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Equations of Ellipses - Guided Lesson Explanation

Explanation#1

Step1) First we should see what we have find out.

Step2) $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2}$

To write the equation in standard form, the center, a^2 and b^2 must be found. The x coordinate of the vertices and foci given are 0, so the center of the e11ipse has to be (0,0).

|a| = horizontal distance

|b| = vertical distance

(H, k) = Center

(0,0) = Center

Vertices: (0,-13), (0,13)

Vertices are 26 units apart.

Foci: (0,6),(0,-6)

Foci are 12 units apart.

Since the foci are 12 units apart, indicating that $|c|$ is 6 and c^2 , then is 36.

$|c| = 6 \quad c^2 = 6^2$

To find b^2, use the foci equation. c is the distance from the center of the ellipse to the foci. Since the center is (0, 0), and the vertices are (0,-13) and (0, 13), a equals 13.

$c^2 = |a - b|$

$|C|$ = distance from center to foci

(0,0)=Center

(0,-13),(0,13)= vertices

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|a| = distance from center to vertex

|a| = 13

Now that we have the values for a and c, we can substitute the values into the equation and simplify to find b.

$C^2 = |a^2 - b^2|$

$(6)^2 = |13^2 - (b)^2|$

$36 = |169 - b^2|$

$b^2 = 169 - 36$

$b^2 = 133$

Substitute 0 for h and k, the square root of 133 for b and 13 for a into the standard form equation of an ellipse. The equation is y squared over the square of 13 plus x squared over the square of the square root of 133 equals to1.

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

$$\frac{(y-0)^2}{(13)^2} + \frac{(x-0)^2}{(\sqrt{133})^2} = 1$$

$$\frac{y^2}{(13)^2} + \frac{x^2}{(\sqrt{133})^2} = 1$$

Exp1anation#2

Step1) First we shou1d see what we have find out.

Step2) $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2}$

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To write the equation in standard form, the center, a^2 and b^2 must be found. The x coordinate of the vertices and foci given are 0, so the center of the e11ipse has to be (0,0).

|a| = horizonta1 distance

|b| = vertica1 distance

(H, k) = Center

(0,0) = Center

Vertices: (0,-15), (0,15)

Vertices are 30 units apart.

Foci: (0,9),(0,-9)

Foci are 18 units apart.

Since the foci are 10 units apart, indicating that |c| is 9 and c^2 , then is 81.

$|c| = 9 \quad c^2 = 9^2$

To find b^2, use the foci equation. c is the distance from the center of the ellipse to the foci. Since the center is (0, 0), and the vertices are (0,-15) and (0, 15), a equals 15.

$c^2 = |a - b|$

|C| = distance from center to foci

(0,0)=Center

(0,-15),(0,15)= vertices

|a| = distance from center to vertex

|a| = 15

Now that we have the values for a and c, we can substitute the values into the equation and simplify to find b.

$$C^2 = |a^2 - b^2|$$

$$(9)^2 = |15^2 - (b)^2|$$

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$81 = |225 - b^2|$

$b^2 = 225 - 81$

$b^2 = 144$

Substitute 0 for h and k, the square root of 144 for b and 15 for a into the standard form equation of an ellipse. The equation is y squared over the square of 15 plus x squared over the square of the square root of 144 equals to1.

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

$$\frac{(y-0)^2}{(15)^2} + \frac{(x-0)^2}{(\sqrt{144})^2} = 1$$

$$\frac{y^2}{(15)^2} + \frac{x^2}{(12)^2} = 1$$

Exp1anation#3

Step1) First we shou1d see what we have find out.

Step2) $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2}$

To write the equation in standard form, the center, a^2 and b^2 must be found. The x coordinate of the vertices and foci given are 0, so the center of the e11ipse has to be (0,0).

|a| = horizontal distance

|b| = vertical distance

(H, k) = Center

(0,0) = Center

Vertices: (0,-10), (0,10)

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Vertices are 20 units apart.

Foci: (0,3),(0,-3)

Foci are 6 units apart.

Since the foci are 10 units apart, indicating that $|c|$ is 3 and c^2 , then is 9.

$|c| = 3 \quad c^2 = 3^2$

To find b^2, use the foci equation. c is the distance from the center of the ellipse to the foci. Since the center is (0, 0), and the vertices are (0,-10) and (0, 10), a equals 10.

$c^2 = |a - b|$

$|C|$ = distance from center to foci

(0,0)=Center

(0,-10),(0,10)= vertices

$|a|$ = distance from center to vertex

$|a| = 10$

Now that we have the values for a and c, we can substitute the values into the equation and simplify to find b.

$$C^2 = |a^2 - b^2|$$

$$(3)^2 = |10^2 - (b)^2|$$

$$9 = |100 - b^2|$$

$$b^2 = 100 - 9$$

$$b^2 = 91$$

Substitute 0 for h and k, the square root of 91 for b and 10 for a into the standard form equation of an ellipse. The equation is y squared over the square of 10 plus x squared over the square of the square root of 91 equals to1.

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

$$\frac{(y-0)^2}{(10)^2} + \frac{(x-0)^2}{(\sqrt{91})^2} = 1$$

$$\frac{y^2}{(10)^2} + \frac{x^2}{(\sqrt{91})^2} = 1$$