

$B+C=110^\circ$
 $A+B+C=180^\circ \Rightarrow A=45^\circ$

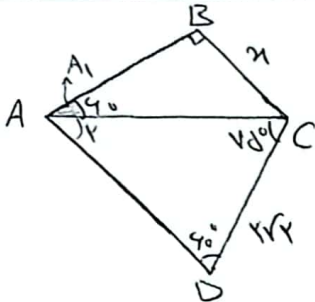
$$\rightarrow \frac{BC}{\sin A} = \frac{AC}{\sin B} \Rightarrow \frac{10}{\frac{\sqrt{5}}{5}} = \frac{10\sqrt{2}}{\sin B}$$

$$\sin B = \frac{\sqrt{5}}{5} \times \frac{\sqrt{5}}{5} \times \frac{1}{1} = \frac{\sqrt{5}}{5}$$

$\Rightarrow B=45^\circ$ ✓

$C=180-45-45=90^\circ$ ✓

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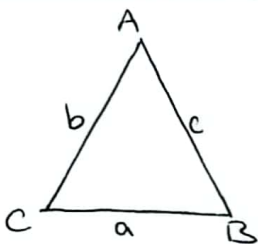
$$BC = AC \times \sin A \Rightarrow x = AC \times \frac{\sqrt{5}}{5} \Rightarrow AC = \frac{x}{\frac{\sqrt{5}}{5}}$$

$A+C+D=180^\circ \Rightarrow A+C+90=180$

$A+C=90^\circ$

$$\Rightarrow \frac{CD}{\sin A} = \frac{AC}{\sin D} \Rightarrow \frac{10\sqrt{2}}{\frac{\sqrt{5}}{5}} = \frac{\frac{x}{\frac{\sqrt{5}}{5}}}{\frac{\sqrt{5}}{5}} \Rightarrow \frac{10\sqrt{2}}{1} = \frac{x}{1} \Rightarrow x=10\sqrt{2}$$

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

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

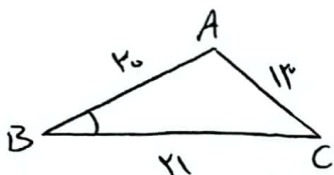
$\rightarrow b = b^2 - 2$

$b^2 - b - 2 = 0$

$(b-2)(b+1) = 0$

$b > 0$

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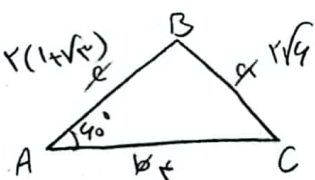
$$AC^2 = AB^2 + BC^2 - 2AB \times BC \times \cos B$$

$149 = 100 + 121 - 2 \times 10 \times 11 \times \cos B$

$\cos B = \frac{121 - 149}{2 \times 10 \times 11} = -\frac{1}{11} \Rightarrow \sin B = \sqrt{1 - \cos^2 B}$

$\sin B = \sqrt{1 - \left(\frac{1}{11}\right)^2} = \frac{\sqrt{120}}{11} = \frac{2\sqrt{30}}{11}$

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الف) $a^2 = b^2 + c^2 - 2bc \cos A$

$a^2 = 14^2 + 10^2 + 11^2 - 2 \times 14 \times 10 \times \frac{1}{2} = 196 + 100 + 121 - 140 = 277$
 $\Rightarrow a = \sqrt{277} = 16.64$ ✓

ب) $\frac{c}{\sin C} = \frac{b}{\sin B} = \frac{a}{\sin A} \Rightarrow \frac{10}{\sin C} = \frac{11}{\sin B} = \frac{16.64}{\sin 45^\circ}$

$\Rightarrow \sin B = \frac{11}{16.64} \Rightarrow B = 40^\circ$ ✓

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$$BC^2 = AB^2 + AC^2 - 2 \times AB \times AC \times \cos \alpha \Rightarrow 5 = 1 + 4 - 2 \times 1 \times 2 \times \cos \alpha \Rightarrow \cos \alpha = \frac{1}{2}$$

$$DE^2 = AD^2 + AE^2 - 2 \times AD \times AE \times \cos \alpha \Rightarrow 14 + 9 - 2 \times 3 \times 4 \times \frac{1}{2} = 25 - 12 = 13$$

منه
المثلث
BCED

$$DE = \sqrt{13} = \sqrt{13}$$

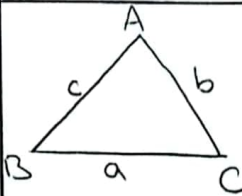
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$$\Rightarrow BC^2 = AB^2 + AC^2 - 2 \times AB \times AC \times \cos A \Rightarrow 49 + 16 - 1 \times 7 \times 7 \times \cos A = 49$$

$$|BC| = 7 \quad \checkmark$$

$$\Rightarrow S_{ABC} = \frac{1}{2} \times AC \times AB \times \sin A \Rightarrow \frac{1}{2} \times 7 \times 7 \times \sin A = 11\sqrt{3}$$

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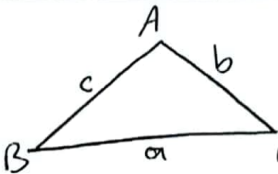


$$\Rightarrow a^2 = b^2 + c^2 - 2bc \cos A$$

$$(b+c)^2 - a^2 = b^2 + c^2 + 2bc - b^2 - c^2 + 2bc \cos A = 2bc(1 + \cos A)$$

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

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$$\frac{a^2 + b^2 - c^2}{a+b-c} \cdot a^2 \Rightarrow a^2 + b^2 - c^2 = a^2 + a^2(b-c)$$

$$(b-c)(b^2 + bc + c^2) = (b-c)(b^2 + c^2 - 2bc \cos A)$$

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

$$\cos A = \frac{1}{2} \quad \checkmark$$

$$\rightarrow A = 120^\circ$$

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$$S_{ABC} = \frac{1}{2} AB \times AC \times \sin A \Rightarrow 7 = \frac{1}{2} \times \frac{1}{2} \times (7 - \cos \theta)(1 + 2 \cos \theta)$$

$$\Rightarrow -7 \cos \theta + 1 \cos \theta + 7 = 1 \Rightarrow 7 \cos \theta - 1 \cos \theta + 6 = 0 \Rightarrow 6 \cos \theta = -5 \Rightarrow \cos \theta = -\frac{5}{6}$$

$$a^2 = AB^2 + AC^2 - 2 \times AB \times AC \times \cos A$$

$$\Rightarrow a^2 = 4 + 14 - 2 \times 2 \times 3 \times \frac{\sqrt{5}}{2} = 18 - 6\sqrt{5}$$

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