REVISION: TRIGONOMETRY 16 SEPTEMBER 2013

Lesson Description

In this lesson we:

- Revise solve 2D trigonometry problems using
  - the Sine Rule:
  - the Cosine Rule
  - the Area Rule

Key Concepts

The Cosine Rule

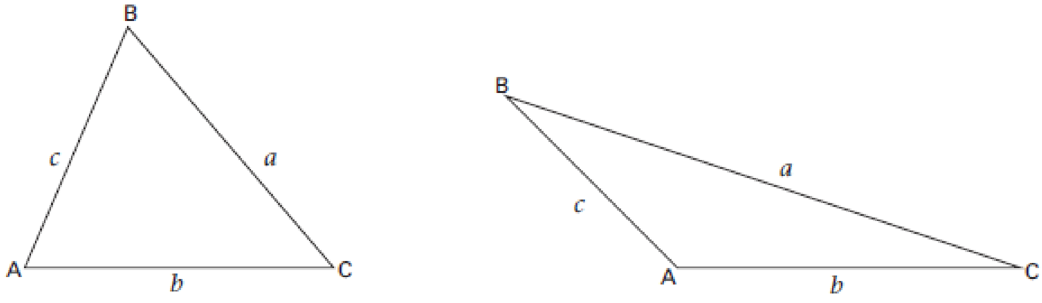
We will apply the cosine rule when we are given:

- the length of two sides of a triangle and the size of the included angle (SAS)
- the length of all three sides of the triangle (SSS).

The cosine rule

In any $\triangle ABC$:

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



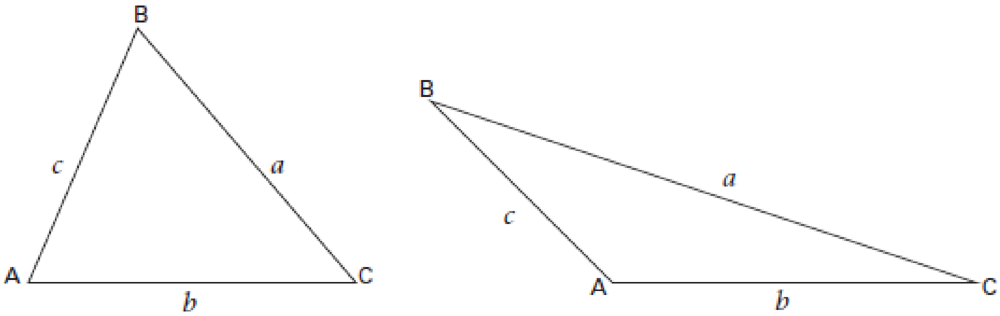
The Sine Rule

We will apply the sine rule when we are given:

- the length of one side and the size of two angles of a triangle (SAA)
- the length of two sides and the size of a non-included angle (SSA).

The sine rule

In any $\triangle ABC$: $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$ or $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

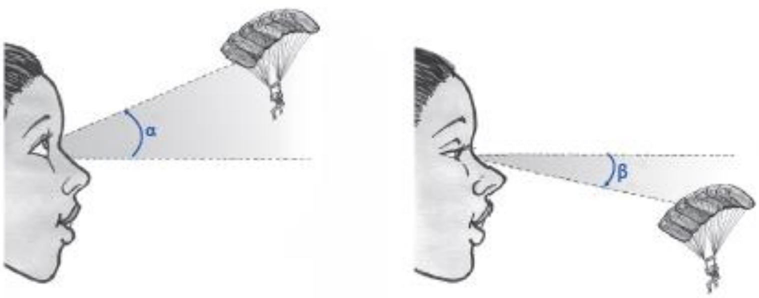


Use $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$ when you want to calculate the size of an angle.

Use $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ when you want to calculate the length of a side.

When using the sine rule, you need to have at least one angle and the side opposite that given angle.

Angles of Elevation and Depression

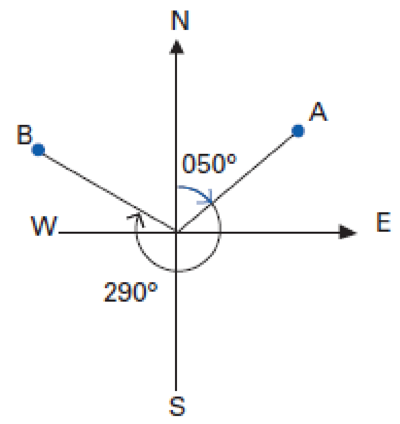


When you look up from the horizontal, the angle through which your eye rotates, α, is called the angle of elevation.

When you look down from the horizontal, the angle through which your eye rotates, β, is called the angle of depression.

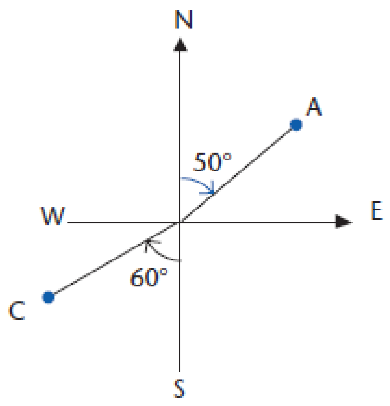
Bearings

We can measure angles using bearing. When using bearing, we always measure the angle from the north line and rotate in a clockwise direction and give the angle using three figures, for example:



The bearing of point A is 050° and the bearing of point B is 290°.

We can also measure angles using direction. In this case a point is stated as the number of degrees east or west from the north-south line, for example:



The direction of point A is N50° E and the direction of point C is S60° W.

