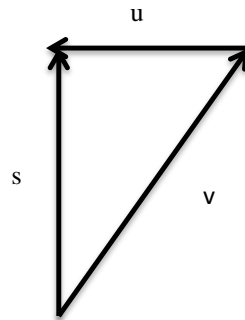


a boat which a speed of 5 km/hr in still water crosses a river of width 1km along the shortest possible path in 15 minutes calculate the velocity of river water in km/hr

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:

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

Therefore:

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

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