Vector Geometry
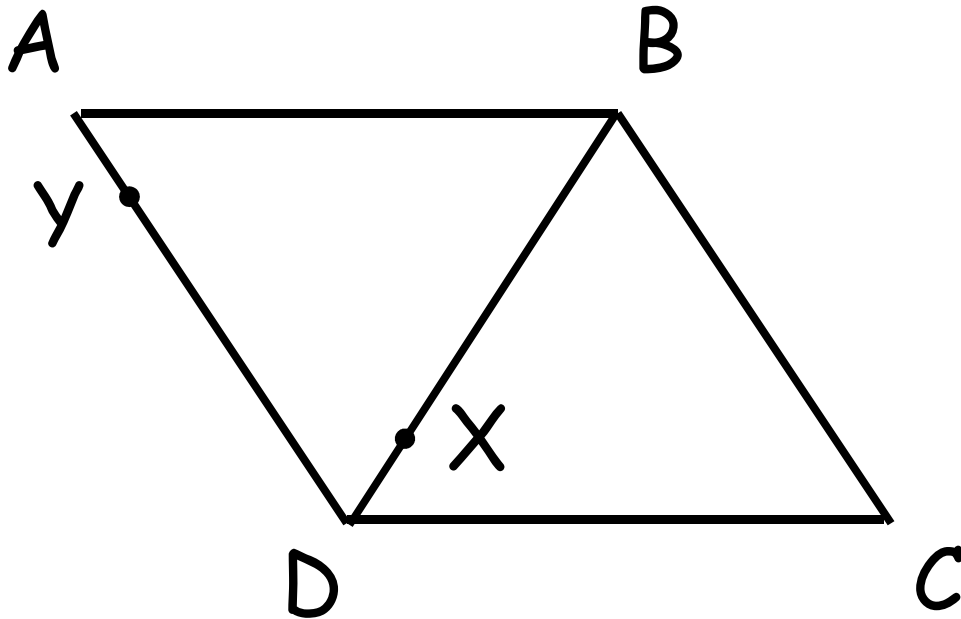

$$\overrightarrow{AB} = \underline{r}$$
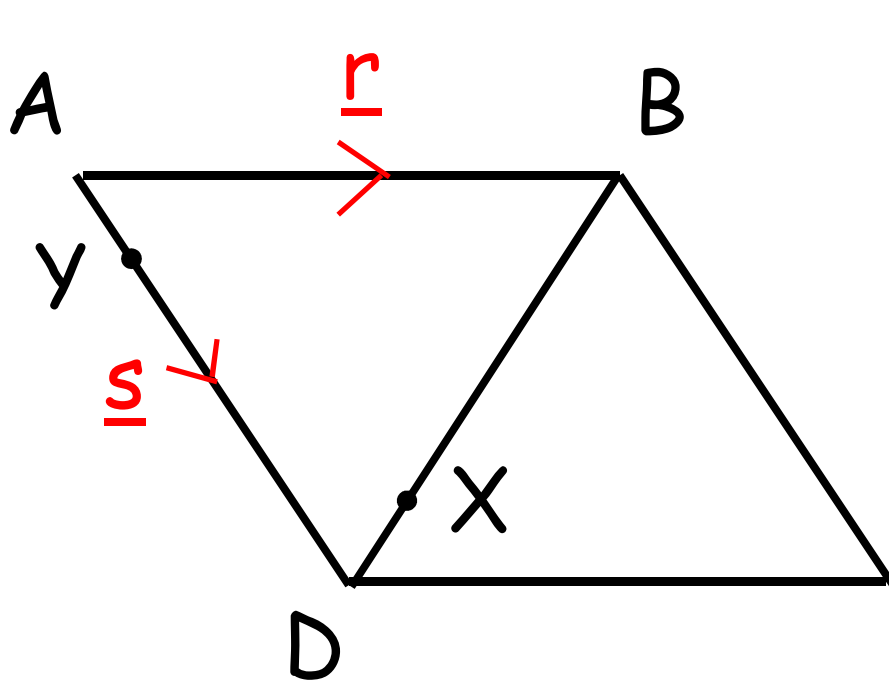
$$\overrightarrow{AD} = \underline{s}$$

