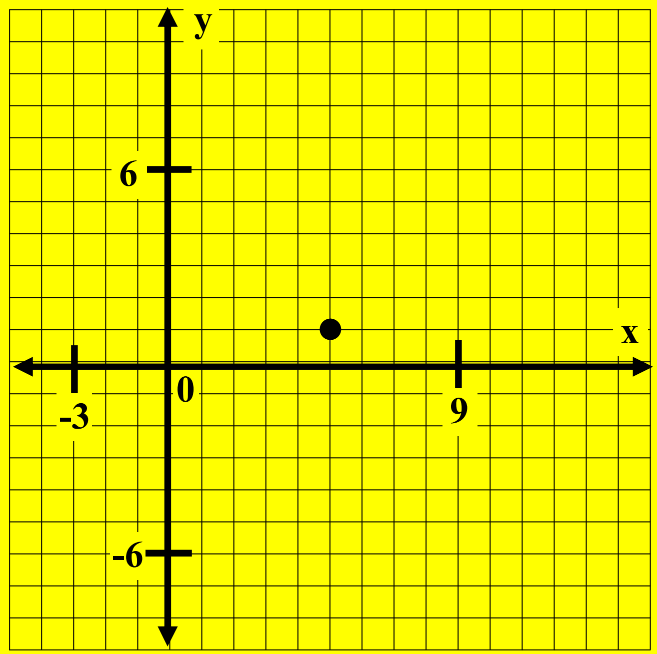

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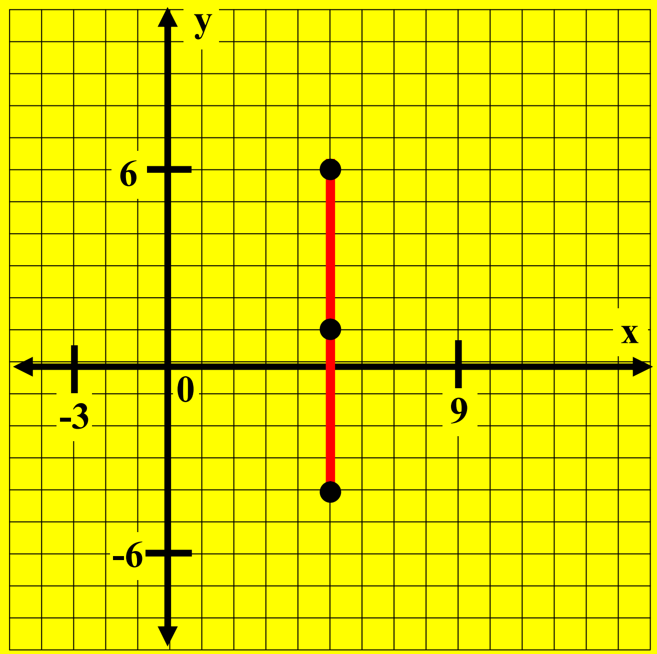

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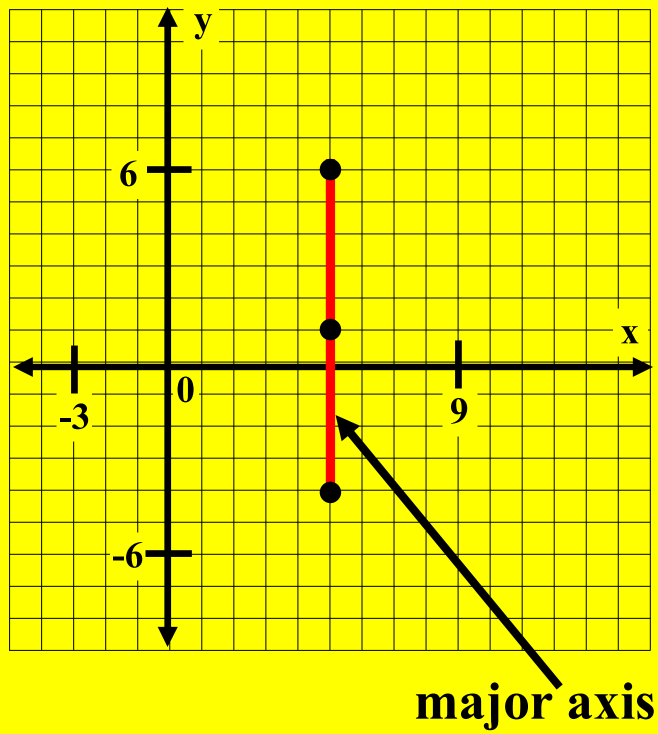

