Answer on Question #57274 – Math – Analytic Geometry

Question

What is the eccentricity of the ellipse shown below?

$$\frac{(x-5)^2}{52} + \frac{(y+1)^2}{64} = 1$$

A: $\sqrt{3}$
B: $\frac{2}{\sqrt{3}}$
C: $\frac{\sqrt{3}}{4}$
D: $\frac{\sqrt{3}}{2}$

Solution

If the equation of the ellipse is

$$\frac{(x-x_0)^2}{b^2} + \frac{(y-y_0)^2}{a^2} = 1,$$

then in equation

$$\frac{(x-5)^2}{52} + \frac{(y+1)^2}{64} = 1$$

 $a^2 = 64$, hence a = 8; $b^2 = 52$. The ellipse is taller-than-wide in this case.

Next,
$$c^2 = a^2 - b^2$$
, hence $c = 2\sqrt{3}$.

The eccentricity is given by

$$\varepsilon = \frac{c}{a} = \frac{\sqrt{a^2 - b^2}}{a}$$
, hence $\varepsilon = \frac{2\sqrt{3}}{8} = \frac{\sqrt{3}}{4}$.
Answer: C: $\frac{\sqrt{3}}{4}$.

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