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CLASS – 9

MATHEMATICS

Chapter – 8

Quadrilaterals

Part - 12

Examples 6 - 7

Vikas Saini

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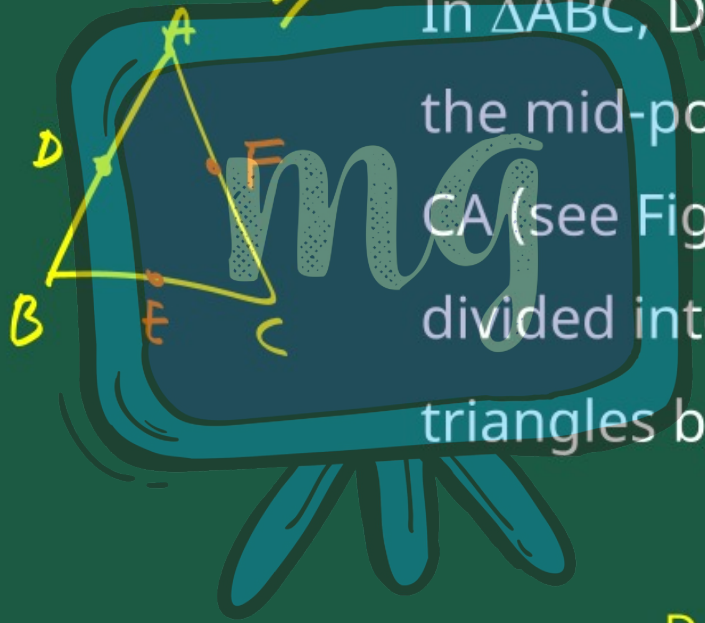
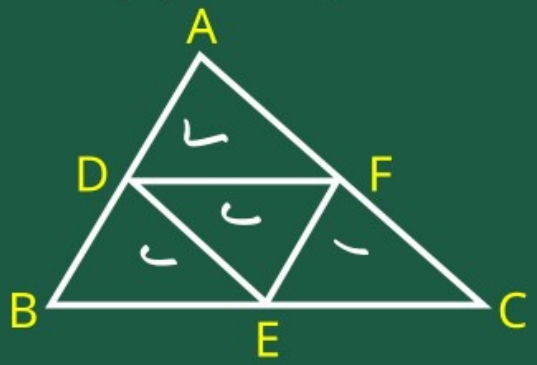
Example–6



In ΔABC, D, E and F are respectively the mid-points of sides AB, BC and CA (see Fig.). Show that A ABC is divided into four congruent triangles by joining D, E and F.



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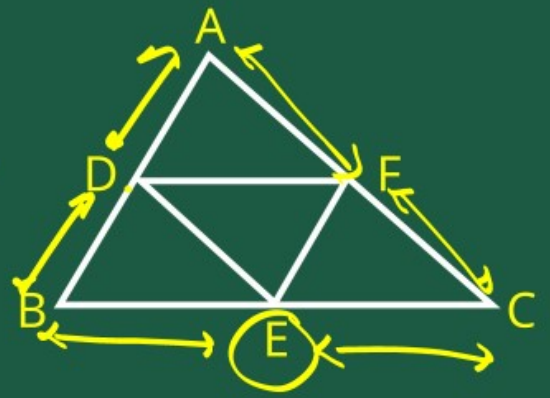
Given: $\triangle ABC$ in which

D, E, F are midpoints of

Sides AB, BC, AC respt.



$AD = BD = \frac{AB}{2}$

$BE = CE = \frac{BC}{2}$

$AF = FC = \frac{AC}{2}$.

To prove: midpoint D, E, F Splits $\triangle ABC$ into four congruent triangles.

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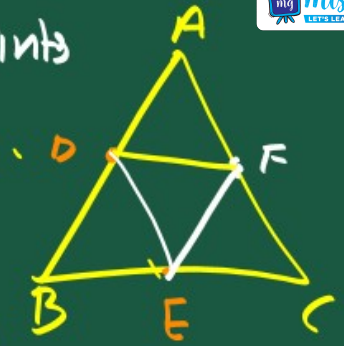
Sol:- DE line segment joining the midpoints of sides AB & BC



$DE = \frac{AC}{2}$ & $DE \parallel AC$ [∵ M.P.T]

∥ly EF midpoints's line segments

$EF \parallel AB$ & $EF = \frac{AB}{2}$ [M.P.T]

∥ly

$DF \parallel BC$ & $DF = \frac{BC}{2}$ [M.P.T].

