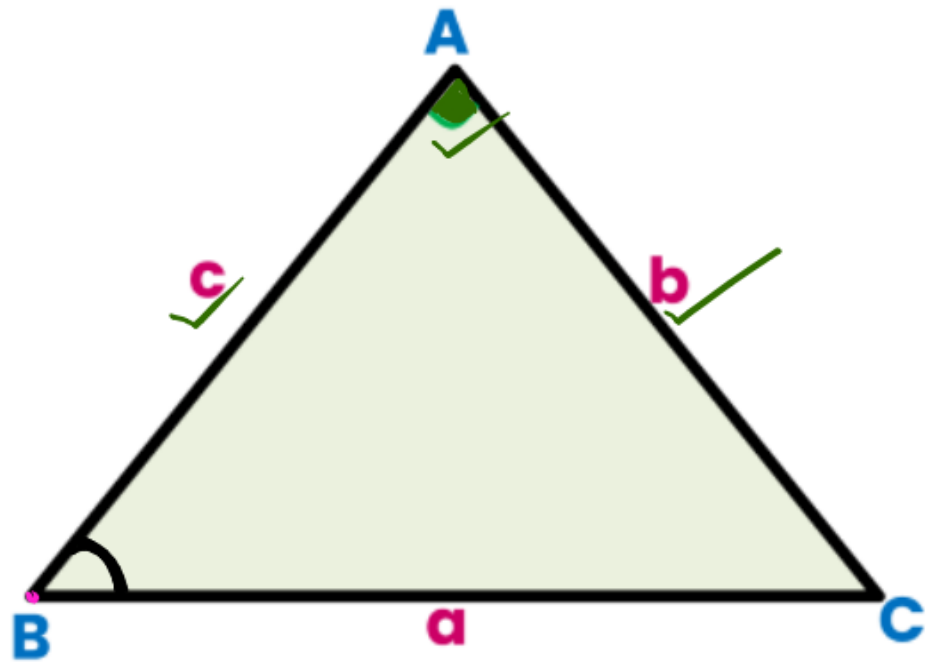


Co-sine Rule



- $a^2 = b^2 + c^2 - 2bc \cos A,$
- $b^2 = c^2 + a^2 - 2ca \cos B,$
- $c^2 = a^2 + b^2 - 2ab \cos C,$

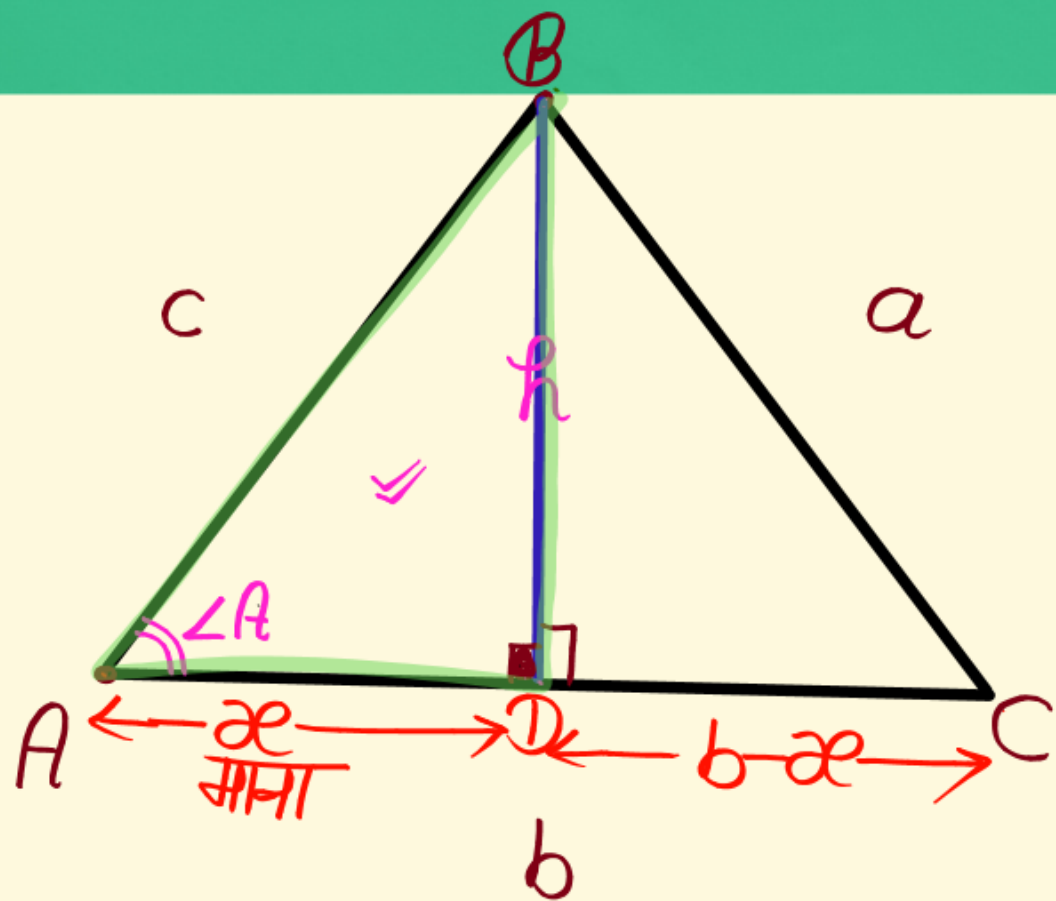
$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

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

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

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

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



$BD \perp AC$

$$\cos A = \frac{x}{c}$$

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

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

$$c^2 - x^2 = \cancel{x^2} - (b^2 + \cancel{x^2} - 2bx)$$

$$c^2 - x^2 = -b^2 + 2bx$$

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

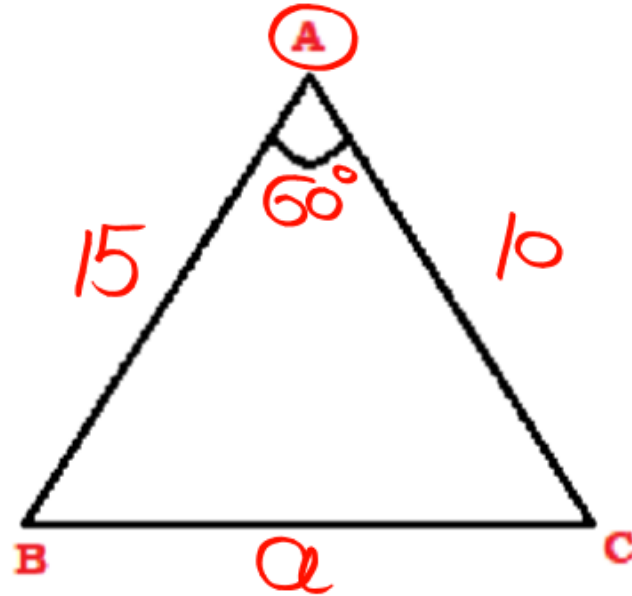
$$\frac{b^2 + c^2 - x^2}{2bc} = \cos A$$



21. In the triangle ABC, AB = 15 cm and AC = 10 cm and $\angle BAC = 60^\circ$. What is the value of the length of the side BC?

