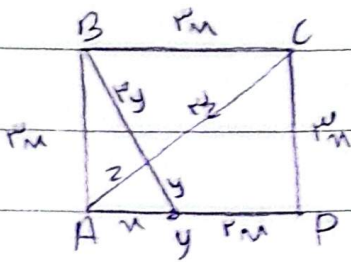


19

مسئله 19 در هندسه

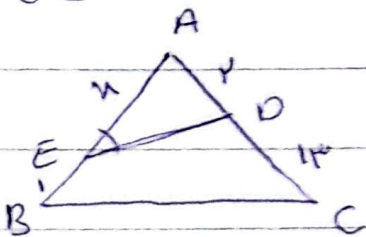


$$\sqrt{(rm)^2 + m^2} = m\sqrt{r} = BE = ry \rightarrow y = \frac{m\sqrt{r}}{r}$$

$$\triangle AEF \sim \triangle BCF \rightarrow \frac{FE}{FB} = \frac{AF}{FC} = \frac{AE}{BC}$$

$$\frac{y}{z} = \frac{\frac{m\sqrt{r}}{r}}{\frac{rm}{r}} = \frac{\sqrt{r}}{r}$$

$$\sqrt{r(rm)^2} = rm\sqrt{r} \Rightarrow rz \rightarrow z = \frac{rm\sqrt{r}}{r}$$



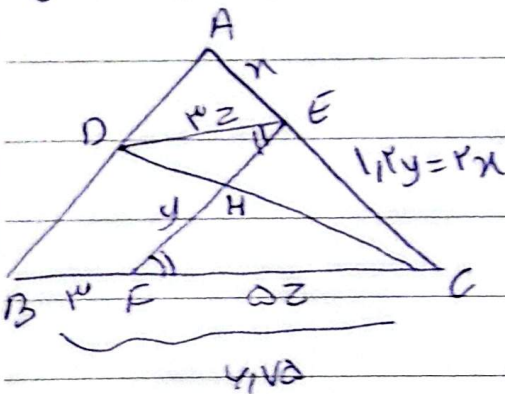
$$\triangle AED \sim \triangle ACB \rightarrow \hat{A} = \hat{A} \quad \left. \begin{array}{l} \hat{AED} = \hat{ACB} \\ \hat{ADE} = \hat{ABC} \end{array} \right\} \rightarrow \triangle AED \sim \triangle ACB$$

$$\frac{r}{n+1} = \frac{n}{10} \rightarrow r = n^2 + n$$

$$n^2 + n - r \rightarrow (n+4)(n-2) = 0$$

$$\downarrow$$

$$n = 2$$



$$DE \parallel BC \quad BF = r$$

$$ry = \Delta m \quad y = \frac{\Delta}{r} m$$

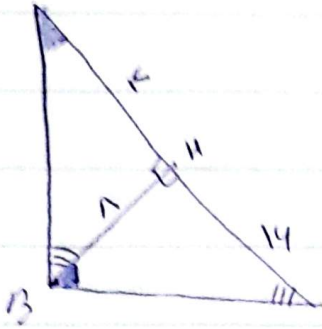
$$\triangle AED \sim \triangle ABC \rightarrow \frac{m}{n+1/ry} = \frac{DE}{BC} = \frac{1}{r}$$

$$\triangle DEH \sim \triangle FCH \rightarrow \frac{n}{y} = \frac{DE}{RF} = \frac{r}{\Delta}$$

$$\Rightarrow \frac{n}{n+1/ry} = \frac{n}{y+r} \quad \left. \begin{array}{l} n+r = \frac{\Delta}{r} n + r \\ \Delta n = \frac{\Delta}{r} n + r \end{array} \right\}$$

$$\Delta z + r = \Delta z \quad z = \frac{r}{r}$$

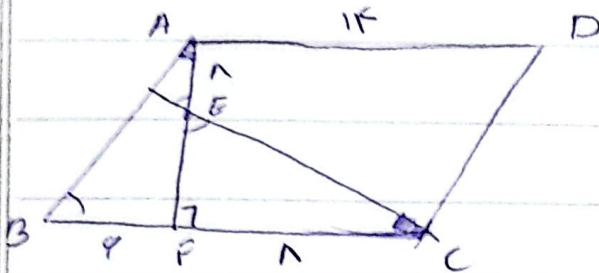
$$\Delta z = 4/10$$



$$AH \times CH = BH^2 \rightarrow x \times 14 = 11^2 \therefore x = \frac{121}{14}$$

$$\frac{BC}{AB} = \frac{HC}{HB} = \frac{14}{11} = \frac{14}{11}$$

(5)



