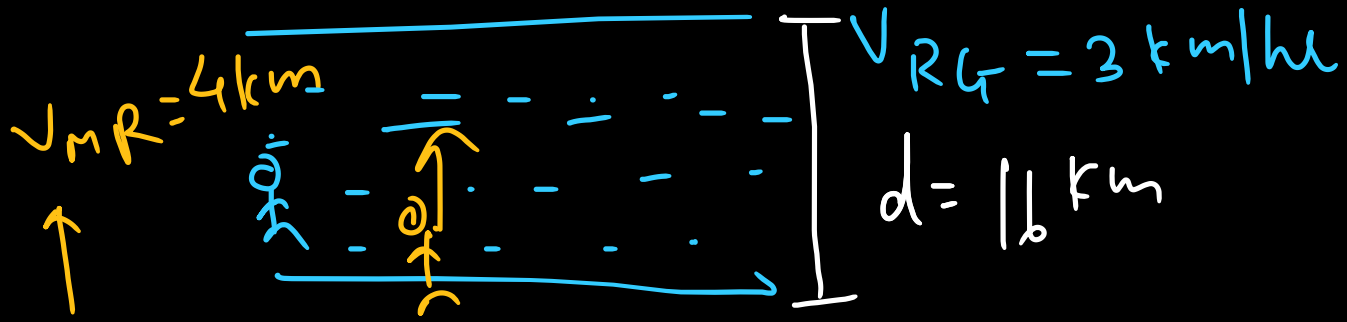
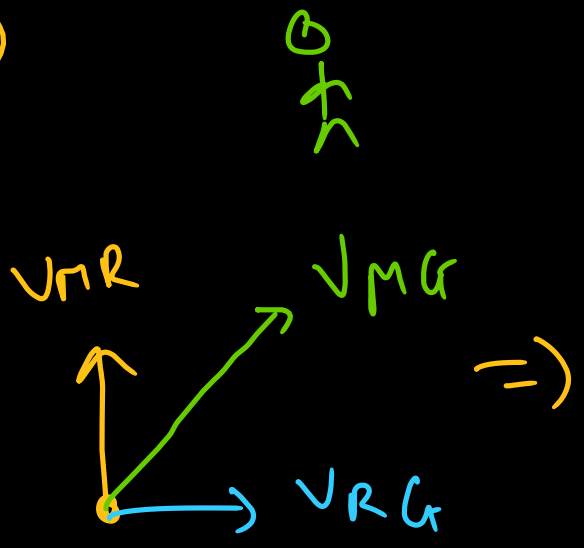
River - boat problems : (Ground frame)