त्रिभुज ABC में, AB = 15 सेमी और AC = 10 सेमी और $\angle BAC = 60^\circ$ है। भुजा BC की लंबाई का मान क्या है?

DSSSB ASSISTANT GRADE-III 2024. (SSC CGL 2022)



[A] 16.66 cm

[C] 14.56 cm

[B] 18.24 cm

[D] 13.23 cm

$$Q^2 = 15^2 + 10^2 - 2 \times 15 \times 10 \times \cos 60^\circ$$

$$Q^2 = 325 - 150$$

$$Q^2 = 175$$

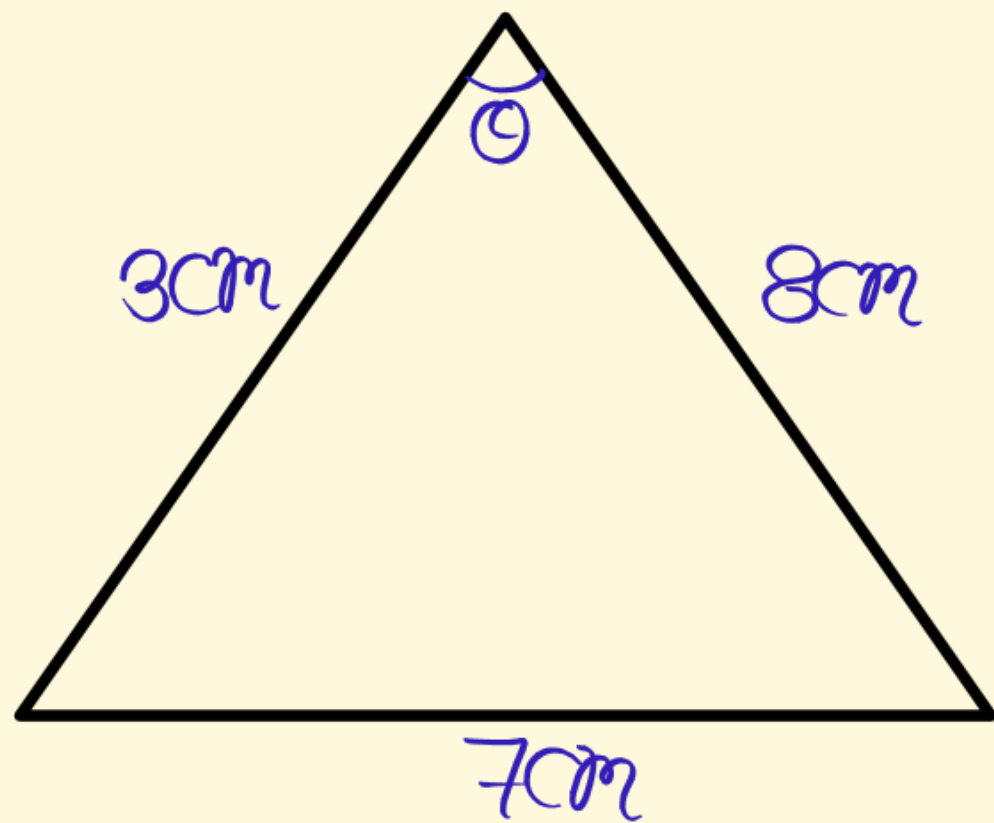
$$Q = \sqrt{175}$$

$$\cos 60^\circ = \frac{1}{2}$$

$$\sin 60^\circ = \frac{\sqrt{3}}{2}$$

$$169 = 13^2$$

$$196 = 14^2$$



$$\theta = ?$$

$$\cos \theta = \frac{3^2 + 8^2 - 7^2}{2 \times 3 \times 8}$$

$$\cos \theta = \frac{24}{48}$$

$$\cos \theta = \frac{1}{2} \Rightarrow \theta = 60^\circ$$

22. In triangle XYZ, sides $XY = 12$ cm, $YZ = 15$ cm and angle $\angle Y = 120^\circ$. What is the length of side XZ?

त्रिभुज XYZ में, भुजा $XY = 12$ cm, $YZ = 15$ cm और कोण $\angle Y = 120^\circ$ है। भुजा XZ की लंबाई कितनी है?

[RRB GROUP - D 2025]

[A] $3\sqrt{61}$ cm

[B] $5\sqrt{61}$ cm

[C] $\sqrt{61}$ cm

[D] $7\sqrt{61}$ cm

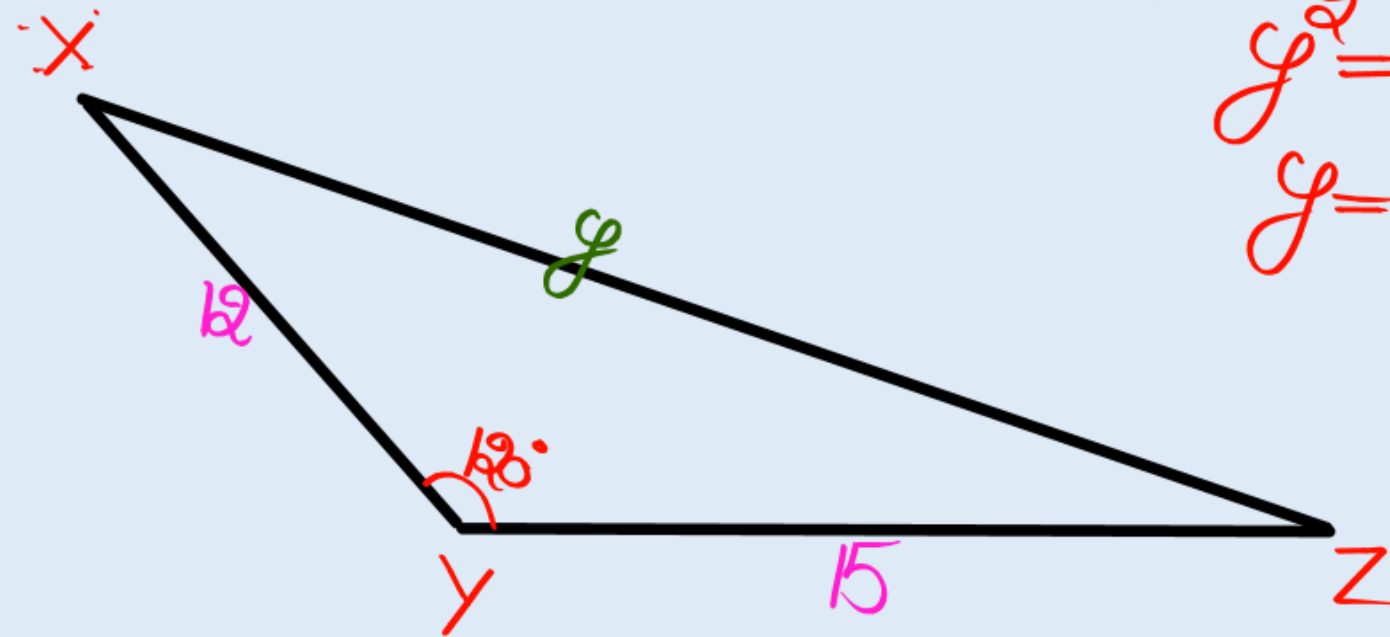
$$y^2 = 12^2 + 15^2 - 2 \times 12 \times 15 \times \frac{-1}{2}$$

