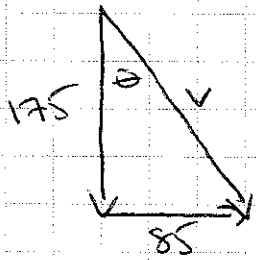


# Vector Problems

①



$$\theta = \tan^{-1} \frac{85}{175}$$

$$\theta = 26^\circ$$

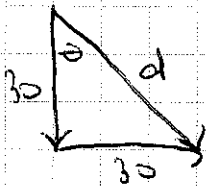
$$v^2 = 175^2 + 85^2$$

$$v = \sqrt{175^2 + 85^2}$$

$$v = 194.6$$

$$\boxed{194.6 \text{ km/h } [26^\circ \text{ E of S}]}$$

②



$$\theta = 45^\circ$$

(isosceles triangle)

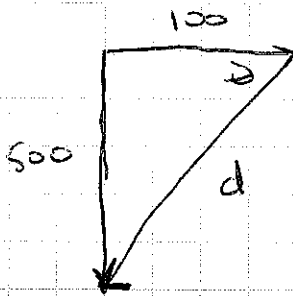
$$d^2 = 30^2 + 30^2$$

$$d = \sqrt{30^2 + 30^2}$$

$$d = 42.4 \text{ m}$$

$$\boxed{42.4 \text{ m } [SE]}$$

③



$$\theta = \tan^{-1} \frac{500}{100}$$

$$\theta = 79^\circ$$

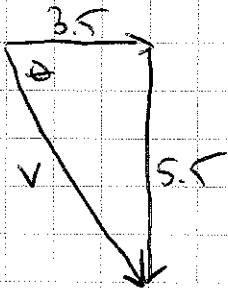
$$d^2 = 100^2 + 500^2$$

$$d = \sqrt{100^2 + 500^2}$$

$$d = 509.9 \text{ km}$$

$$\boxed{510 \text{ km } [79^\circ \text{ S of W}]}$$

④



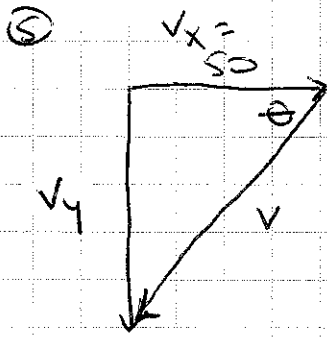
$$a) v^2 = 3.5^2 + 5.5^2$$

$$v = \boxed{6.5 \text{ m/s}}$$

$$b) \theta = \tan^{-1} \frac{5.5}{3.5}$$

$$\theta = 57.5^\circ \text{ to horizontal}$$

$$\boxed{32.5^\circ \text{ to vertical}}$$



$$v_y = \frac{450 \text{ km}}{3 \text{ h}} = 150 \text{ km/h}$$

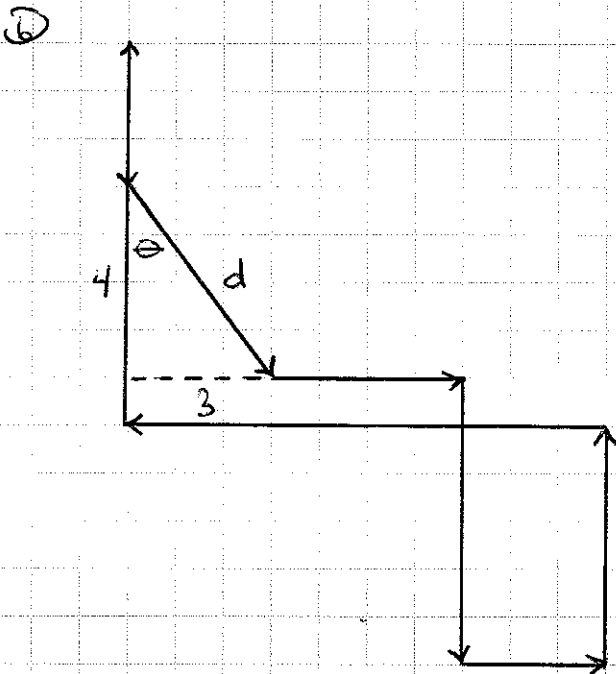
$$v^2 = 150^2 + 50^2$$

$$v = 158 \text{ km/h}$$

$$\theta = \tan^{-1} \frac{150}{50}$$

$$\theta = 71.6^\circ$$

**158 km/h [72° S of W]**



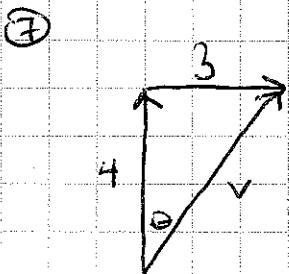
$$\theta = \tan^{-1} \frac{3}{4}$$

$$\theta = 36.9^\circ$$

$$d^2 = 3^2 + 4^2$$

$$d = 5 \text{ km}$$

**5 km [37° E of S]**



a)  $\theta = \tan^{-1} \frac{3}{4}$

$$v^2 = 3^2 + 4^2$$

$$v = 5 \text{ m/s}$$

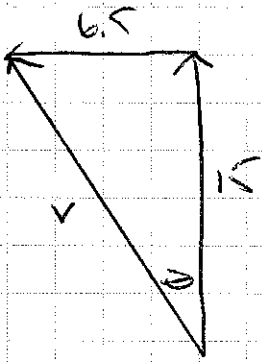
$$\theta = 37^\circ$$

**5 m/s [53° to shore]**

b) parallel 3 m/s

perp. 4 m/s

⑧



$$\theta = \tan^{-1} \frac{6.5}{15}$$

$$v^2 = 6.5^2 + 15^2$$

$$\theta = 23^\circ$$

$$v = 16.3 \text{ m/s}$$

16.3 m/s [23° W of vertical]