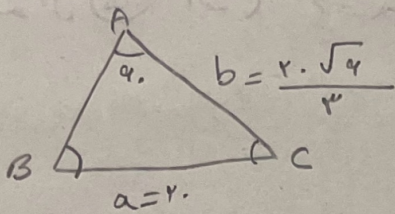


18, 15

پارسین



$$\hat{B} + \hat{C} = 180^\circ$$

$$\hat{A} = 4^\circ$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

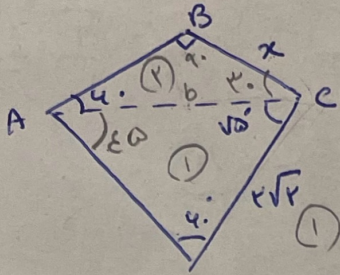
$$\frac{2}{\sin 4^\circ} = \frac{2 \cdot \sqrt{4}}{\sin B} \Rightarrow \sin B = \frac{2 \cdot \sqrt{4}}{2 \cdot \sin 4^\circ} = \frac{\sqrt{4}}{\sin 4^\circ}$$

سوال 1

$$\hat{A} = 4^\circ, \hat{B} = 4^\circ, \hat{C} = 180^\circ - 4^\circ - 4^\circ = 172^\circ$$

$$\frac{1 - \sqrt{18}}{2} = \frac{1 - \sqrt{18}}{2 \cdot \sqrt{2} \cdot \sqrt{2}} = \frac{\sqrt{18}}{4} = \frac{\sqrt{2} \cdot \sqrt{2}}{4} = \frac{\sqrt{2}}{2}$$

$$\Rightarrow \hat{B} = 45^\circ$$



$$4^\circ + 172^\circ = 180^\circ$$

$$180^\circ - 172^\circ = 8^\circ$$

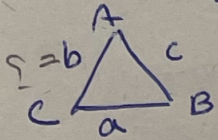
$$\frac{2\sqrt{2}}{\sin 4^\circ} = \frac{b}{\sin 4^\circ} \Rightarrow \frac{2\sqrt{2}}{\frac{\sqrt{2}}{2}} = \frac{b}{\frac{\sqrt{2}}{2}} \Rightarrow b = 2\sqrt{2} \times \frac{\sqrt{2}}{2} = 2$$

سوال 2

$$\frac{2\sqrt{2}}{\sin 4^\circ} = \frac{x}{\sin 4^\circ} \Rightarrow \frac{2\sqrt{2}}{1} = \frac{x}{\frac{\sqrt{2}}{2}} \Rightarrow x = 2\sqrt{2} \times \frac{\sqrt{2}}{2} = 2$$

$$(b^2 - r) \frac{\sin \hat{C}}{\sin \hat{B}} = c$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = K$$



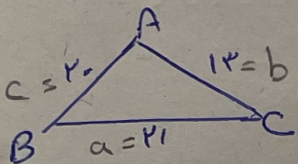
$$\Rightarrow \sin C = \frac{c}{K}, \sin B = \frac{b}{K}$$

$$\frac{\sin C}{\sin B} = \frac{c}{b^2 - r} \Rightarrow \frac{\frac{c}{K}}{\frac{b}{K}} = \frac{c}{b^2 - r} \Rightarrow \frac{c}{b} = \frac{c}{b^2 - r} \Rightarrow b^2 - b - r = 0$$

$$\Rightarrow b = -1 \times$$

$$\boxed{b = 2} \checkmark$$

سوال 4



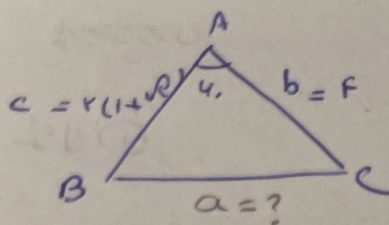
$$\sin \hat{B} = ?$$

$$b^2 = a^2 + c^2 - 2ac \cos B \Rightarrow 149 = 149 + 149 - 2 \times 149 \times \cos B$$

$$149 = 149 - 149 \cos B \Rightarrow 149 \cos B = 149 - 149 \Rightarrow \cos B = \frac{149}{149}$$

$$\cos^2 B + \sin^2 B = 1 \Rightarrow \boxed{\sin B = 0.4}$$

سؤال ٥ (الف) $a = ?$ (ب) $\hat{B} = ?$ (ج) $\hat{C} = ?$



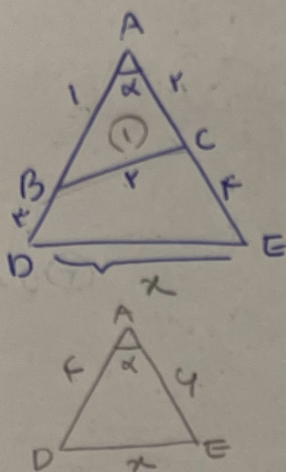
$$a^2 = b^2 + c^2 - 2bc \cos \hat{A} \Rightarrow a^2 = 7^2 + 14^2 - 2(7)(14) \cos 45^\circ$$