$$y^2 = 369 + 180$$

$$y^2 = 549$$

$$y = 3\sqrt{61}$$

$$\cos 120^\circ = -\frac{1}{2}$$



22. In triangle XYZ, sides $XY = 12$ cm, $YZ = 15$ cm and angle $\angle Y = 120^\circ$. What is the length of side XZ?

त्रिभुज XYZ में, भुजा $XY = 12$ cm, $YZ = 15$ cm और कोण $\angle Y = 120^\circ$ है। भुजा XZ की लंबाई कितनी है?

[RRB GROUP - D 2025]

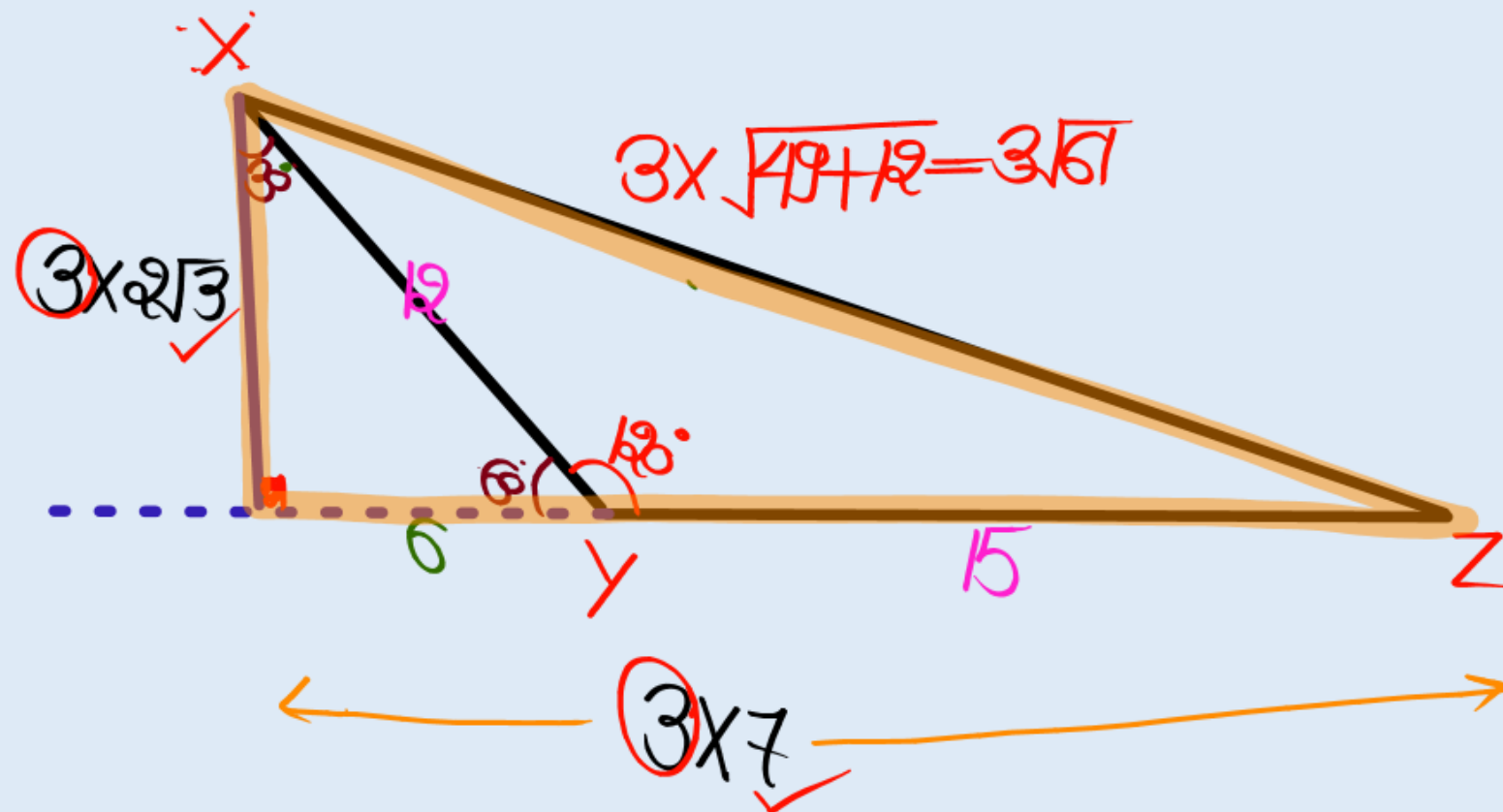
[A] $3\sqrt{61}$ cm

[B] $5\sqrt{61}$ cm

[C] $\sqrt{61}$ cm

[D] $7\sqrt{61}$ cm

$$\cos 120^\circ = -\frac{1}{2}$$



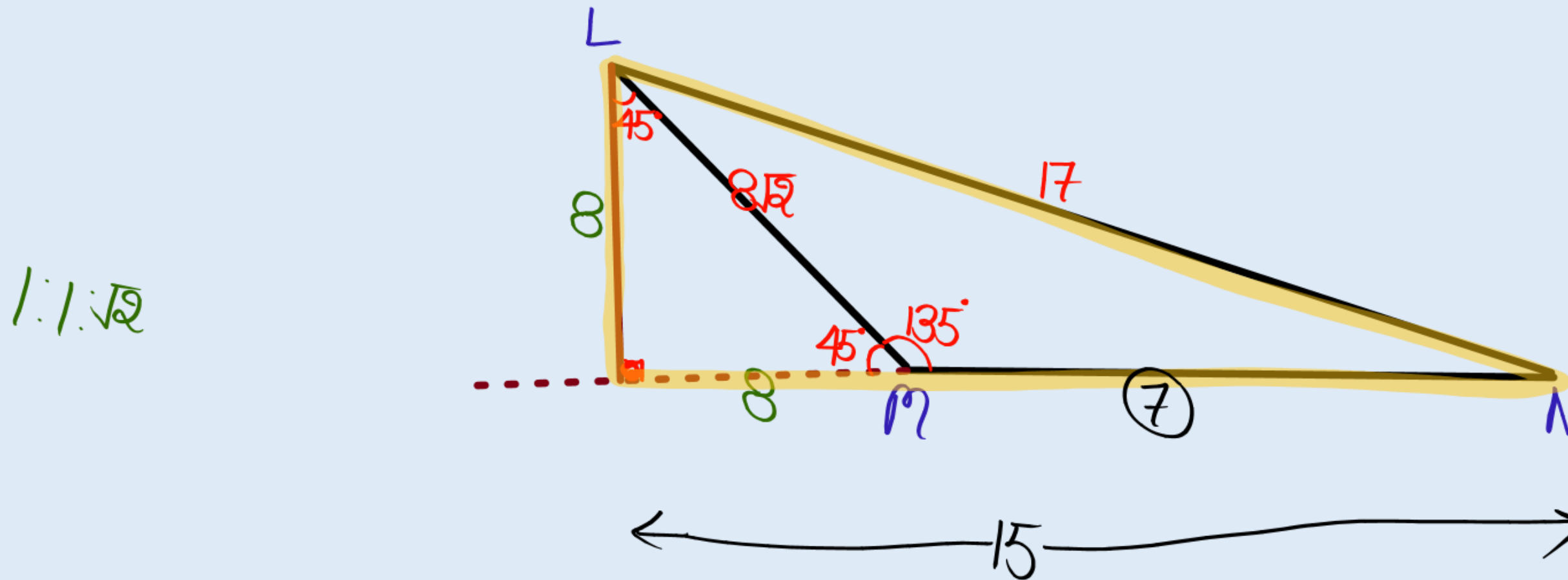
23. In $\triangle LMN$, $LM = 8\sqrt{2}$ cm, $LN = 17$ cm and $\angle LMN = 135^\circ$. What is the length (in cm) of MN ?