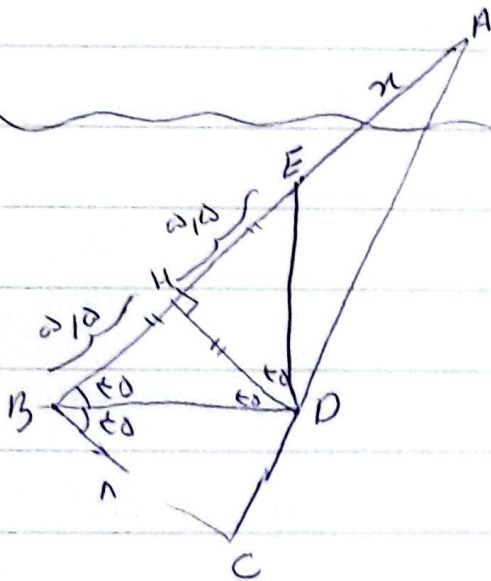
$$\triangle AEB, \triangle EFC \therefore$$

$$\frac{EC}{AF} = \frac{EF}{BF} = \frac{11}{EF+11} = \frac{EF}{4}$$

$$x = EF + AFE \rightarrow EF + 11FE = x$$

$$(FE+11)(FE-4) \rightarrow FE = 4$$

$$FE + AE = AF = 11$$



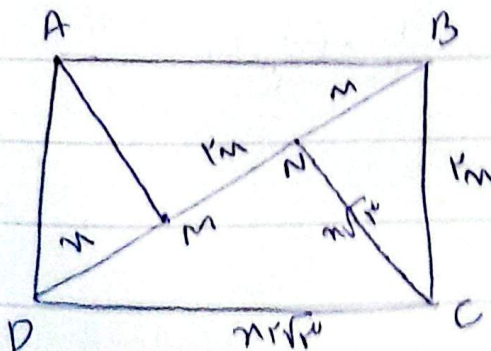
$$\frac{EH}{BH} = 1 \quad EH = BH = \frac{11}{2} = 5.5 \therefore x = 4$$

$$\frac{x + 4}{x + 11} = \frac{4}{11}$$

$$11x + 44 = 4x + 44 \therefore x = 4$$

$$14/11 = 4/11 \rightarrow x = 4, 4$$

(5)



$$NBC, DBC \rightarrow \frac{BC}{DB} = \frac{NB}{BC} \therefore$$

$$14x = FM^2 + m^2 \rightarrow BC = m$$

$$(BC)^2 = FM^2 \rightarrow BC^2 = FM$$

$$\frac{\sqrt{r} n \times m}{r}$$

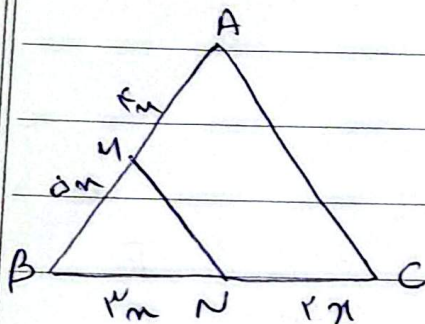
$$r m \sqrt{r}$$

$$= \frac{m \sqrt{r}}{r}$$

$$r \sqrt{r} m^r$$

$$= \frac{1}{n}$$

$$\frac{\sin \theta}{\sin \phi} = n$$

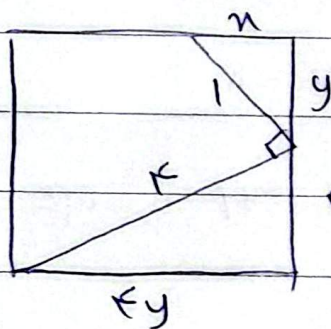


$$\frac{BN \times BM \times \frac{1}{r} \times \sin 13^\circ}{BC \times AB \times \frac{1}{r} \times \sin B}$$

$$\frac{BM \times r m}{m n \times AB} = \frac{1}{r} \rightarrow \frac{BM}{AB} = \frac{a}{a}$$

$$\frac{BM}{AM} = \frac{a}{r}$$

$$\frac{BM}{AM} = \frac{a}{r}$$



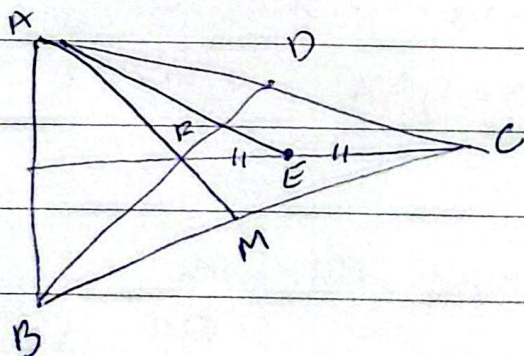
$$r_m = r_y$$

$$r_y = r_m + y \rightarrow r_y = r_m \cdot a$$

$$\sqrt{a y^2 + 14 y^2} = 2 y = r$$

$$y = \frac{r}{a}$$

$$\left(r \times \frac{r}{a} \right)^2 = \frac{r a y}{r a}$$



$$AG = r GM = \frac{r}{r} AM$$

$$BD = r GP$$

$$FB = \frac{1}{r} GB$$

$$FD = \frac{1}{r} \times \left(\frac{1}{r} BD \right) = \frac{BD}{r} = a$$

$$\frac{S_{ABC}}{S_{BMN}} = \frac{\frac{1}{r} \times AB \times BC \times \sin B}{\frac{1}{r} \times BM \times BN \times \sin B} = r$$

$$\frac{AB}{BM} = \frac{a}{a} \rightarrow \frac{AB - BM}{BM} = \frac{r}{a} \rightarrow \frac{BM}{AM} = \frac{a}{r}$$