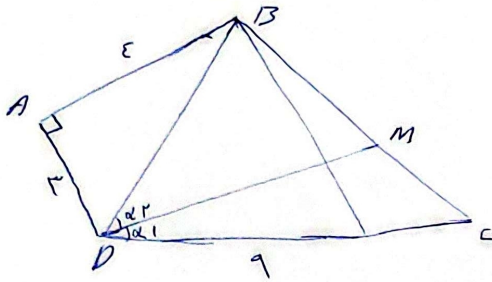


$$\frac{AB}{AD} = \frac{AC}{AE} = \frac{BC}{DE} = \frac{12}{a}$$

$$\frac{S_{\triangle BCE}}{S_{\triangle BDE}} = \frac{\frac{1}{2} \times BC \times h}{\frac{1}{2} \times DE \times h} = \frac{12}{a} = \frac{2}{14}$$



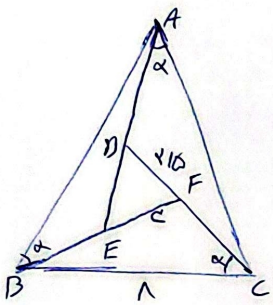
ABMD متوازي $\rightarrow DM = \epsilon$ $BM = c$

$\hat{D}_1 = \hat{D}_2 \rightarrow \triangle MDB, \triangle MDE$ متماثل الزاوية $\rightarrow MF = BM = c$

$DF = a$ $FC = \epsilon$

نقطة وسط المثلث $BC \rightarrow$

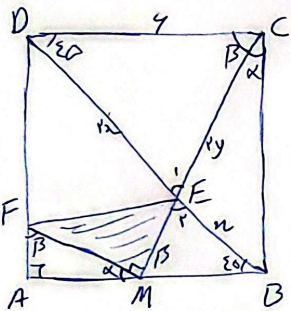
$\frac{BM}{BF} = \frac{MO}{FC} = \frac{c}{\epsilon} = \frac{1}{2} \rightarrow MO = 2$



$\triangle EFD \rightarrow \triangle FBC$ زاوية خارجي $\rightarrow \hat{EFD} = \hat{B} - \alpha + \alpha = \hat{B}$

$\triangle FDE \rightarrow \triangle ABE$ زاوية خارجي $\rightarrow \hat{FDE} = \hat{A} - \alpha + \alpha = \hat{A}$

$\triangle ABC \sim \triangle DEF \rightarrow \frac{14}{1} = \frac{c}{AB} \rightarrow AB = 9/4$



$$\tan \beta = \frac{AM}{AF} = \frac{BC}{MB} \rightarrow \frac{c}{AF} = 2 \rightarrow AF = \frac{c}{2}$$

$$MF = \sqrt{\left(\frac{c}{2}\right)^2 + (c)^2} = \frac{c\sqrt{5}}{2}$$

$\hat{E}_1 = \hat{E}_2$ $\rightarrow \triangle DCE \sim \triangle MEB \rightarrow \frac{y}{c} = 2 \rightarrow cy = \sqrt{4^2 + c^2} = c\sqrt{5}$

$y = \sqrt{5}$

$$S_{FEM} = \frac{1}{2} \times MF \times EM = \frac{1}{2} \times \frac{c\sqrt{5}}{2} \times \sqrt{5} = \frac{5c}{4}$$

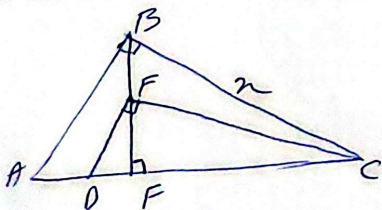
$$11^2 + 2^2 \rightarrow AF = \sqrt{11^2 + 2^2}$$

$$\triangle EAC \sim \triangle ACD \rightarrow \frac{AE}{ED} = \frac{EC}{AE} \rightarrow AE^2 = ED \times EC$$

$$11^2 + 2^2 = ED \times EC \rightarrow 11^2 + 2^2 = 1 \cdot 0 + 1 \cdot n \rightarrow n^2 - 1 \cdot n + 21 = 0$$

