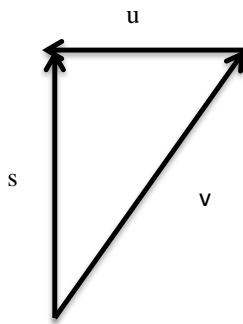


a boat which a speed of 5 km/hr in still water crosses a river of width 1km along the shortest possible path in 15 minutes calculate the velocity of river water in km/hr

Velocity-addition formula:

if a boat is moving relative to the water velocity v and water is on a river that is flowing with velocity u , then the velocity of the boat relative to the shore equals the vector sum:

$$\vec{s} = \vec{v} + \vec{u}$$



Time will be minimal if s is perpendicular to the shores.

Pythagorean theorem

$$u^2 = v^2 - s^2$$

velocity of the boat relative to the shore equals:

$$s = \frac{1\text{km}}{15\text{min}} = 4 \frac{\text{km}}{\text{h}}$$

Therefore:

$$u = \sqrt{v^2 - s^2} = 3 \frac{\text{km}}{\text{h}}$$

Answer: $3 \frac{\text{km}}{\text{h}}$