

CBSE HOTS IX, Areas of Parallelograms and Triangles 2

$$\Rightarrow \text{ar}(\triangle PQR) = \text{ar}(\triangle ARC) \dots \textcircled{i}$$

Solution by Dev Anoop (Bathinda)

$$\begin{aligned} \frac{\text{ar}(\triangle PQR)}{\text{ar}(\triangle ARC)} &= \frac{\frac{1}{2} \times QR \times EF}{\frac{1}{2} \times CA \times FD} \\ &= \frac{QR \times x}{2QR \times x} \\ &= \frac{1}{2} \end{aligned}$$

$$\Rightarrow \text{ar}(\triangle PQR) = \frac{1}{2} \text{ar}(\triangle ARC) \dots \textcircled{ii}$$

$$\frac{\text{ar}(\triangle RQC)}{\text{ar}(\triangle ABC)} = \frac{\text{ar}(\triangle ABC) - [\text{ar}(\triangle BQP) + \text{ar}(\triangle PQR) + \text{ar}(\triangle ARC)]}{\text{ar}(\triangle ABC)}$$

$$= \frac{\frac{1}{2} \times CA \times BD - [\text{ar}(\triangle ARC) + \frac{1}{2} \text{ar}(\triangle ARC) + \text{ar}(\triangle ARC)]}{\frac{1}{2} \times CA \times BD} \quad [\text{Using } \textcircled{i}, \textcircled{ii}]$$

$$= \frac{\frac{1}{2} \times CA \times BD - \frac{5}{2} \text{ar}(\triangle ARC)}{\frac{1}{2} \times CA \times BD}$$

$$= \frac{\frac{1}{2} \times CA \times BD - \frac{5}{2} \times \frac{1}{2} \times CA \times FD}{\frac{1}{2} \times CA \times BD}$$

$$= \frac{\frac{1}{2} \cancel{CA} (BD - \frac{5}{2} FD)}{\frac{1}{2} \cancel{CA} \times BD}$$

$$= \frac{4x - \frac{5}{2} \times x}{4x}$$

$$= \frac{3x}{8x}$$

$$= \frac{3}{8}$$

$$\text{ar}(\triangle RQC) = \frac{3}{8} \text{ar}(\triangle ABC)$$

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