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Heinemann

Higher Maths Text Book

Worked Solutions

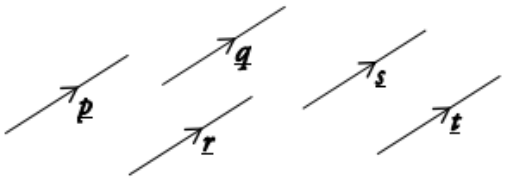
Ex 13B

Equal Vectors

Equal Vectors EF

Vectors with the same magnitude and direction are equal.

For example, all the vectors shown to the right are equal.



If vectors are equal to each other, then all of their components are equal, i.e.

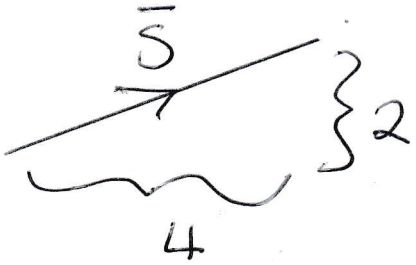
$$\text{if } \begin{pmatrix} a \\ b \\ c \end{pmatrix} = \begin{pmatrix} d \\ e \\ f \end{pmatrix} \text{ then } a = d,\ b = e \text{ and } c = f.$$

Conversely, two vectors are only equal if all of their components are equal.

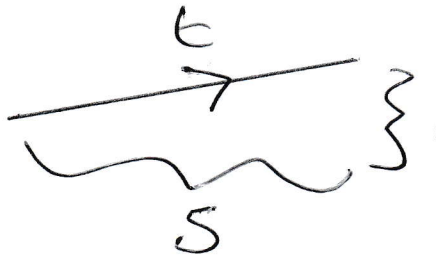
Ex 13B Questions 1-4

Worked solutions courtesy of Mr R Milton

(1) (a)

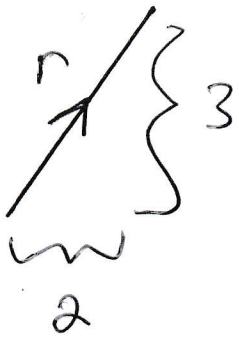


$\bar{s} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$ ✓

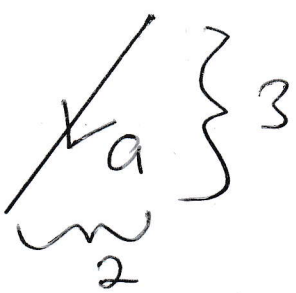


$\bar{t} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$ ✓

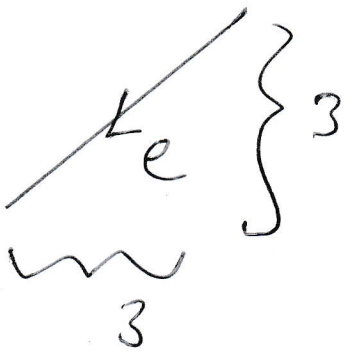
$\bar{u} = \begin{bmatrix} -2 \\ -3 \end{bmatrix}$ ✓



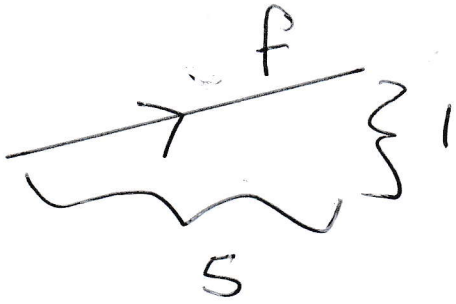
$\bar{r} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ ✓



