EXERCISE 9.3

1. In Fig.9.11, PSDA is a parallelogram. Points Q and R are taken on PS such that PQ = QR = RS and PA || QB || RC. Prove that ar (PQE) = ar (CFD).

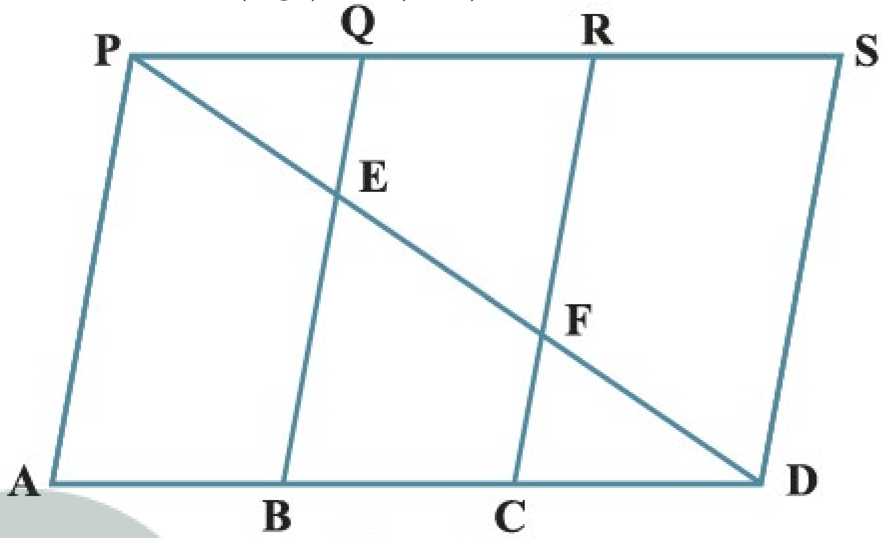


Fig. 9.11

Solution:

According to the question,
PA║QB║RC║SD & PQ=QR=RS
According to the Equal intercept theorem,
We know that if three or more parallel lines make equal intercept on traversal, then they make equal intercept on any other form of traversal.
Hence, we get,
PE=EF=FD& AB=BC=CD
From ΔPQE & ΔDCF,
We get,
∠PEQ=∠DFC
PE=DF
∠QPE=∠CDF
So,
ΔPQE ≅ ΔDCF
Since Congruent figures have equal areas,
We get,
ar ΔPQE= ar ΔDCF
Hence proved.

2. X and Y are points on the side LN of the triangle LMN such that LX = XY = YN. Through X, a line is drawn parallel to LM to meet MN at Z (See Fig. 9.12). Prove that ar (LZY) = ar (MZYX)

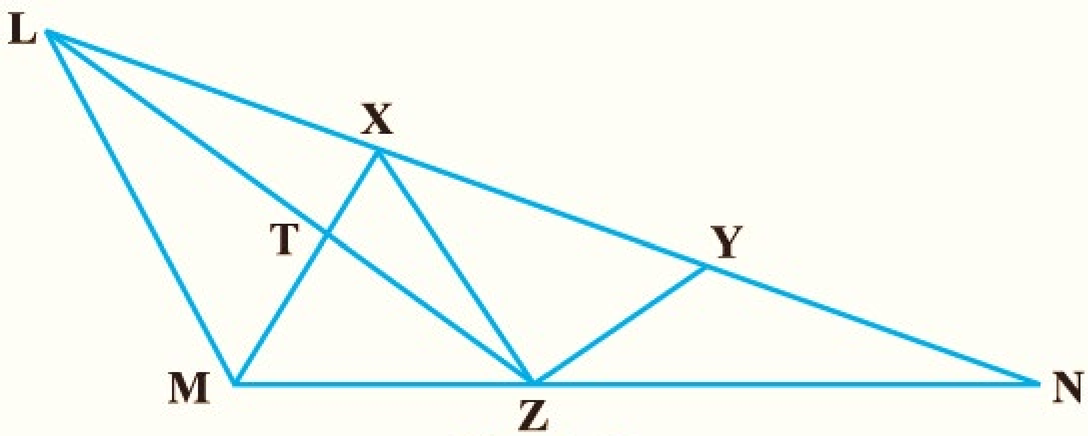


Fig. 9.12

Solution:

