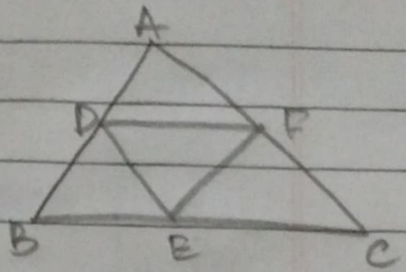


5. Given : D, E, F are midpoints of AB, BC, CA

~~To p~~

$DF = \frac{1}{2} BC$ (midpoint theorem)

Proof $DE = \frac{1}{2} CA$ (midpoint theorem)

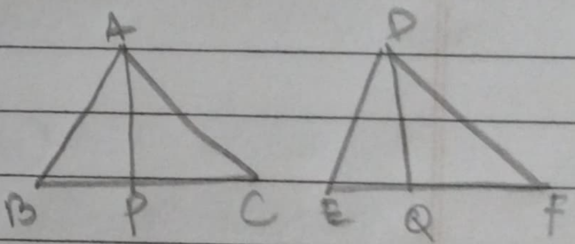
$EF = \frac{1}{2} AB$ (midpoint theorem)

$$\frac{DF}{BC} = \frac{DE}{CA} = \frac{EF}{AB} = \frac{1}{2}$$

$\Delta DEF \sim \Delta ABC$ by SSS

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

Required ratio = 1 : 4



6. Given: $\Delta ABC \sim \Delta DEF$

To prove: $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DEF} = \frac{AP^2}{DQ^2}$

In $\Delta ABC \sim \Delta DEF$

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{2BP}{2EQ} = \frac{BP}{EQ}$$

$$\frac{AB}{DE} = \frac{BP}{EQ} \quad \text{—(i)}$$

In $\Delta ABP \sim \Delta DEQ$

$$\frac{BP}{EQ} = \frac{AP}{DQ} \quad \text{—(ii)}$$

From equ (i) and equ (ii)

$$\frac{AB}{DE} = \frac{AP}{DQ}$$

$$\therefore \frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DEF} = \frac{AP^2}{DQ^2}$$

7. let ABCQ be a square with side a
Then diagonal = $a\sqrt{2}$

$\Delta BCP \sim \Delta ACQ$

$$\frac{\text{Area of } \Delta BCP}{\text{Area of } \Delta ACQ} = \frac{BC^2}{AC^2} = \frac{a^2}{(a\sqrt{2})^2} = \frac{1}{2}$$

area of $\Delta BCP = \frac{1}{2}$ area of ΔACQ (proved)

8. (i) let $AB = BC = CA = a$
Midpoint is BC
$$BD = \frac{1}{2} a$$
$$\Delta ABC \sim \Delta BDE$$
c) $$\frac{\text{area of } \Delta ABC}{\text{area of } \Delta BDE} = \frac{AB^2}{BD^2} = \frac{a^2}{(\frac{1}{2}a)^2} = \frac{a^2}{\frac{1}{4}a^2} = \frac{4}{1} \text{ or } 4:1$$

9) sides of triangle = 4 : 9
Area of triangle = $(4)^2 : (9)^2$
$= 16 : 81$
(d)