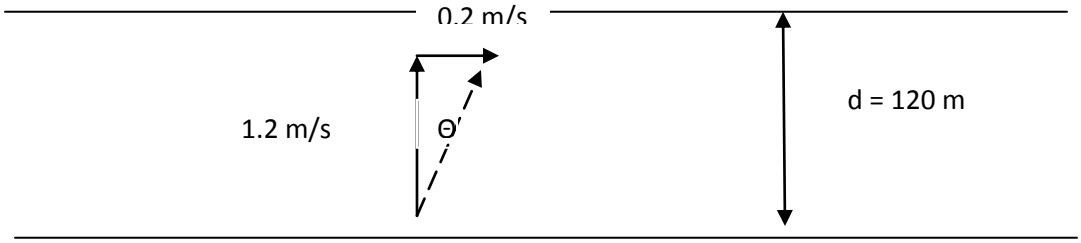
2D motion - River questions

Section 2.2 in your text

I can swim at 1.2 m/s [N] and the river's current is 0.2 m/s [E]. What is my resultant velocity?



Remember to add TAIL-TO-TIP and draw the resultant vector (start at start and end at the end)

PYTHAGOREAN - To solve for resultant velocity I use Pythagorean theorem.

So… $(0.2)^2 + (1.2)^2 = (\text{resultant velocity})^2$

In this case, the resultant velocity $V_R = 1.24$ m/s

SOH CAH TOA – use trigonometry to solve for the angle Θ

Tan Θ = 0.2/1.2 Θ = 10^o

So…resultant velocity as seen by someone on the bank is <u>1.24 m/s [N 10^o E]</u>

<u>How long to cross the river with NO current?</u>

V = d/t so… t = d/v = 120m / 1.2m/s time = 100s !

<u>How long to cross the river WITH current?</u>

** Current only causes me to drift east. It does NOT slow down my northerly progress. There is NO component of my swimming north that is in the easterly direction!

So..time = 100 s

<u>How far do I drift east by the time I cross the river?</u>

Well, I know it take 100s to cross. I know I am drifting 0.2 m/s. So..

V=d/t d=vt = 0.2 m/s [E] x 100s = 20 m [E] I have drifted 20 m [E].

Because I am swimming [north] and drifting [east], one speed does not affect the other. There is NO component of [north] that is acting [east] because these 2 directions are 90^o to each other! They act separately.