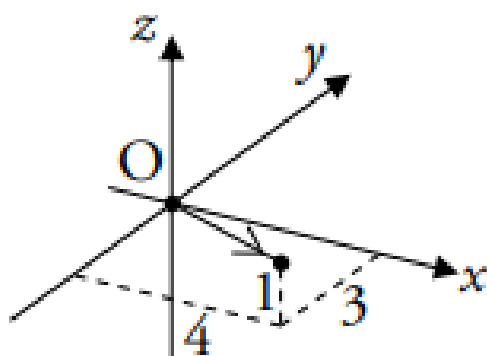




Heinemann
Higher Maths Text Book
Worked Solutions

Ex 13M
3-Dimensional Vectors

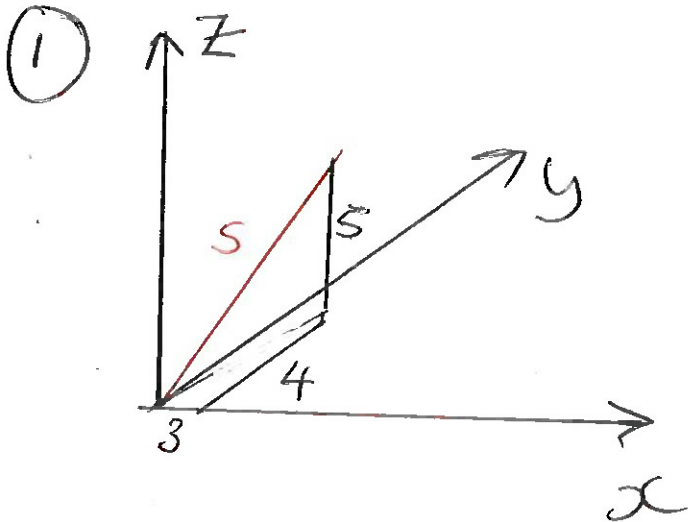


$$\begin{pmatrix} 4 \\ -3 \\ 1 \end{pmatrix}$$



Ex 13M Questions 1,2,3,4

Worked solutions courtesy of Mr R Milton



① $\underline{s} = 3\mathbf{i} + 4\mathbf{j} + 5\mathbf{k}$ ✓

① $\underline{s} = \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}$ ✓

② ① $\underline{v} = \begin{bmatrix} 2 \\ 5 \\ 7 \end{bmatrix}$ ✓ ② $\vec{BC} = \begin{bmatrix} 6 \\ -4 \\ 3 \end{bmatrix}$ ✓

③ $\underline{w} = \begin{bmatrix} 5 \\ 0 \\ -2 \end{bmatrix}$ ✓ ④ $\vec{FG} = \begin{bmatrix} 0 \\ 0 \\ -7 \end{bmatrix}$ ✓

$$\textcircled{3} \textcircled{a} \underline{p} = 5\underline{i} + 3\underline{j} + 4\underline{k} \quad \checkmark$$

$$\textcircled{b} \underline{m} = 6\underline{i} - 4\underline{j} - \underline{k} \quad \checkmark$$

$$\textcircled{c} \underline{q} = -3\underline{i} + 4\underline{k} \quad \checkmark$$

$$\textcircled{d} \underline{r} = \underline{j} \quad \checkmark$$

$$\textcircled{4} \textcircled{a} \underline{p} + \underline{a} = 2\underline{i} + 3\underline{j} + \underline{k} \\ + \underline{i} + 2\underline{j} - 2\underline{k}$$

$$= 3\underline{i} + 5\underline{j} - \underline{k} \quad \checkmark = \underline{\begin{bmatrix} 3 \\ 5 \\ -1 \end{bmatrix}} \quad \checkmark$$

$$\textcircled{b} \underline{q} - \underline{p} = \underline{i} + 2\underline{j} - 2\underline{k} \\ - (2\underline{i} + 3\underline{j} + \underline{k})$$

$$= -\underline{i} - \underline{j} - 3\underline{k} \quad \checkmark = \underline{\begin{bmatrix} -1 \\ -1 \\ -3 \end{bmatrix}} \quad \checkmark$$

$$\textcircled{c} \quad 3\underline{p} - \underline{q}$$

$$= 6\underline{i} + 9\underline{j} + 3\underline{k} - (\underline{i} + 2\underline{j} - 2\underline{k})$$

$$= \underline{5\underline{i} + 7\underline{j} + 5\underline{k}} \quad \checkmark = \underline{\begin{bmatrix} 5 \\ 7 \\ 5 \end{bmatrix}} \quad \checkmark$$

$$\textcircled{d} \quad 2\underline{p} + 3\underline{q}$$

$$= 4\underline{i} + 6\underline{j} + 2\underline{k} + 3\underline{i} + 6\underline{j} - 6\underline{k}$$

$$= \underline{7\underline{i} + 12\underline{j} - 4\underline{k}} \quad \checkmark = \underline{\begin{bmatrix} 7 \\ 12 \\ -4 \end{bmatrix}} \quad \checkmark$$