



Video Solution on Website:-

<https://physicsaholics.com/home/courseDetails/52>

Video Solution on YouTube:-

<https://youtu.be/hmH8jwEsj98>

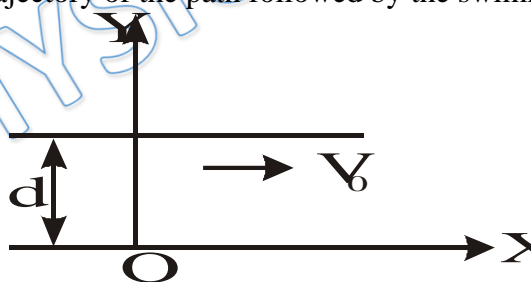
- Q 1. A boat moves relative to water with a velocity which is n times the river flow velocity
- (a) If $n < 1$, boat cannot cross the river
 - (b) If $n = 1$, boat cannot cross the river without drifting
 - (c) If $n > 1$, boat can cross the river along shortest path
 - (d) Boat can cross the river whatever is the value of n (excluding zero value)
- Q 2. A river is flowing east to west with velocity v . A man can swim with velocity v_0 in still water. He takes minimum time t_1 to cross the river. When he swims along shortest path, takes time t_2 . The ratio of time $t_1 t_2$ is $1 : 2$, then $\frac{v_0}{v}$ is equal to
- (a) $\sqrt{3} : 2$
 - (b) $1 : 1$
 - (c) $2 : \sqrt{3}$
 - (d) $2 : 1$
- Q 3. A boat which has a speed of 5 km/h in still water crosses a river of width 1 km along the shortest possible path in 15 min. The velocity of the river water in km/h is:
- (a) 1
 - (b) 3
 - (c) 4
 - (d) $\sqrt{41}$
- Q 4. River is flowing with a velocity $\vec{v}_R = 4\hat{i}$ m/s. A boat is moving with a velocity of $\vec{v}_{BR} = (-\hat{i} + 4\hat{j})$ m/s relative to river. The width of the river is 100 m along y-direction. Choose the correct alternative(s)
- (a) The boatman will cross the river in 25 s
 - (b) Absolute velocity of boatman is $2\sqrt{5}$ m/s
 - (c) Drift of the boatman along the river current is 50 m
 - (d) The boatman can never cross the river.
- Q 5. A man wants to cross a river 500 m wide. The rowing speed of the man relative to water is 3 km/hr and the river flows at the speed of 2 km/hr. If the man's walking speed on the shore is 5 km/hr, then in which direction should he start rowing in order to reach the directly opposite point on the other bank in the shortest time?
- (a) At an angle $\sin^{-1}\left(\frac{3}{7}\right)$ with the river flow direction
 - (b) At an angle $90^\circ + \sin^{-1}\left(\frac{3}{7}\right)$ with the river flow direction
 - (c) At an angle $90^\circ - \sin^{-1}\left(\frac{3}{7}\right)$ with the river flow direction
 - (d) At an angle $90^\circ - \cos^{-1}\left(\frac{3}{7}\right)$ with the river flow direction
- Q 6. A swimmer crosses a river of width d flowing at velocity v . While swimming, he keeps himself always at an angle of 120° with the river flow and on reaching the other end



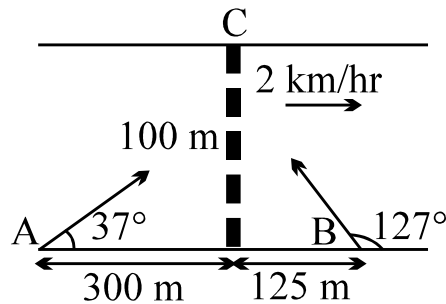
he finds a drift of $d/2$ in the direction of flow of river. The speed of the swimmer with respect to the river is

