DALOS COLLEGE

Dalos

Learning to Achieve

DALOS COLLEGE,OTA.

SUBJECT: MATHEMATICS

TOPIC: TRIGONOMETRY

SUB TOPIC:SINE AND COSINE RULE

CLASS S.S.2

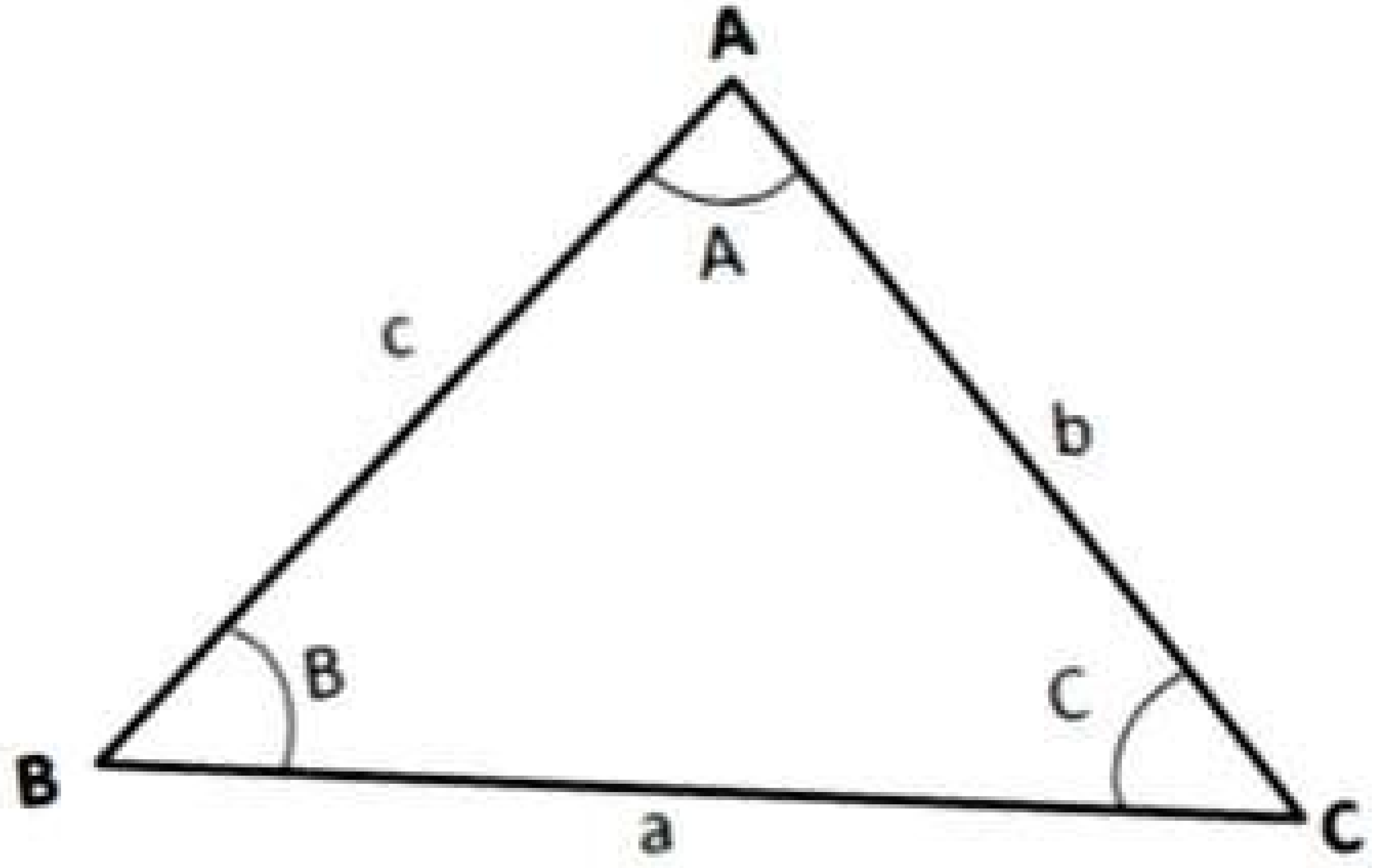
Objective:

At the end of the lesson, students should be able to:

- Solve problems using the sine rule for any triangle.

Not all triangles are right-angled, of course. But you can still use trigonometric operations to find the sides and angles of non-right angled triangles. The basic trigonometric ratios of sine, cosine and tangent help us to find the sides and angles of right-angled triangles. The sine rule is a relationship which can be used with non-right – angled triangles. The sine rule helps us to calculate sides and angles in some triangles where there is not a right angle.

Given the triangle ABC.



We use the convention that;

a is the side opposite angle A

b is the side opposite angle B

c is the side opposite angle C

The sine rule states that:

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

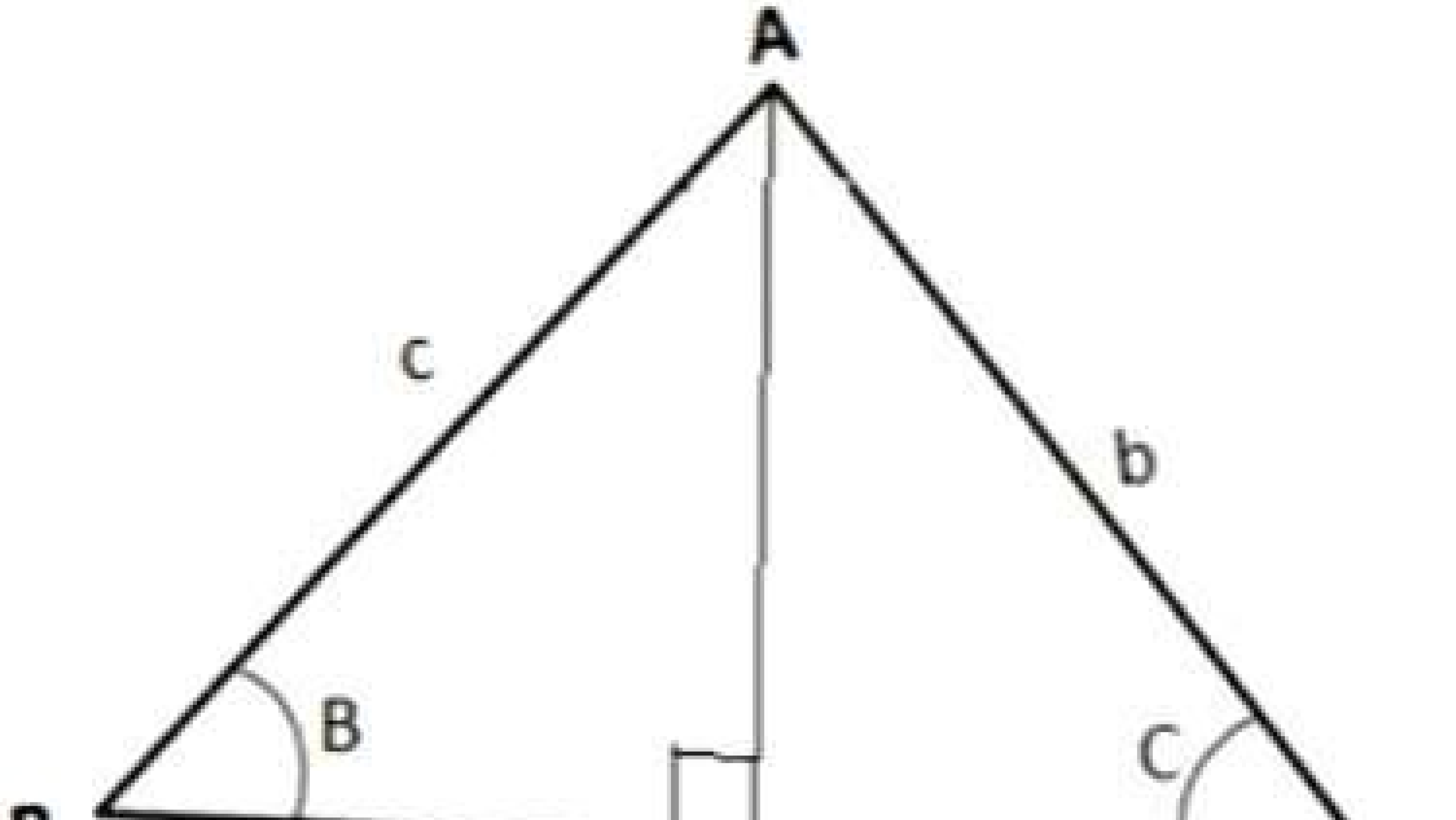
2) $\frac{Sin\ A}{a} = \frac{Sin\ B}{b} = \frac{Sin\ C}{c}$

1) when finding a side and

2) when finding an angle.

Proof.

Draw a perpendicular from A to BC. meeting it at D. then by the trigonometry you have used so far.



$\text{Sin B} = \frac{AD}{c}$

Sin B = $\frac{AD}{c}$

AD = c × sin B   (in triangle ABD)

Sin C = $\frac{AD}{b}$

AD = b × sin C   (in triangle ACD)

Hence c × sin B = b × sin C

Divide both sides by **sin B sin C**

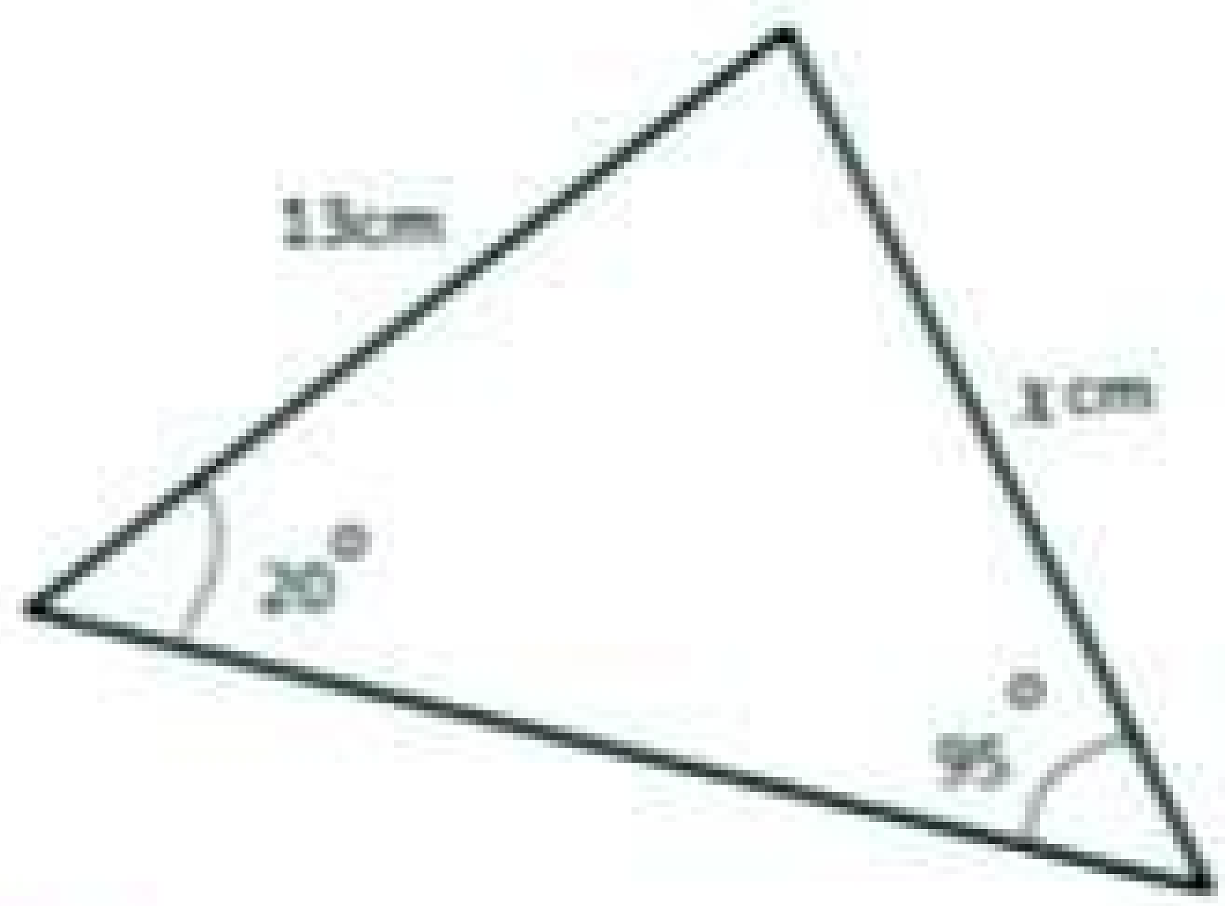
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Also, when you divide both sides by **cb**

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

Example 1

Calculate the length of the side marked x.



Solution

Note that the side marked x *cm* is opposite the angle 20^0 and the side marked 13 cm is opposite the angle 95^0.

$\frac{x}{\sin 20} = \frac{13}{\sin 95}$

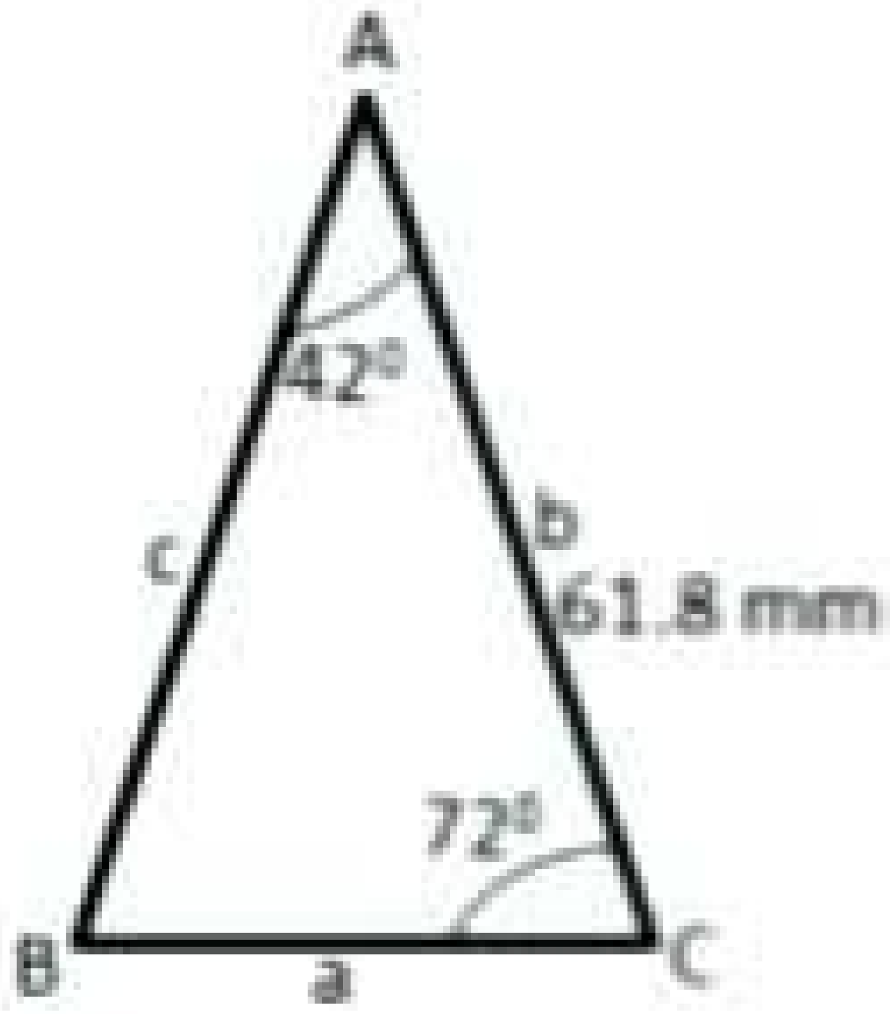
$x \sin 95 = 13 \sin 20$

$x = \frac{13 \sin 20}{\sin 95}$

$x = 4.46$ cm

Example 2

Solve for a and c in the triangle below.



Solution

We need to first find the angle that is opposite the side AC.

The sum of angles in a triangle is 180. Therefore angle ABC = $180^0 - 42^0 - 72^0 = 66^0$

The sine rule states:

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

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

$$a = \frac{61.8 \times \sin 42}{\sin 66} = 45.27 \text{ mm}$$

Also,

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

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

$$c = \frac{61.8 \times \sin 72}{\sin 66} = 64.34$$

The complete solution is;

$\angle ABC = 66^0$

a = 45.27 mm

c = 64.34 mm

Example 3.

Calculate the size of the angle marked x^0 in the following diagram.

Solution

Note that the side marked 9 cm is opposite angle x and the side marked 14 cm is opposite the angle 65^0.