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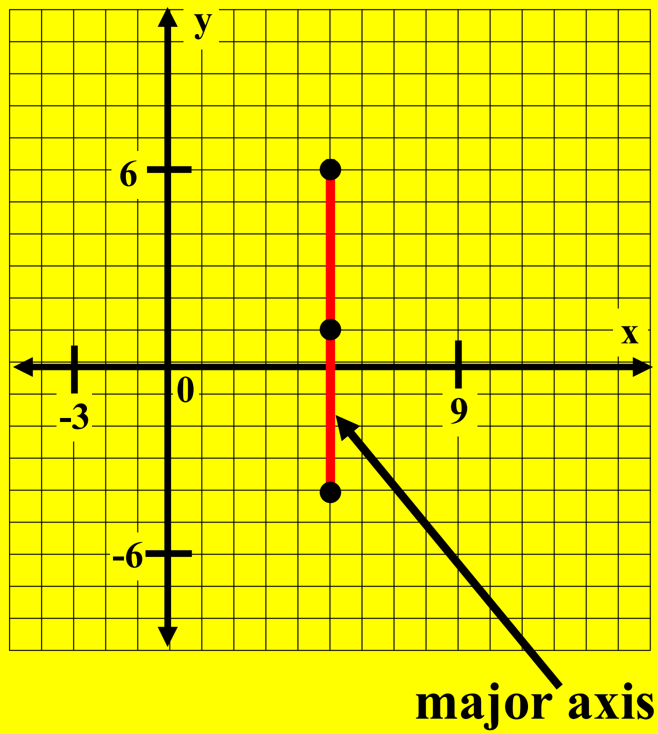

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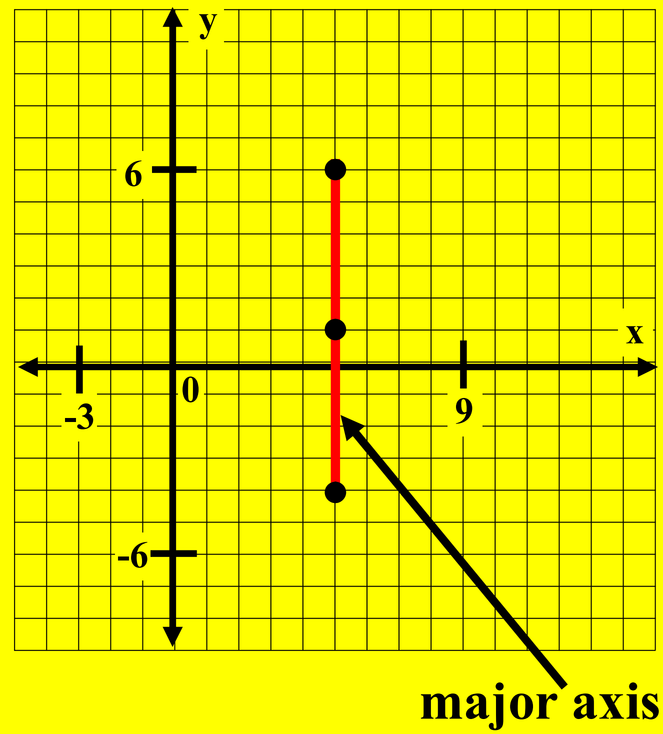
Center (5, 1)

