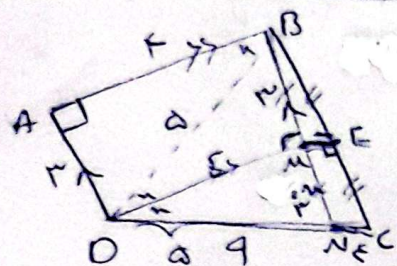


$$DE \parallel BC \rightarrow \frac{AD}{DB} = \frac{AE}{EC}$$

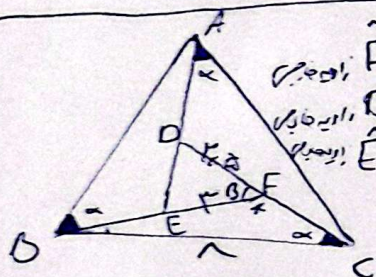
$$\frac{1/2 S}{y} = \frac{1/4 S}{y_k} \rightarrow y = \frac{1/2 S}{1/4 S} = \frac{1/2}{1/4} = 2$$

$$\frac{S_{BCE}}{S_{BDE}} = \frac{1/2 S}{1/4 S} = \frac{1/2}{1/4} = 2$$



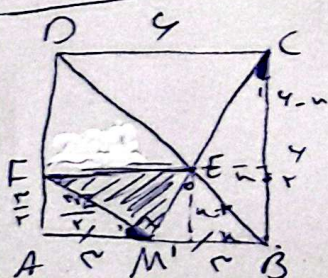
$$\left. \begin{array}{l} \hat{B}_1 = \hat{D}_1 \\ \hat{M} = \hat{A} \end{array} \right\} \rightarrow \triangle BMD \sim \triangle MNE$$

$$\left. \begin{array}{l} BM = MN \\ BE = EC \end{array} \right\} \rightarrow ME \parallel NC \rightarrow \frac{ME}{NC} = \frac{BM}{BN} \rightarrow \frac{ME}{r} = \frac{r}{2r} \rightarrow ME = r$$



$$\left. \begin{array}{l} \hat{F} = \alpha + \beta_1 = \beta \\ \hat{D} = \hat{C} \\ \hat{E} = \hat{A} \end{array} \right\} \rightarrow \triangle ABC \sim \triangle EFD$$

$$\frac{AB}{EF} = \frac{BC}{FD} \rightarrow \frac{AB}{9} = \frac{10}{9} \rightarrow AB = 9.4$$



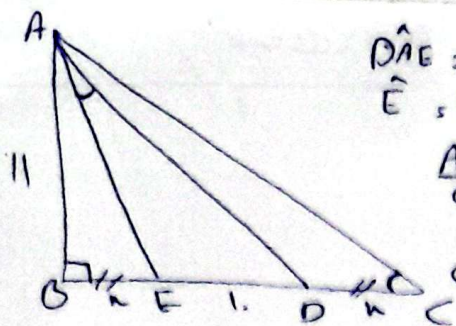
$$\left. \begin{array}{l} \hat{C}_1 = \hat{M}_1 \\ \hat{A}_1 = \hat{B}_1 \end{array} \right\} \rightarrow \triangle CBM \sim \triangle MAF$$

$$\frac{CB}{MA} = \frac{CM}{MA} = \frac{BM}{AF}$$

$$\frac{r}{r} = \frac{r}{AF} \Rightarrow AF = r$$

$$ME = \sqrt{r^2 + 1} = \sqrt{10}$$

$$S_{FEM} = \frac{\sqrt{10} \times \frac{r}{2} \sqrt{10}}{2} = \frac{10}{2} = 5$$



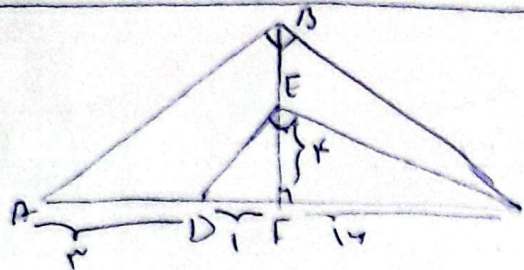
$$\hat{DAE} = \hat{ACO} \left\{ \begin{array}{l} \hat{E} = \hat{C} \end{array} \right\} \rightarrow \triangle AED \sim \triangle ABE \sim \triangle CEA$$