AY:YD = 1:2

DX:XB = 1:2

i) Show that YX is parallel to AC

ii) What is the ratio YX:AC

Solutions

$$\overrightarrow{AC} = \underline{r} + \underline{s}$$

$$\overrightarrow{DB} = \underline{r} - \underline{s}$$

$$\overrightarrow{YX} = 2/3\underline{r} + 1/3(\underline{r} - \underline{s})$$
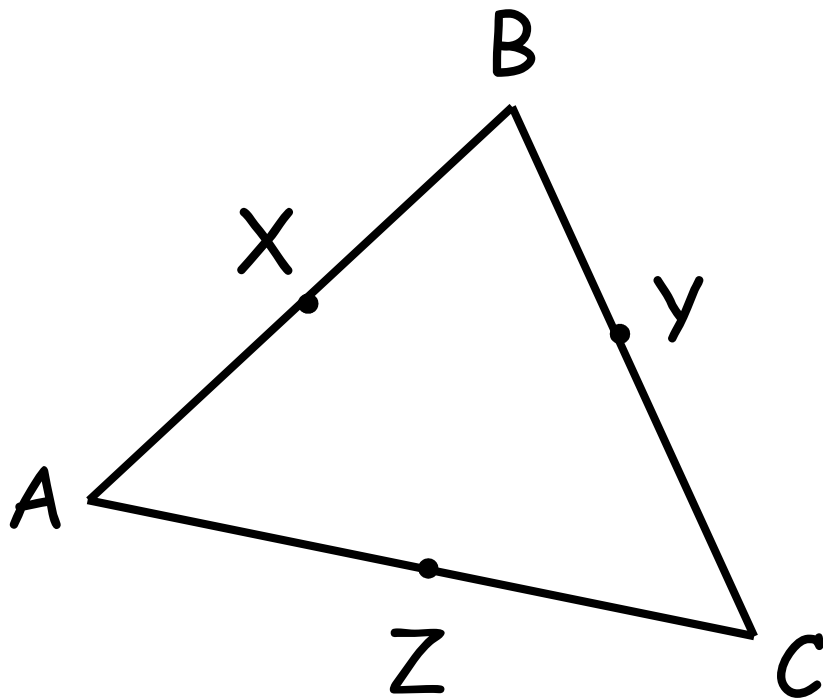
$$\overrightarrow{YX} = 1/3(\underline{r} + \underline{s})$$

i) AC and YX are scalar multiples => parallel

ii) YX : AC = 1 : 3

i) Show that YX is parallel to AC

ii) What is the ratio YX:AC

Vector Geometry

$$\overrightarrow{AB} = \underline{p}$$

$$\overrightarrow{AC} = \underline{q}$$

Solutions
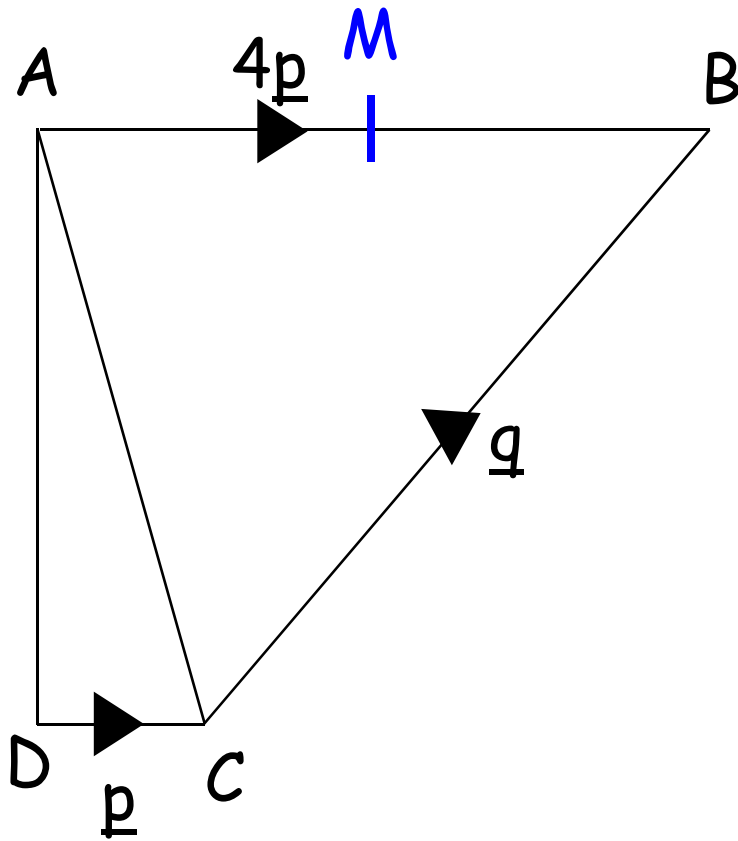
$$\overrightarrow{BC} = \underline{q} - \underline{p}$$