a = 5 b =



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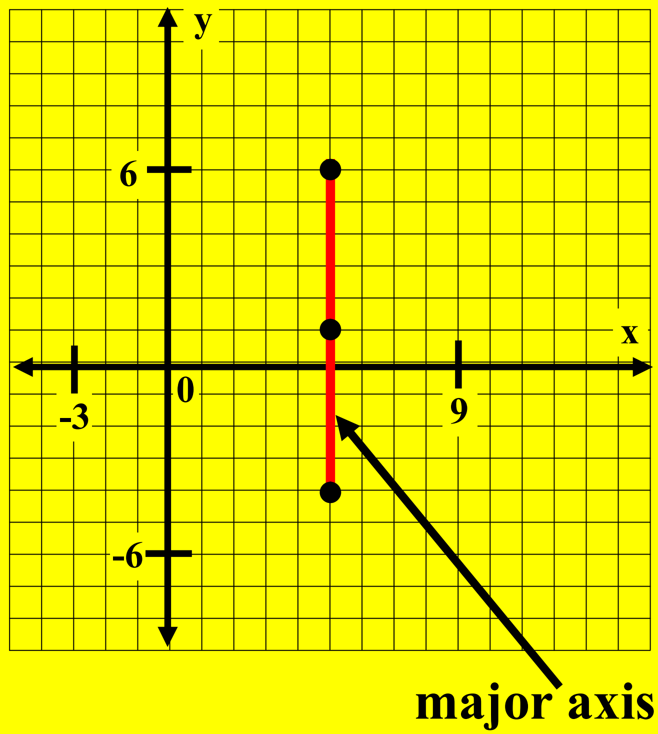
Center (5, 1)

a = 5　　b = 4



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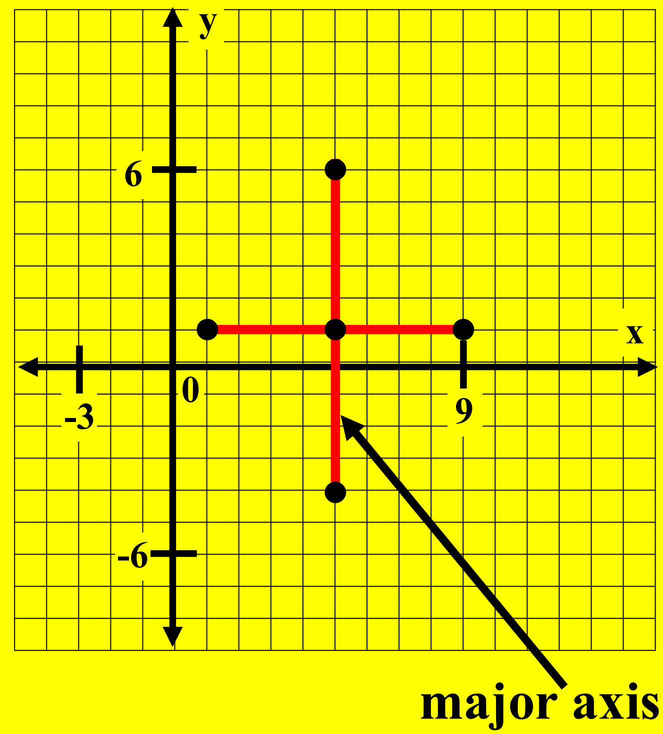

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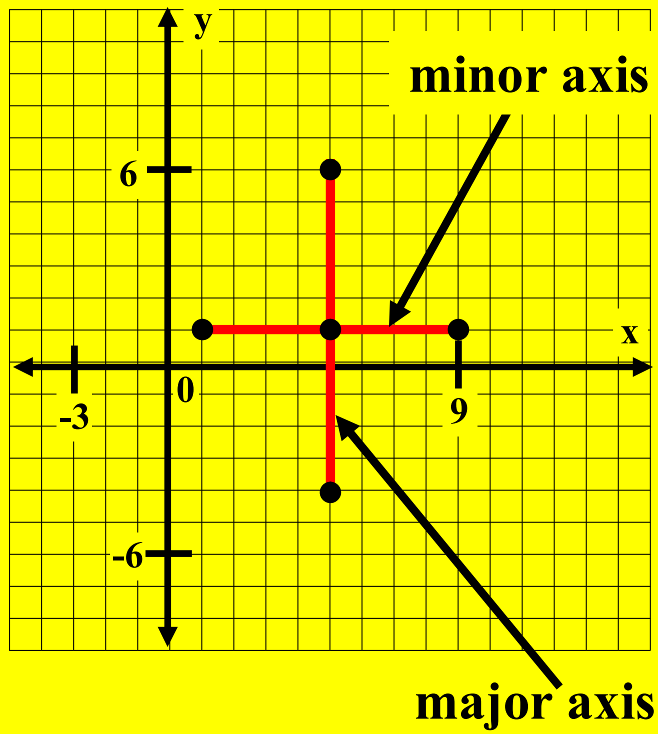