$\bar{a} = \begin{bmatrix} -2 \\ -3 \end{bmatrix}$ ✓

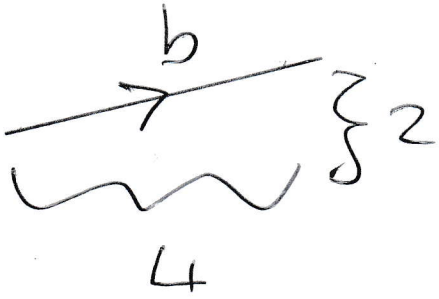


$\bar{e} = \begin{bmatrix} -3 \\ -3 \end{bmatrix}$ ✓



$\bar{f} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$ ✓

$\bar{d} = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$ ✓



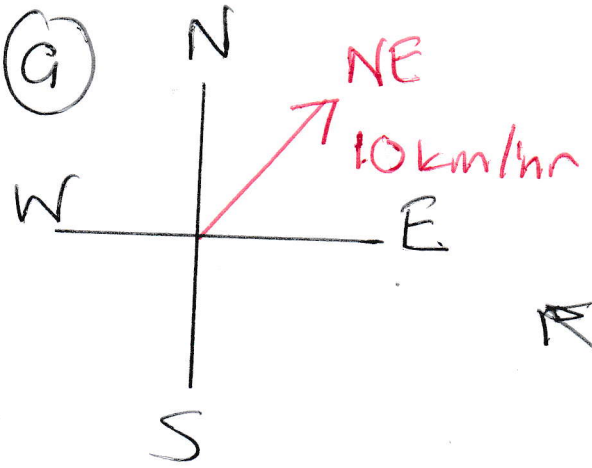
$\bar{b} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$ ✓

(b) (i) $\bar{u} = \bar{a} = \begin{bmatrix} -3 \\ -3 \end{bmatrix}$ ✓

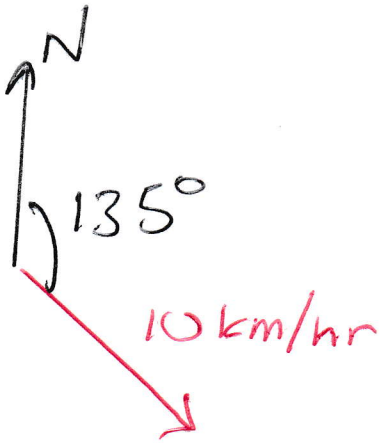
(ii) $\bar{s} = \bar{b} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$ ✓

(iii) $\bar{t} = \bar{f} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$ ✓

(2) (a)

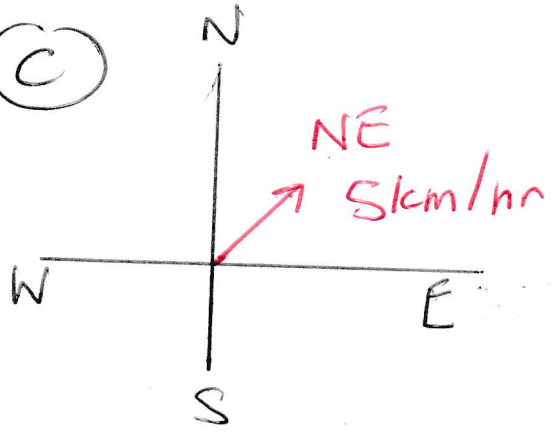


(b)

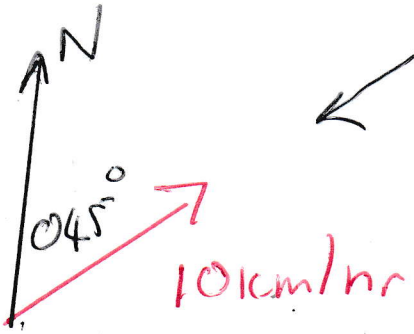


(a) & (d) SAME VECTOR

(c)



(d)



③ $u = v$

$$\begin{bmatrix} 3x \\ y+6 \end{bmatrix} = \begin{bmatrix} 12 \\ -2 \end{bmatrix}$$

$3x = 12$ $\quad$ $y+6 = -2$

$x = 4$ ✓ $\quad$ $y = -8$ ✓

④ $r = s$

$$\begin{bmatrix} p+2 \\ q-4 \end{bmatrix} = \begin{bmatrix} q \\ -p \end{bmatrix}$$

$p + 2 = q \Rightarrow p - q = -2$ - ①

$q - 4 = -p \Rightarrow p + q = 4$ - ②

① + ② $\quad 2p = 2$

$p = 1$ ✓ $\Rightarrow 1 - q = -2$

$-q = -3$

$q = 3$ ✓