- (a) $(2 - \sqrt{3})v$ (b) $2(2 - \sqrt{3})v$
(c) $4(2 - \sqrt{3})v$ (d) $(2 + \sqrt{3})v$

- Q 7. A motor boat is to reach at a point 30° upstream on the other side of a river flowing with velocity 5 m/s. Velocity of motor boat with respect to water is $5\sqrt{3}$ m/sec. The driver should steer the boat an angle:
- (a) 30° w.r.t. the line of destination from starting point
(b) 60° w.r.t.. normal to the bank
(c) 120° w.r.t. stream direction
(d) None of these
- Q 8. A man can swim at a speed of 5 km/h w.r.t. water. He wants to cross a 1.5 km wide river flowing at 3 km/h. He keeps himself always at an angle of 60° with the flow direction while swimming. The time taken by him to cross the river will be
- (a) 0.25 hr. (b) 0.35 hr. (c) 0.45 hr. (d) 0.55 hr.
- Q 9. A swimmer wishes to cross a 1 km wide river flowing at 5 km h^{-1} . His speed in still waters is 3 km/h. He has to reach directly opposite in minimum possible time. If he does not reach directly opposite by swimming, he has to walk that distance at 5 km h^{-1} . Find the time taken
- (a) 0.45 hr (b) 0.66 hr
(c) 1 hr (d) 1.5 hr
- Q 10. A swimmer swims (with respect to water) perpendicular to the current with acceleration $a = 2t$ (where t is time) starting from rest from the origin O at $t = 0$. Velocity of the river with respect to ground is given by ' V_0 '. Width of the river is ' d '. The equation of trajectory of the path followed by the swimmer



- (a) $y = \frac{x^3}{3V_0^3}$ (b) $y = \frac{x^2}{2V_0^2}$
(c) $y = \frac{x}{V_0}$ (d) $y = \sqrt{\frac{x}{V_0}}$
- Q 11. Two swimmers start a race. One who reaches the point C first on the other bank wins the race. A makes his strokes in a direction of 37° to the river flow with velocity 5km/hr relative to water. B makes his strokes in a direction 127° to the river flow with same relative velocity. River is flowing with speed of 2km/hr and is 100m wide. speeds of A and B on the ground are 8km/hr and 6km/hr respectively.



- (a) A will win the race
 (b) B will win the race
 (c) the time taken by A to reach the point C is 165 seconds
 (d) the time taken by B to reach the point C is 150 seconds

- Q 12. A man wishes to swim across a river 0.5 km wide. If he can swim at the rate of 2 km/h in still water and the river flows at the rate of 1 km/h. The angle (with respect to the flow of the river) along which he should swim so as to reach a point exactly opposite his starting point, should be-
 (a) 60° (b) 120° (c) 145° (d) 90°
- Q 13. A boat moves relative to water with a speed which is $\frac{1}{n}$ times the river flow speed. At what angle to the stream direction be boat move to minimize drifting (given $n > 1$) -
 (a) $\frac{\pi}{2}$ (b) $\sin^{-1} \frac{1}{n}$ (c) $\frac{\pi}{2} + \sin^{-1} \frac{1}{n}$ (d) $\frac{\pi}{2} + \sin^{-1}(n)$
- Q 14. Flow velocity of river of width d is given as $u = u_0 r$, where u_0 is constant and r is perpendicular distance from nearer bank. A swimmer heads perpendicular to direction of flow of river. Find his drift if his velocity in still water is v ?
 (a) $\frac{u_0 d^2}{4v}$ (b) $\frac{u_0 d}{2}$ (c) $\frac{u_0^2 d^3}{3v^2}$ (d) $\frac{u_0^2 d^2}{2v}$

Answer Key

Q.1 b,c,d	Q.2 c	Q.3 b	Q.4 a	Q.5 b
Q.6 c	Q.7 b	Q.8 b	Q.9 b	Q.10 a
Q.11 b,c,d	Q.12 b	Q.13 c	Q.14 a	