$$\frac{\sin 65}{14} = \frac{\sin x}{9}$$

$$\sin x = \frac{9 \times \sin 65}{14}$$

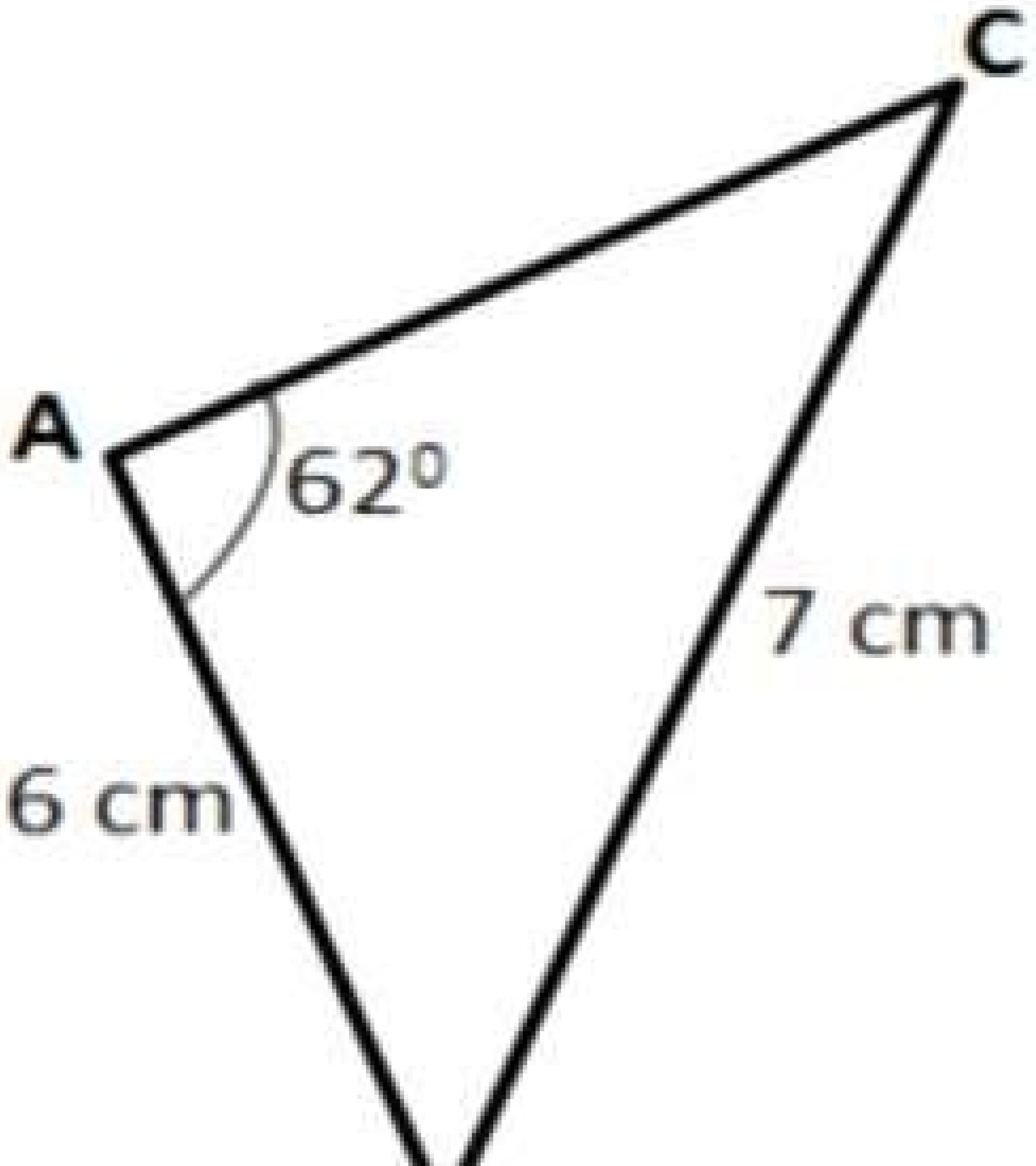
$$\sin x = 0.5826$$

$$x = \sin^{-1}(0.5826)$$

$$x = 35.6^0$$

Example 4.

In triangle ABC, angle A = 62^0, AB = 6cm and BC = 7 cm. Find angle ABC.



AB. We have been asked to find the angle at B. Since we do not know the side opposite angle B, it is expedient to find the angle at C and latter find the angle at B.

Here we know AB, which is c, and BC, which is a. use part of the sine rule to find the angle at C.