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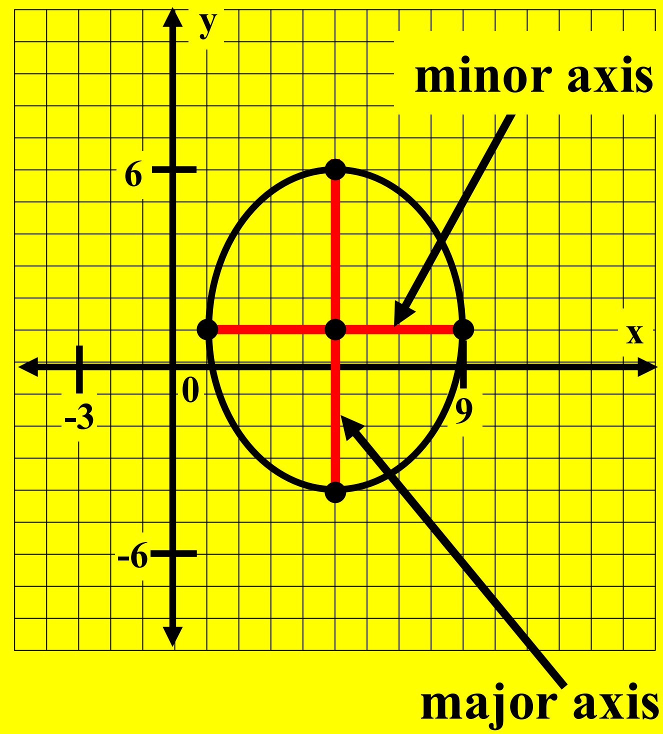

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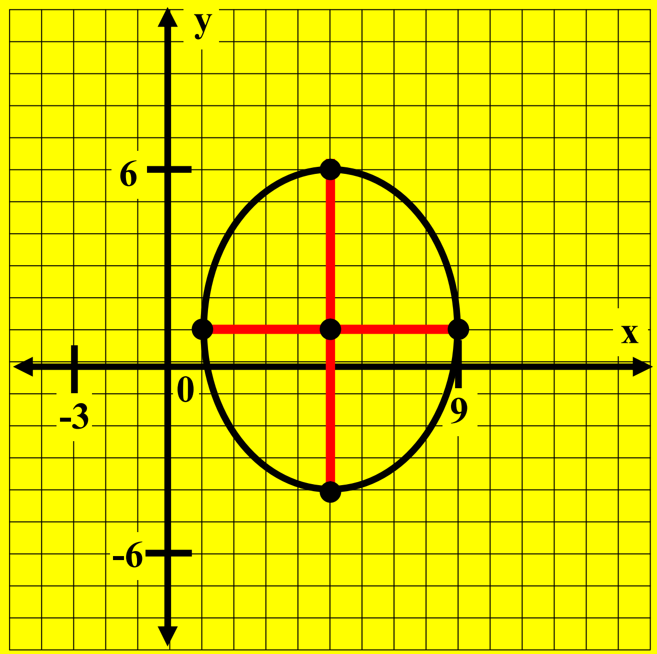

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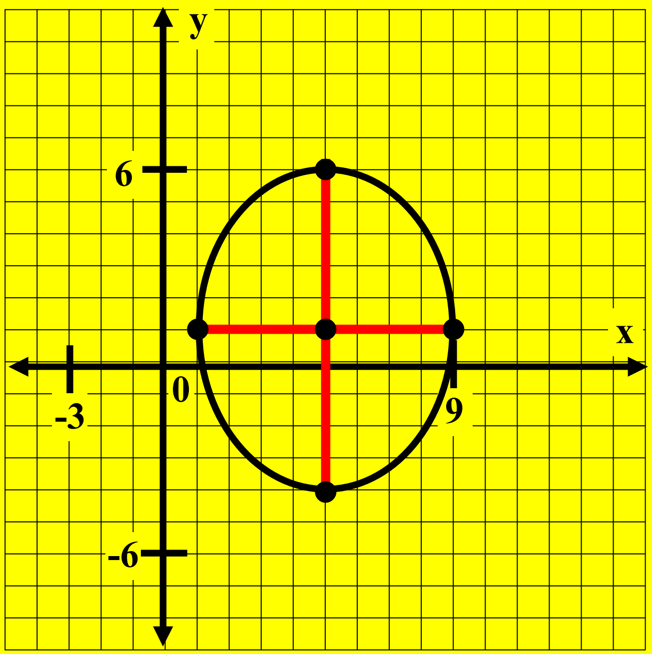

Locate and label foci F_1 and F_2.

