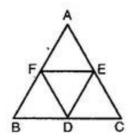


Exercise 6.4

 $\therefore$  DF || CA  $\Rightarrow$  DE || AE .....(ii)



From (i) and (ii), we can say that AFDE is a parallelogram.

Similarly, BDEF is a parallelogram.

Now, in  $\Delta$ s DEF and ABC, we have

 $\angle$  FDE =  $\angle$  A[opposite angles of  $\parallel$  gm AFDE]

And  $\angle DEF = \angle B[\text{opposite angles of } || gm BDEF]$ 

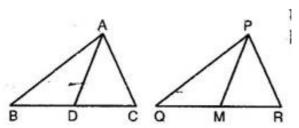
... By AA-criterion of similarity, we have  $\Delta$  DEF  $\sim \Delta$  ABC

$$\Rightarrow \frac{\text{Area }(\Delta \text{DEF})}{\text{Area }(\Delta \text{ABC})} = \frac{\text{DE}^2}{\text{AB}^2} = \frac{\left(\frac{1}{2}\text{AB}\right)^2}{\text{AB}^2} \frac{1}{4}$$

$$[\because DE = \frac{1}{2}AB]$$

Hence, Area ( $\triangle$ DEF): Area ( $\triangle$ ABC) = 1:4

6. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding medians. **Ans. Given:**  $\triangle$  ABC  $\sim$   $\triangle$  PQR, AD and PM are the medians of  $\triangle$ s ABC and PQR respectively.



To Prove:  $\frac{\text{Area} (\Delta ABC)}{\text{Area} (\Delta PQR)} = \frac{AD^2}{PM^2}$ 

**Proof**: Since  $\triangle ABC \sim \triangle PQR$ 

$$\frac{\text{Area} (\Delta ABC)}{\text{Area} (\Delta PQR)} = \frac{AB^2}{PQ^2} \dots (1)$$

But, 
$$\frac{AB}{PO} = \frac{AD}{PM}$$
 .....(2)

: From eq. (1) and (2), we have,

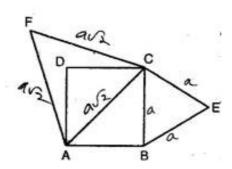
$$\frac{\text{Area }(\Delta ABC)}{\text{Area }(\Delta PQR)} = \frac{AD^2}{PM^2}$$

7. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of the diagonals.

Tick the correct answer and justify:

Ans. Given: A square ABCD,

Equilateral  $\Delta$ s BCE and ACF have been drawn on side BC and the diagonal AC respectively.



**To Prove**: Area ( $\triangle$  BCE) =  $\frac{1}{2}$  Area ( $\triangle$ ACF)

**Proof:**  $\triangle$ BCE  $\sim \triangle$ ACF

[Being equilateral so similar by AAA criterion of similarity]

$$\Rightarrow \frac{\text{Area} (\Delta B C E)}{\text{Area} (\Delta A C F)} = \frac{B C^2}{A C^2}$$

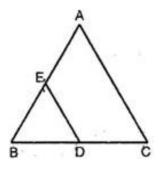
$$\Rightarrow \frac{\text{Area} (\Delta B C E)}{\text{Area} (\Delta A C F)} = \frac{B C^2}{\left(\sqrt{2} B C\right)^2}$$

[: Diagonal =  $\sqrt{2}$  side  $\Rightarrow$  AC =  $\sqrt{2}$  BC]

$$\Rightarrow \frac{\text{Area} (\Delta BCE)}{\text{Area} (\Delta ACF)} = \frac{1}{2}$$

- 8. ABC and BDE are two equilateral triangles such that D is the mid-point of BC. Ratio of the areas of triangles ABC and BDE is:
- (A) 2:1
- (B) 1:2
- (C) 4: 1
- (D) 1:4
- Ans. (C) Since  $\triangle$ ABC and  $\triangle$ BDE are equilateral, they are equiangular and hence,

$$\Delta ABC \sim \Delta BDE$$



$$\Rightarrow \frac{\text{Area} (\Delta ABC)}{\text{Area} (\Delta BDE)} = \frac{BC^2}{BD^2}$$

$$\Rightarrow \frac{\text{Area} (\Delta ABC)}{\text{Area} (\Delta BDE)} = \frac{(2BD)^2}{BD^2}$$

[∵ D is the mid-point of BC]

$$\Rightarrow \frac{\text{Area} (\Delta ABC)}{\text{Area} (\Delta BDE)} = \frac{4}{1}$$

∴ (C) is the correct answer.

9. Sides of two similar triangles are in the ratio 4: 9. Areas of these triangles are in the ratio:

- (A) 2:3
- (B) 4: 9
- (C) 81:16
- (D) 16:81

**Ans. (D)** Since the ratio of the areas of two similar triangles is equal to the ratio of the squares of any two corresponding sides. Therefore,

Ratio of areas = 
$$\frac{(4)^2}{(9)^2} = \frac{16}{81}$$

.. (D) is the correct answer.

\*\*\*\*\*\*\*\* END \*\*\*\*\*\*\*