$$\overrightarrow{XZ} = \tfrac{1}{2}(\underline{q} - \underline{p})$$

=> Scalar multiples (same direction)

X, Y and Z are all midpoints

i) Express $\overrightarrow{BC}$ in terms of $\underline{p}$ and $\underline{q}$

ii) Show that XZ is parallel to BC

1) i) $\overrightarrow{AD}$ ii) $\overrightarrow{CA}$ iii) $\overrightarrow{DB}$

iv) $\overrightarrow{CM}$ v) $\overrightarrow{MD}$

EXT:

In triangle ABC, P is a point on AC such that CP:PA = 3:1

Find $\overrightarrow{BP}$ in terms of m and n
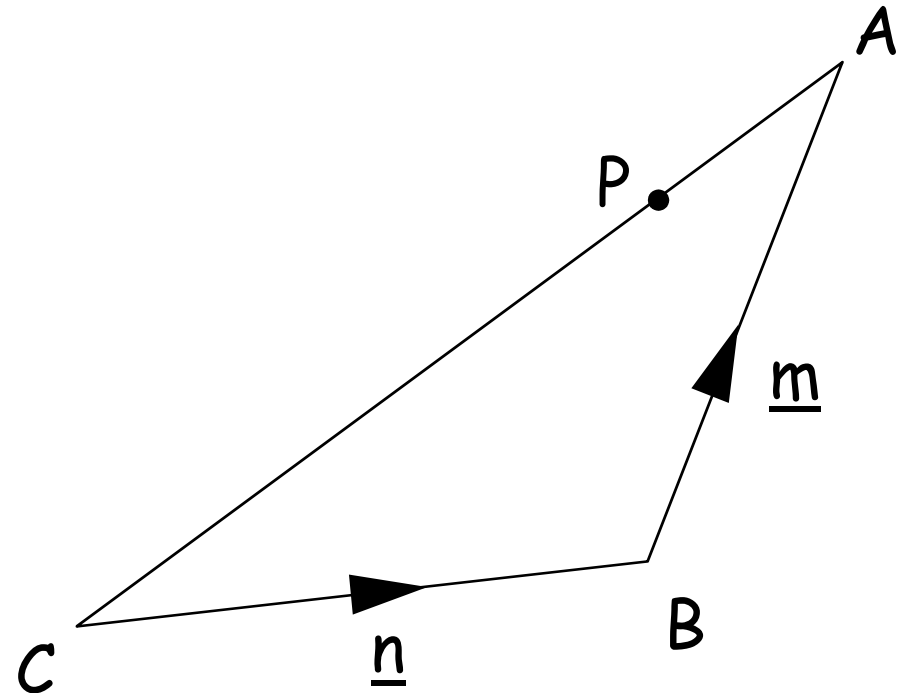
Solution
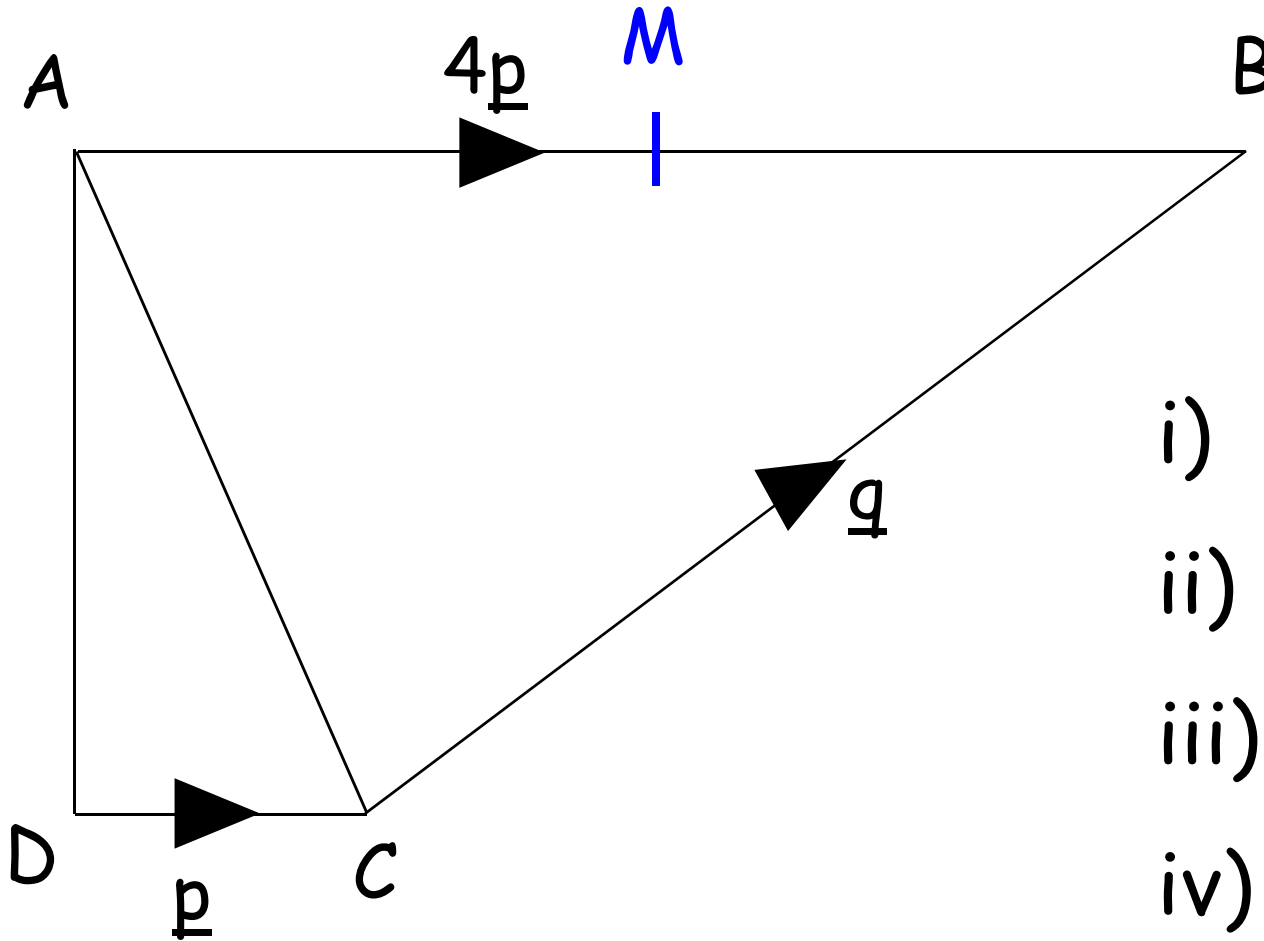
i) $\overrightarrow{AD}$ = 3p - q

