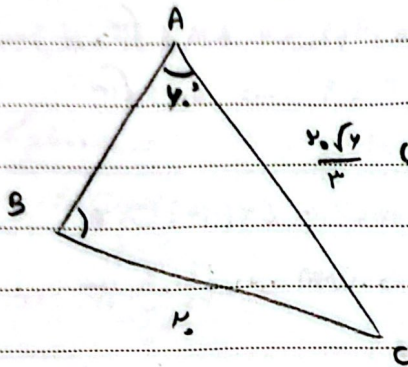


در این خدا ۲۲

تالیف شماره ۱۳

کیوان بکام نسب

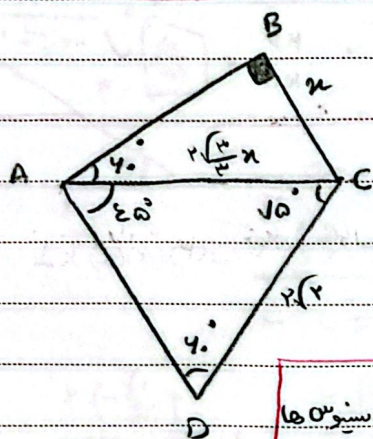


$$\hat{A} + \hat{B} + \hat{C} = 180^\circ \rightarrow \hat{A} = 40^\circ$$

$$\frac{3}{\sin 120^\circ} = \frac{2}{\sin 40^\circ} \rightarrow \frac{3}{\sqrt{3}} = \frac{2}{\sin 40^\circ}$$

$$\rightarrow \frac{3 \times \sqrt{3}}{\sqrt{3}} = \frac{2 \times \sqrt{3}}{\sin 40^\circ} \rightarrow \sin 40^\circ = \frac{2 \times \sqrt{3}}{3 \times \sqrt{3}} \rightarrow \sin 40^\circ = \frac{2}{3}$$

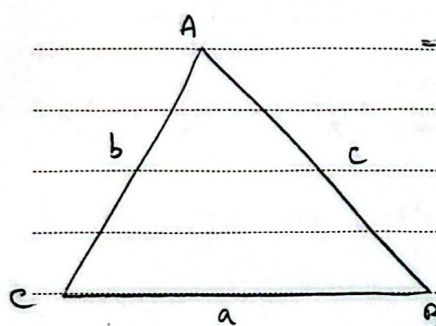
$$\hat{C} = 120^\circ - 40^\circ = 80^\circ \rightarrow \hat{B} = 40^\circ$$



$$\hat{A} = 180^\circ - (40^\circ + 40^\circ) = 100^\circ, AC = 2 \times \sqrt{3} \times \sin 40^\circ$$

$$\rightarrow \frac{2 \times \sqrt{3} \times \sin 40^\circ}{\sin 100^\circ} = \frac{2 \times \sqrt{3}}{\sin 80^\circ}$$

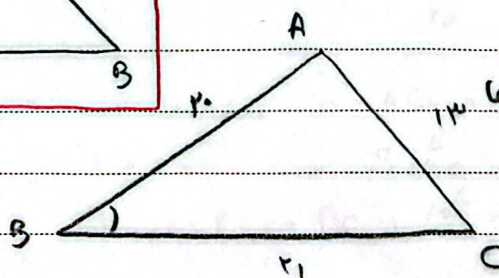
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \rightarrow \frac{\sin C}{\sin B} = \frac{c}{b}$$



$$\rightarrow (b^2 - c^2) \left(\frac{c}{b} \right) = c \rightarrow b^2 - c^2 = b \rightarrow b^2 - b - c = 0$$

