Answer on question #61413, Physics / Other

Question   The water of a 0.5 km wide river is floating from west to east with a velocity of 5.0 m/s. A boatman standing at one of the banks of the river wishes to take his boat to a point on the opposite bank exactly in front of his present position. He can row his boat with a velocity of 13.0 m/s relative to the water in the direction of north-west. What time will be taking to cross the river?

Solution   The velocity of the boat is differences of velocities of float (5.0 m/s) and of the boat in the water without float (13.0 m/s). As the boatman wishes to take his boat to a point on the opposite bank exactly in front of his present position they will be perpendicular. Hence, final velocity of the boat is

$$v = \sqrt{v_b^2 - v_f^2} = \sqrt{13^2 - 5^2} = 12 \, m/s$$

Hence, it will take him
$$t = \frac{s}{v} = \frac{500}{12} = 41.67 \, s$$

to cross the river.