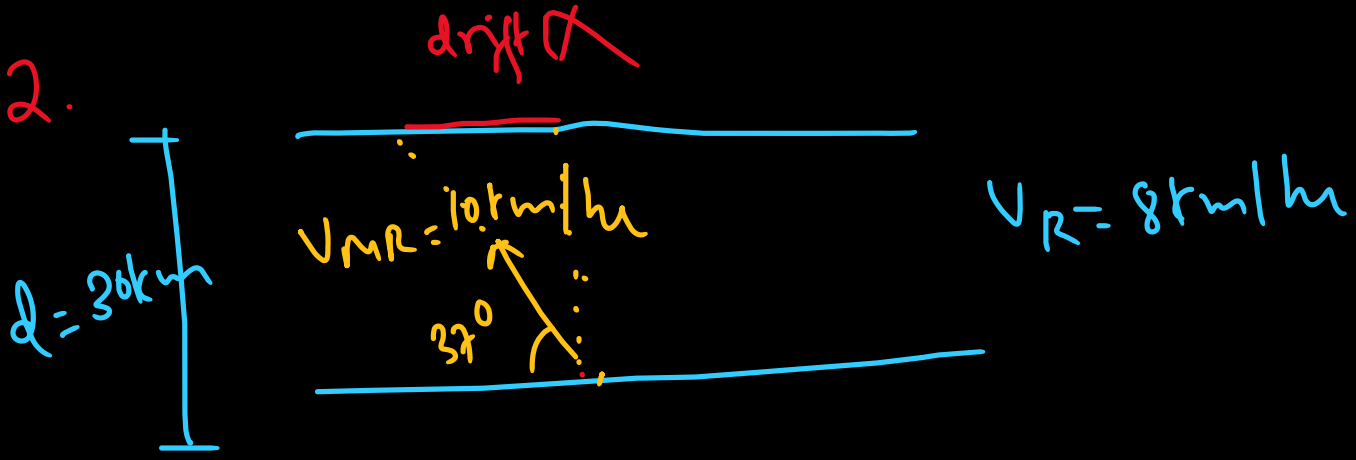
$$V_{MR} = V_{MG} - V_{RG}$$

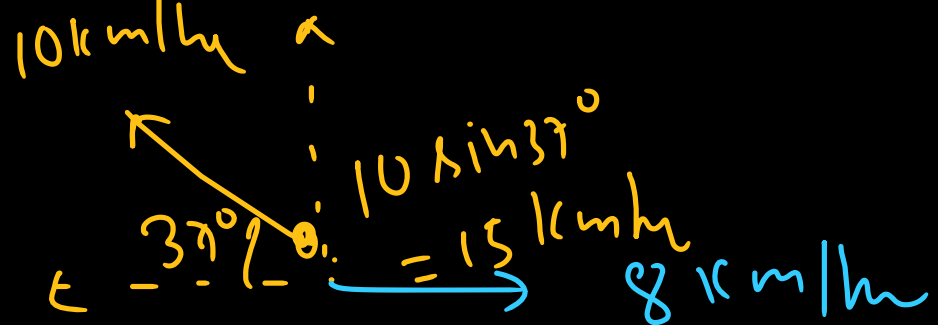
$$V_{MR} = 4\hat{j} + 3\hat{i}$$

$$\text{time to cross} = \frac{16}{4} = 4 \text{ KM}$$

$$drift = v_R \times t$$
$$= 3 \times 4 = 12\,km$$

2.

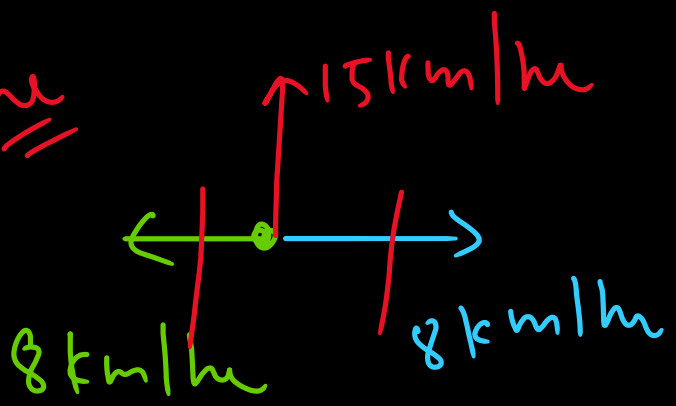




$10\cos 37°$

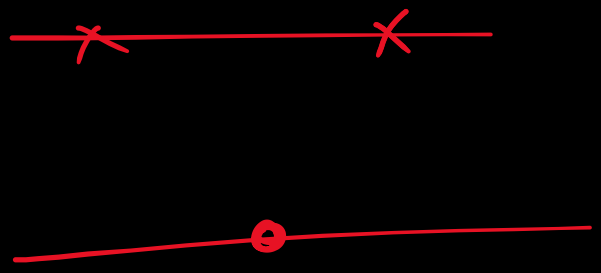
$= 10 \times \frac{4}{5} = 2 \times 4 = 8\,km/hr$

$t = \frac{d}{15} = \frac{30}{15} = 2\,hr$

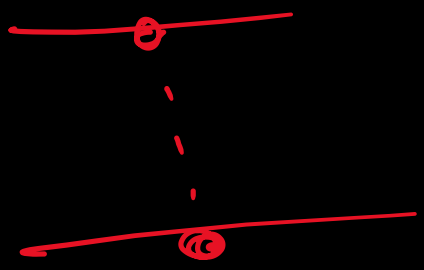


drift = 0 ⟶ no velocity

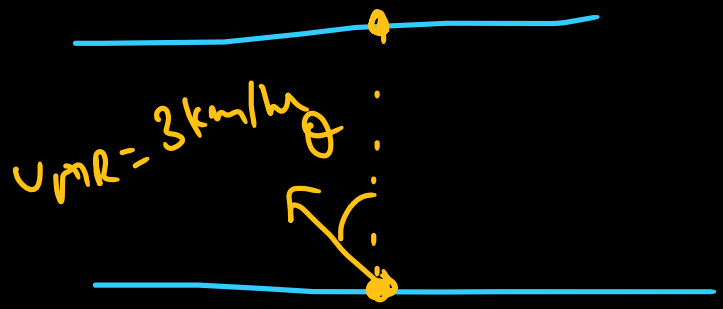
drift ≠ 0



drift = 0



3.