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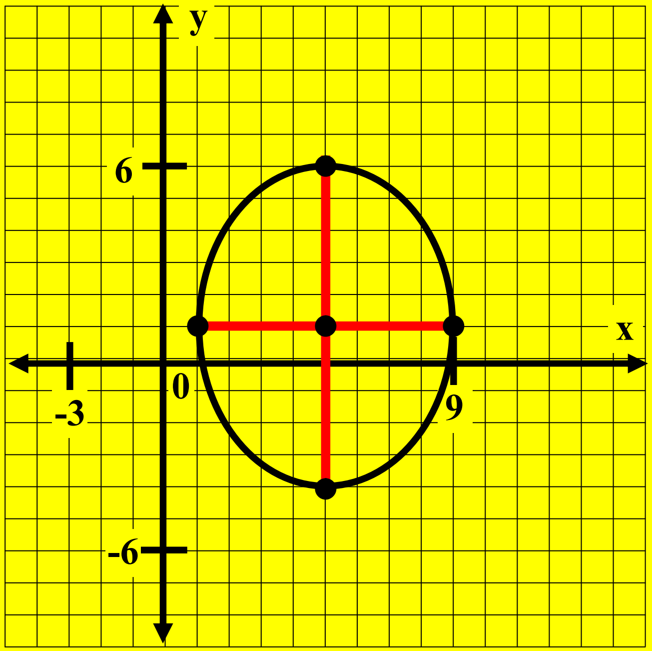

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$$\frac{(x-5)^2}{4^2} + \frac{(y-1)^2}{5^2} = 1$$

Center (5, 1)

$a = 5$ $b = 4$

$$c = \sqrt{a^2 - b^2}$$

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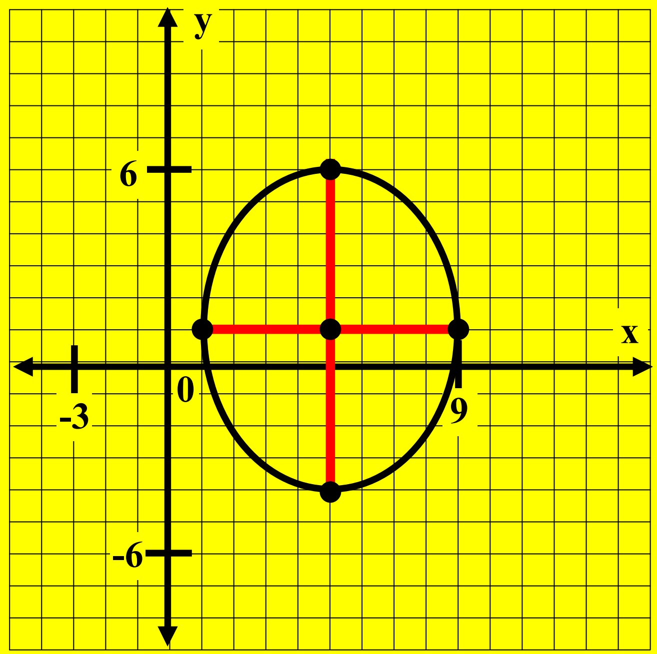