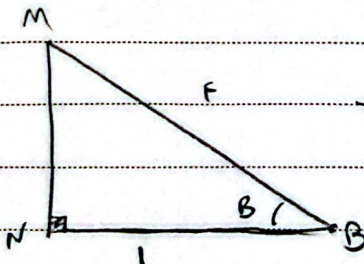
$$\rightarrow (b+1)(b-2) = 0 \rightarrow b = -1 \text{ غیر قابل قبول } \times$$

$$\boxed{b = 2} \text{ قابل قبول } \checkmark$$



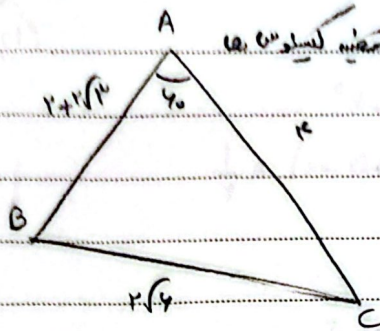
$$13^2 = 20^2 + 21^2 - 2(20)(21)\cos \hat{B}$$

$$\rightarrow 169 = 400 + 441 - 840 \cos \hat{B} \rightarrow 840 \cos \hat{B} = 672 \rightarrow \cos \hat{B} = \frac{672}{840} = \frac{4}{5}$$



$$\rightarrow MN^2 = MB^2 - NB^2 \rightarrow MN^2 = 14^2 - 7^2 = 105 \rightarrow MN = \sqrt{105}$$

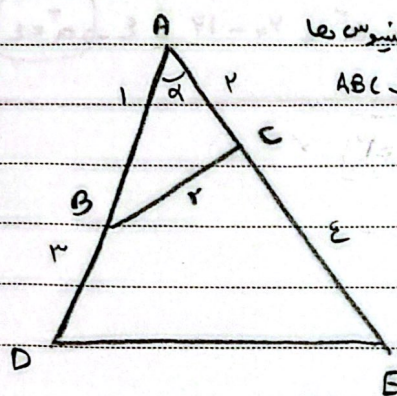
$$\rightarrow \sin \hat{B} = \frac{\sqrt{105}}{14}$$



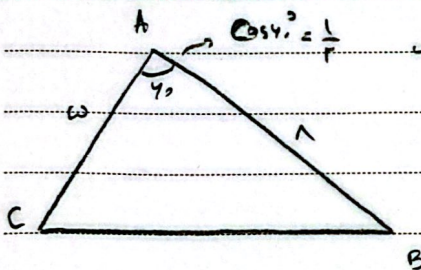
قانون کسینوس $\rightarrow BC^2 = 2^2 + 2^2 - 2(2)(2)\cos 45^\circ$ (3)
 $\rightarrow BC^2 = 4 + 4 - 4\sqrt{2} = 8 - 4\sqrt{2}$
 $\rightarrow BC^2 = 4 + 4 - 4 - 4\sqrt{2} = 4 - 4\sqrt{2}$ $\rightarrow BC^2 = 4 \rightarrow BC = 2$
 $\rightarrow a = BC = 2\sqrt{2}$ (نصف)

ب) قسینوس ها $= \frac{2\sqrt{2}}{\sqrt{2}\sin 45^\circ} = \frac{4}{\sin B} \rightarrow \frac{2\sqrt{2} \times 2}{\sqrt{2}} = \frac{4}{\sin B} \rightarrow \sin B = \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2}$

$\rightarrow \hat{B} = 45^\circ \rightarrow \hat{A} + \hat{B} + \hat{C} = 180^\circ \rightarrow 45^\circ + 45^\circ + \hat{C} = 180^\circ \rightarrow \hat{C} = 90^\circ$



قانون کسینوس ها $\rightarrow x^2 = 1^2 + 2^2 - (1)(2)\cos \alpha$ (4)
 در مثلث ABC $\rightarrow 2\cos \alpha = 1 \rightarrow \cos \alpha = \frac{1}{2}$
 قسینوس ها در $\rightarrow DE^2 = 1^2 + 2^2 - (1)(2)\cos \alpha = 1$
 در مثلث ADE $\rightarrow DE^2 = 1^2 - 1^2 = 0$
 $\Rightarrow DE = \sqrt{0} = 0$ ✓



