Answer on Question #45466 – Physics – Mechanics | Kinematics | Dynamics

Question:

A ferryboat travelling at a speed of 30 km/h attempts to cross a river with a current of 5 km/h. What is the boat's speed relative to the shore?

Answer:

We assume that ferryboat is travelling downstream.

The boat's motor is what carries the boat across the river the **Distance A**; and so any calculation involving the **Distance A** must involve the speed value labeled as **Speed A**(the boat speed relative to the water). Similarly, it is the current of the river that carries the boat downstream for the **Distance B**; and so any calculation involving the **Distance B** must involve the speed value labeled as **Speed B** (the river speed). Together, these two parts (or components) add up to give the resulting motion of the boat. That is, the across-the-river component of displacement adds to the downstream displacement to equal the resulting displacement.
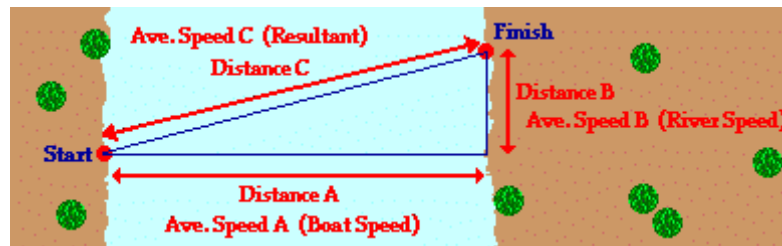
$$Speed\ C = \sqrt{Speed\ A^2 + Speed\ B^2}$$

$$Speed\ C = \sqrt{30^2 + 5^2} \approx 30.4\ km/h$$

Answer: The boat speed relative to the shore is **30.4 km/h**