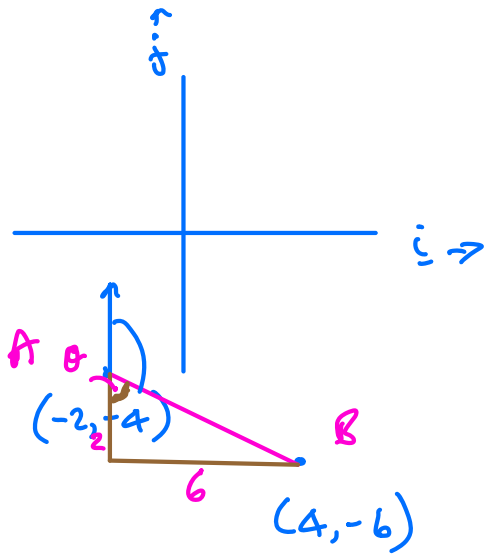


Mixed Exercise 11

2



$$a) \tan \theta = \frac{6}{2} = 3$$

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

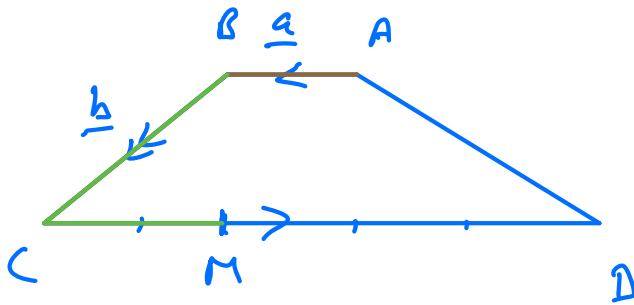
$$\begin{aligned} \text{Bearing of the drift} &= 180^\circ - \tan^{-1} 3 \\ &= 108.4^\circ \end{aligned}$$

$$b) |AB| = \sqrt{2^2 + 6^2} = \sqrt{40}$$

$$\text{Time } \frac{2}{3} \text{ hr}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{\sqrt{40}}{2/3} = 9.49 \text{ km/hr}$$

4)



$$\vec{DC} = -\vec{CD}$$

$$\vec{DC} = 4\vec{a}$$

$$\vec{CM} = \frac{2}{5}\vec{CD}$$

$$= -\frac{8}{5}\vec{a}$$

$$a) \vec{AM} = \vec{AB} + \vec{BC} + \vec{CM}$$

$$= \vec{a} + \vec{b} - \frac{8}{5}\vec{a}$$

$$= \vec{b} - \frac{3}{5}\vec{a}$$

$$b) \quad \vec{BD} = \vec{BC} + \vec{CD}$$

$$= \underline{b} - 4\underline{a}$$

$$c) \quad \vec{MB} = \vec{MC} + \vec{CB}$$

$$= \frac{8}{5}\underline{a} - \underline{b}$$

$$d) \quad \vec{DA} = \vec{DC} + \vec{CB} + \vec{BA}$$

$$= 4\underline{a} - \underline{b} - \underline{a}$$

$$= 3\underline{a} - \underline{b}$$

$$6) \quad \underline{a} = \begin{pmatrix} 7 \\ 4 \end{pmatrix} \quad \underline{b} = \begin{pmatrix} 10 \\ -2 \end{pmatrix} \quad \underline{c} = \begin{pmatrix} -5 \\ -3 \end{pmatrix}$$

$$a) \quad \underline{a} + \underline{b} + \underline{c} = \begin{pmatrix} 12 \\ -1 \end{pmatrix}$$

$$b) \quad \underline{a} - 2\underline{b} + \underline{c} = \begin{pmatrix} 7 \\ 4 \end{pmatrix} - 2 \begin{pmatrix} 10 \\ -2 \end{pmatrix} + \begin{pmatrix} -5 \\ -3 \end{pmatrix}$$

$$= \begin{pmatrix} -18 \\ 5 \end{pmatrix}$$

$$c) \quad 2\underline{a} + 2\underline{b} - 3\underline{c}$$

$$= 2 \begin{pmatrix} 7 \\ 4 \end{pmatrix} + 2 \begin{pmatrix} 10 \\ -2 \end{pmatrix} - 3 \begin{pmatrix} -5 \\ -3 \end{pmatrix}$$

$$= \begin{pmatrix} 14 \\ 8 \end{pmatrix} + \begin{pmatrix} 20 \\ -4 \end{pmatrix} + \begin{pmatrix} 15 \\ 9 \end{pmatrix} = \begin{pmatrix} 49 \\ 13 \end{pmatrix}$$

8)

$$\underline{a} = \begin{pmatrix} 4 \\ -3 \end{pmatrix} \quad \underline{b} = \begin{pmatrix} 2p \\ -p \end{pmatrix}$$

$$\underline{a} + \underline{b} = \begin{pmatrix} 4 + 2p \\ -3 - p \end{pmatrix} \quad \text{parallel to } \begin{pmatrix} 2 \\ -3 \end{pmatrix}$$

$$\begin{pmatrix} 4 + 2p \\ -3 - p \end{pmatrix} = k \begin{pmatrix} 2 \\ -3 \end{pmatrix}$$

$$4 + 2p = 2k \quad \textcircled{1}$$

$$-3 - p = -3k \quad \textcircled{2}$$

$$\textcircled{1} \times 3$$

$$12 + 6p = 6k \quad \textcircled{3}$$

$$\textcircled{2} \times 2$$

$$-6 - 2p = -6k \quad \textcircled{4}$$

$$\textcircled{3} + \textcircled{4}$$

$$6 + 4p = 0$$

$$4p = -6$$

$$p = -\frac{6}{4}$$

$$\underline{p = -\frac{3}{2}}$$

$$b) \quad \text{Resultant} = \underline{a} + \underline{b} = \begin{pmatrix} 4 + 2p \\ -3 - p \end{pmatrix}$$

$$= \begin{pmatrix} 4 - 3 \\ -3 + \frac{3}{2} \end{pmatrix}$$

$$= \begin{pmatrix} 1 \\ -1.5 \end{pmatrix}$$