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: $\dfrac{2}{\sqrt{3}}$

C: $\dfrac{\sqrt{3}}{4}$

D: $\dfrac{\sqrt{3}}{2}$

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

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

Answer: C: $\dfrac{\sqrt{3}}{4}$.