 $\triangle LMN$ में, $LM = 8\sqrt{2}$ cm, $LN = 17$ cm और $\angle LMN = 135^\circ$. MN की लंबाई (सेमी में) क्या है?
(SSC CHSL PRE 2020), (SSC CGL MAINS 2021)

✓ [A] 7

[B] 8

[C] $8\sqrt{2}$

[D] $7\sqrt{2}$



24. The side AB of a triangle is 80 cm long, whose perimeter is 170 cm. If angle ABC is equal to 60° , then the smallest side of the triangle is cm?

किसी त्रिभुज की भुजा AB, 80 cm लम्बी है, जिसका परिमाप 170 cm है। यदि कोण $ABC = 60^\circ$ है, तो त्रिभुज की सबसे छोटी भुजा का माप.....cm है?

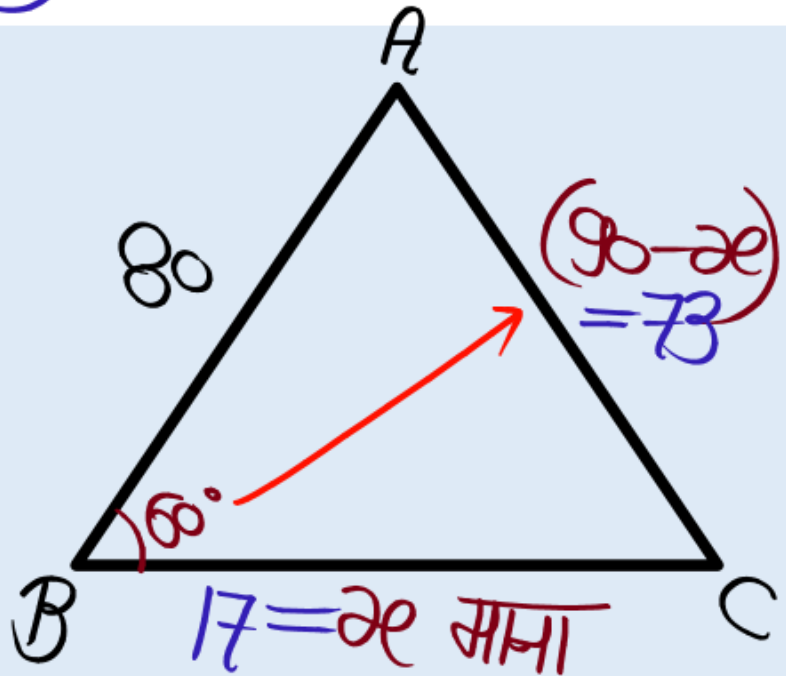
(SSC CPO 2018)