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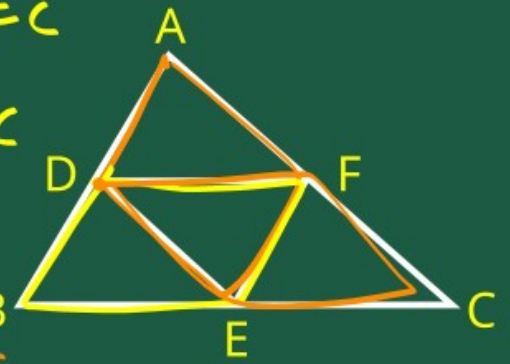
$AB \parallel EF \Rightarrow AD \parallel EF$ & $BD \parallel EF$

$AC \parallel DE \Rightarrow DE \parallel AF$ & $DE \parallel FC$

$BC \parallel DF \Rightarrow DF \parallel BE$ & $DF \parallel EC$



Now In Quad. ADEF

$AF \parallel DE$

$AD \parallel EF$



Ily In quad BEFD

$BE \parallel FD$

$BD \parallel EF$

In Quad. DFCF

$DF \parallel CE$

$DE \parallel FC$

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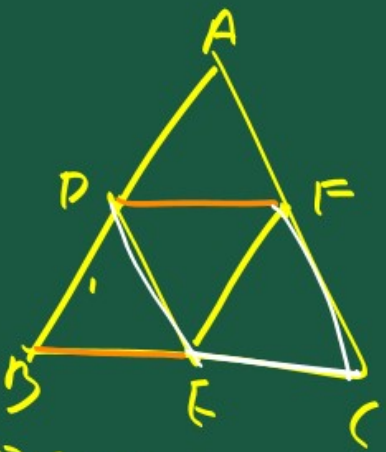
Since both pair of opp sides of quad. are parallel.

then it is llgm



∴ ADEF
BEFD
DFCE
are all Parallelogram.

Now DF diagonal of llgm ADEF

DF diagonal of llgm DFEB

EF diagonal of llgm DFCE

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We know that

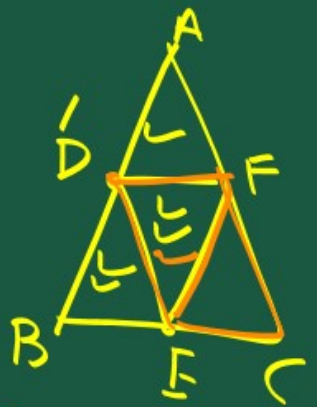
diagonal of parallelogram divides it into two congruent triangles

$\triangle ADF \cong \triangle EDF$

$\triangle EDF \cong \triangle DBF$

$\triangle EDF \cong \triangle FCE$

$\triangle ADF \cong \triangle EDF \cong \triangle DBF \cong \triangle FCE$



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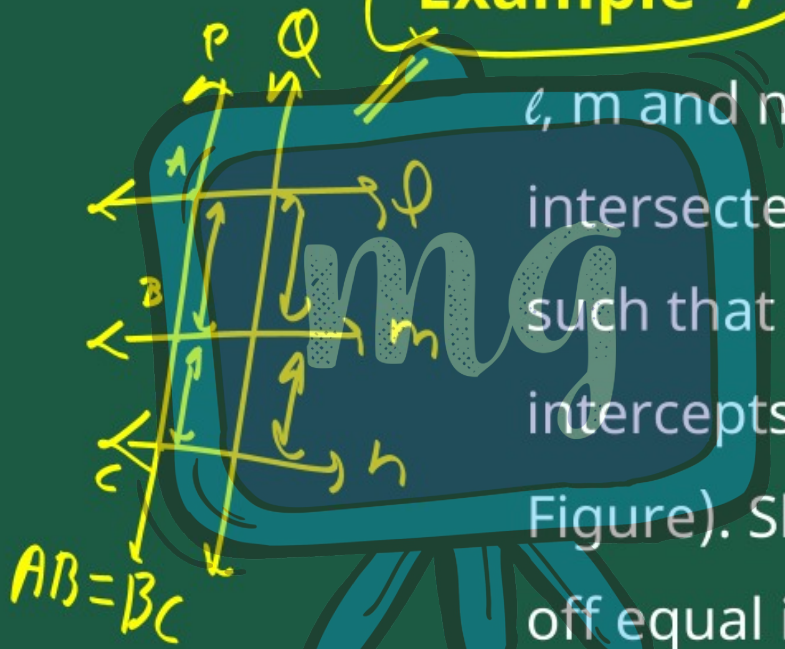
Example–7