$$\Rightarrow a^2 = 49 + 196 - 196 \cos 45^\circ = 245 - 196 \times \frac{1}{\sqrt{2}} = 245 - 140\sqrt{2}$$

$$245 - 140\sqrt{2} = 49 \Rightarrow a = \sqrt{200} = 10\sqrt{2}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \Rightarrow \frac{10\sqrt{2}}{\sin 45^\circ} = \frac{7}{\sin B} \Rightarrow \sin B = \frac{7 \sin 45^\circ}{10\sqrt{2}} = \frac{7}{20}$$

$$\hat{B} = \sin^{-1} \left(\frac{7}{20} \right) \quad \hat{C} = 180^\circ - (45^\circ + \hat{B}) = 135^\circ - \hat{B} \Rightarrow \hat{C} = 135^\circ - \sin^{-1} \left(\frac{7}{20} \right)$$



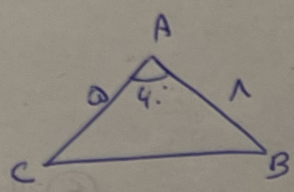
سؤال ٦ (الف) $BC^2 = AC^2 + AB^2 - 2(AC)(AB) \cos A$

$$x^2 = 1^2 + 1^2 - 2(1)(1) \cos \alpha \Rightarrow x^2 = 2 - 2 \cos \alpha$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc} = \frac{1^2 + 1^2 - x^2}{2(1)(1)} = \frac{2 - x^2}{2} \Rightarrow \cos A = \frac{1 - x^2/2}{1}$$

$$x^2 = 2 - 2 \cos A = 2 - 2 \left(\frac{1 - x^2/2}{1} \right) = 2 - 2 + x^2 = x^2$$

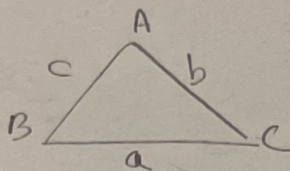
$$x = \sqrt{2} \Rightarrow x = \sqrt{2}$$



سؤال ٧ (الف) $BC = ?$ (ب) $S_{\triangle ABC} = ?$

$$BC^2 = 1^2 + 1^2 - 2(1)(1) \cos 45^\circ = 2 - \sqrt{2} \Rightarrow BC = \sqrt{2 - \sqrt{2}}$$

$$S_{\triangle ABC} = \frac{1}{2} \times AC \times AB \times \sin 45^\circ = \frac{1}{2} \times 1 \times 1 \times \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{4}$$



$$\frac{b^2 + c^2 + rbc - a^2}{bc + bccos\hat{A}}$$

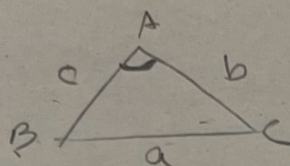
$$\frac{(b+c)^2 - a^2}{bc(\cos\hat{A} + 1)} = ?$$

سؤال ٩

$$\frac{b^2 + c^2 + rbc - b^2 - c^2 + rbc \cos A}{bc(1 + \cos A)} = \frac{rbc(1 + \cos A)}{bc(1 + \cos A)} = \boxed{r}$$

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$$\frac{a^2 + b^2 - c^2}{a + b - c} = a^2$$



سؤال ٩

no

$$\cos \hat{A} = ?$$

$$\frac{a^2 + b^2 - c^2}{a + b - c} = b^2 + c^2 - rbc \cos \hat{A} \Rightarrow \frac{a^2 + b^2 - c^2}{a + b - c} - (b^2 + c^2) = -rbc \cos \hat{A}$$

$$a^2 + b^2 - c^2 = a^2 + a^2 b - a^2 c$$

$$b^2 - c^2 = a^2(b - c)$$

$$b^2 + c^2 + bc = a^2 \rightarrow b^2 + c^2 - bc = a^2 - rbc \cos A$$

$$\cos \hat{A} = \frac{1}{r} \rightarrow \hat{A} = 120^\circ$$

$$S = r$$

$$S = \frac{1}{r} \times AB \times AC \times \sin r$$

سؤال ١٠

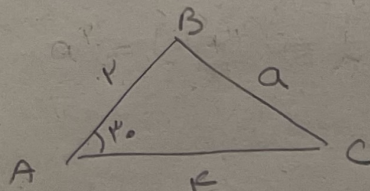
$$a^2 = ?$$

$$S = \frac{1}{r} \times (r - \cos \theta)(1 + r \cos \theta) \times \frac{1}{r}$$

$$r = \frac{1}{r} (r + a \cos \theta - \cos \theta - r \cos \theta) \Rightarrow a \cos \theta$$

$$\Rightarrow r = \frac{1}{r} (r + a \cos \theta) \Rightarrow r = \frac{r}{r} + \frac{a}{r} \cos \theta \Rightarrow \frac{a}{r} = \frac{a}{r} \cos \theta \Rightarrow \cos \theta = 1$$

$$\Rightarrow \theta = 0$$



$$a^2 = 14 + r - r(6)(r) \cos r \Rightarrow a^2 = r - 14 \left(\frac{\sqrt{r}}{r} \right) = r - 14\sqrt{r}$$

$$\Rightarrow \boxed{a^2 = r - 14\sqrt{r}}$$