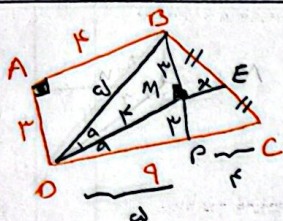


$$ADE \sim ABC \Rightarrow \frac{DE}{BC} = \frac{12a}{24a} = \frac{1}{2}$$

$$\frac{S_{BCE}}{S_{BDE}} = \frac{BC}{DE} = \frac{24a}{12a} = \frac{2}{1} = 2, f$$

1



$$DM \parallel AB \Rightarrow \angle BMD = \angle ABD \text{ (مقابل موازی)}$$

$$BM \parallel AD \Rightarrow \angle BMD = \angle ADM \text{ (مقابل موازی)}$$

$$\angle BDC = 2\angle BDM$$

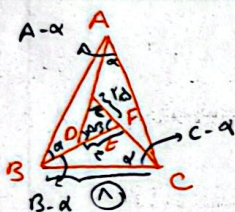
$$\angle BDM = \angle DMP = x$$

$$DM \text{ میانه} \Rightarrow BM = MP = 2$$

$$\Rightarrow ME = \frac{1}{2} PC \Rightarrow ME = \frac{1}{2} \times 4 = 2$$

$$\frac{2}{4} = \frac{x}{2} \Rightarrow x = 2$$

2



$$ABC \sim DEF$$

$$\frac{1}{2} = \frac{x}{2} \Rightarrow x = \frac{1 \times 2}{2} = 1$$

3

$$CD \parallel MB \Rightarrow CDE \sim EMB \Rightarrow \frac{CE}{ME} = \frac{CD}{MB} = \frac{1}{2} \Rightarrow CE = \frac{1}{2} ME$$

$$\Rightarrow \frac{CE}{ME} = \frac{CD}{MB} = \frac{1}{2} \Rightarrow CE = \frac{1}{2} ME$$

$$CM = CE + ME = \frac{1}{2} ME + ME = \frac{3}{2} ME \Rightarrow CM = \frac{3}{2} ME$$

$$CM^2 = CB^2 + BM^2 \Rightarrow \left(\frac{3}{2} ME\right)^2 = 2^2 + 1^2 = 5 \Rightarrow ME = \sqrt{5}$$

4

$$BE = DC = x$$

$$BC = BE + ED + DC = x + x + 1 = 2x + 1 \Rightarrow ABE \sim ABD \sim ABC$$

$$\Rightarrow \frac{AE}{AC} = \frac{BE}{BC} = \frac{x}{2x+1} \quad \frac{AD}{AC} = \frac{AE}{AD} \Rightarrow \frac{x+1}{2x+1} = \frac{x}{2x+1} \Rightarrow (x-2)(x-1) = 0$$

$$\Rightarrow \frac{AD}{AC} = \frac{BD}{BC} = \frac{x+1}{2x+1}$$

5

$$EF^2 = DF \times FC \Rightarrow 14 = 1 \times FC \Rightarrow \underline{FC = 14}$$

$$BC^2 = CF \times CA \Rightarrow BC^2 = 14 \times 20 = (14\sqrt{5})^2$$

$$BC = 14\sqrt{5}$$

$$ED = \sqrt{14^2 + 14^2} = \sqrt{196 + 196} = \sqrt{392} = 14\sqrt{2}$$

$$CE = \sqrt{CD^2 + ED^2} = \sqrt{CD^2 + 196}$$

$$AC = AD + DC = 3 + CD$$

$$AB = \sqrt{3^2 + 14^2} = 14\sqrt{5}$$

$$\sin \angle C = \frac{1}{2} \Rightarrow \angle C = 30^\circ \Rightarrow \angle A = 60^\circ \Rightarrow \angle B = 90^\circ \Rightarrow \triangle ABC \text{ is a right triangle with } \angle B = 90^\circ$$

$$m_a = \frac{1}{2} \sqrt{2b^2 + 2c^2 - a^2} \quad \begin{matrix} a = 14\sqrt{2} \\ b = 14\sqrt{5} \\ c = 14 \end{matrix} \Rightarrow m_a = \frac{1}{2} \sqrt{2(14\sqrt{5})^2 + 2(14)^2 - (14\sqrt{2})^2} = \frac{1}{2} \sqrt{1960 + 392 - 392} = \frac{1}{2} \sqrt{1960} = 7\sqrt{10}$$

$$BD^2 + DC^2 = BC^2 \Rightarrow BC = \sqrt{20}$$

$$\angle B = \angle C \Rightarrow CE = BE = \sqrt{5}$$

$$\Rightarrow BA^2 = BE \times BC \Rightarrow BA^2 = \sqrt{5} \times \sqrt{20} = BA^2 = 10 \Rightarrow \underline{BA = \sqrt{10}}$$

$$BA^2 = BE^2 + AE^2 \Rightarrow 10 = 5 + AE^2 \Rightarrow \underline{AE = \sqrt{5}}$$

$$\frac{AC}{BC} = \frac{AE}{BE} = \frac{\sqrt{5}}{\sqrt{5}} = 1 \Rightarrow \underline{AC = BC} = \sqrt{5}$$

$$AC, BC \rightarrow \text{parallel}$$

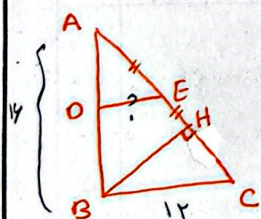
$$DE, BC \rightarrow \text{parallel} \Rightarrow AC \parallel DE$$

$$\Rightarrow BC - CE = BE \Rightarrow 9 - 0.9 = \underline{8.1}$$

$$BC = 9 \Rightarrow BA^2 = 9 + 12 = BA^2 = 21 \Rightarrow \underline{BA = \sqrt{21}}$$

$$CA^2 = AD \times AB \Rightarrow 9 = AD \times \sqrt{21} \Rightarrow \underline{AD = \frac{9}{\sqrt{21}}}$$

$$CD = \sqrt{9 - \frac{81}{21}} = \sqrt{\frac{108}{21}} = \frac{6}{\sqrt{7}} \Rightarrow (CD)^2 = CE \times BC \Rightarrow \left(\frac{6}{\sqrt{7}}\right)^2 = CE \times 9 \Rightarrow \underline{CE = \frac{4}{9}}$$



$$AC^2 = AB^2 + BC^2$$

$$\Rightarrow 14^2 + 14^2 = AC^2 \Rightarrow \underline{AC = 14\sqrt{2}}$$

$$\Rightarrow AB \times BC = AC \times BH$$

$$14 \times 14 = 14\sqrt{2} \times BH \Rightarrow \underline{BH = 7\sqrt{2}}$$

$$AH^2 = AB^2 - BH^2 = 14^2 - (7\sqrt{2})^2$$

$$\Rightarrow \underline{AH = 7\sqrt{2}}$$

$$AE = \frac{AH}{AB} = \frac{7\sqrt{2}}{14} = \underline{\frac{1}{2}}$$

$$\Rightarrow DE = \frac{DE}{BH} = \frac{AE}{AB} \Rightarrow \frac{DE}{7\sqrt{2}} = \frac{1/2}{14} \Rightarrow \underline{DE = \frac{1}{4}}$$