These positions could also be described as follows:

i) A is 50° east of north.
ii) C is 60° west of south.

The Area Rule

$Area\ \Delta ABC = \frac{1}{2} absinC$

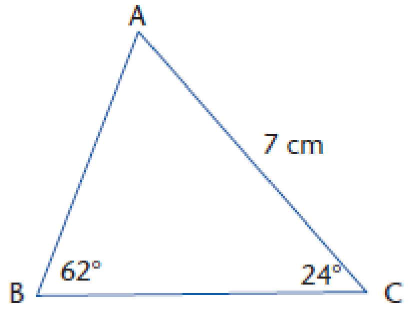
$Area\ \Delta ABC = \frac{1}{2} acsinB$

$Area\ \Delta ABC = \frac{1}{2} bcsinA$

Questions

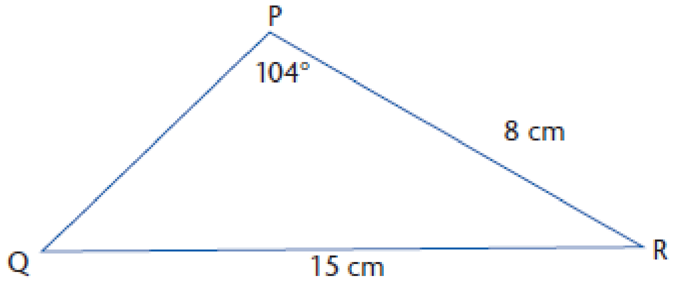
Question 1

Calculate the length of AB.



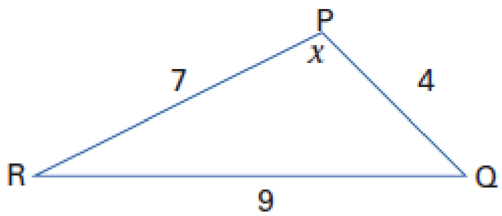
Question 2

Calculate the size of $\hat{Q}$



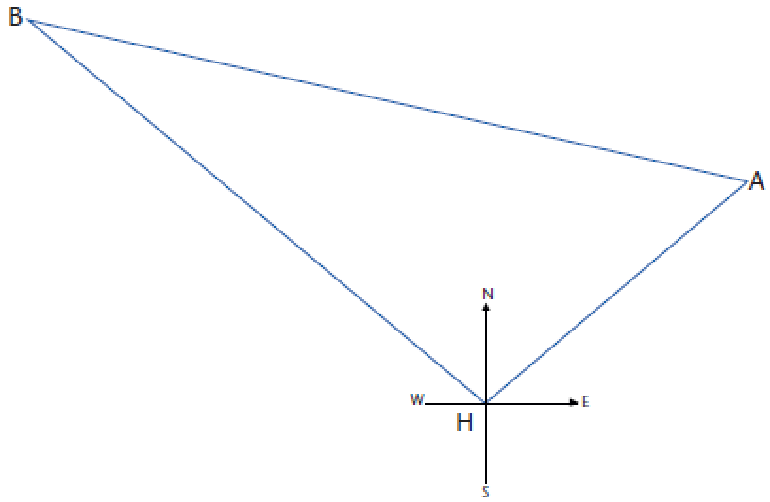
Question 3

Calculating the largest angle in a triangle with all three sides known:



Question 4

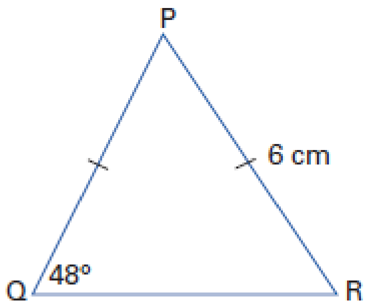
Two ships leave a harbour, H, at the same time. The first ship sails 32 km to point A in a direction of N55° E. The second ship sails for 58 km to point B on a bearing of 315°. How far apart are the points A and B?



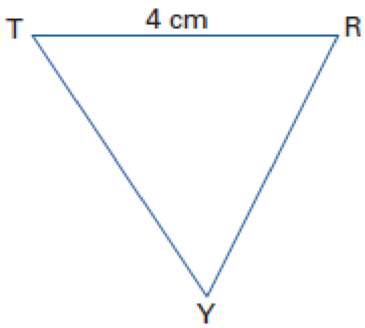
Question 1

Calculate the area of the following shapes:

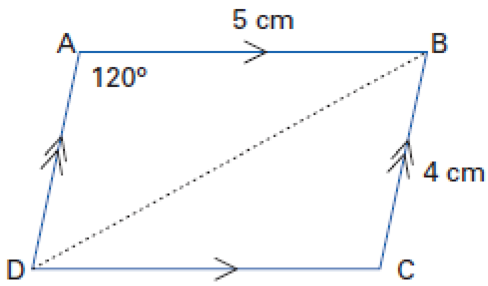
a.) Isosceles triangle PQR, with PQ = PR



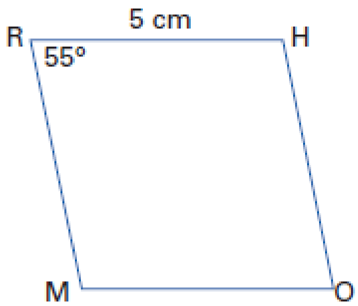
b.) Equilateral triangle TRY



c.) Parallelogram ABCD



d.) Rhombus RHOM



Question 2

TRAP is a trapezium with TR || PA.

a.) Calculate the length of PR.
b.) Calculate the size of $T\hat{R}P$.
c.) Hence determine the size of $R\hat{P}A$
d.) Calculate the area of TRAP.