

$$d^2 = 45^2 + 60^2 \Rightarrow d = 75 \text{ m}$$

$$\tan D = \frac{60}{45} = \frac{4}{3}$$

$$\Rightarrow D = 53.13^\circ$$

$$\Rightarrow E = 126.87^\circ$$

Using the Sine Rule:

$$\frac{0.6t}{\sin 126.87^\circ} = \frac{0.45t}{\sin B}$$

$$\begin{aligned} \Rightarrow \sin B &= \frac{0.45 \sin 126.87^\circ}{0.6} \\ &= 0.6 \end{aligned}$$

$$\Rightarrow B = 36.87^\circ \quad \text{OR} \quad B = 143.13^\circ$$

Case 1:  $B = 36.87^\circ$

$$A = 180^\circ - 36.87^\circ - 126.87^\circ$$

$$\Rightarrow A = 16.26^\circ$$

Using the Sine Rule:

$$\frac{75}{\sin 16.26^\circ} = \frac{0.6t}{\sin 126.87^\circ}$$

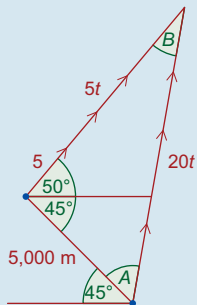
$$\Rightarrow t = 357 \text{ s}$$

Case 2:  $B = 143.13^\circ$

$$A = 180^\circ - 143.13^\circ - 126.87^\circ$$

$$\Rightarrow A = -90^\circ \quad \dots \text{ not possible}$$

Q. 4.



$$\frac{20t}{\sin 95^\circ} = \frac{5t}{\sin A}$$

$$\therefore 20 \sin A = 5 \sin 95^\circ$$

$$\therefore A = 14.42^\circ \quad \text{OR} \quad 165.578^\circ$$

$$\therefore B = 180^\circ - 95^\circ - 14.42^\circ = 70.58^\circ$$

$\therefore$  Speedboat must travel

$$(45 + 14.42) = 59.42^\circ \text{ North of West}$$

$$\frac{5,000}{\sin 70.58^\circ} = \frac{20t}{\sin 95^\circ}$$

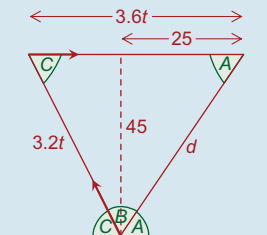
$$\therefore t = \frac{250 \sin 95^\circ}{\sin 70.58^\circ} = 264 \text{ s}$$

Q. 5. (i) Let  $t$  = the time taken to cross the river.

The boat will head upstream at 3.2 m/s, and would travel a distance  $3.2t$ .

Meanwhile the river carries the boat downstream a distance  $3.6t$ .

The boat lands 25 m downstream.



$$\tan A = \frac{45}{25} = \frac{9}{5}$$

$$\Rightarrow A = 60.945^\circ$$

$$d^2 = 25^2 + 45^2$$

$$\Rightarrow d = 51.478 \text{ m}$$

Using the Sine Rule:

$$\frac{3.2t}{\sin 60.945^\circ} = \frac{3.6t}{\sin B}$$

$$\Rightarrow B = \sin^{-1} \left[ \frac{3.6 \sin 60.945^\circ}{3.2} \right]$$

$$\Rightarrow B = 79.553^\circ \quad \text{OR} \quad B = 100.447^\circ$$

(ii) Case 1:  $B = 79.553^\circ$

$$C = 180^\circ - 79.553^\circ - 60.945^\circ$$

$$\Rightarrow C = 39.502^\circ$$

Case 2:  $B = 100.447^\circ$

$$C = 180^\circ - 100.447^\circ - 60.945^\circ$$

$$\Rightarrow C = 18.608^\circ$$

Using the Sine rule:

$$\frac{3.2t}{\sin 60.945^\circ} = \frac{51.478}{\sin 39.502^\circ}$$

$$\Rightarrow t = \frac{51.478 \sin 60.945^\circ}{3.2 \sin 39.502^\circ}$$

$$\Rightarrow t = 22 \text{ s}$$

$$\frac{3.2t}{\sin 60.945^\circ} = \frac{51.478}{\sin 18.608^\circ}$$

$$\Rightarrow t = \frac{51.478 \sin 60.945^\circ}{3.2 \sin 18.608^\circ}$$

$$\Rightarrow t = 44 \text{ s}$$