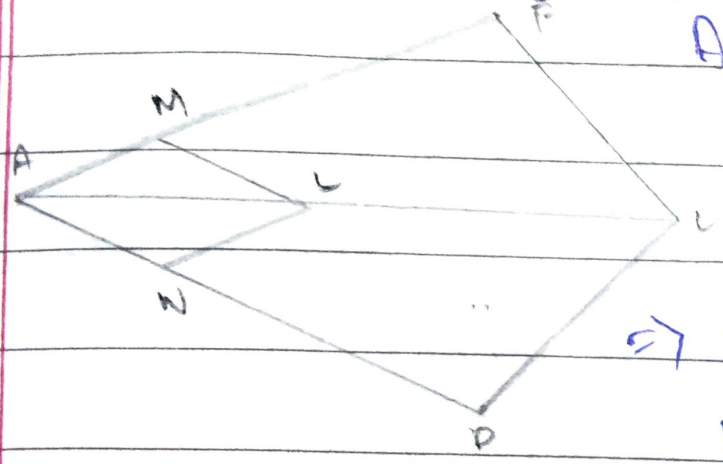
3) In the following figure If LM || CB and LN || CD prove that



And Given, LM || CB

By using Basic proportionality theorm we obtain

$\Rightarrow \frac{AM}{AB} = \frac{AL}{AC}$ - (1) ∵ Similarly LN || CD

$\Rightarrow \frac{AN}{AD} = \frac{AL}{AC}$ (11)

From (1) & (11)

$= \frac{AM}{AB} = \frac{AN}{AD}$

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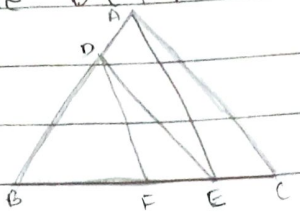
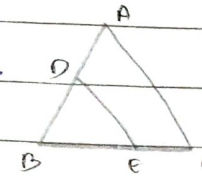
4) In the following figure DE || AC and DF || AE. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$



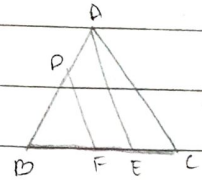
Ans.



In $\triangle ABC$, $DE \parallel AC$

$\therefore \frac{BD}{DA} = \frac{BE}{EC}$ - (i)

[Basic Proportionality Theorem]



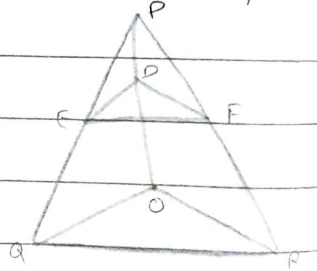
In $\triangle ABE$, $DF \parallel AE$

$\therefore \frac{BD}{DA} = \frac{BF}{FE}$ (Basic Proportionality Theorem) - (ii)

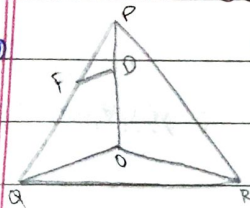
From (i) & (ii) we obtain

$\frac{BE}{EC} = \frac{BF}{FE}$

5) In the following figure $DE \parallel OQ$ and $DF \parallel OR$, show that $EF \parallel QR$



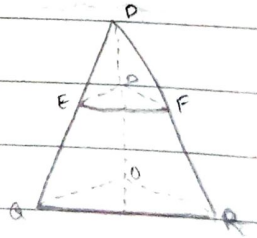
Ans

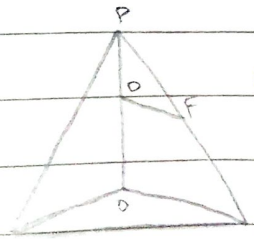


In $\triangle PQR$, $DE \parallel OQ$

$\therefore \frac{PE}{EQ} = \frac{PD}{DO}$ - eq (i)

(Basic proportionality theorem) - (i)





In $\triangle POR$, $DF \parallel OR$

$\therefore \frac{PF}{FR} = \frac{PD}{DO}$ (Basic proportionality theorem) - (ii)

From (i) & (ii) we obtain

$\frac{PE}{EQ} = \frac{PF}{FR}$ $\therefore EF \parallel QR$

(Converse of basic proportionality theorem)

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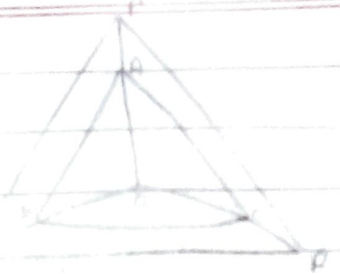
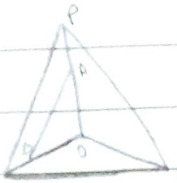
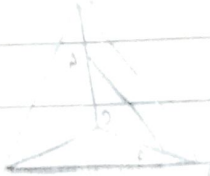
6) In the following figure A, B and C are points on OP, OQ & OR respectively such that AB || PQ & AC || PR show that BC || QR



Ans.