According to the question,

LX=XY=YN

XZ II LM

We have,

ar(LZX)+(XZY)=ar(LZY) --- (1)

ar(MXZ)+ar(XZY)=ar(MZYX) --- (2)

Both triangles LZX and MXZ are on the same base XZ and between same parallels LM and XZ

ar(LZX)=ar(MXZ)

Adding equation (1) and (2),

We get,

ar(LZY)=ar(MZYX)

Hence proved

3. The area of the parallelogram ABCD is 90 cm^2 (see Fig.9.13). Find

(i) ar (ABEF)

(ii) ar (ABD)

(iii) ar (BEF)

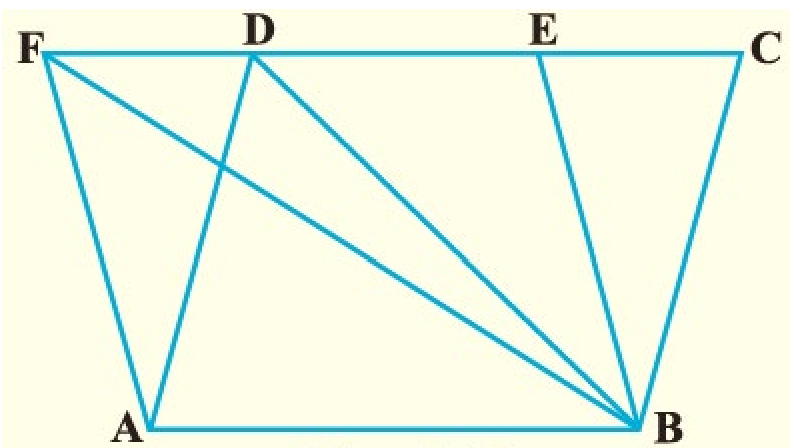


Fig. 9.13

Solution:

According to the question,
Area of parallelogram, ABCD = 90 cm^2
(i)
We know that,
Parallelograms on the same base and between the same parallel are equal in areas.
Here,
The parallelograms ABCD and ABEF are on same base AB and between the same parallels AB and CF.
Therefore, ar (ABEF) = ar (ABCD) = 90 cm^2
(ii)
We know that,
If a triangle and a parallelogram are on the same base and between the same parallels, then area of triangle is equal to half of the area of the parallelogram.
Here,
ΔABD and parallelogram ABCD are on the same base AB and between the same parallels AB and CD.
Therefore, ar (ΔABD) = ½ ar (ABCD)
= ½ x 90 = 45 cm^2
(iii)
We know that,
If a triangle and a parallelogram are on the same base and between the same parallels, then area of triangle is equal to half of the area of the parallelogram.
Here,
ΔBEF and parallelogram ABEF are on the same base EF and between the same parallels AB and EF.
Therefore, ar (ΔBEF) = ½ ar (ABEF)
= ½ x 90 = 45 cm^2

4. In △ ABC, D is the mid-point of AB and P is any point on BC. If CQ || PD meets AB in Q (Fig. 9.14), then prove that ar (BPQ) = ½ ar (ABC).