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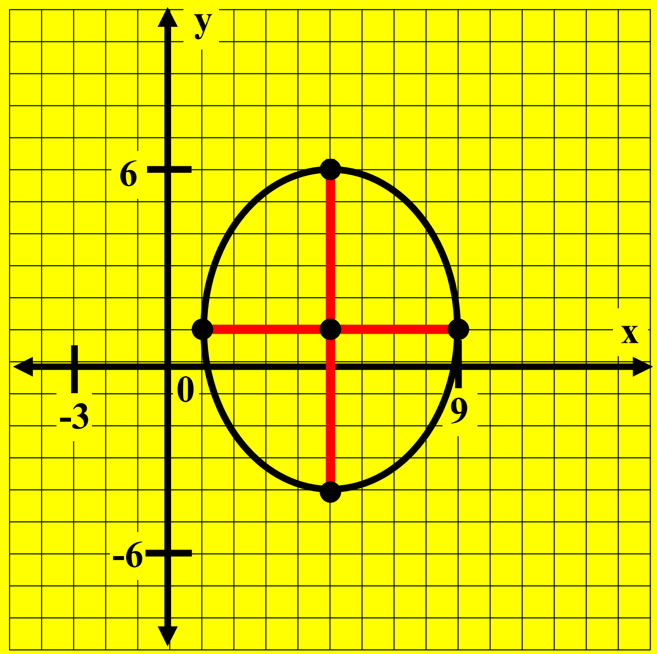

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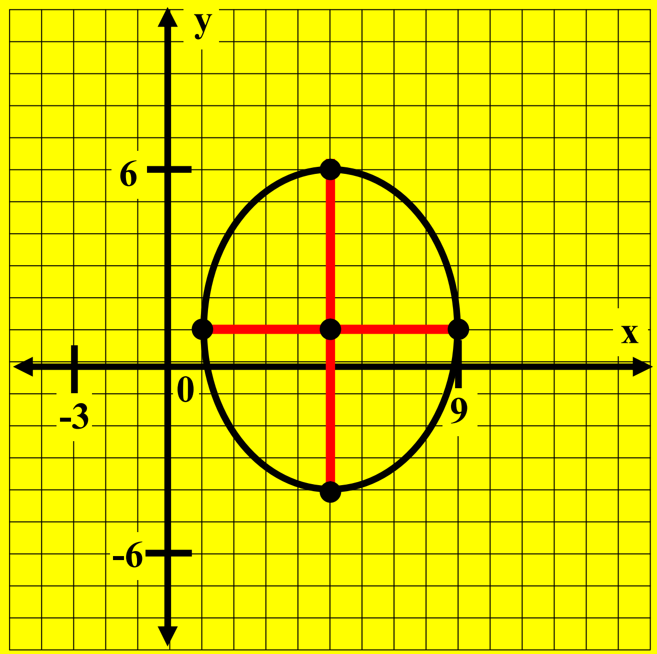

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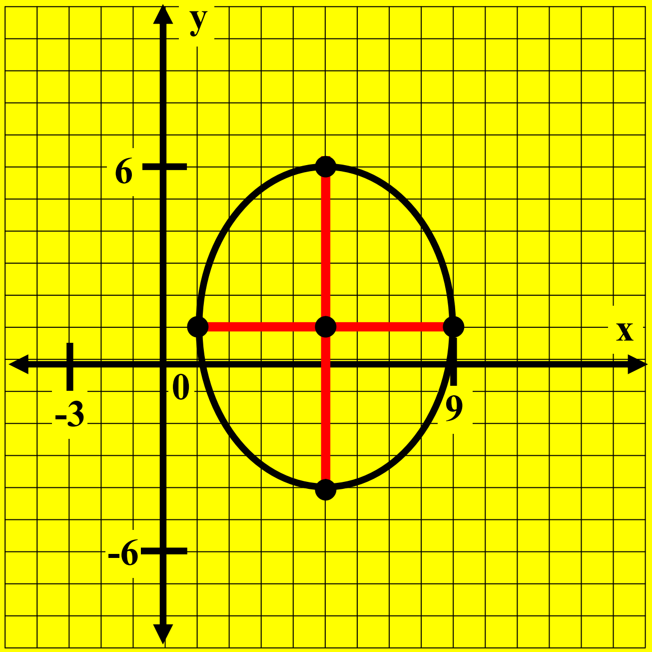

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Center (5, 1)

$a = 5 \qquad b = 4$

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Locate and label foci F_1 and F_2.