[A] 15

[B] 25

[C] 17

[D] 21



$$170 - 80 - x$$

$$(90-x)^2 = 80^2 + x^2 - 2 \times 80 \times x \times \frac{1}{2}$$

$$8100 + x^2 - 180x = 6400 + x^2 - 80x$$

$$1700 = 100x$$

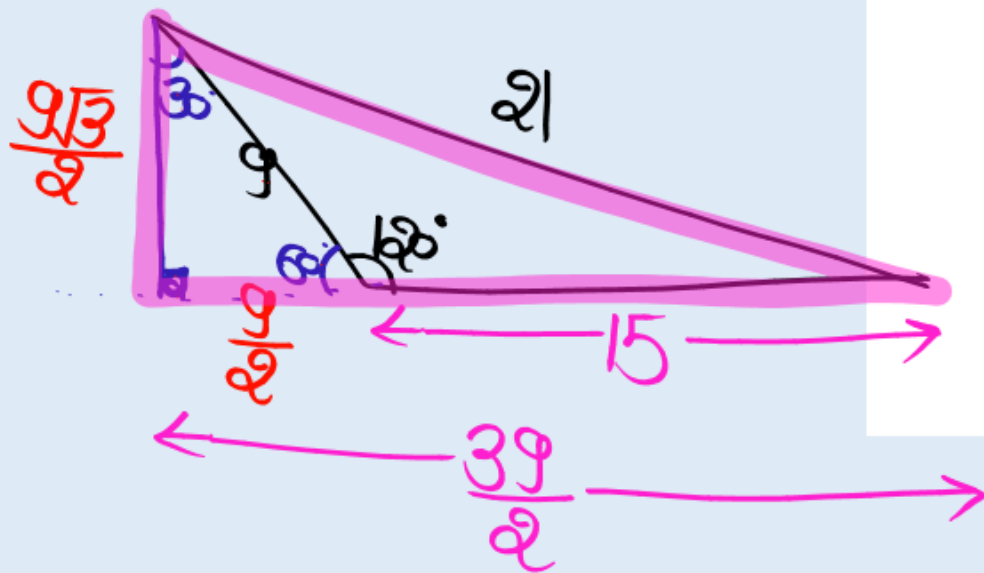
$$17 = x$$

$$21^2 = 9^2 + x^2 - 2 \times 9 \times x \times \cos 120^\circ$$

$$x^2 + 9x - 36 = 0$$

$$x = +15, -24$$

$$-36 = -15 \times 24$$

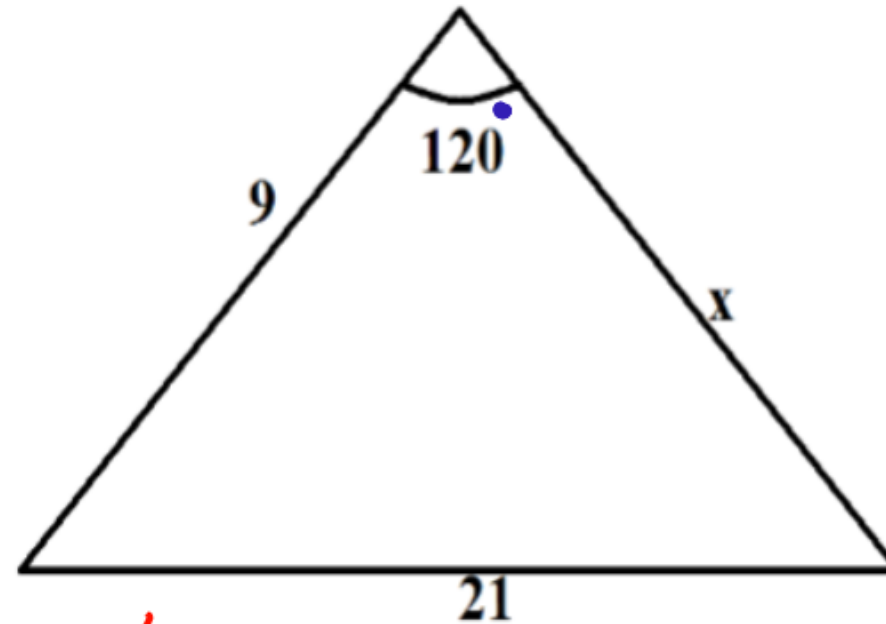


$$\frac{1764}{4}$$

$$\sqrt{\frac{1764}{4}} = \sqrt{\frac{1521}{4}} = \frac{39}{2}$$

25. In the given fig. find the area?

दिए गए चित्र में, त्रिभुज का क्षेत्रफल ज्ञात कीजिये



[A] $\frac{135\sqrt{3}}{4}$

[C] $\frac{120\sqrt{3}}{7}$

[B] $\frac{145\sqrt{3}}{4}$

[D] $\frac{145\sqrt{5}}{7}$

$$\text{Area} = \frac{1}{2} \times 9 \times 15 \times \frac{\sqrt{3}}{2}$$

26. In an obtuse-angled triangle ABC, the length of its longest side AB is 50 cm and one of the other two sides is 42 cm. If the area of the triangle is 294 cm², what is the length (in cm) of its third side?

एक अधिक-कोण त्रिभुज ABC में, इसकी सबसे लंबी भुजा AB की लंबाई 50 cm है और अन्य दो भुजाओं में से एक की लंबाई 42 cm है। यदि त्रिभुज का क्षेत्रफल 294 cm² है, तो इसकी तीसरी भुजा की लंबाई (cm में) क्या है?