ii) $\overrightarrow{CA}$ = q - 4p

iii) $\overrightarrow{DB}$ = p + q

iv) $\overrightarrow{CM}$ = q - 2p

v) $\overrightarrow{MD}$ = p - q

CP : PA = 3:1

A

P

m

B

C

$\underline{n}$
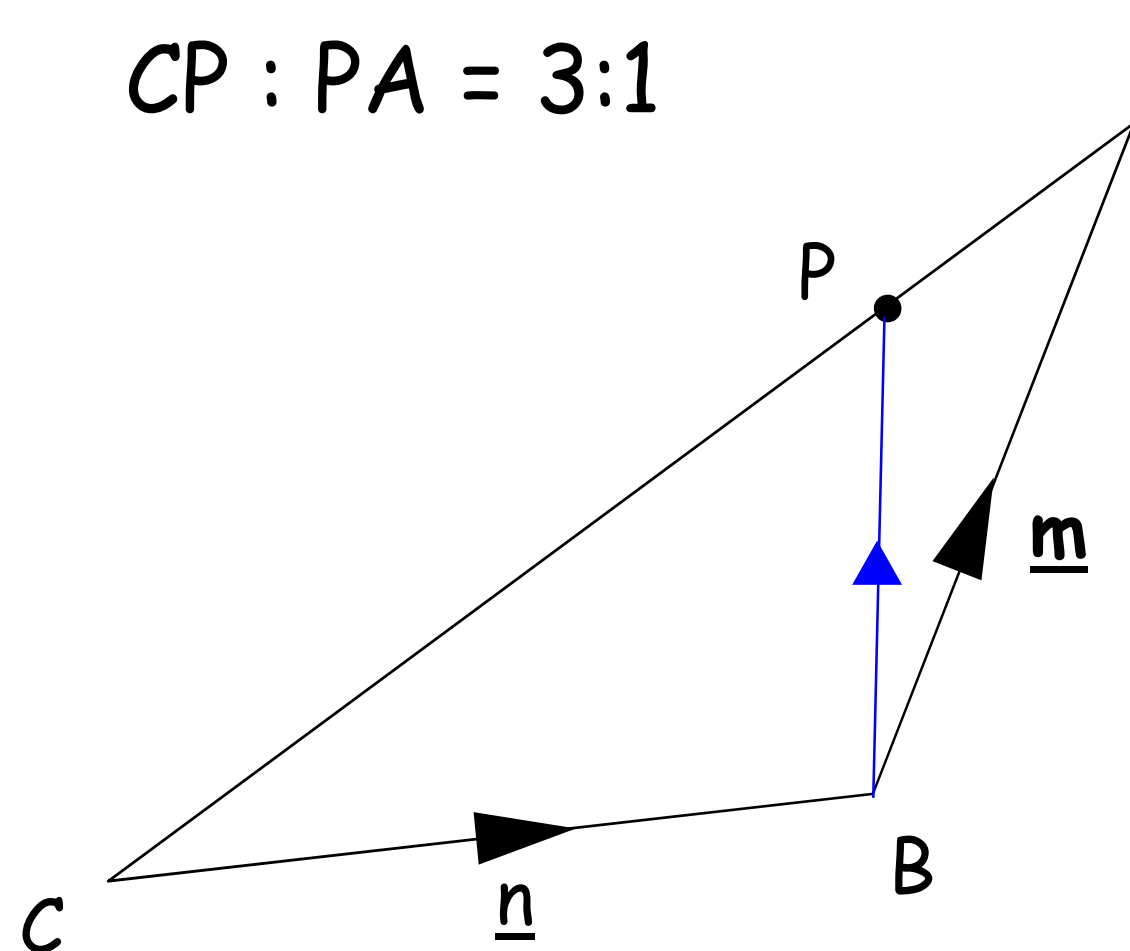
$\vec{CA} = \underline{n} + \underline{m}$

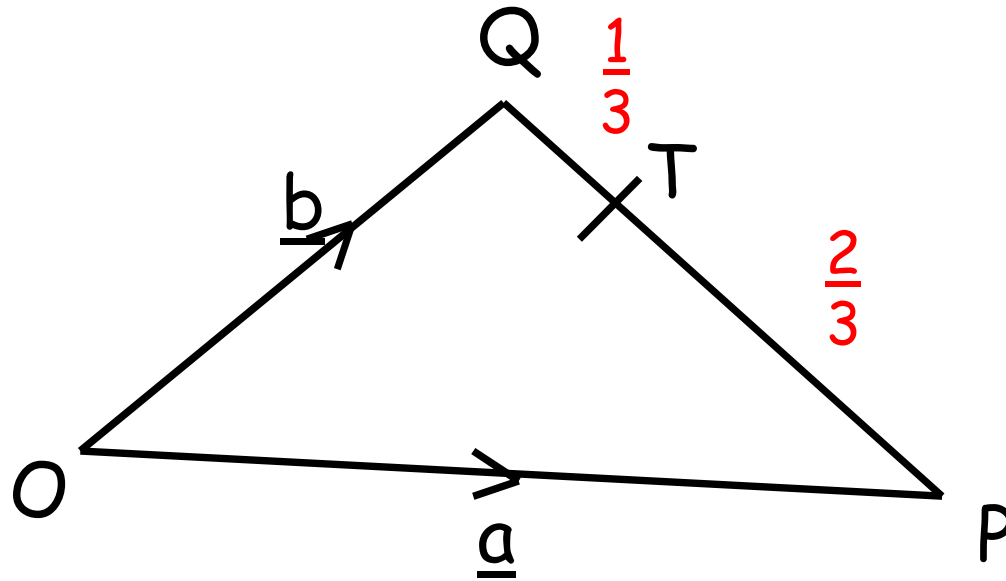$\vec{CP} = \frac{3}{4} \vec{CA} = \frac{3}{4} (\underline{n} + \underline{m})$

