A ferry is crossing a river. The ferry is
headed due north with a speed of 2.5 m/s
relative to the water and the river's velocity
is 3.5 m/s to the east. Find the direction in which the ferry is moving_measured from due east with
counterclockwise postive)

Solution:

$V_{f,r} = 2.5\dfrac{m}{s}$ — velocity of the ferry relative to the water;

$V_{river} = 3.5\dfrac{m}{s}$ — velocity of the river;

α

$-$ *the angle between east direction and the direction of the ferry's motion*

Formula for the relative velocity of the track:

$\vec{V}_{f,r} = \vec{V}_{ferry} - \vec{V}_{river}$

$\vec{V}_{ferry} = \vec{V}_{f,r} + \vec{V}_{river}$

From the right triangle ABC:

$$\tan\alpha = \frac{V_{f,r}}{V_{river}} \implies \alpha = \arctan\left(\frac{V_{f,r}}{V_{river}}\right) = \arctan\left(\frac{2.5\frac{m}{s}}{3.5\frac{m}{s}}\right) = 36°$$

Answer: the angle between east direction and the direction of the ferry's motion is
36°