ℓ, m and n are three parallel lines intersected by transversals p and q such that ℓ, m and n cut off equal intercepts AB and BC on p (see Figure). Show that ℓ, m and n cut off equal intercepts DE and EF on q also.

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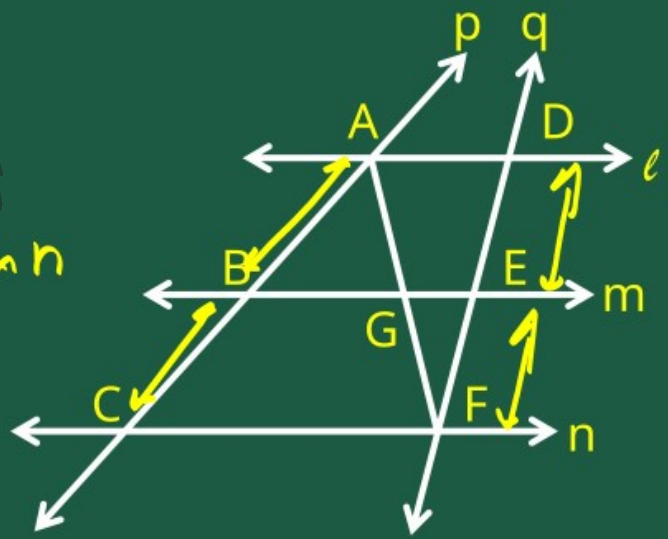
Given :- $l \parallel m \parallel n$

P transversal equal intercept l, m & n

S.t $AB = BC$

To prove :- $DE = EF$



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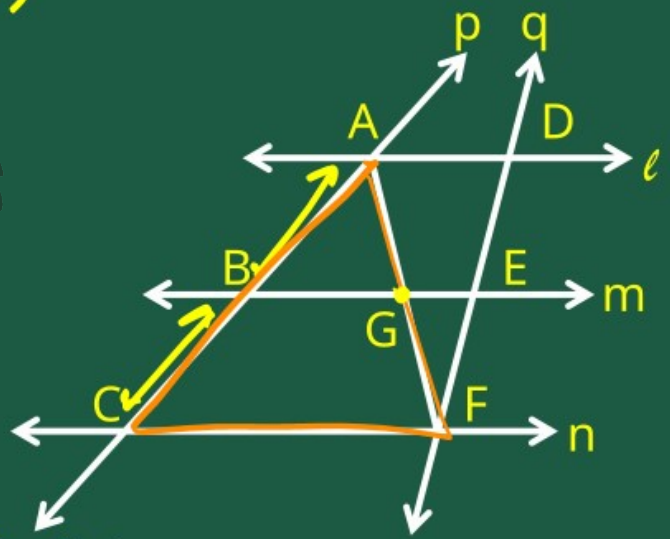
Soln :- $AB = BC$ [Given]

$\therefore$ B is midpoint AC.



Now

In $\triangle ACF$

line drawn from mid-point AC at BE

which intersect AF at point G

Since $m \parallel n \Rightarrow BG \parallel CF$

$\therefore$ G is midpoint of AF [C.M.P.T]

$AG = GF$

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Since In AFD,

G is midpoint

a line drawn from G intersect side DF at E

& $l \parallel m$

$GE \parallel AD$ also

$\therefore$ E is the midpoint of DF

$DE = EF$