$$\frac{AE}{CE} = \frac{ED}{EA} \rightarrow AE^2 = ED \times CE \rightarrow AE^2 = 1 \times x + 1 \dots$$

$$\textcircled{v} AE^2 = n^2 + 1 \dots$$

$$\textcircled{v} 1 \times u + 1 \dots = n^2 + 1 \dots$$

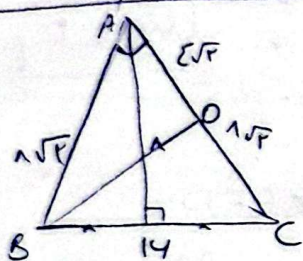
$$\rightarrow n^2 - 1 \times u - 1 \dots = (u-1)(u-1) \dots \rightarrow u = 1$$



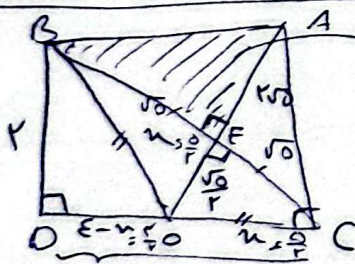
$$EF^2 = DF \times FC \rightarrow 14 \times 1 \times FC \rightarrow FC = 14$$

$$BC^2 = FC \times AC \rightarrow BC^2 = 14 \times 10$$

$$BC = 1\sqrt{140}$$



$$BD = \sqrt{14 \times 10} = \sqrt{140} = (E\sqrt{10})$$



$$S_{ABE} = \frac{1\sqrt{140} \times \sqrt{10}}{2} = \boxed{5\sqrt{10}}$$

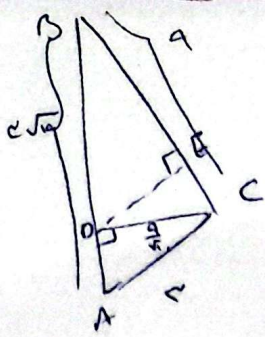
$$n^2 = 14 + 14 + 14 - 1 \times 14$$

$$n^2 = 14 \rightarrow n = \sqrt{14}$$

$$BC^2 = 14 + 14 + 14 \rightarrow BC = 3\sqrt{14}$$

$$EO^2 = \frac{14}{2} - \frac{14}{2} = \frac{14}{2} \rightarrow EO = \frac{\sqrt{14}}{2}$$

$$AO^2 = CE^2 = AE \times EO \rightarrow \boxed{5\sqrt{10}} = AE \times \frac{\sqrt{10}}{2}$$

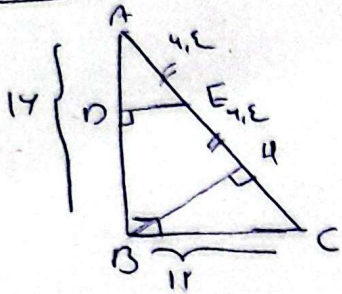


$$AB = \sqrt{11^2 + 9^2} = \sqrt{181}$$

$$9 = AD \times \frac{BE}{AB} \rightarrow AD = \frac{9 \times AB}{BE} \quad (9)$$

$$CD = \sqrt{AC^2 - AD^2} = \sqrt{181 - 121} = \sqrt{60} = \sqrt{11} \times \frac{9}{\sqrt{11}}$$

$$\frac{11}{11} = EC \times 9 \rightarrow EC = \frac{9}{11} \rightarrow BE = BC - EC = 9 - \frac{9}{11} = \frac{100}{11}$$



$$AC = \sqrt{12^2 + 12^2} = \sqrt{288} = 12\sqrt{2}$$

(1)

$$BC^2 = CH \times AC \rightarrow 12^2 = CH \times 12\sqrt{2} \rightarrow CH = \frac{12}{\sqrt{2}} = 6\sqrt{2}$$

$$12 - 6\sqrt{2} = 12\sqrt{2} \rightarrow 4\sqrt{2} = AE = EH$$

$$\hat{D} = \hat{B} = 90^\circ \quad \text{and} \quad \hat{E} = \hat{H} = 90^\circ \quad \text{and} \quad ED \parallel BC \rightarrow \frac{DE}{BC} = \frac{AE}{AC}$$

$$\frac{4\sqrt{2}}{12\sqrt{2}} = \frac{DE}{12} \rightarrow DE = \frac{4}{3}$$