$$\frac{\sin 62^0}{7} = \frac{\sin c}{6}$$

Hence $\sin C = \frac{6 \times \sin 62^0}{7} = 0.7568$

Sin C = o.7568

$C = \sin^{-1}(0.7568)$

$C = 49.2^0$

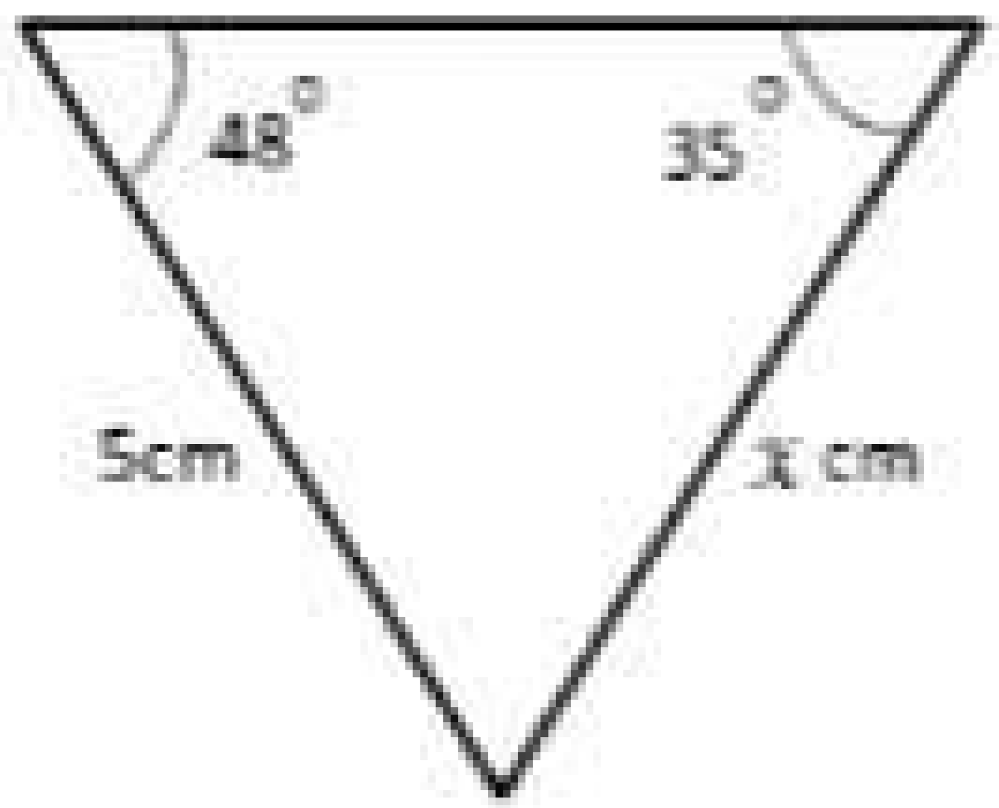
Now angle A and angle C are known.

We can therefore use the sum of angles in a triangle to find angle B.

$B = 180^0 - 49.2^0 - 62^0 = 68.8^0$

Calculate the length of the side marked in each of the following diagrams. Give your answer to 1d.p where necessary.

1)



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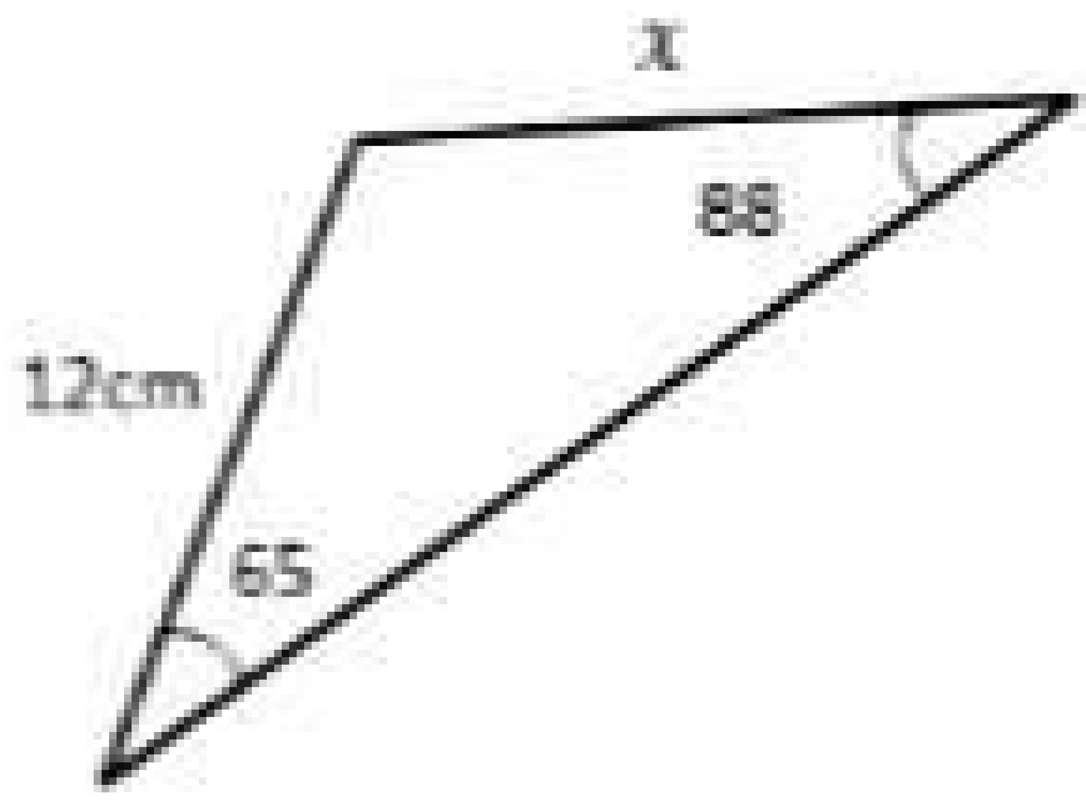