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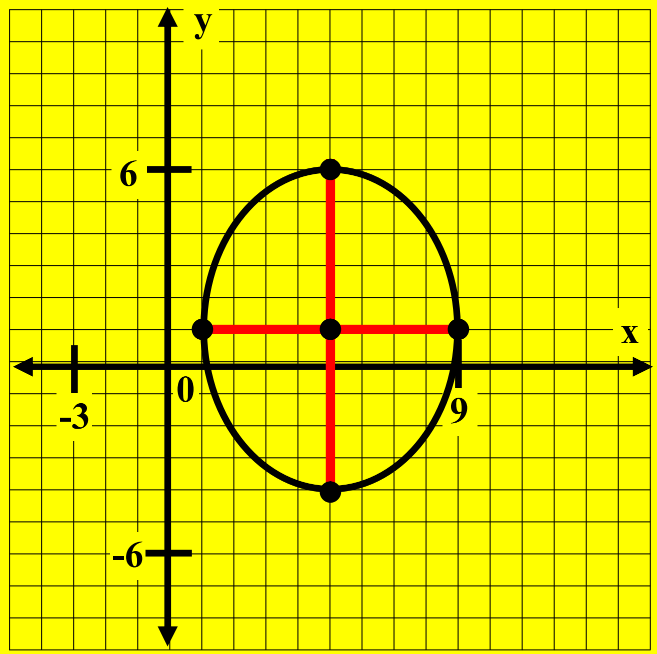

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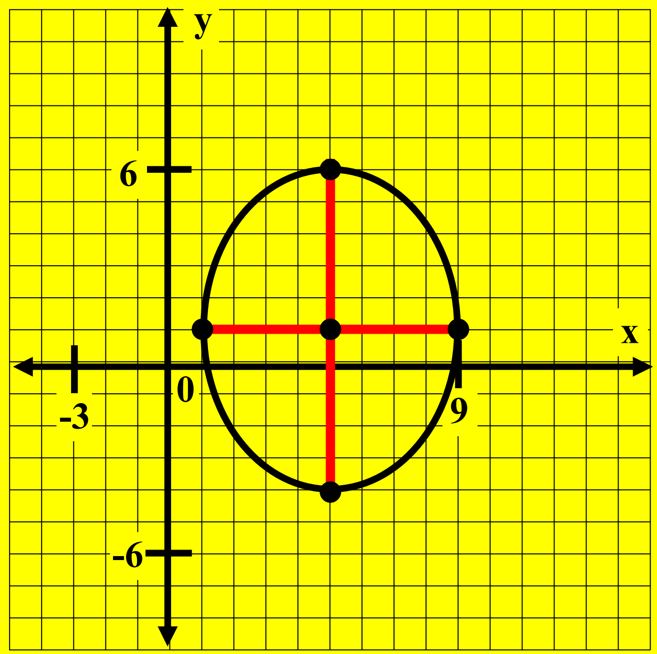

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Center (5, 1)

$a = 5 \qquad b = 4$

$$c = \sqrt{a^2 - b^2} = \sqrt{25 - 16} = \sqrt{9}$$

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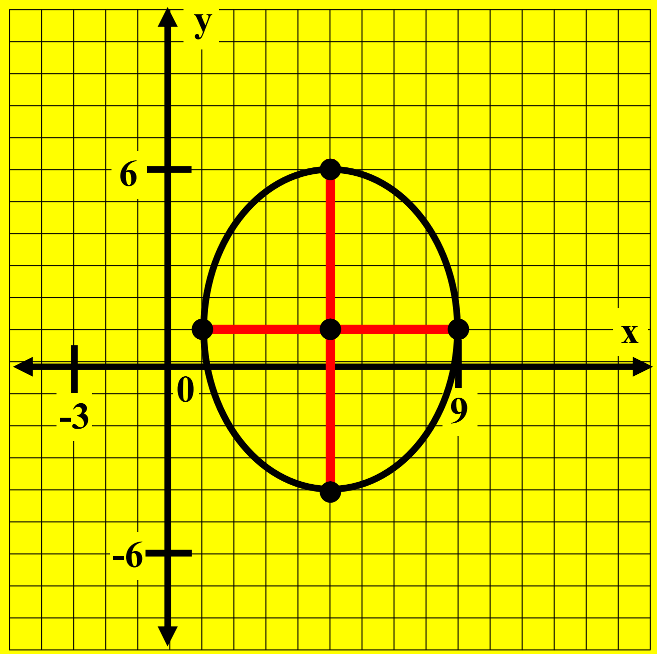