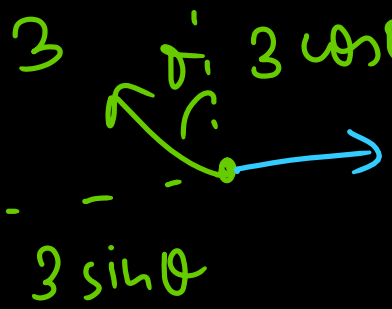


V_{RG} = 2 km/hr

drift = 0

↓

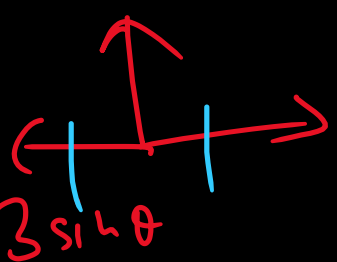
no horiz



$\sqrt{9-4} = \sqrt{5}$

$\cos\theta = \frac{\sqrt{5}}{3}$

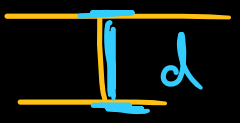
drift = 0



$3\sin\theta = 2 \Rightarrow \sin\theta = 2/3$

$\theta = \sin^{-1} 2/3$

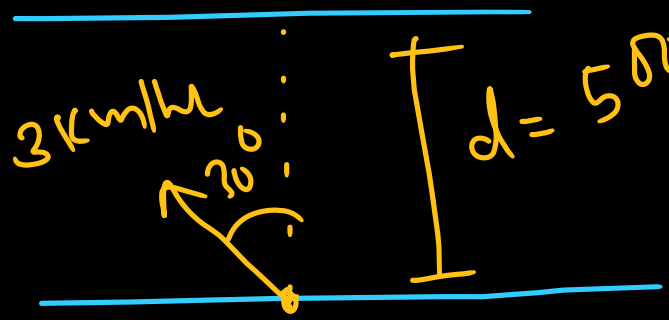
$d = 500 = 0.5$ km



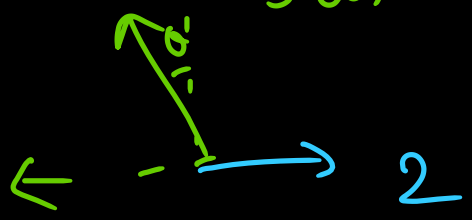
$$t = \frac{d}{3000} = \frac{0.5}{3\cdot\sqrt{5}} = \frac{1}{2\sqrt{5}}$$

$$= \frac{1}{2\sqrt{5}} \text{ hrs}$$

Q.

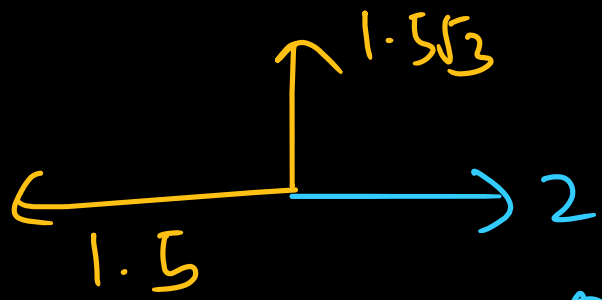


$V_{RG} = 2$ km/hr



$3\cos 30 = 3 \times \frac{\sqrt{3}}{2} = 1.5\sqrt{3}$

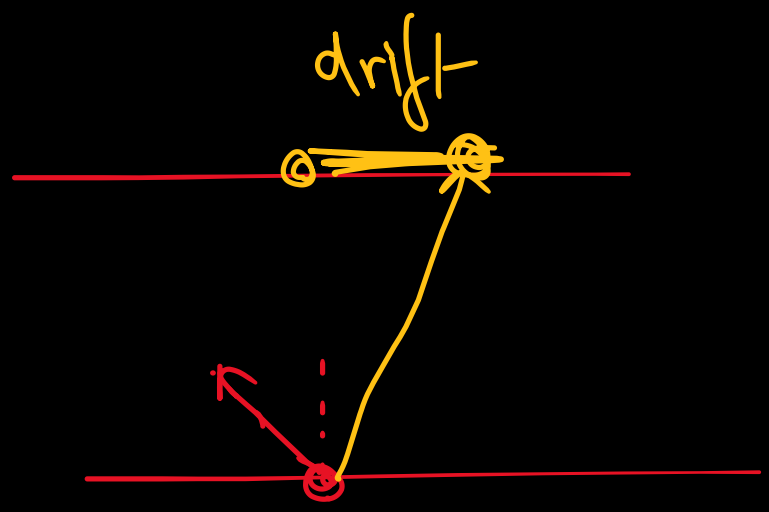
$3\sin 30 = 3 \times \frac{1}{2} = 3/2 = 1.5$



