UDAAN 2025

Mathematics

Triangles

DHA : 02

Q1 In a ΔABC,D and E are points on the sides AB and AC respectively. For each of the following case show that DE||BC :
AB = 12 cm, AD = 8 cm, AE = 12 cm and AC = 18 cm.

Q2 In Figure, state if PQ||EF.

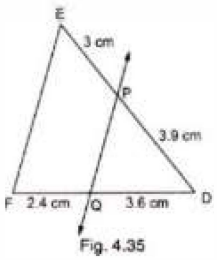


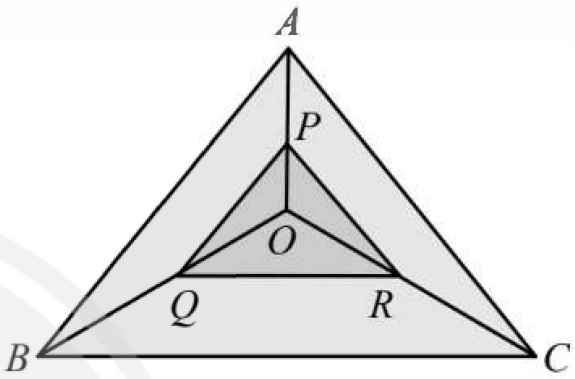
Fig. 4.35

Q3 If D and E are points on sides AB and AC respectively of a Δ ABC such that DE||BC and BD = C E. Prove that ΔABC is isosceles.

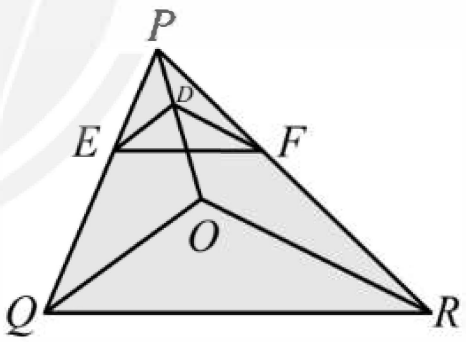
Q4 M and N are points on the sides PQ and PR respectively of a ΔPQR. For the following case, state whether MN||QR :

$\mathrm{PM} = 4\ \mathrm{cm}, \mathrm{QM} = 4.5\ \mathrm{cm}, \mathrm{PN} = 4\ \mathrm{cm}, \mathrm{NR} = 4.5\ \mathrm{cm}$

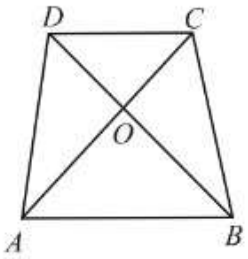
Q5 In the given figure, $PQ||AB$ and $PR||AC$. Prove that $QR||BC$.



Q6 In the figure given along side, $DE||OQ$ and $DF||OR$.
Show that $EF||QR$.



Q7 In the given figure, $AB||DC$ and diagonals A C & B D intersect at O. If A O=(3 x-1) cm , B O=(2 x+1) cm, O C=(5 x-3) cm and O D=(6 x-5) cm, then x=



(A) 2
(B) 3
(C) 2.5
(D) 3.5

Answer Key

Q1 Proof

Q2 So PQ is not parallel to EF

Q3 Proof

Q4 Yes MNIIQR

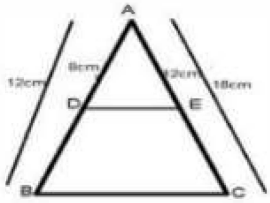
Q5 (Use BPT and converse of BPT)

Q6 (Use BPT and converse of BPT)

Q7 (A)

Hints & Solutions

Q1 Text Solution:



(i) AB = 12 cm, AD = 8 cm, AE = 12 cm and AC = 18 cm.

$\therefore \mathrm{DB} = AB - AD$

$= 12 - 8$

= 4 cm

$EC = AC - AE$

$= 18 - 12$

$= 6$ cm

Now AD/DB = 8/4 = 2

AE/EC = 12/6 = 2

Thus DE dvides side AB and AC of ΔABC in same ratio

Then by the converse of basic proportionality theorem.

DE||BC

Video Solution:

Q2 Text Solution:

$\mathrm{DP/PE} = 3 \cdot 9/3 = 1 \cdot 3/1 = 13/10$

$\mathrm{DQ/QF} = 3 \cdot 6/2 \cdot 4 = 36/24 = 3/2$

$\mathrm{DP/PE} \neq \mathrm{DQ/QF}$

So PQ is not parallel to EF

Video Solution:

Q3 Text Solution:

We have DE||BC

by the converse of proportionalify theorem

$\mathrm{AD/DB} = \mathrm{AE/EC}$

$\mathrm{AD/DB} = \mathrm{AE/DB[BD = CE]}$

$\mathrm{AD} = \mathrm{AE}$.....(1)

BD = CE.....(2)

Adding equation (1) and (2)

$AD + BD = AE + EC$

$AB = AC$

ΔABC is isosceles

Video Solution:

Q4 Text Solution:

we have

$PM = 4$ cm, $\mathrm{QM} = 4.5$ cm, $PN = 4$ cm $and\ NR = 4.5$ cm

Hence PM||Q M = 4/4.5 = 40/45 = 8/9

$\mathrm{PN/NR} = 4/4 \cdot 5 = 40/45 = 8/9$

$\mathrm{PM/QM} = \mathrm{PN/NR}$

By the converse of proportionality theorem

MN||QR

Video Solution:

Q5 Text Solution:

In ΔAOB,
AB || PQ (given)
OP/OA = OQ/QB ..... (i) [By Basic proportionality theorem]
In ΔAOC,
AC || PQ (given)
OP/OA = OR/RC..... (ii) [By Basic proportionality theorem]
From equations (i) and (ii)
OP/OA = OQ/QB = OR/RC
OQ/QB = OR/RC
Now, In ΔOBC
OQ/QB = OR/RC
Thus, BC || QR [By Converse of Basic proportionality theorem]

Video Solution:

Q6 Text Solution:

In ΔPOQ
DE || OQ (given)
PE/EQ = PD/DO.....(1)
In ΔPOR
DF || OR (given)
PF/FR = PD/DO..... (2)
From equation (1) and (2)
PE/EQ = PF/FR = PD/DO
PE/EQ = PF/FR
In ΔPQR
PE/EQ = PF/FR
∴ QR || EF (Converse of Basic Proportionality theorem)

Video Solution:

Q7 Text Solution:

OA= 3x-1 , OC= 5x-3, OD= 6x-5 , BO = 2x+1
AO/OC = BO/OD

[The diagonals of a Trapezium divide each other proportionally]

(3x-1)/(5x-3) =(2x+1)/(6x-5)
(3x-1) (6x-5) = (5x-3) (2x+1)
3x(6x-5) -1 (6x-5) = 2x(5x-3)+1(5x-3)
$18x^2$ -15x -6x +5 = $10x^2$ -6x +5x -3
$18x^2$ -21x +5 = $10x^2$ - x -3
$18x^2$ -$10x^2$ -21x + x +5+3 =0
$8x^2$ - 20x +8= 0
$4(2x^2$ -5x +2) = 0
$2x^2$ -5x +2 = 0
$2x^2$ -4x -x +2= 0
[By factorization]
2x(x-2) -1(x-2)= 0
(2x-1) (x-2) = 0
(2x-1) = 0 or (x-2) = 0

x = ½ or x = 2

If we put x= ½ in OD , The value of OD is negative.

Hence, the value of is x = 2.

Video Solution: