



## 3055 BA SANGAM COLLEGE

PH: 6674003/9264117 E-mail: basangam@connect.com.fj



### WORKSHEET 19

School: Ba Sangam College

Year / Level: 12

Subject: Mathematics

Name of Student: \_\_\_\_\_

Strand	5 - Trigonometry
Sub strand	5.1 - Triangles
Content Learning Outcome	➤ Investigate and solve problems using trigonometric relations

### Trigonometry

(Ref: Year 12 Mathematics Pg 139 -145)

#### Solving Non- Right Angled Triangles Sine and Cosine Rules

Use the **Sine/ Cosine Rule** to find unknown sides and angles.

- SINE RULE

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

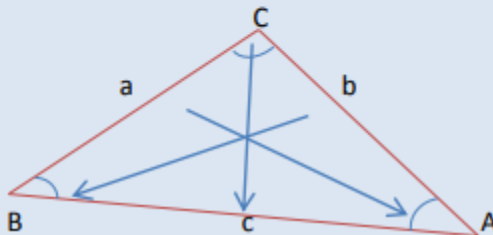
Or :

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

- COSINE RULE

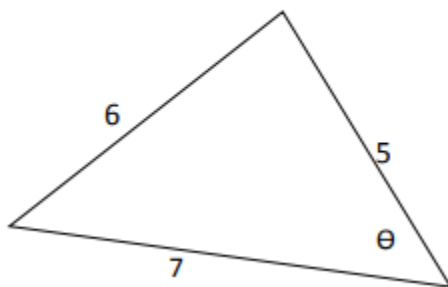
$$a^2 = b^2 + c^2 - 2bc \cos A$$

Where **small letters** [a,b,c] represent the **sides**, and **capital letters** [A,B,C] are representing the opposite **angles**.



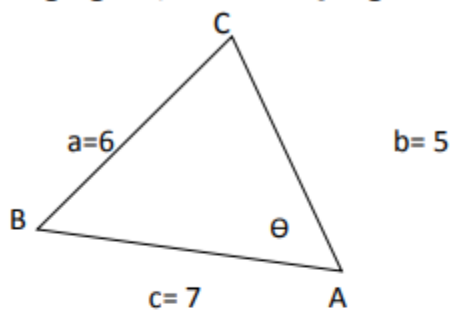
#### Example 1:

Find the value for the angle  $\theta$  in the triangle shown below:



**Answer:**

Since only one angle given, let it be A: [Diagram not drawn to scale]



Use Cosine Rule to find the missing angle:

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

$2bc \cos A = b^2 + c^2 - a^2$  ( take  $2bc \cos A$  to the left and  $a^2$  to the right by doing opposite operations)

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

$$\cos A = \frac{5^2 + 7^2 - 6^2}{2 \times 5 \times 7} = \frac{38}{70}$$

$$\cos A = \frac{38}{70}$$

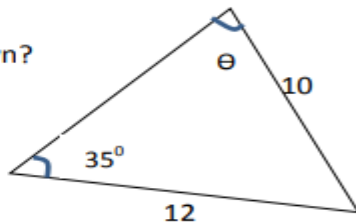
To solve for A, do the opposite operation:

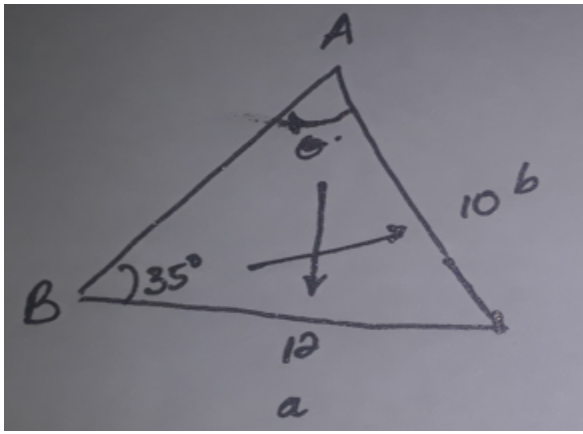
$$A = \cos^{-1}\left(\frac{38}{70}\right)$$

$$A = 57.12^\circ$$

**Example 2:**

What is the value of  $\theta$  in the triangle shown?





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

$$\frac{\sin \theta}{12} = \frac{\sin 35}{10}$$

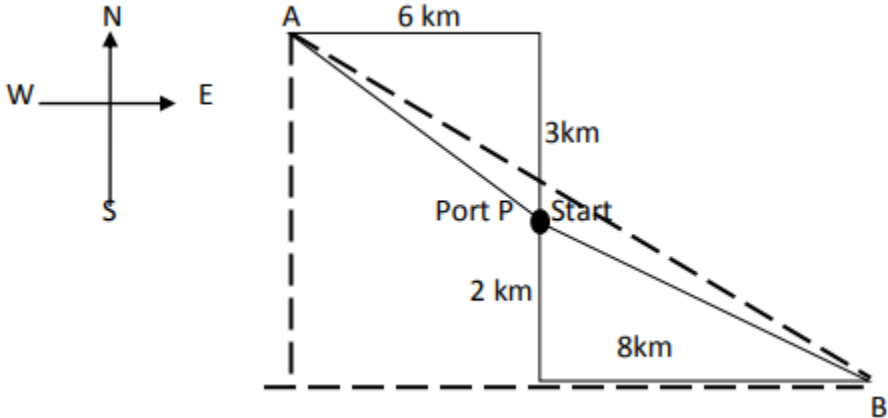
$$\sin \theta = \frac{12 \sin 35}{10}$$

$$\theta = \sin^{-1} \left( \frac{12 \sin 35}{10} \right)$$

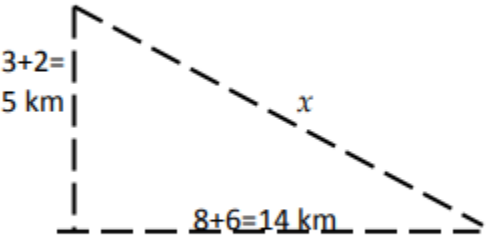
$$\theta = 43.5^\circ$$

**Example 3:**

Esekaia sails 3 km North and 6 km West from a Port P to destination A. Samit sails 2 km South and 8 km East from Port P to destination B. How far in a straight line is destination A from B?



**Answer:**  
Diagrammatically, we are interested in the bigger triangle,



Using Pythagoras theorem:

$$c^2 = a^2 + b^2$$

$$x^2 = 5^2 + 14^2$$

$$x^2 = 25 + 196$$

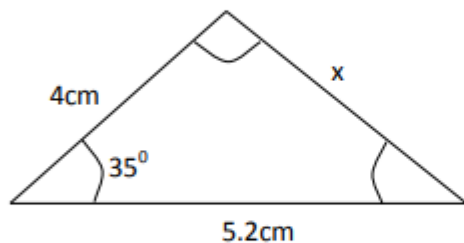
$$x^2 = 221$$

$$\therefore x = \sqrt{221} = 14.87 \text{ km}$$

**ACTIVITY**

- 1.

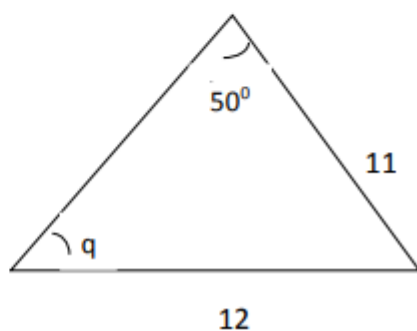
Find the value of  $x$  in the given triangle.



( 2MARKS)

2.

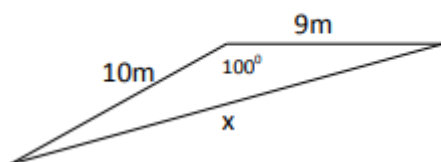
Find the value of angle marked a.



(2 MARKS)

3.

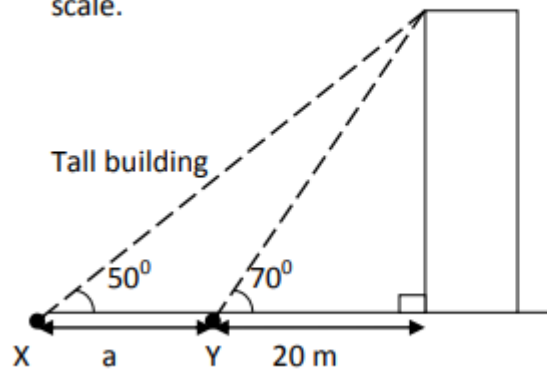
Use the cosine rule to solve for  $x$ .



(2 MARKS)

4.

Rajjie is stationed at a Point Y, 20 m from the base of a tall building. He looks up to the top of the building at an angle of  $70^\circ$ . Diagram not to scale.



- a) How high is the building?
- b) Rajjie then moves back some distance so that he stands at Point X and now looks to the top of the building at an angle of  $50^\circ$ . Calculate the distance 'a'.

**THE END**