$1.5\sqrt{3}$ km/hr

0.5 km/hr

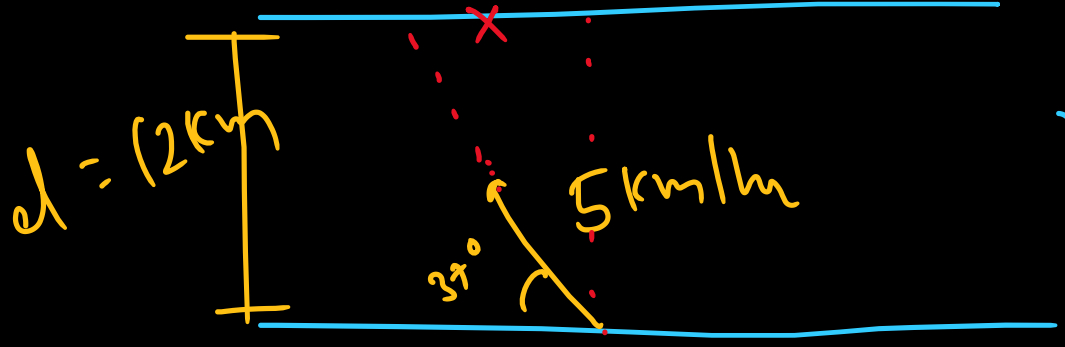
$$t = \frac{d}{1.5\sqrt{3}} = \frac{0.5}{3 \times 1.5\sqrt{3}} = \frac{1}{3\sqrt{3}} \text{ hrs}$$



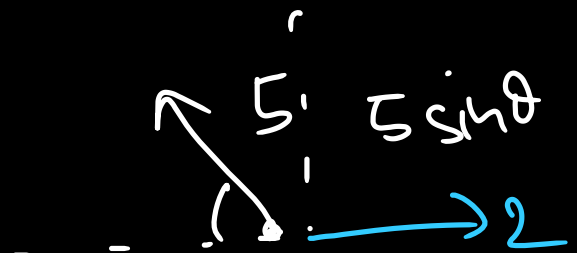
$$\text{drift} = 0.5 \times \frac{1}{6\sqrt{3}}$$

$$= \frac{1}{6\sqrt{3}} \text{ km}$$

Q $t = ?$ किस point पे arrive होगा ?

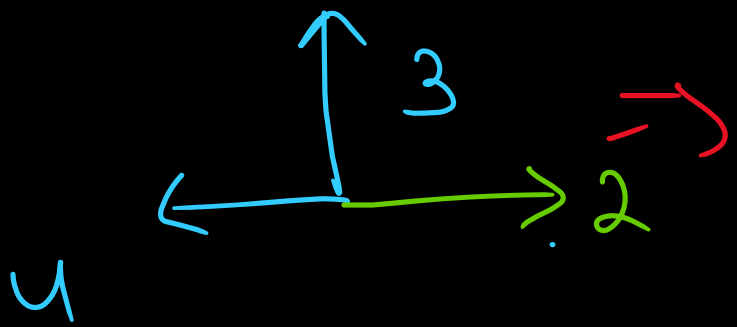


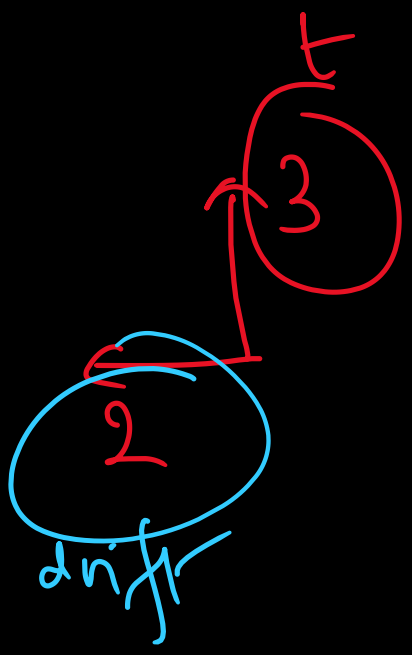
$V_{RG} = 2 km/hr$



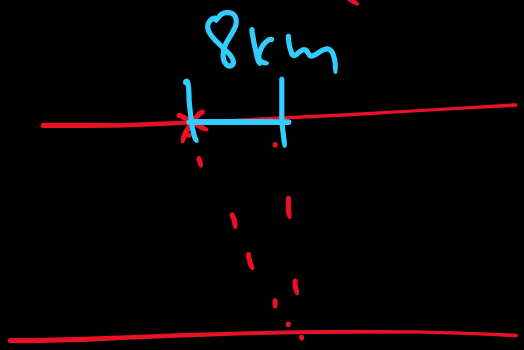
$5 \sin\theta = 5 \times \frac{3}{5} = 3$