$\cos 45^\circ = \frac{1}{\sqrt{2}} \rightarrow BC^2 = 2^2 + 1^2 - (2)(1)\cos 45^\circ$ (5)
 $\Rightarrow BC^2 = 4 + 1 - \sqrt{2} = 5 - \sqrt{2}$
 $\Rightarrow BC = \sqrt{5 - \sqrt{2}}$ ✓
 ب) $S = \frac{1}{2} AC \cdot AB \cdot \sin 45^\circ \rightarrow S = \frac{1}{2} \times 2 \times 1 \times \frac{\sqrt{2}}{2} = \frac{1}{2}\sqrt{2}$

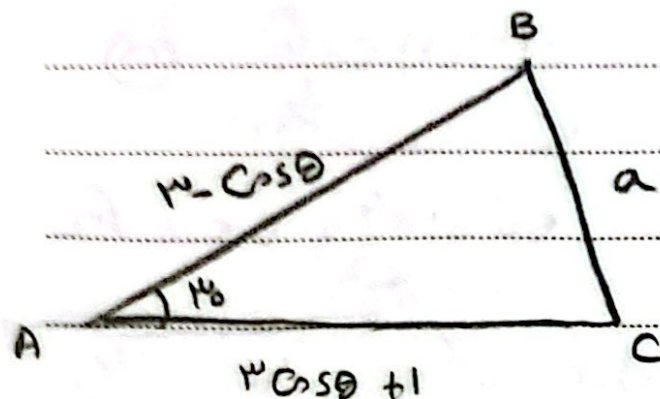
$\frac{(b+c)^2 - a^2}{bc(\cos A + 1)} = \frac{b^2 + c^2 + 2bc - a^2}{bc \cdot \cos A + bc} = \frac{\cancel{b^2} + \cancel{c^2} + 2bc - \cancel{b^2} - \cancel{c^2} + 2bc \cos A}{bc \cdot \cos A + bc}$ (6)

پس $a^2 = b^2 + c^2 - 2bc \cdot \cos A \Rightarrow \frac{2bc(1 + \cos A)}{bc(\cos A + 1)} = 2$ (7) ✓

$\frac{a^3 + b^3 - c^3}{a+b-c} = \frac{a^2(a+b-c) + a^2b - a^2c}{a+b-c} \rightarrow \frac{a^2b - a^2c}{a+b-c} = \frac{a^2(b-c)}{a+b-c}$ (8)

انتقاد $\rightarrow (b-c)(b^2 + bc + c^2) = a^2(b-c) \rightarrow b^2 + bc + c^2 = a^2$ ✓
 $\Rightarrow a^2 = b^2 + c^2 - 2bc \cdot \cos A \rightarrow bc = -2bc \cdot \cos A \rightarrow \cos A = -\frac{1}{2}$

(12)



$$S = \frac{1}{2} AB \cdot AC \cdot \sin 120^\circ$$

$$\Rightarrow \frac{1}{2} = \frac{1}{2} \times (12 \cos \theta) (12 \cos \theta + 1) \times \frac{1}{2}$$

$$\Rightarrow 1 = 9 \cos^2 \theta + 12 \cos \theta - 12 \cos^2 \theta - \cos^2 \theta \Rightarrow 12 \cos^2 \theta - 12 \cos \theta + 1 = 0$$

جمع ضرایب است

$$\left\{ \begin{array}{l} \cos \theta = +1 \rightarrow AB = 12, AC = 13 \\ \cos \theta = \frac{1}{3} \end{array} \right.$$

چون $\cos \theta$ باید در بازه $[-1, 1]$ باشد، این جواب غیر قابل قبول است.

$$\Rightarrow a^2 = 4 + 12 - (12)(4)(1) \Rightarrow a^2 = 16 - 48 = -32 \rightarrow a^2 = 4$$