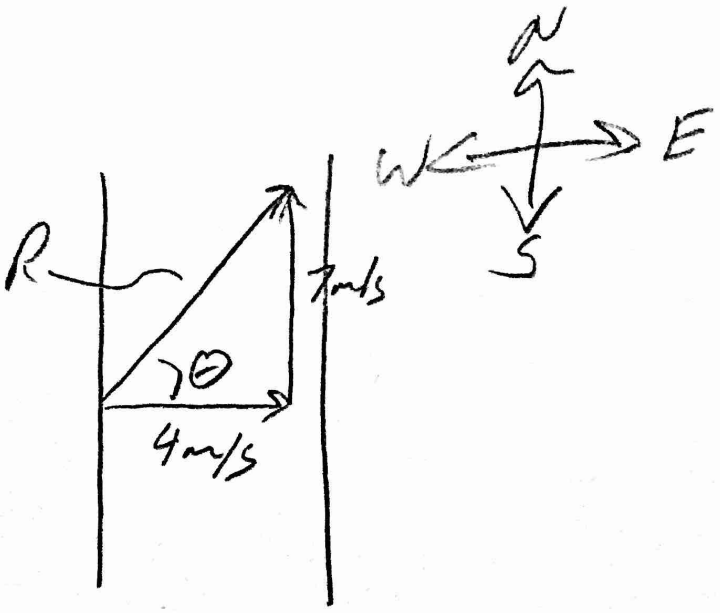
2.



a. $R = \sqrt{7^2+4^2} = 8.1\ m/s$

$\theta = \tan^{-1}\left(\frac{7}{4}\right) = 60.3^\circ$ (N of East)

b. $\Delta x = 100m$ (x = East/west)

$V_x = 4\ m/s$

$V_x = \frac{\Delta x}{\Delta t} \Rightarrow 4\ m/s = \frac{100m}{\Delta t}$

$\Delta t = 25s$

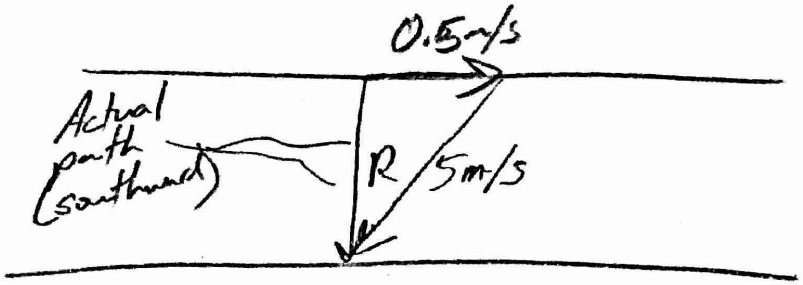
c. $\Delta y = ?$ (y = North/south)

$V_y = 7\ m/s$

$V_y = \frac{\Delta y}{\Delta t} \Rightarrow 7\ m/s = \frac{\Delta y}{25s}$

$\Delta y = 175m$

3.

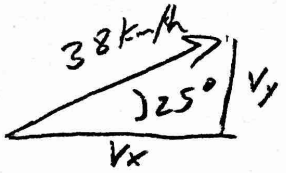


$R = \sqrt{5\,m/s^2 - 0.5\,m/s^2} = 4.97\ m/s$

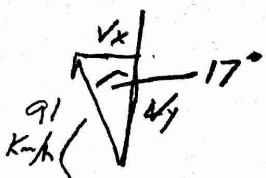
$d = rt$

$100\,m = 4.97\,m/s\,(t) \Rightarrow t = 20.1\,s$

4. Wind Velocity



Actual Velocity (Resultant)

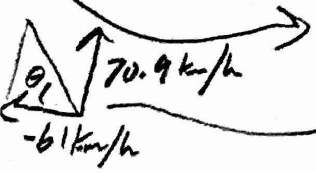


$\frac{182\,km}{2\,h} = 91\,km/h$

Helicopter Airspeed = ?

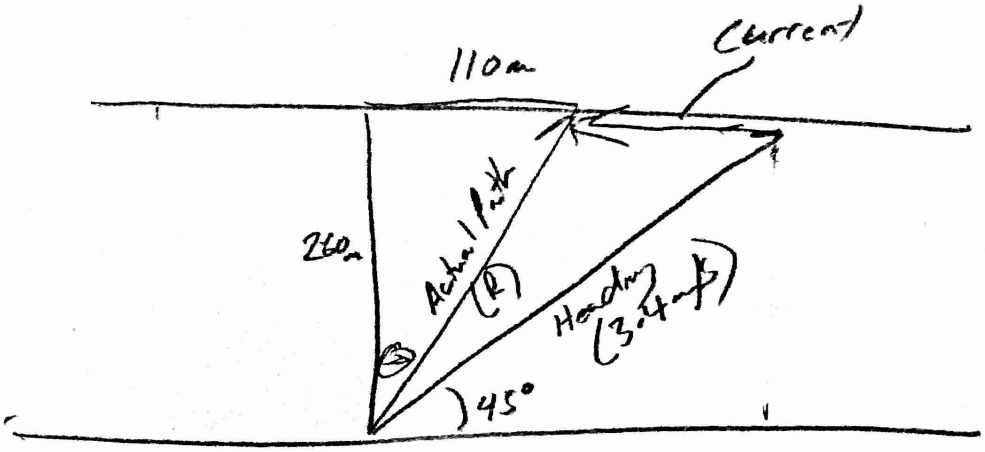
	Vx — columns must add up to resultant	Vy
Wind V	Cos 25°(38) = 34.4 km/h	Sin 25°(38) = 16.1 km/h
Helicopter Air Velocity	-26.6 - 34.4 = -61 km/h	87 - 16.1 = 70.9 km/h
Actual Velocity relative to ground (resultant)	-Sin 17°(91) = -26.6 km/h	Cos(17°)(91) = 87.0 km/h

$V = \sqrt{V_x^2 + V_y^2} = \sqrt{-61^2 + 70.9^2} = 93.5\ km/h$

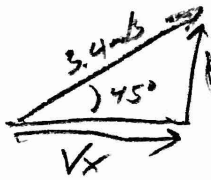


$\theta = \tan^{-1}\left(\frac{70.9}{61}\right) = 49.3°\ N\ of\ West$

5.



Boat Water Velocity $\Rightarrow$



— Determines Crossing time

$V_y = \sin 45° (3.4 m/s) = 2.4 m/s$

$\text{Crossing time} = \frac{260m}{2.4s} = 108s$

$\text{Actual path length} = \sqrt{110m^2 + 260m^2} = 282m$

$\text{Speed along Actual path} = \frac{\text{Distance}}{\text{Crossing time}} = \frac{282m}{108s}$

Actual Speed $= 2.61 m/s$

$\theta = \tan^{-1}\left(\frac{110m}{260m}\right) = 22.9°$

Resultant $\Rightarrow$ V_x of actual Velocity $= \sin 22.9° (2.61 m/s) = 1.02 m/s$

V_x of boat water velocity $= \cos 45° (3.4 m/s) = 2.4 m/s$

$V_x \text{ Actual} = V_x \text{ water velocity} + V_x \text{ current}$

$1.02 m/s = 2.4 m/s + V_x \text{ current}$

$V_x \text{ current} = 1.38 m/s$ Down river