

Answer on Question #57277 – Math – Analytic Geometry

Question

Which of the following is the equation of an ellipse centered at (5,1) having a vertical minor axis of length 4 and a major axis length 6?

A: $\frac{(x-5)^2}{4} + \frac{(y-1)^2}{9} = 1$

B: $\frac{(x-5)^2}{9} + \frac{(y-1)^2}{4} = 1$

C: $\frac{(x+5)^2}{9} + \frac{(y+1)^2}{4} = 1$

D: $\frac{(x-5)^2}{36} + \frac{(y-1)^2}{16} = 1$

Solution

The equation of an ellipse:

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

The center of an ellipse is O(c, d). It is given that the center of the given ellipse is O(5, 1).

Major axis is the longest diameter of an ellipse. Minor axis is the shortest diameter of an ellipse.

The lengths of axes are $2a$ and $2b$. Because the minor axis is vertical, for ellipse $a > b$, then $2a > 2b$.

So

$$2a = 6$$

$$a = \frac{6}{2} = 3$$

and

$$2b = 4$$

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

The equation of the ellipse is

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

$$\frac{(x-5)^2}{9} + \frac{(y-1)^2}{4} = 1.$$

Answer: B: $\frac{(x-5)^2}{9} + \frac{(y-1)^2}{4} = 1.$