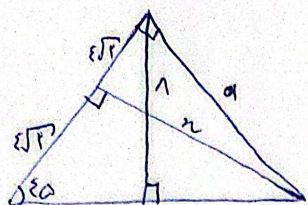
$$\rightarrow (n-1)(n-21) = 0 \rightarrow \begin{cases} n = 1 \\ n = 21 \end{cases}$$

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



$$2^2 = CF \times AC \rightarrow 2^2 = 14 \times 2$$

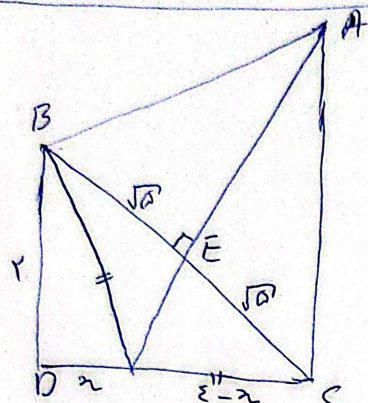
$$2 = 14 \times 2 \rightarrow 2 = 14 \times 2$$



$$2a^2 = 16^2 \rightarrow a^2 = 16 \times 14 \rightarrow a = 4 \times 2\sqrt{2} = 8\sqrt{2}$$

$$z^2 = \sqrt{(8\sqrt{2})^2 + (4\sqrt{2})^2} = \sqrt{144} = 12$$

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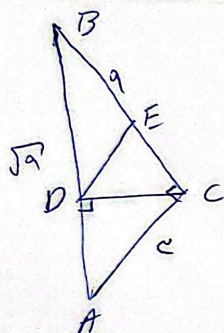
$$BC = \sqrt{2^2 + 3^2} = \sqrt{13}$$

$$(x - z)^2 = x^2 + z^2 \rightarrow x^2 - 2xz + z^2 = x^2 + z^2 \rightarrow z = \frac{c}{r}$$

$$BO \rightarrow x - z \rightarrow x - \frac{c}{r} = \frac{a}{r} \quad \triangle OEC \Rightarrow OE^2 = \left(\frac{a}{r}\right)^2 - \left(\frac{c}{r}\right)^2 = \frac{a^2 - c^2}{r^2}$$

$$OE = \frac{\sqrt{a^2 - c^2}}{r} \rightarrow AO \times OE = AC^2 \rightarrow AO \times \frac{\sqrt{a^2 - c^2}}{r} = \left(\frac{a}{r}\right)^2$$

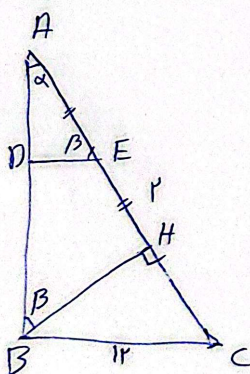
$$AO = \frac{r a^2}{r \sqrt{a^2 - c^2}} \rightarrow \frac{a \sqrt{a^2 - c^2}}{r} \quad S_{AEB} = \frac{1}{2} \times \sqrt{a^2 - c^2} \times \left(\frac{a \sqrt{a^2 - c^2}}{r} - \frac{\sqrt{a^2 - c^2}}{r}\right) = \frac{a^2 - c^2}{2r}$$



$$BC^2 = BD \times AB \rightarrow 9^2 = BD \times \sqrt{9^2 + 16^2} \rightarrow BD = \frac{81}{25} = \frac{16}{5}$$

$$BD^2 = BE \times BC \rightarrow \left(\frac{16}{5}\right)^2 = BE \times 9 \quad BE = \frac{256}{45} = \frac{16}{9}$$

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$$AC = 2$$

$$BH \times AC = AB \times BC \rightarrow BH \times 2 = 16 \times 2 \rightarrow BH = \frac{32}{2} = 16$$

$$AH = \sqrt{(16)^2 - (14)^2} = 12 \rightarrow HE = 2$$

$$\begin{cases} \hat{A} = \hat{A} \\ \hat{H} = \hat{D} \end{cases} \rightarrow \triangle ADE \sim \triangle AHB \rightarrow \frac{DE}{BH} = \frac{AE}{AB}$$

$$\rightarrow \frac{DE}{16} = \frac{2}{14} \rightarrow DE = \frac{16}{7} = \frac{16}{7}$$

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