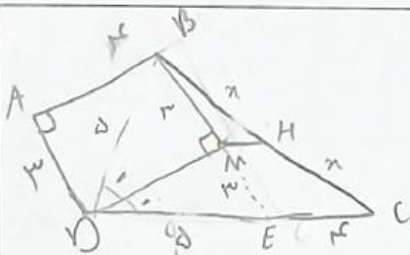


$BC \parallel DE$

$$\rightarrow \frac{AD}{AB} = \frac{DE}{BC} \rightarrow \frac{2}{12} = \frac{DE}{BC}$$

$$\frac{S_{BCE}}{S_{BDE}} = \frac{\frac{1}{2} \times BC \times h}{\frac{1}{2} \times DE \times h} = \frac{12}{2}$$

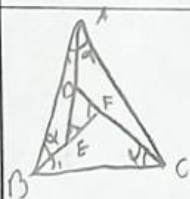
۱



$$\triangle MDE \sim \triangle MAB$$

$$\frac{MH}{F} = \frac{r}{4} = \frac{1}{2} \rightarrow MH = 2$$

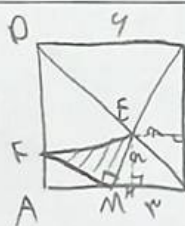
۲



$$\left. \begin{array}{l} F = \alpha + B_1 = B \\ E = \alpha + A_1 = A \end{array} \right\} \rightarrow \triangle DEF \sim \triangle ABC \rightarrow \frac{DE}{AC} = \frac{DF}{BC} = \frac{EF}{AB}$$

$$\frac{r, 2}{1} = \frac{r}{AB} \rightarrow AB = 9, 4$$

۳



$$\triangle BEM \sim \triangle AFM \rightarrow \frac{BF}{MB} = \frac{MF}{MC} = \frac{AF}{AC} \rightarrow \frac{AF}{4} = \frac{r}{4} \rightarrow AF = \frac{r}{2}$$

$$MF = AF + AM = \frac{r}{2} + 1 = \frac{ED}{2} \Rightarrow MF = \frac{r\sqrt{2}}{2}$$

$$\text{و نیز: } \frac{r}{4} = \frac{4-n}{4} \rightarrow 4n = 16 - 4n \rightarrow 8n = 16 \rightarrow n = 2, m = 1$$

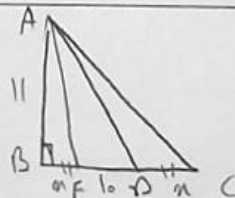
$$ME^2 = 1^2 + 2^2 = 5 \rightarrow ME = \sqrt{5} \quad S_{FME} = \sqrt{5} \times \frac{r\sqrt{2}}{2} \times \frac{1}{2} = \frac{12}{5} = 2, 4$$

۴

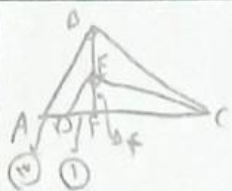
$$\triangle AED \sim \triangle AEC \rightarrow \frac{ED}{AE} = \frac{AD}{AC} = \frac{AE}{EC} \rightarrow AE^2 = (10+n)(10) = 100 + 10n$$

$$AB^2 + BE^2 = AE^2 \rightarrow 121 + n^2 = 100 + 10n$$

$$n^2 - 10n + 21 = 0 \rightarrow (n-7)(n-3) \rightarrow \begin{array}{l} n=7 \\ n=3 \end{array}$$



۵

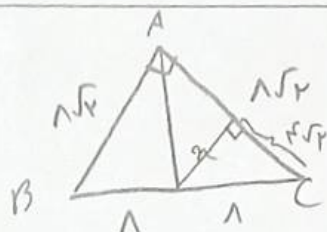


$$EF^2 = DF \cdot FC \rightarrow 14 = 1 \times FC \rightarrow FC = 14$$

$$BC^2 = CF \cdot AC \rightarrow 14 \times 20 = BC^2$$

$$BC = \sqrt{14 \times 20} = \sqrt{280}$$

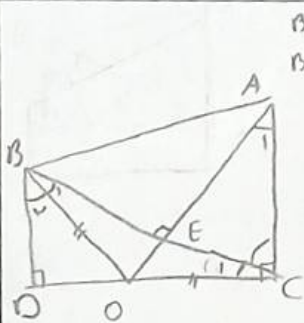
8



سایه دارد و در سقف درست است پس قائم الزامی است.

$$9^2 + 12^2 = EF^2 \rightarrow EF = \sqrt{15} = \sqrt{15}$$

✓

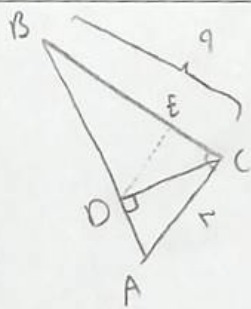


$$B_1 = C_1, B_1 + C_1 + B_2 = 90^\circ \left\{ \begin{array}{l} BC = r^2 + r^2 = \sqrt{2} = \sqrt{2} \rightarrow EC = \sqrt{2} = EB \\ \frac{C_1}{B_1} + \frac{C_2}{B_2} + \frac{A_1}{B_1 + C_1} = 90^\circ \rightarrow \triangle AEC \sim \triangle BDC \rightarrow \frac{AC}{BC} = \frac{AE}{CD} = \frac{EC}{BD} \end{array} \right.$$

$$\frac{A}{\sqrt{2}} = \frac{AE}{r} = \frac{\sqrt{2}}{r} \rightarrow AE = \sqrt{2}$$

$$S_{ABE} = \frac{AE \times BE}{2} = \frac{\sqrt{2} \times \sqrt{2}}{2} = 1$$

1



$$AB = \sqrt{10}$$

$$CD \times AB = AC \times BC \rightarrow CD \times \sqrt{10} = 3 \times 9 \rightarrow CD = \frac{9}{\sqrt{10}}$$

$$BE = m$$

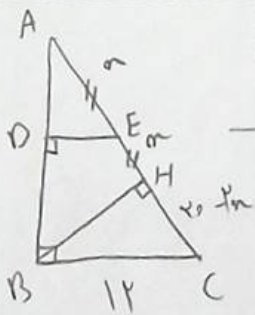
$$BE = 1,1$$

$$(AC)^2 = AD \times AB \rightarrow 9 = AD \times \sqrt{10} \rightarrow AD = \frac{9}{\sqrt{10}}$$

$$(BC)^2 = BD \times AB \rightarrow 11 = BD \times \sqrt{10} \rightarrow BD = \frac{11}{\sqrt{10}}$$

$$\text{وگرنه: } \frac{BD}{AD} = \frac{BE}{CE} \rightarrow \frac{\frac{11}{\sqrt{10}}}{\frac{9}{\sqrt{10}}} = \frac{m}{9-m} \rightarrow 9 = \frac{m}{9-m} \rightarrow 11 - 9m = m \rightarrow 11 = 10m \rightarrow m = 1,1$$

✓



$$AB = 14 \left\{ \begin{array}{l} \text{مقابل} \\ \text{مقابل} \end{array} \right. AC = 40$$

$$BC^2 = (CH)(AC) \rightarrow 14^2 = (x_1)(40) \rightarrow 14^2 = 40x_1 \rightarrow x_1 = \frac{14^2}{40} = \frac{49}{10}$$

$$\text{وگرنه: } \frac{DE}{BC} = \frac{AE}{AC} \rightarrow \frac{DE}{14} = \frac{4,4}{40} \rightarrow DE = 3,14$$

✓