$\vec{BP} = -\underline{n} + \frac{3}{4} (\underline{n} + \underline{m})$

$= -\frac{1}{4} \underline{n} + \frac{3}{4} \underline{m}$
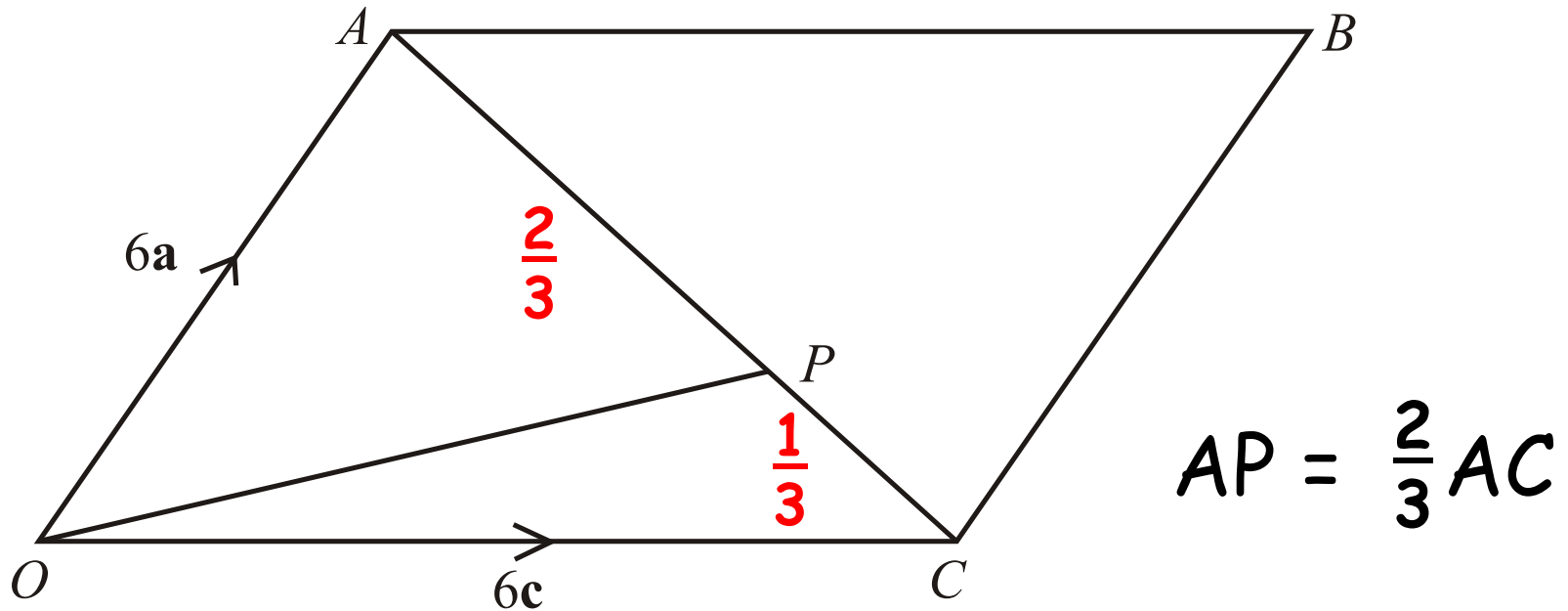
or