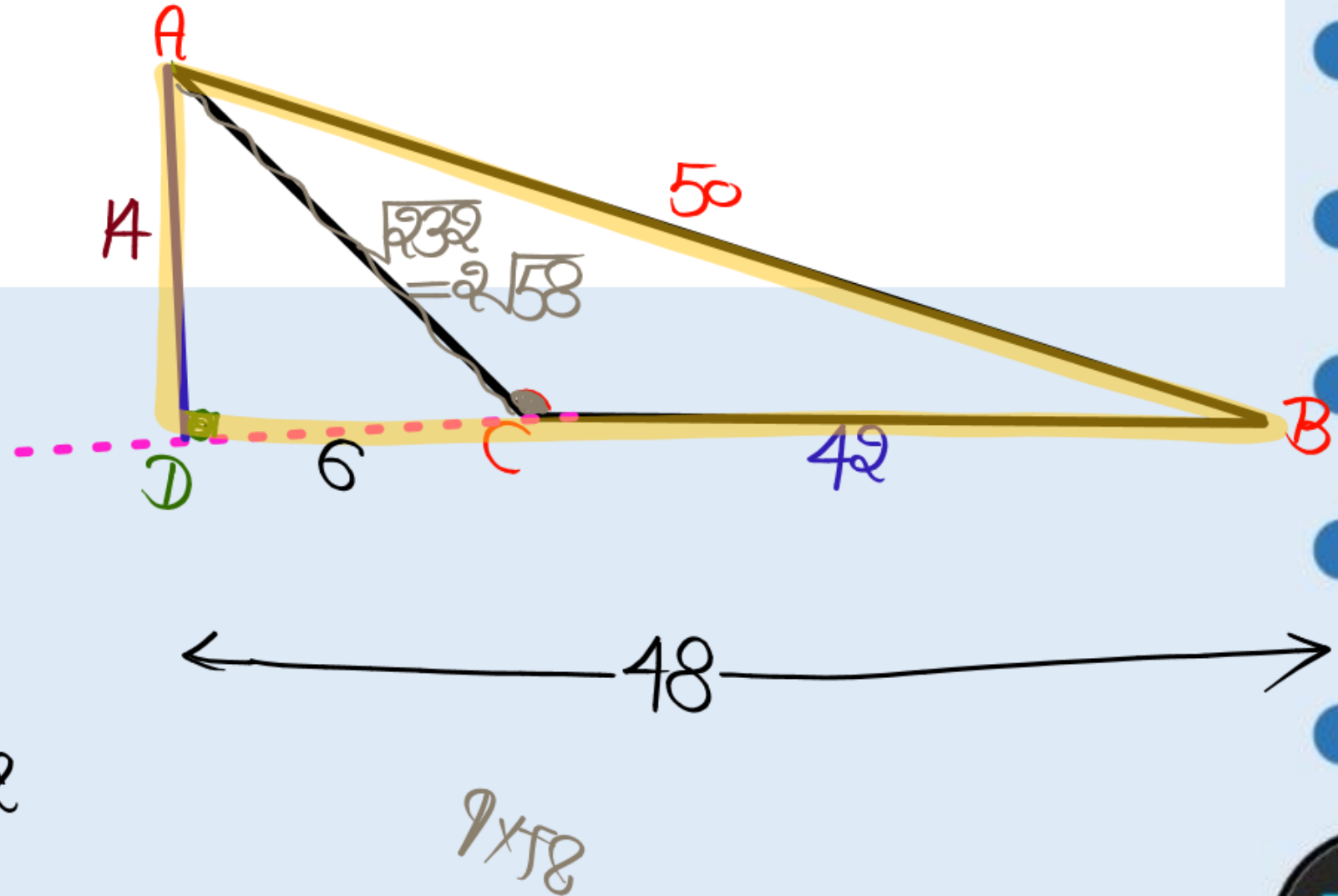
SSC CHSL PRE 2024

[A] ~~$8\sqrt{35}$~~

[C] $2\sqrt{58}$

[B] ~~$15\sqrt{21}$~~

[D] ~~$12\sqrt{43}$~~



$$\frac{1}{2} \times 42 \times AD = 294$$

$$AD = 14$$

$$\frac{1}{2} \times (48 + 6) \times 14$$

27. A triangle has its longest side as 38 cm. If one of the remaining sides is 10 cm and the area of the triangle is 152 sq.cm. Find the third side?

एक त्रिभुज की सबसे लंबी भुजा 38 सेमी है। यदि शेष भुजाओं में से एक 10 सेमी है और त्रिभुज का क्षेत्रफल 152 वर्ग सेमी है। तीसरा भुजा की लंबाई खोजें?

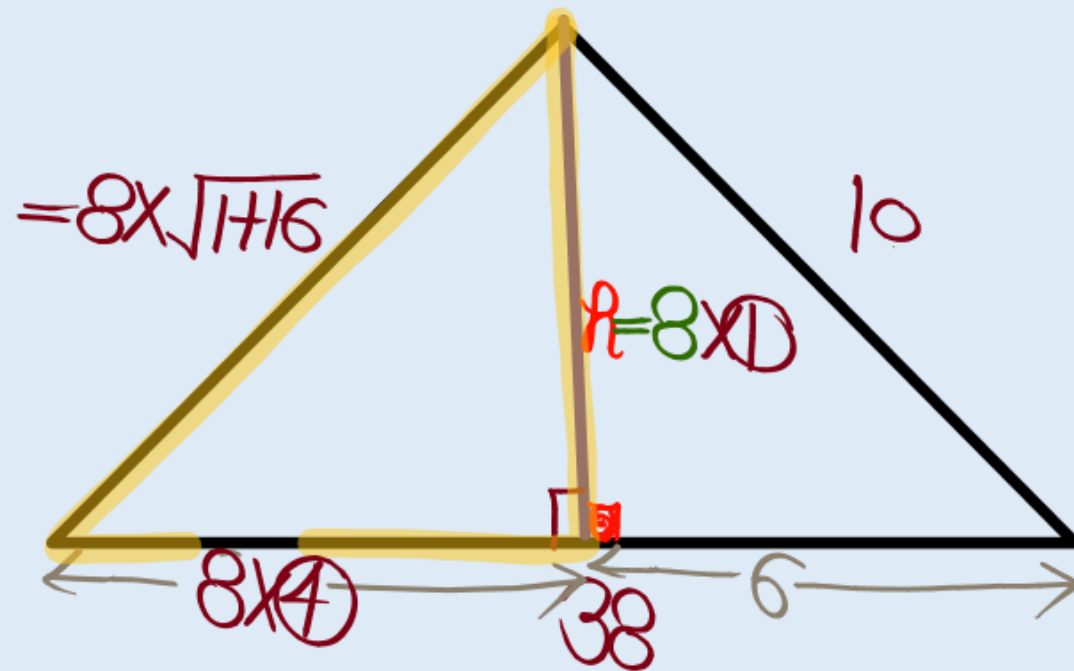
[A] $6\sqrt{17}$

[B] $7\sqrt{17}$

[C] $8\sqrt{17}$

[D] $9\sqrt{17}$

~~$\frac{1}{2} \times 38 \times h = 152$~~
 $h = 8$



28. In a triangle ABC, if three sides are $a = 5$, $b = 7$ and $c = 3$, then find angle B?

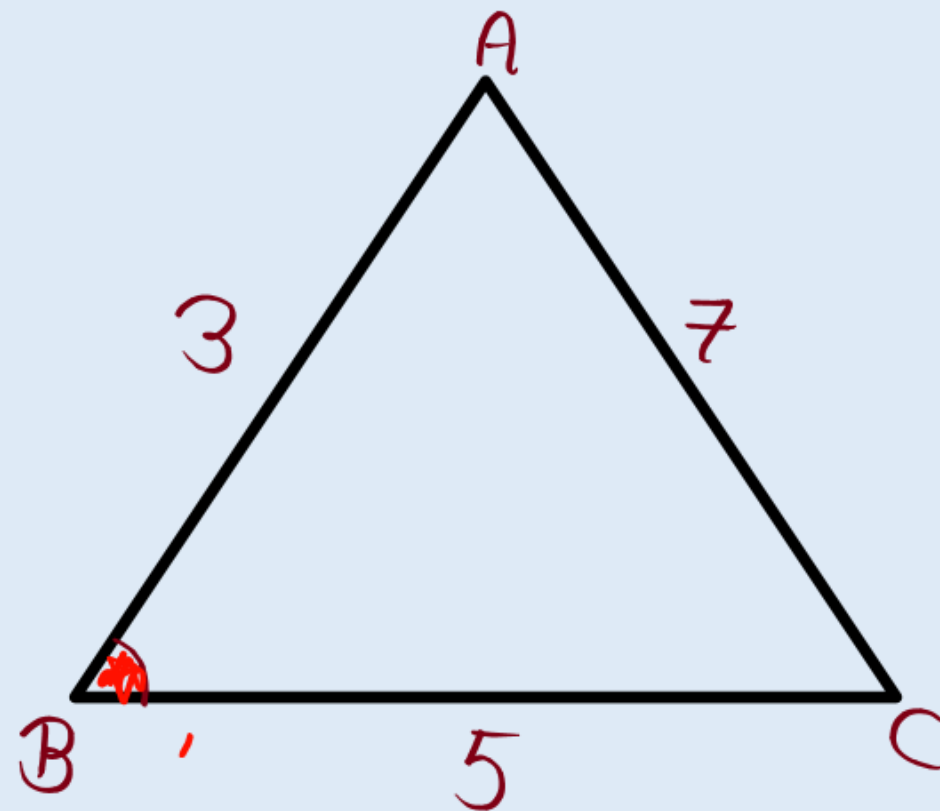
एक त्रिभुज ABC में, यदि तीन भुजाएँ $a = 5$, $b = 7$ और $c = 3$ हैं, तो कोण B ज्ञात कीजिए?