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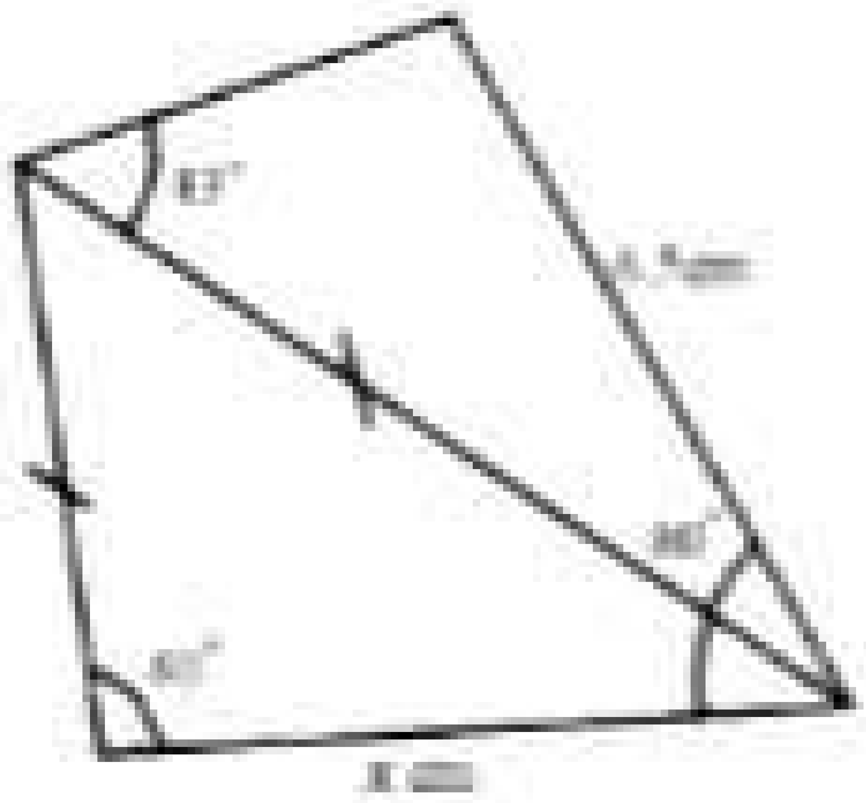

