

# 3.13 Vectors

## Question Paper

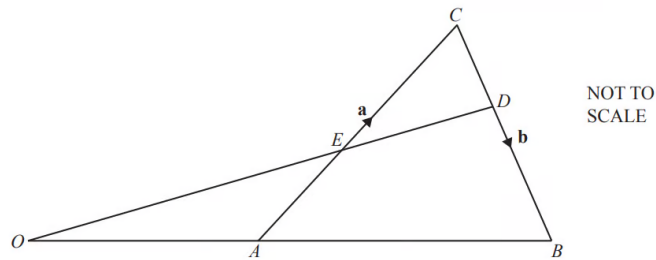
Course	CIE IGCSE Maths
Section	3. Geometry
Topic	3.13 Vectors
Difficulty	Very Hard

**Time allowed:** 30

**Score:** /24

**Percentage:** /100

## Question 1



In the diagram,  $OAB$  and  $OED$  are straight lines.

$O$  is the origin,  $A$  is the midpoint of  $OB$  and  $E$  is the midpoint of  $AC$ .

$\vec{AC} = \mathbf{a}$  and  $\vec{CB} = \mathbf{b}$ .

Find, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , in its simplest form

i)  
 $\vec{AB}$ ,

$\vec{AB} = \dots\dots\dots$  [1]

ii)  
 $\vec{OE}$ ,

$\vec{OE} = \dots\dots\dots$  [2]

iii)  
the position vector of  $D$ .

[3]

[6 marks]

**Question 2**

$$\vec{MT} = \begin{pmatrix} 2k \\ -k \end{pmatrix} \text{ and } |\vec{MT}| = \sqrt{180}.$$

Find the positive value of  $k$ .

$$k = \dots\dots\dots [3]$$

**[3 marks]**

**Question 3a**

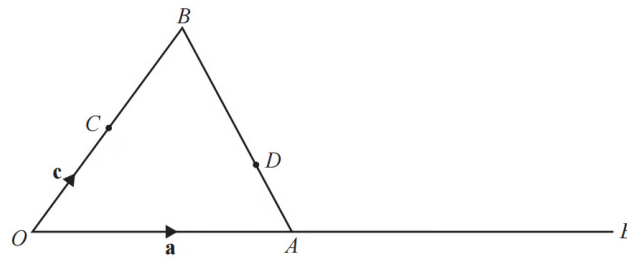
$$\vec{CE} = k\vec{CD}$$

Find the value of  $k$ .

$$k = \dots\dots\dots [1]$$

**[1 mark]**

### Question 3b



NOT TO  
SCALE

$OAB$  is a triangle and  $C$  is the mid-point of  $OB$ .

$D$  is on  $AB$  such that  $AD : DB = 3 : 5$ .

$OAE$  is a straight line such that  $OA : AE = 2 : 3$ .

$\vec{OA} = \mathbf{a}$  and  $\vec{OC} = \mathbf{c}$ .

Find the following vectors, in terms of  $\mathbf{a}$  and  $\mathbf{c}$ , in their simplest form

i)  
 $\vec{AB}$ ,

$\vec{AB} = \dots\dots\dots [1]$

ii)  
 $\vec{AD}$ ,

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

iii)  
 $\vec{CE}$ ,

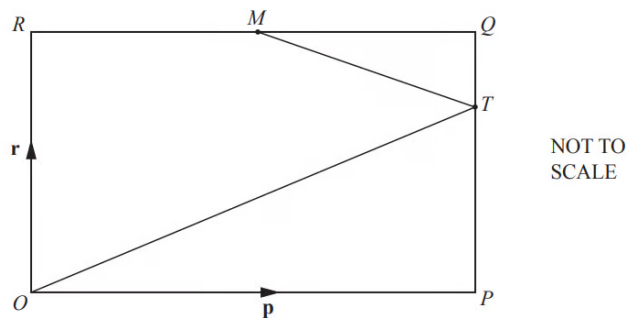
$\vec{CE} = \dots\dots\dots [1]$

iv)  
 $\vec{CD}$ .

$\vec{CD} = \dots\dots\dots [2]$

[5 marks]

### Question 4a



$OPQR$  is a rectangle and  $O$  is the origin.

$M$  is the midpoint of  $RQ$  and  $PT:TQ = 2:1$ .

$\vec{OP} = \mathbf{p}$  and  $\vec{OR} = \mathbf{r}$ .

Find, in terms of  $\mathbf{p}$  and/or  $\mathbf{r}$ , in its simplest form

i)  
 $\vec{MQ}$ ,

$\vec{MQ} = \dots\dots\dots [1]$

ii)  
 $\vec{MT}$ ,

$\vec{MT} = \dots\dots\dots [1]$

iii)  
 $\vec{OT}$ ,

$\vec{OT} = \dots\dots\dots [1]$

[3 marks]

**Question 4b**

$RQ$  and  $OT$  are extended and meet at  $U$ .

Find the position vector of  $U$  in terms of  $\mathbf{p}$  and  $\mathbf{r}$ .

Give your answer in its simplest form.

[2]

[2 marks]

Question 5

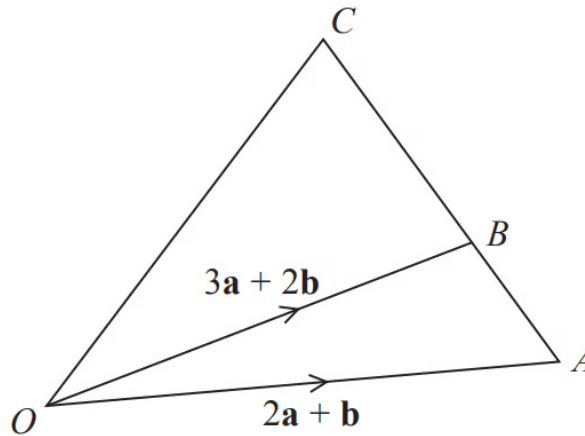


Diagram **NOT**  
accurately drawn

$ABC$  is a straight line.

$$AB : BC = 2 : 5$$

$$\vec{OA} = 2\mathbf{a} + \mathbf{b}$$

$$\vec{OB} = 3\mathbf{a} + 2\mathbf{b}$$

Express  $\vec{OC}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
Give your answer in its simplest form.

[4 marks]