In $\triangle POQ$, $AB \parallel PQ$

$\therefore \frac{OA}{AP} = \frac{OB}{BQ}$ ... (i)

[Basic proportionality theorem (1)]

In $\triangle POR$, $AC \parallel PR$

$\therefore \frac{OA}{AP} = \frac{OC}{CR}$ ... (ii)

[By basic proportionality theorem (ii)]

From (i) & (ii) we get

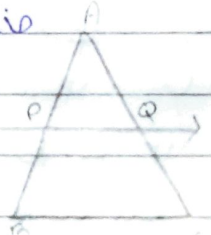
$\frac{OB}{BQ} = \frac{OC}{CR}$

$\therefore BC \parallel QR$

[By the converse of Basic proportionality theorem]

7) Using basic proportionality theorem prove that a line drawn through the mid point of one side of a triangle parallel to other side bisects the third side.

Ans. Consider the given figure in which in a line drawn through the mid point P of line segment AB meeting AC at Q such that $PQ \parallel BC$



By using basic proportionality theorem we obtain

$\Rightarrow \frac{AP}{PB} = \frac{AQ}{QC} \Rightarrow \frac{1}{1} = \frac{AQ}{QC} \Rightarrow AQ = QC$

(P is mid point of AB, $\therefore AP = PB$)

Q is the mid-point of AC.

8) Using converse of basic proportionality theorem prove that the joining the mid point of any two sides of triangle is parallel to the third side (Recall that you have done that in class ix)

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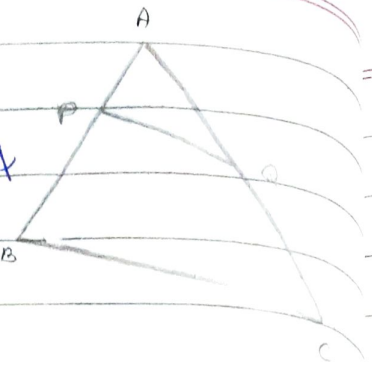
Ans. Consider that given figure in which PQ is a line segment joining the mid point P & Q of line AB and AC respectively.



i.e., AP = PB & AQ = QC

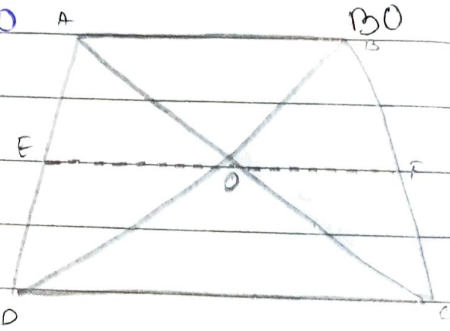
It can be observed that

$\frac{AP}{PB} = \frac{1}{1}$ & $\frac{AQ}{QC} = \frac{1}{1}$ $\therefore \frac{AP}{PB} = \frac{AQ}{QC}$

Hence, using basic proportionality theorem we obtain PQ || BC

9) ABCD is a trapezium in which AB || DC & its diagonals intersects eachother at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$

Ans. Draw a line EF through point O such that EF || CD



In $\triangle ADC$, EO || CD

By using basic proportionality theorem we obtain.

$\frac{AE}{AD} = \frac{AO}{OC}$ — (i)

In $\triangle ABD$, OE || AB

So by using basic proportionality theorem we obtain

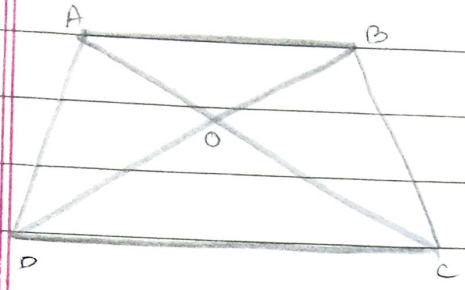
$\Rightarrow \frac{ED}{AE} = \frac{OD}{BO}$ $\Rightarrow \frac{AE}{DE} = \frac{BO}{OD}$ — eqn (ii)

From equation (i) & (ii) we obtain.

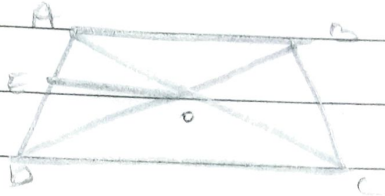
$\Rightarrow \frac{AO}{OC} = \frac{BO}{OD}$ $\Rightarrow \frac{AO}{BO} = \frac{OC}{OD}$

10) The diagonals of a quadrilateral ABCD intersect eachother at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium.

Ans: let us consider the following figure for the given questions.



Draw a line OE || AB



In $\triangle ABD$, $OE \parallel AB$

By using basic proportionality theorem we obtain

$$\frac{AE}{ED} = \frac{BO}{OD} \quad \text{- eq(I)}$$

However it is given that

$$\frac{AO}{OC} = \frac{OB}{OD} \quad \text{- eq(II)}$$

From equation (I) & (II) we get

$$\Rightarrow \frac{AE}{ED} = \frac{AO}{OC}$$

$\Rightarrow EO \parallel DC$ [by the convenge of basic proportionality theorem)

$\Rightarrow AB \parallel OE \parallel DC$

$\Rightarrow AB \parallel CD$

$\therefore ABCD$ is a trapizum.