[A] 60°

[B] 150°

☒ [C] 120°

[D] 90°



$$\cos B = \frac{9 + 25 - 49}{2 \times 3 \times 5}$$

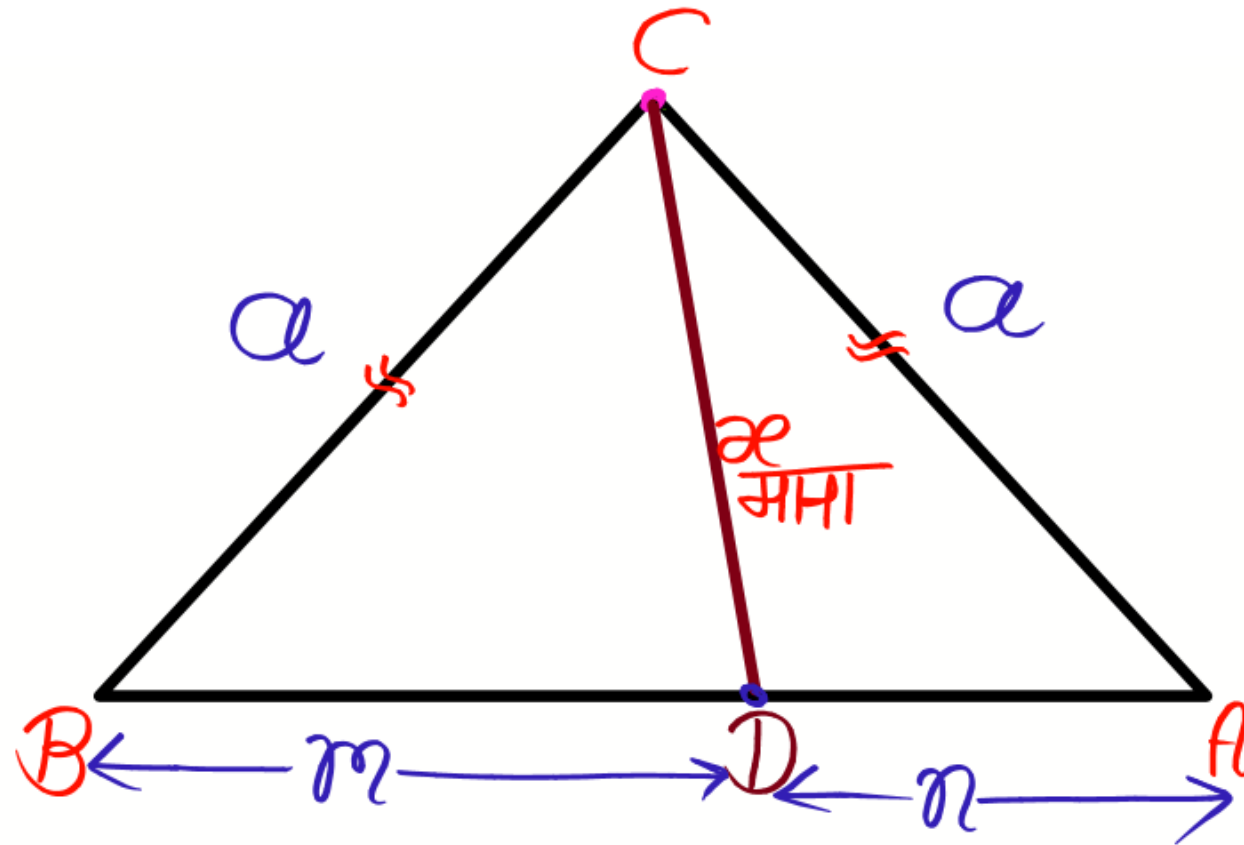
$$\cos B = -\frac{\sqrt{5}}{3}$$

$$\cos B = -\frac{1}{2} \Rightarrow B = 120^\circ$$

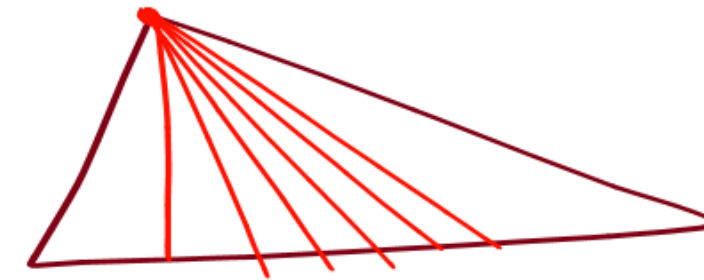
SPECIAL CASE IN ISOSCELES TRIANGLE

समद्विबाहु त्रिभुज में विशेष स्थिति

#



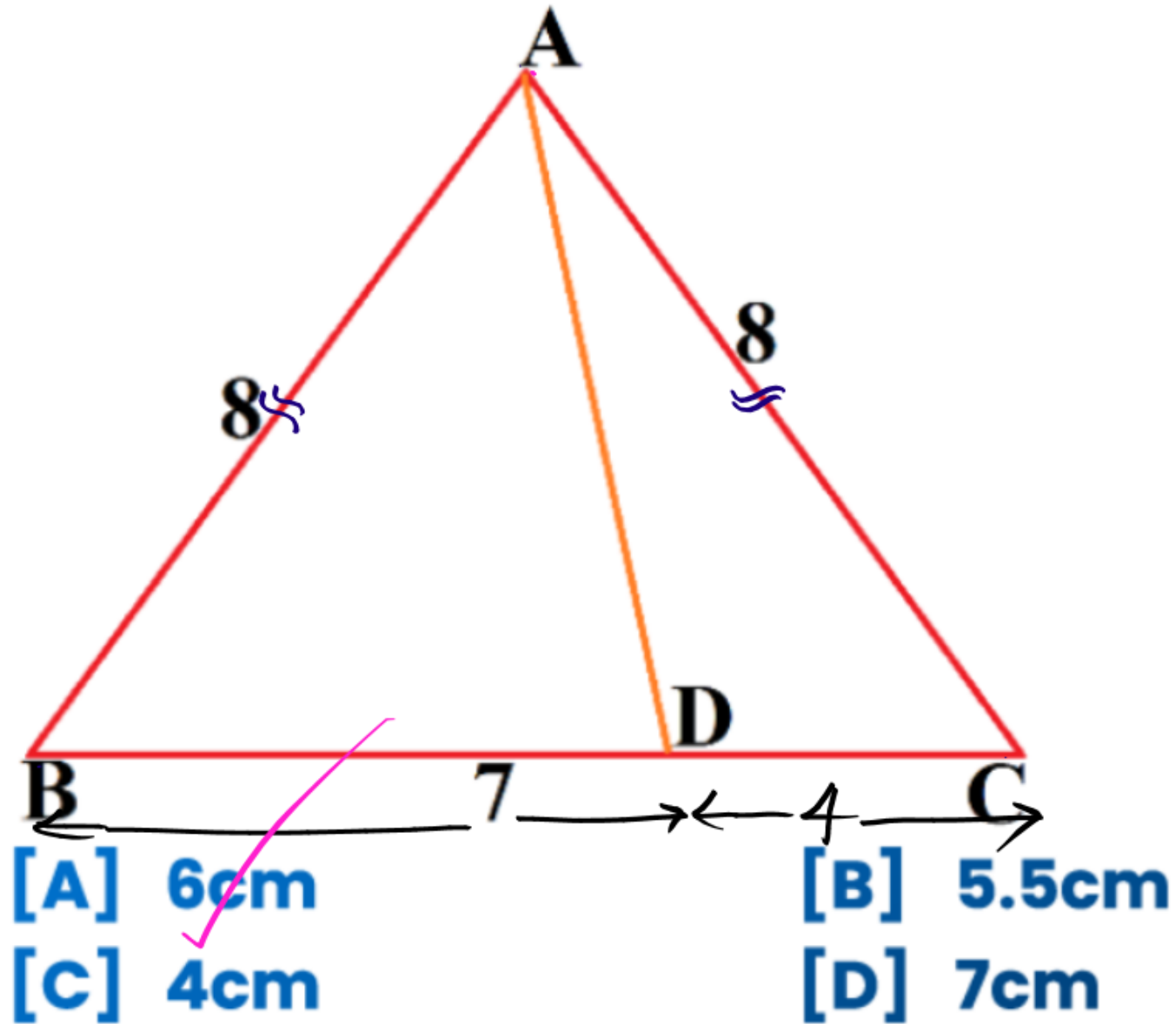
$$x^2 = a^2 - mn$$



$$\text{CEVIAN } CD = x$$



29. In the given fig. if $AB=AC=8\text{cm}$, $BC=11\text{cm}$, $BD=7\text{cm}$ $AD=?$