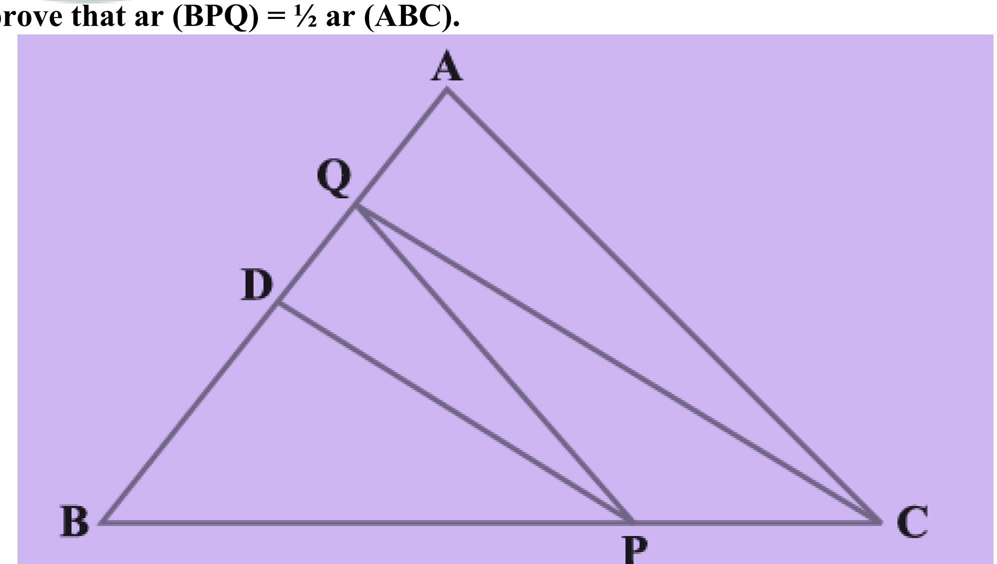
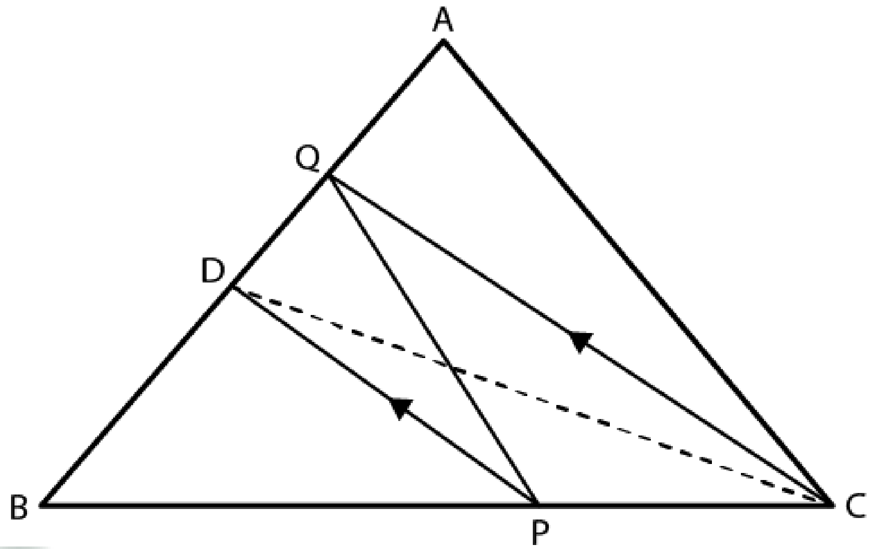


Fig. 9.14

Solution:

According to the question,
We have the figure,



In △ ABC,
D is the mid-point of AB
P is any point on BC.
If CQ || PD meets AB at Q
To prove: ar (BPQ) = ½ ar (ABC)
Construction: Join DC
Proof:- Since D is the mid-point of AB. so, in △ ABC, CD is the median.
ar(△ BCD) = ½ ar (△ ABC)...... (1)
We know that,
△ PDQ and △ PDC are on the same base PD and between the same parallels lines PD QC.
Therefore, ar(△ PDQ) = ar(△ PDC)..................(2)
From (1) and (2)
ar(△ BCD) = ½ ar(△ ABC)
ar(△ BCD = ar(△ BPD) + ar(△ PDC)
= ½ ar(△ ABC)
Area of △ PDC = PDQ
So,
ar(△ BPQ) = ar(△ BPD) + ar(△ PDQ)
= ½ ar(△ ABC)
Therefore, ar(△BPQ) = ½ ar(△ ABC)
Hence Proved