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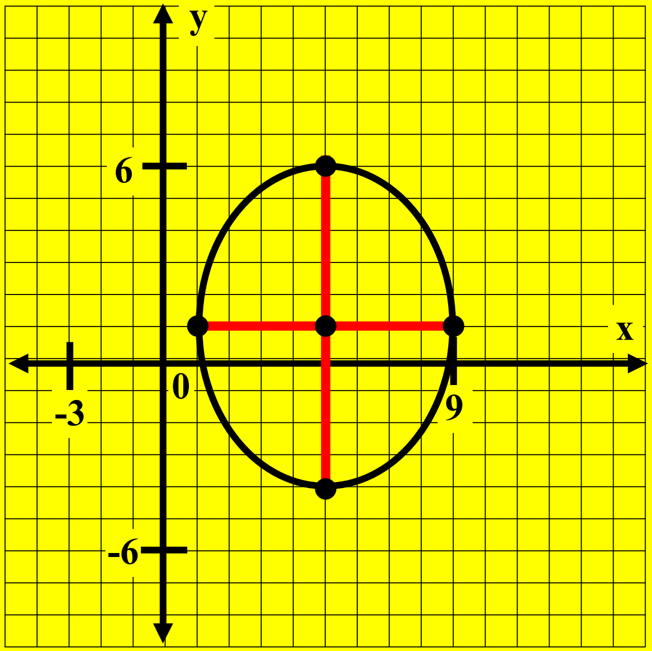

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Each focus is on the major axis 3 units from the center.

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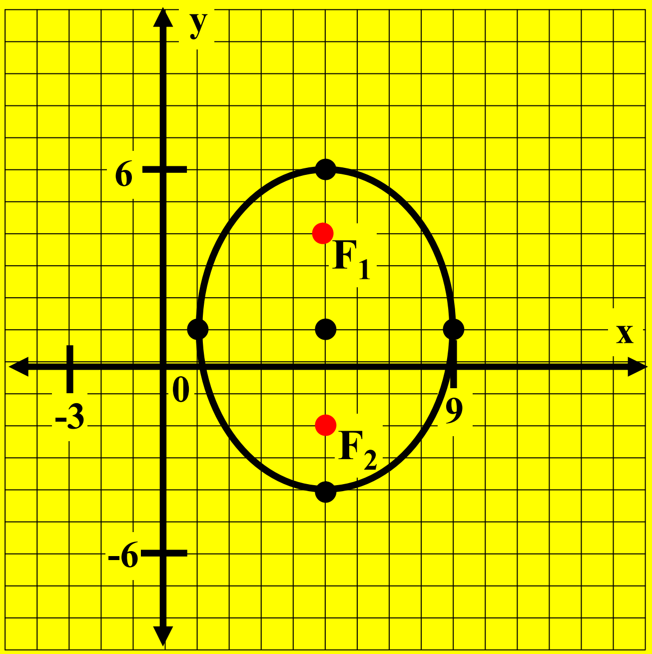

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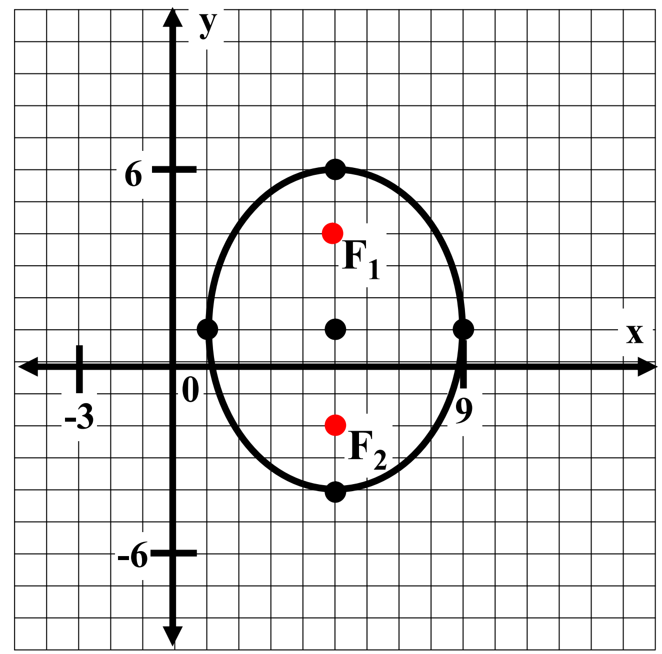

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