

$$b = \sqrt{3}$$

$$c = 2(1 + \sqrt{3})$$

$$\hat{A} = 40^\circ$$

$$a^2 = b^2 + c^2 - 2bc \cos \hat{A}$$

$$a = ? \text{ (الف) } \textcircled{5}$$

$$a^2 = 14 + (2 + \sqrt{3})^2 - 2(2)(\sqrt{3})(1 + \sqrt{3})\left(\frac{1}{2}\right) \Rightarrow$$

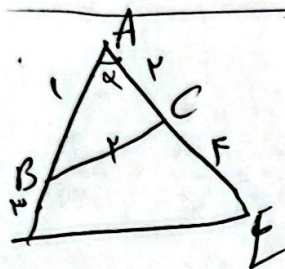
$$a^2 = 14 + 4 + 12 + 4\sqrt{3} - 2 - 4\sqrt{3} = 24$$

$$a = \sqrt{24} = 2\sqrt{6}$$

$$\frac{a}{\sin \hat{A}} = \frac{b}{\sin \hat{B}} = \frac{c}{\sin \hat{C}} \Rightarrow \frac{2\sqrt{6}}{\frac{\sqrt{3}}{2}} = \frac{2}{\sin \hat{B}} \Rightarrow \sin \hat{B} = \frac{\sqrt{3}}{2} \Rightarrow$$

$$\frac{2\sqrt{6}}{\frac{\sqrt{3}}{2}} = \frac{2(1 + \sqrt{3})}{\sin \hat{C}} \Rightarrow \hat{C} = 110^\circ \text{ (40 + 90)} = 70^\circ$$

$$\hat{B} = 20^\circ \text{ (نقص 180)}$$



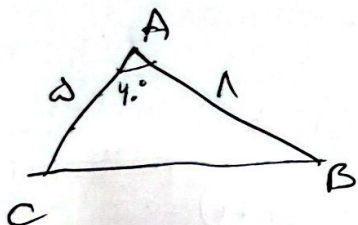
$$\Rightarrow r = 2 + 1 - 2(2)(1) \cos 20^\circ \Rightarrow$$

$$2 = a - r \cos 20^\circ \Rightarrow r \cos 20^\circ = \frac{1}{2}$$

$$\textcircled{4}$$

$$ADE \text{ قائم الزاوية: } DE^2 = 14 + 14 - 2(2)(2) \cos 90^\circ = 24 - 4 = 20$$

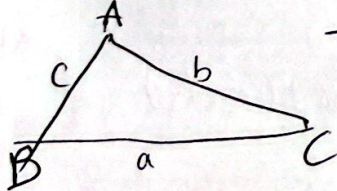
$$DE = \sqrt{20} = 2\sqrt{5}$$



$$BC^2 = 4 + 1 - 2(2)(1) \cos 40^\circ = \text{ (الف) } \textcircled{7}$$

$$\Rightarrow BC^2 = 4 - 1 = 3 \Rightarrow BC = \sqrt{3}$$

$$S_{ABC} = \frac{1}{2} AB \times AC \times \sin \hat{A} = \frac{1}{2} \times 2 \times 1 \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$$



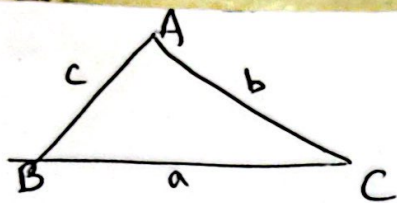
$$\frac{(b+c)^2 - a^2}{bc(\cos \hat{A} + 1)} = \frac{b^2 + c^2 + 2bc - a^2}{bc(\cos \hat{A} + 1)} = \textcircled{1}$$

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

$$\textcircled{2}$$

$$a^2 = b^2 + c^2 - 2bc \cos \hat{A}$$

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

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

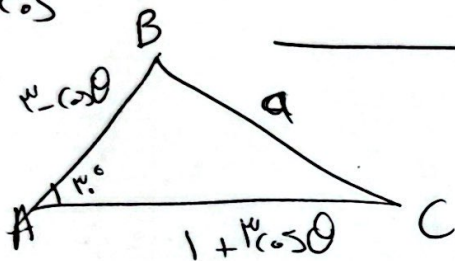
$$a^2 + b^2 - c^2 = a + a^2(b - c)$$

$$a^2 + b^2 - c^2 = a + a^2(b - c) \Rightarrow (b - c)(b^2 + bc + c^2) = a^2(b - c)$$

$$\Rightarrow b^2 + c^2 + bc = a^2$$

$$\Rightarrow b^2 + c^2 - 2bc \cos \hat{A} = a^2$$

$$\cos \hat{A} = \frac{1}{2} \Rightarrow \hat{A} = 120^\circ$$



$$S_{ABC} = 1$$

$$a^2 = ?$$

$$S_{ABC} = \frac{1}{2} \times \frac{1}{2} (1 + \sqrt{3} \cos \theta) (\sqrt{3} - \cos \theta) = 1 \Rightarrow \sqrt{3} - \sqrt{3} \cos \theta + \cos \theta - \cos \theta = 1$$

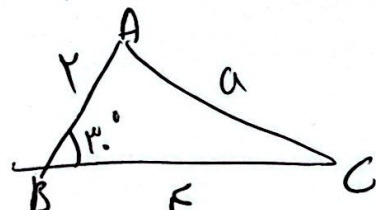
$$\Rightarrow -\sqrt{3} \cos \theta + 1 \cos \theta - 1 = 0 \Rightarrow \sqrt{3} \cos \theta - 1 \cos \theta + 1 = 0 \rightarrow$$

$$\cos \theta - 1 \cos \theta + 1 = 0 \rightarrow (\cos \theta - 1)(\cos \theta - 1) = 0 \Rightarrow \cos \theta = 1$$

$$\cos \theta = 1$$

$$\cos \theta = \frac{1}{\sqrt{3}}$$

$$\Rightarrow$$



$$a^2 = 1 + 1 - 2(1)(1)\left(\frac{1}{\sqrt{3}}\right) = 2 - \frac{2}{\sqrt{3}}$$