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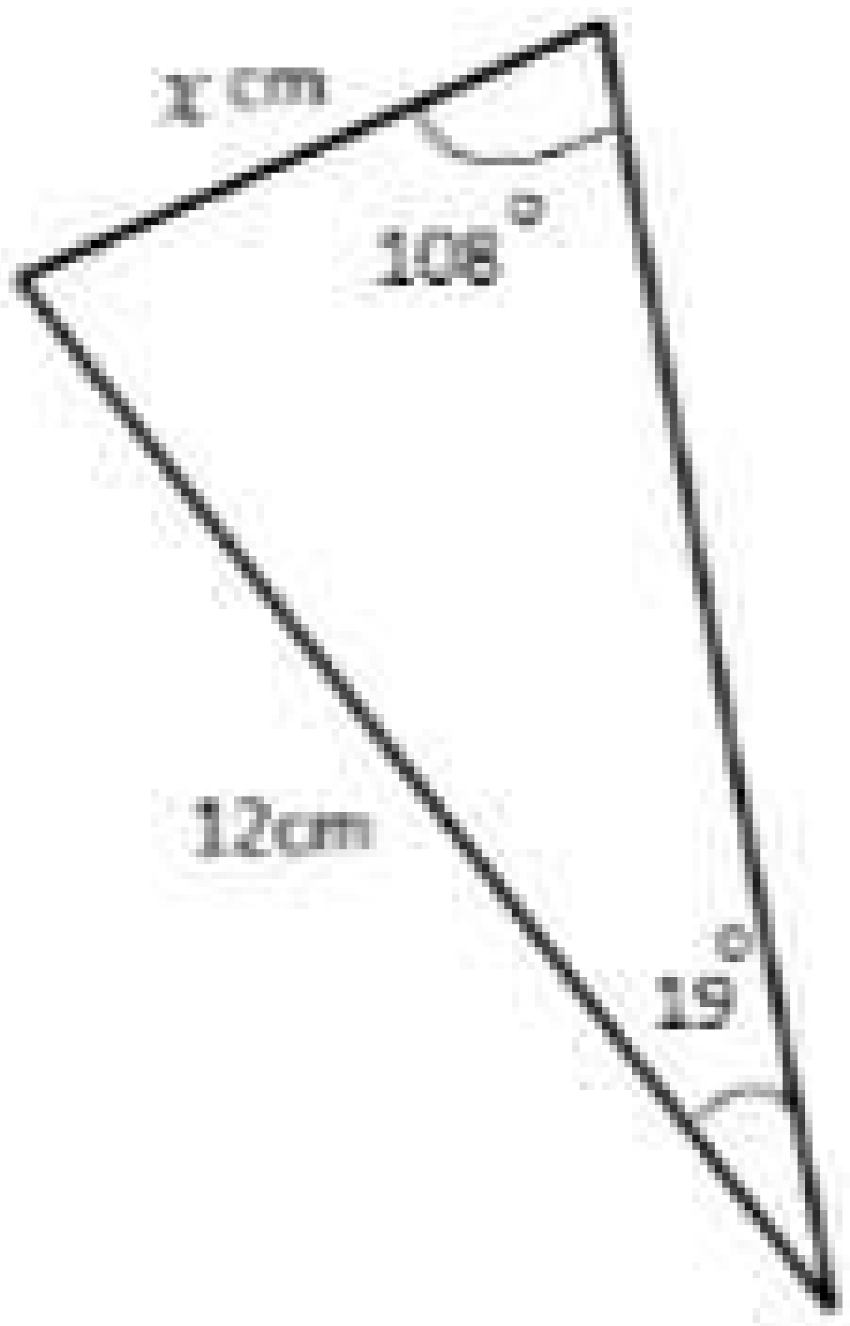

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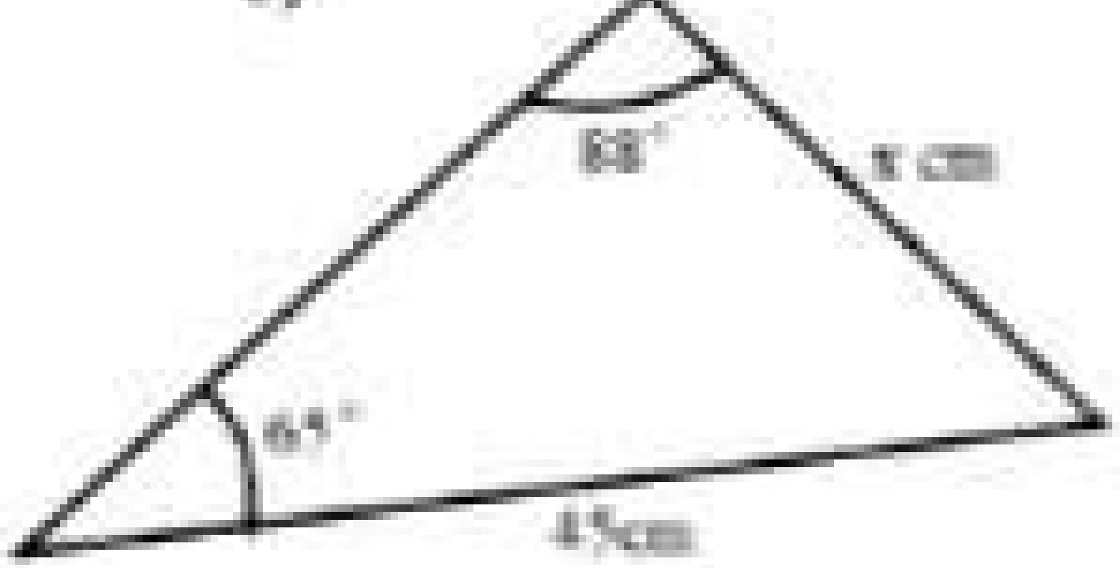

THE DIAGRAM FIVE FIGURES ABOVE IS YOUR ASSIGNMENT.SOLVE AND SUBMIT TO MY WHATSAPP NUMBER 08139586155.ON THURSDAY,7TH MAY,2020.