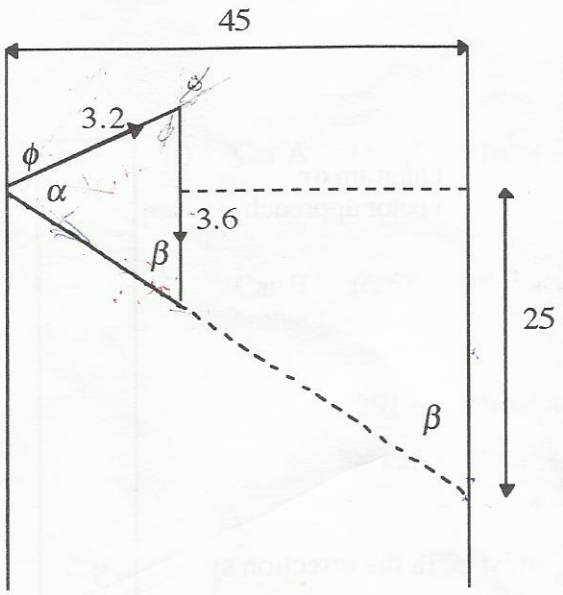
1998 2(b)

2 (b) A man wishes to row a boat across a river to reach a point on the opposite bank that is 25 m downstream from his starting point. The man can row the boat at 3.2 m/s in still water. The river is 45 m wide and flows uniformly at 3.6 m/s.
Find

(i) the two possible directions in which the man could steer the boat

(ii) the respective crossing times.



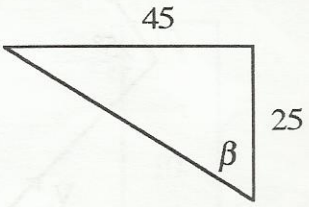


Diagram **or** relative velocity equation — 10

$$\tan\beta = \frac{45}{25} \quad \Rightarrow \quad \beta = 60.95° \qquad \text{— 5}$$

$$\frac{\sin\alpha}{3.6} = \frac{\sin 60.95}{3.2}$$

$$\Rightarrow \quad \alpha = 79.55° \text{ or } 100.45°$$

$$\Rightarrow \quad \phi = 39.5° \text{ or } 18.6° \qquad \text{— 5}$$

$$\text{time}_1 = \frac{45}{3.2\sin 39.5°} = 22.1 \text{ s}$$

$$\text{time}_2 = \frac{45}{3.2\sin 18.6°} = 44.1 \text{ s} \qquad \text{— 5}$$

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