

The point A is $(0, 7)$, and the point B is $(6, 9)$.

(a) Express \vec{AB} as a column vector.

Answer [1]

(b) Find the gradient of AB .

Answer [1]

(c) The equation of the line AB is $x + Py + Q = 0$.

Find P and Q .

Answer $P =$
 $Q =$ [2]

(d) The point C is $(12, 2)$.

(i) Given that C is the midpoint of BM , find the coordinates of M .

Answer $(\dots\dots\dots, \dots\dots\dots)$ [1]

(ii) Calculate AC .

Answer units [1]

- (iii) The point D lies on the line AB .
The line CD is parallel to the y -axis.

(a) Find the coordinates of D .

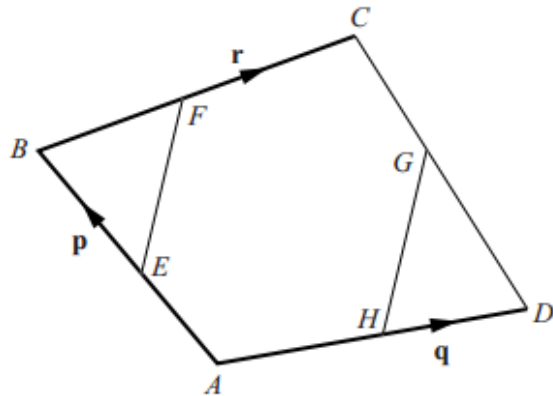
Answer (..... ,) [2]

(b) Express \vec{AD} in terms of \vec{AB} .

Answer $\vec{AD} = \dots\dots\dots$ [1]



- (a) E, F, G and H are the midpoints of AB, BC, CD and DA respectively.
 $\vec{AB} = \mathbf{p}, \vec{AD} = \mathbf{q}$ and $\vec{BC} = \mathbf{r}$.



- (i) Find, in terms of \mathbf{p}, \mathbf{q} and \mathbf{r} as appropriate

(a) \vec{EF} ,

Answer [1]

(b) \vec{DC} ,

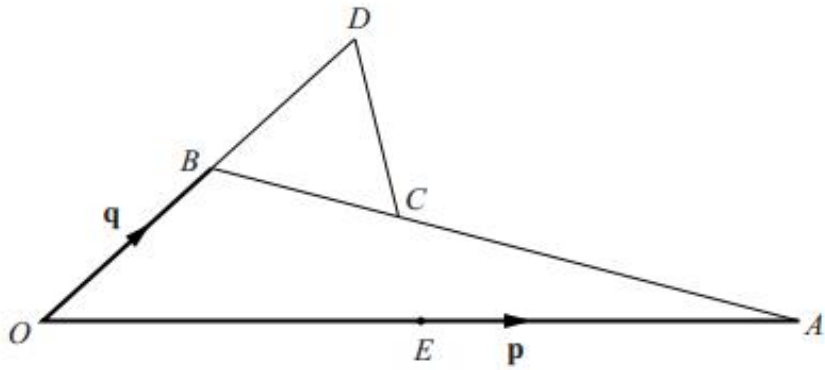
Answer [1]

(c) \vec{HG} , expressing the vector as simply as possible.

Answer [2]

- (ii) What conclusions can be drawn about the lines EF and HG ?

Answer
 [1]



B is the midpoint of OD and E is the midpoint of OA .
 C is the point on AB such that $AC : CB = 2 : 1$.
 $\vec{OA} = \mathbf{p}$ and $\vec{OB} = \mathbf{q}$.

(i) Find, in terms of \mathbf{p} and \mathbf{q} ,

(a) \vec{AB} ,

Answer [1]

(b) \vec{CD} ,

Answer [1]

(c) \vec{ED} .

Answer [1]

(ii) Use your answers to parts (i)(b) and (i)(c) to make two statements about the points E , C and D .

Answer

..... [2]