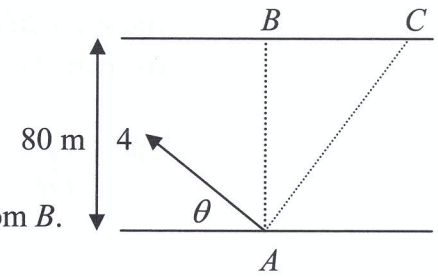
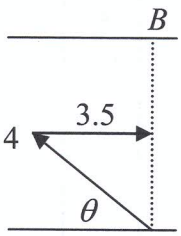
2011

2 (b) A woman can row a boat at 4 m s^{-1} in still water.
She rows across a river 80 m wide.
The river flows at a constant speed of
3.5 m s^{-1} parallel to the straight banks.
She wishes to land between B and C.
The point B is directly across from the starting
point A and the point C is $20\sqrt{3}$ m downstream from B.



If θ is the direction she takes, find the range of values of θ if she lands between B and C.



$$\cos\theta = \frac{3.5}{4}$$

$$\theta = 28.955°$$

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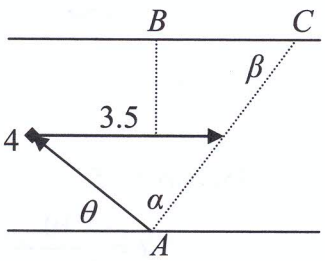

$$\tan\beta = \frac{80}{20\sqrt{3}}$$

$$\beta = 66.59°$$

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$$\frac{\sin\alpha}{3.5} = \frac{\sin\beta}{4}$$

$$\sin\alpha = 0.8029$$

$$\alpha = 53.41°$$

$$\theta = 180 - 66.59 - 53.41$$

$$= 60°$$

$$28.955 \le \theta \le 60$$

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