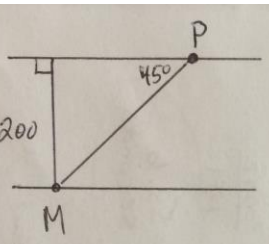
7.2 #14.

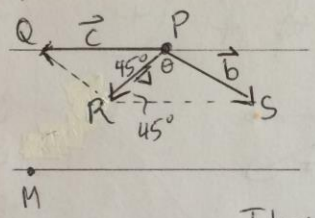


N ↑ position diagram:

Dave must get from point P to point M (marina); he cannot miss it, or land before it. Thus, his velocity $\vec{v}$ must be in the same direction as segment PM.

a) vector diagram:

Let $\vec{c}$ be current.
Let $\vec{b}$ be boat.
Let θ be angle between $\vec{v}$ and $\vec{b}$



By Z-pattern, $\angle PRS = 45°$

$$\frac{\sin 45°}{4} = \frac{\sin\theta}{5.5}$$

$$\therefore \theta \doteq 76.476°$$

Thus, he must go in the direction $\angle P = 180° - 45° - 76.476° \doteq 58.5°$, to the shore, upstream. □

b) Find $|\vec{v}|$ first! (sine or cosine law) ... $|\vec{v}| \doteq 4.824$ m/s.

Now, PM is $200\sqrt{2}$ m due to 45:45:90° triangle.

Using similar triangles, or $\Delta t = \frac{\Delta d}{\text{speed}}$, we have:

$$\Delta t = \frac{200\sqrt{2}}{|\vec{v}|} \rightarrow \dots \Delta t \doteq 58.6 \text{ seconds}$$ □