$\frac{1}{4} (3\underline{m} - \underline{n})$

Solution

PT : TQ = 2 : 1

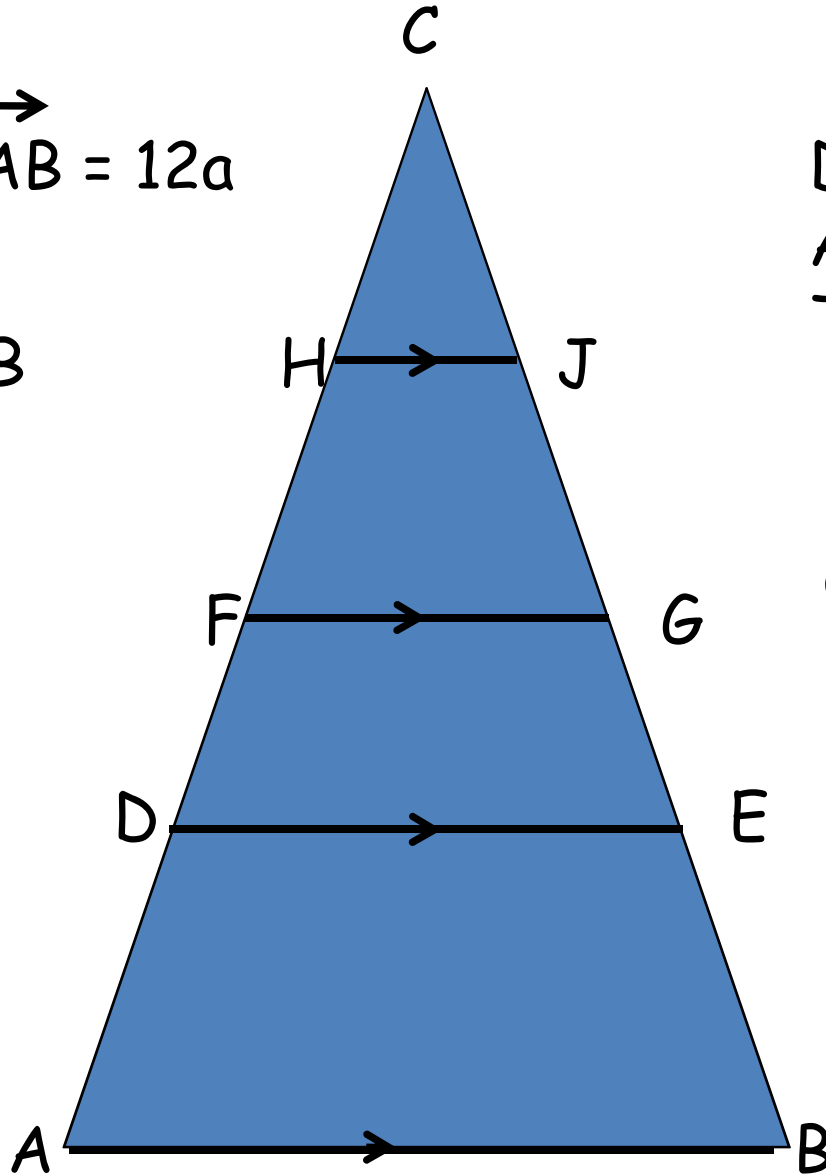$$\vec{OT} = 1\tfrac{1}{3}\,\underline{b} - \tfrac{1}{3}\,\underline{a}$$

Solution

$$AP = \frac{2}{3}AC$$

$$\overrightarrow{OP} = \overrightarrow{OC} + \overrightarrow{CP}$$

$$6\underline{c} + (-2\underline{c} + 2\underline{a})$$

$$4\underline{c} + 2\underline{a}$$

The vector $\vec{AB}$ = 12a

CJ is 1/6 CB
CG is ½ CB
CE is ¾ CB

DE, FG, HJ
Are all parallel
To AB

What can be said
about the lengths
of HJ, FG,DE ?

Solutions

HJ is 1/6a
FG is ½a
DE is ¾a

(Due to similar triangles)