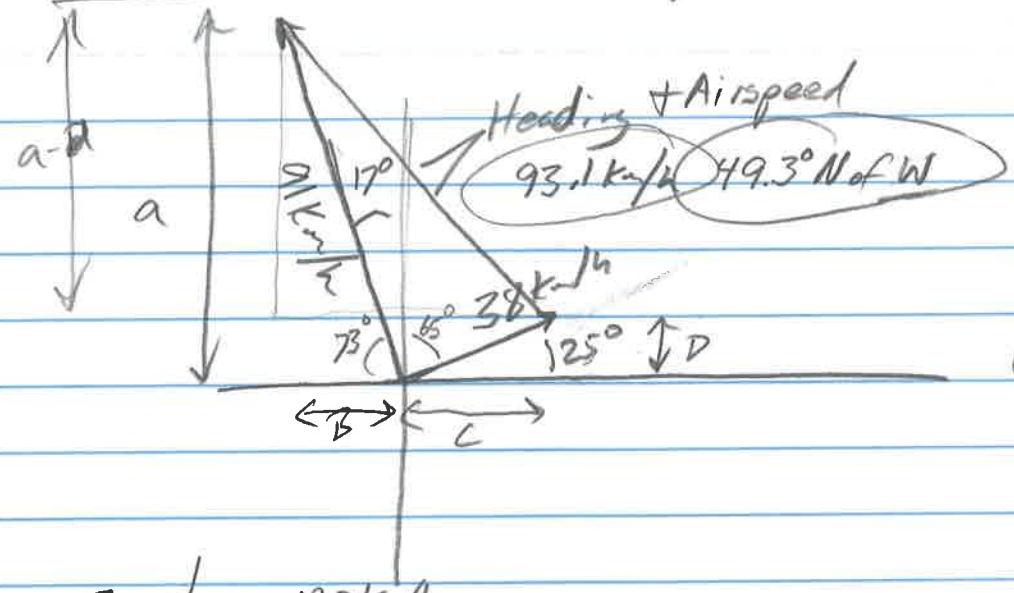
Still More River Problems

4.



Not drawn to scale

$$\bar{V} = \frac{d}{t} = \frac{182\ km/h}{2h} = 91\ km/h$$

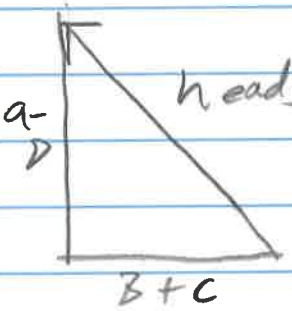
Trig/algebra solution

$a = \sin 73°(91\ km/h) = 87.0\ km/h$

$b = \cos 73°(91\ km/h) = 26.7\ km/h$

$c = \cos 25°(38\ km/h) = 34.4\ km/h$

$d = \sin 25(38\ km/h) = 16.1\ km/h$



$$\text{Airspeed} = \sqrt{(a-D)^2 + (B+C)^2}$$

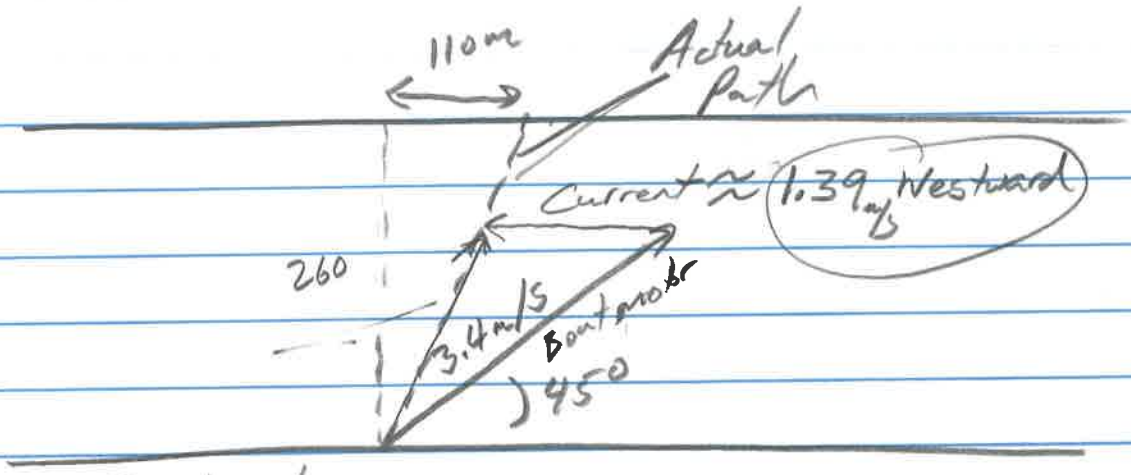
$$= \sqrt{(70.9)^2 + (60.8)^2}$$

$$\text{Airspeed} = 93.3\ km/h$$

$$\text{Direction} = \tan^{-1}\left(\frac{a-D}{B+C}\right) = \tan^{-1}\left(\frac{70.9}{60.8}\right)$$

$$= 49.4°\ N\ of\ W$$

5.



Graphical Solution: ① Draw to scale, at proper angles. ② Draw boat motor vector ③ Draw downstream current vector until it intersects path. ④ Measure length of current vector

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Numerical (Analytical Soln)

Boat V ⇒ $V_{Bx} = \cos(45^\circ)(3.4\,m/s) = 2.4\,m/s$

$V_{By} = \sin(45^\circ)(3.4\,m/s) = 2.4\,m/s$

River V ⇒ $V_{Rx} = V_{Rx}$?

$V_{Ry} = 0$

$Resultant\,x = V_{Bx} + V_{Rx} = 2.4\,m/s + V_{Rx}$

$Resultant\,y = V_{By} = 2.4\,m/s$

$\frac{\Delta x}{\Delta y} = \frac{110\,m}{260\,m}$ $\quad \Delta x = (2.4\,m/s + V_{Rx})t$ $\quad \Delta y = 2.4\,m/s\,(t)$

$\frac{(2.4\,m/s + V_{Rx})t}{2.4\,m/s\,t} = \frac{110\,m}{260\,m}$

$260\,m(2.4\,m/s) + 260\,m(V_{Rx}) = 110\,m(2.4\,m/s)$

$V_{Rx} = -1.38\,m/s$