$5 \cos\theta = 5 \times \frac{4}{5} = 4$



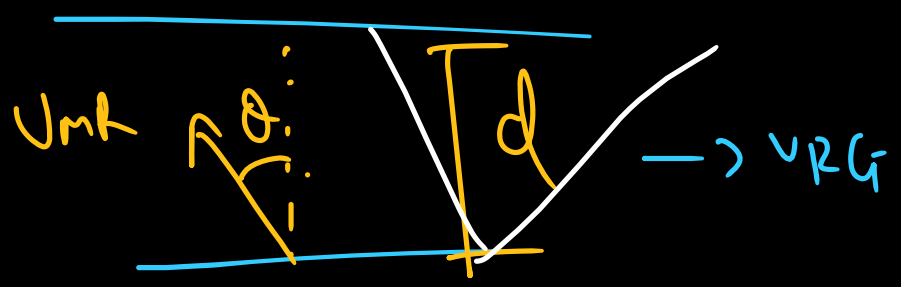


$$t = \frac{d}{2} = \frac{12}{3} = 4\,hr$$

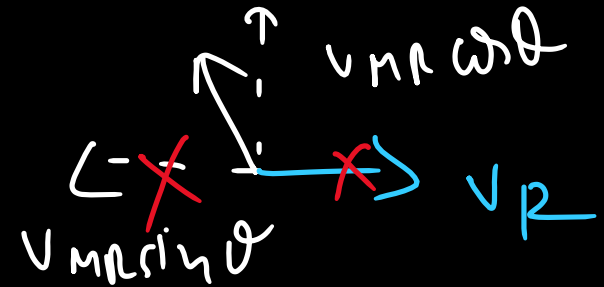


$$drift = 2 \times 4 = 8\,km$$

Minimum dist :



min dist = d (Ie ar dist is always least)

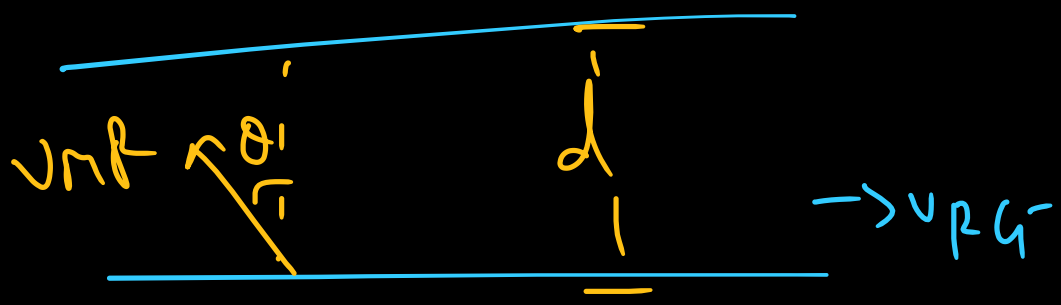


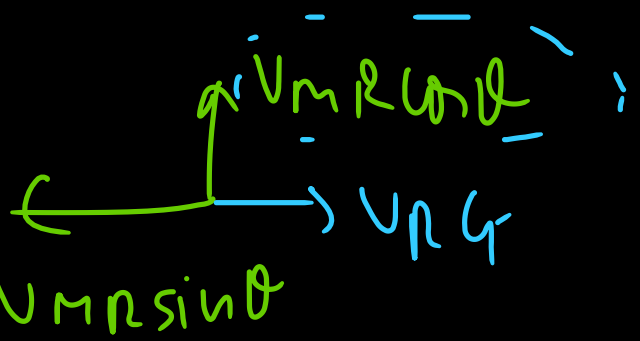
$V_R = V_{MR}\sin\theta$

$\sin\theta = \frac{V_R}{V_{MR}}$

$V_{MR} = \frac{V_R}{\sin\theta}$

Minimum time





$$\text{time} = \frac{d}{v_{mR}\cos\theta}$$

Minimize time $\Rightarrow$ Maximize $(v_{mR}\cos\theta)$

$$\text{time}_{min} = \frac{d}{v_{mR}\cos\theta}$$

इसका मान ↑ capacity