दिए गए चित्र में यदि $AB = AC = 8\text{cm}$, $BC = 11\text{cm}$, $BD = 7\text{cm}$ तब $AD = ?$



$$AD^2 = 8^2 - 7 \times 4$$

$$AD^2 = 36$$

$$AD = 6$$

30. In isosceles $\triangle ABC$, $AB = AC = 17\text{cm}$, D is any point on BC such that $AD = 15\text{cm}$ and $CD = 4\text{cm}$ then find length of BD ?

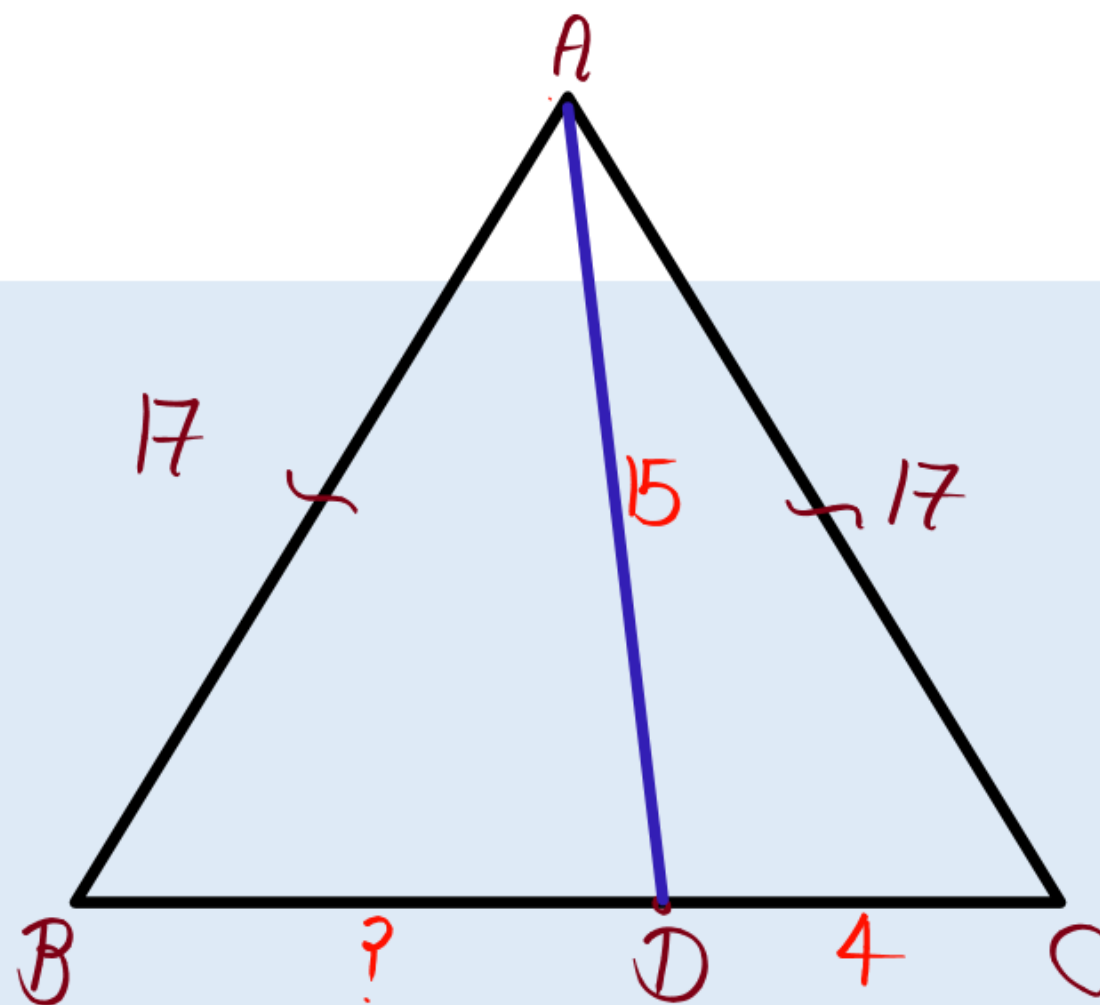
समद्विबाहु $\triangle ABC$ में, $AB = AC = 17$ सेमी, BC पर D कोई बिंदु है यदि $AD = 15\text{cm}$ और $CD = 4\text{cm}$ तो BD की लंबाई ज्ञात करें?

[A] 14 cm

[B] 16 cm

[C] 15 cm

[D] 16.2 cm



$$15^2 = 17^2 - BD \times 4$$

$$4BD = 8^2$$

$$BD = 16$$