10

GCSE VECTORS

23

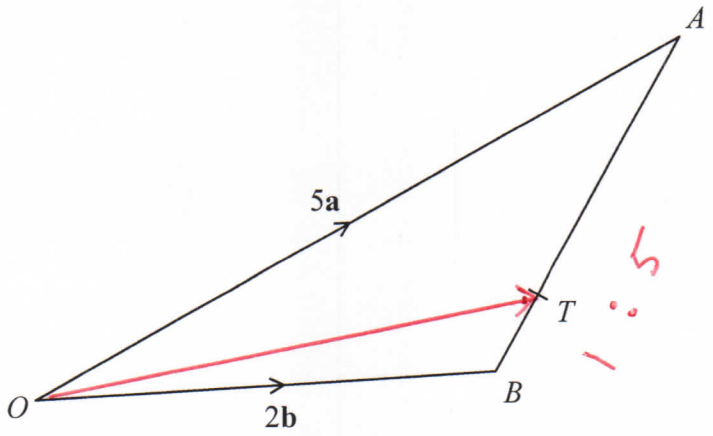

Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = 5\mathbf{a}$

$\overrightarrow{OB} = 2\mathbf{b}$

T is the point on AB such that $AT : TB = 5 : 1$

Show that OT is parallel to the vector $\mathbf{a} + 2\mathbf{b}$

$\overrightarrow{BA} = \overrightarrow{BO} + \overrightarrow{OA}$

$= -2\underline{b} + 5\underline{a}$

$\overrightarrow{BT} = \frac{1}{2}\overrightarrow{BA}$

$\overrightarrow{BT} = -\frac{2}{6}\underline{b} + \frac{5}{6}\underline{a}$

$\overrightarrow{OT} = \overrightarrow{OB} + \overrightarrow{BT}$

$= 2\underline{b} - \frac{2}{6}\underline{b} + \frac{5}{6}\underline{a}$

$= \frac{10}{6}\underline{b} + \frac{5}{6}\underline{a} \qquad = \frac{5}{6}(\underline{a} + 2\underline{b})$

$\therefore \overrightarrow{OT}$ is parallel to $\underline{a} + 2\underline{b}$

(Total for Question 23 is 4 marks)