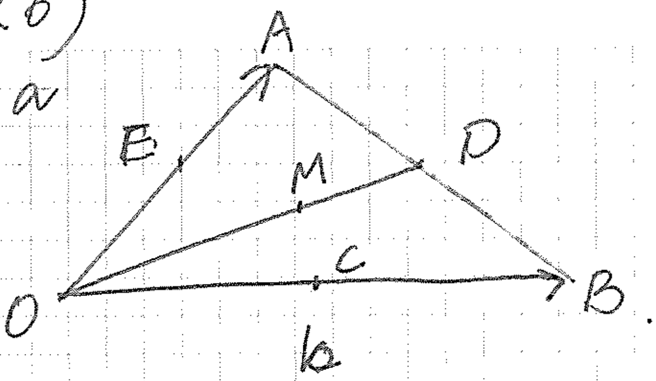
Q6)



a) (i) $\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA} = b - a$

(ii) $\overrightarrow{AC} = \overrightarrow{OC} - \overrightarrow{OA} = \frac{1}{2}b - a$

(iii) $\overrightarrow{AD} = \frac{1}{2}\overrightarrow{AB} = \frac{1}{2}b - \frac{1}{2}a$

(iv) $\overrightarrow{OD} = \overrightarrow{OB} - \overrightarrow{DB} = b - \frac{1}{2}\overrightarrow{AB} = b - \frac{1}{2}(b-a) = \frac{b}{2} + \frac{a}{2}$.

(v) $\overrightarrow{OM} = \frac{2}{3}\overrightarrow{OD} = \frac{2}{3} \times \frac{1}{2}(b+a) = \frac{1}{3}(b+a)$

(vi) $\overrightarrow{AM} = \overrightarrow{OM} - \overrightarrow{OA} = \frac{1}{3}b + \frac{1}{3}a - a = \frac{1}{3}b - \frac{2}{3}a$

b) $\overrightarrow{MC} = \overrightarrow{OC} - \overrightarrow{OM} = \frac{1}{2}b - \frac{1}{3}(b+a) = \frac{1}{6}b - \frac{1}{3}a$

$$\frac{\overrightarrow{AM}}{MC} = \frac{\frac{1}{3}b - \frac{2}{3}a}{\frac{1}{6}b - \frac{1}{3}a} = \frac{2}{1}$$

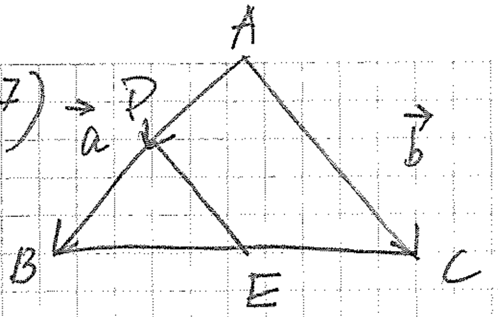
c) $\overrightarrow{BM} = \overrightarrow{OM} - \overrightarrow{OB} = \frac{1}{3}b + \frac{1}{3}a - b = \frac{1}{3}a - \frac{2}{3}b$

$\overrightarrow{ME} = \overrightarrow{OE} - \overrightarrow{OM} = \frac{1}{2}a - \frac{1}{3}(b+a) = \frac{1}{6}a - \frac{1}{3}b$

$$\therefore \frac{\overrightarrow{BM}}{\overrightarrow{ME}} = \frac{\frac{1}{3}a - \frac{2}{3}b}{\frac{1}{6}a - \frac{1}{3}b} = \frac{2}{1}$$

Q.

Q7)



$\because DE \parallel AC$

$\therefore \angle DEB = \angle ACB$ (corresponding angles)

$\therefore \angle EDB = \angle CAB$ (corresponding angles)

while $\angle DBE = \angle ABC$ (common)

$\therefore \triangle DBE \sim \triangle ABC$ (equiangular)

As $\dfrac{\overrightarrow{AB}}{\overrightarrow{AD}} = \dfrac{1}{h}$ $\therefore \dfrac{\overrightarrow{AB}}{\overrightarrow{DB}} = \dfrac{1}{1-h}$

$\dfrac{\overrightarrow{CB}}{\overrightarrow{EB}} = \dfrac{1}{1-h}$ (matching sides of similar triangles are in the same ra

$\therefore \dfrac{\overrightarrow{CB}}{\overrightarrow{CE}} = \dfrac{1}{h}$ i.e. $h\overrightarrow{CB} = \overrightarrow{CE}$ $\square$.