MENSURATION MC

Form 6
Vol 2

Part A – Basic Question

1. $\because AD : DB = 3 : 1$

$\therefore$ Area of ΔADE : Area of $\Delta DBE = 3 : 1$

Area of ΔDBE

$= 30 \times \frac{1}{3}$

$= 10 \text{ cm}^2$

$\because BE : EC = 2 : 3$

$\therefore BE : BC = 2 : 5$

$\therefore$ Area of ΔABE : Area of $\Delta ABC = 2 : 5$

Area of ΔABC

$= (30 + 10) \times \frac{5}{2}$

$= 100 \text{ cm}^2$

2. $AE : EB = 1 : 4$, $AB = DC$ and $EB = DF$

$DF : FC$

$= DF : (DC - DF)$

$= EB : (AB - EB)$

$= EB : AE$

$= 4 : 1$

$\therefore$ Area of $ABFD$: Area of ΔBFC

$= (1 + 4 + 4) : 1$

$= 9 : 1$

$\therefore$ Area of $ABFD$

$= 10 \times 9$

$= 90 \text{ cm}^2$

3. In ΔABG and ΔACE,

$\angle B = \angle C$ and $\angle G = \angle E$ (corr. $\angle$s, $BG // CE$)

$\angle A = \angle A$ (common)

$\therefore \Delta ABG \sim \Delta ACE$ (AAA)

$BG : CE = AB : AC = 1 : 2$ (corr. sides, $\sim \Delta$s)

Similarly, in ΔDCE and ΔDBF,

$\therefore CE : BF = 1 : 2$

$\because BG : CE = 1 : 2$ and $CE : BF = 1 : 2$

$BG : CE : BF = 1 : 2 : 4$

$\therefore BG : BF = 1 : 4$

4. $AB = CD$, $DE : EC = 4 : 3$ and $AF : FB = 2 : 5$

$\therefore DE : EC : AF : FB = 4 : 3 : 2 : 5$

$\because EC // FB$

$\therefore$ It is trivial that $\Delta CEG \sim \Delta FBG$

$\therefore CG : GF = 3 : 5$ (corr. sides, $\sim \Delta$s)

$\therefore$ Area of ΔCBG : Area of $\Delta FBG = 3 : 5$

Area of ΔCBG

$= (120) \times \frac{3}{5}$

$= 72 \text{ cm}^2$

Area of $DEBA$: Area of ΔCBF

$= (4 + 5 + 2) : (0 + 5)$

$= 11 : 5$

$\therefore$ Area of $DEGFA$

= Area of $DEBA$ – Area of ΔFBG

$= (120 + 72) \times \frac{11}{5} - 120$

$= 302.4 \text{ cm}^2$

5. $AD = BC$ and $BF : FC = 3 : 2$

$\therefore BF : FC : AD = 3 : 2 : 5$

$\because BF : FC = 3 : 2$

$\therefore AG : GF = (3+2) : (3+2+3) = 5 : 8$

$$\frac{\text{area of } \Delta AEG}{\text{area of } \Delta AFB} = \frac{5 \times 1}{13 \times 2} = \frac{5}{26}$$

$$\text{area of } \Delta AFB$$

$$= 10 \times \frac{26}{5}$$

$$= 52$$

$$\frac{\text{area of } \Delta ADE}{\text{area of } \Delta AFB} = \frac{5 \times 1}{3 \times 2} = \frac{5}{6}$$

$$\text{area of } \Delta ADE$$

$$= 52 \times \frac{5}{6}$$

$$= \frac{130}{3}$$

Area of $ADCF$: Area of ΔAFB

$= (5+2) : (0+3)$

$= 7 : 3$

$\therefore$ Area of $CDGF$

= Area of $ADCF$ − Area of ΔADE + Area of ΔAEG

$$= 52 \times \frac{7}{3} - \frac{130}{3} + 10$$

$$= 88 \text{ cm}^2$$

6. $\because BH // AG$

$\therefore \Delta CBD \sim \Delta CAE$ and $\Delta FEG \sim \Delta FDH$

$$\begin{cases} CD : DE = BC : AB = 3 : 1 \\ FE : DE = FG : GH = 3 : 4 \end{cases} \text{ (corr. sides, } \sim \Delta \text{s)}$$

CF

$= CD + DE + EF$

$$= 6 \times 3 + 6 + 6 \times \frac{3}{4}$$

$$= 28.5$$

7. $\because AD : DB = 1 : 3$ and $BF : FC = 3 : 5$

$\therefore$ Area of ΔAED : Area of $\Delta DEB = 1 : 3$

Area of ΔBEF : Area of $\Delta FEC = 3 : 5$

Let area of $\Delta AED = x$, area of $\Delta BEF = 3y$,

then area of $\Delta DEB = 3x$, area of $\Delta FEC = 5y$.

$\therefore$ area of $\Delta ABC = 4x + 8y$

area of $BDEF = 3x + 3y$

$AE = EC$

Area of ΔABE = Area of ΔEBC

$4x = 8y$

$x = 2y$

$\therefore$ The ratio of the area of ΔABC to that of $BDEF$

$= 4x + 8y : 3x + 3y$

$= 4(2y) + 8y : 3(2y) + 3y$

$= 16y : 9y$

$= 16 : 9$

8. $AD = BC$ and $BF : FC = 2 : 3$

$\therefore BF : FC : AD = 2 : 3 : 5$

$\therefore$ Area of ΔBEF : Area of $\Delta AED = 2 : 5$

Area of ΔAED

$= (5) \times \frac{5}{2}$

$= 12.5 \text{ cm}^2$

Area of ΔFDC : Area of ΔBEF

$= (2 \times 1) : (3 \times 2)$

$= 1 : 3$

Area of ΔFDC

$= 5 \times 3$

$= 15 \text{ cm}^2$

Area of $ADFB$: Area of ΔFDC

$= (5 + 2) : (0 + 3)$

$= 7 : 3$

$\therefore$ Area of ΔEDF

= Area of $ADFB$ – Area of ΔBEF – Area of ΔAED

$= 15 \times \frac{7}{3} - 5 - 12.5$

$= 17.5 \text{ cm}^2$