1-1.5-32

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Question:
Find the ratio in which the line segment joining the points $(1,-3)$ and $(4,5)$ is divided by X axis.

Solution:

Equation of line segment joining $A(1,-3)$ and $B(4,5)$ given by

$$\frac{x-1}{3} = \frac{y+3}{8}$$

The intersection with the x-axis occurs when $y = 0$. Substitute $y = 0$ into the parametric equation:

$$\frac{x-1}{3} = \frac{3}{8}$$

$$x - 1 = \frac{3 \cdot 3}{8} = \frac{9}{8}$$

$$x = 1 + \frac{9}{8} = \frac{8+9}{8} = \frac{17}{8}$$

Therefore, the point of intersection with the x-axis is $\left(\frac{17}{8}, 0\right)$.

Let this point $\left(\frac{17}{8}, 0\right)$ divide the segment AB in the ratio $k : 1$.

Using section formula,

$$\left(\frac{k \cdot 4 + 1}{k+1}, \frac{k \cdot 5 - 3}{k+1}\right) = \left(\frac{17}{8}, 0\right)$$

Equate the y-coordinates:

$$\frac{k \cdot 5 - 3}{k+1} = 0$$

$$k \cdot 5 - 3 = 0$$

$$k = \frac{3}{5}$$

Hence, the ratio in which the line segment joining the points $(1,-3)$ and $(4,5)$ is divided by the x-axis is $3 : 5$.