Edexcel GCSE
Mathematics (Linear) – 1MA0

SINE AND COSINE RULES & AREA OF TRIANGLES

Materials required for examination	**Items included with question papers**
Ruler graduated in centimetres and	Nil
millimetres, protractor, compasses,	
pen, HB pencil, eraser.	
Tracing paper may be used.	

Instructions

Use black ink or ball-point pen.
Fill in the boxes at the top of this page with your name, centre number and candidate number.
Answer all questions.
Answer the questions in the spaces provided – there may be more space than you need.
Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.
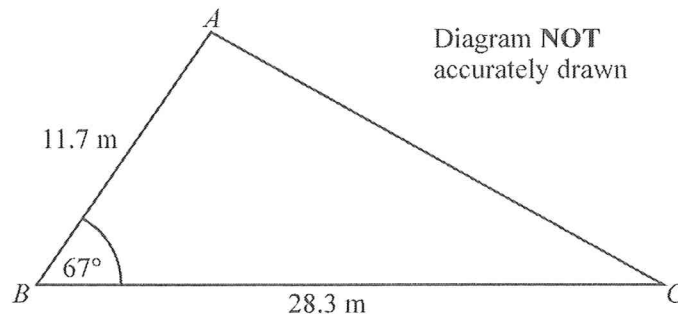
Advice

Read each question carefully before you start to answer it.
Keep an eye on the time.
Try to answer every question.
Check your answers if you have time at the end.

1.

Diagram **NOT** accurately drawn

$AB = 11.7$ m.
$BC = 28.3$ m.
Angle $ABC = 67^0$.

(a) Calculate the area of the triangle ABC.
   Give your answer correct to 3 significant figures.

using $\frac{1}{2} ab \sin C$

Area $= \frac{1}{2}(11.7)(28.3)\sin 67$

$= 152.394181$ m^2

$= 152$ (3 sf)

..............152............. m^2

(2)

(b) Calculate the length of AC.
   Give your answer correct to 3 significant figures.

using

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

$a^2 = (11.7)^2 + (28.3)^2 - 2(11.7)(28.3)\cos 67$

$a^2 = 679.0300321$

$a = 26.05820477$ cm

$= 26.1$ (3sf)

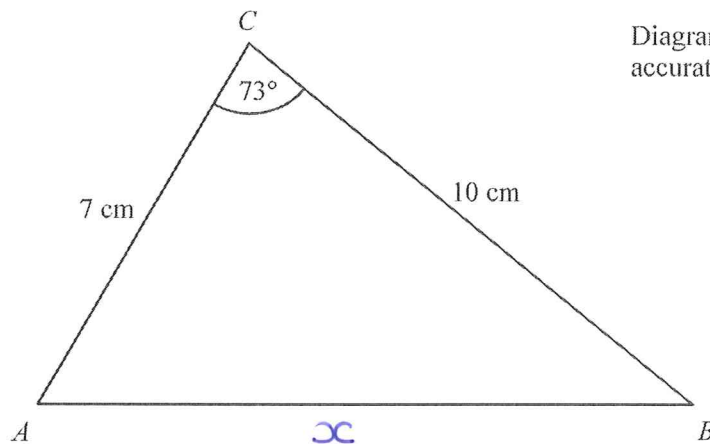............26.1............. m

(3)
(Total 5 marks)

2.

Diagram **NOT** accurately drawn

In triangle ABC,
$AC = 7$ cm,
$BC = 10$ cm,
angle $ACB = 73°$.

Calculate the length of AB.
Give your answer correct to 3 significant figures.

$x^2 = 7^2 + 10^2 - 2(7)(10)\cos 73$

$x^2 = 108.06796$

$x = \sqrt{108.06796}$

$x = 10.395574$ cm

$x = 10.4$ (3 sf)

10.4 .... cm

(Total 4 marks)

3.

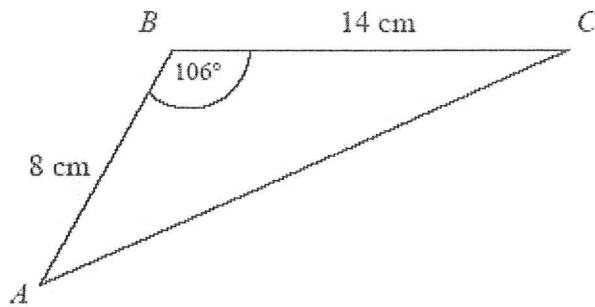B   14 cm   C

106°

8 cm

A

Diagram **NOT**
accurately drawn

ABC is a triangle.

AB = 8 cm

BC = 14 cm

Angle *ABC* = 106 °

Calculate the area of the triangle.

Give your answer correct to 3 significant figures.

$$\text{Area} = \frac{1}{2}(8)(14)\sin 106$$

$$= 53.83065497 \ cm^2$$

$$= 53.8 \ cm^2 \ (3 \ sf)$$

.........53.8.........cm²

(Total 3 marks)
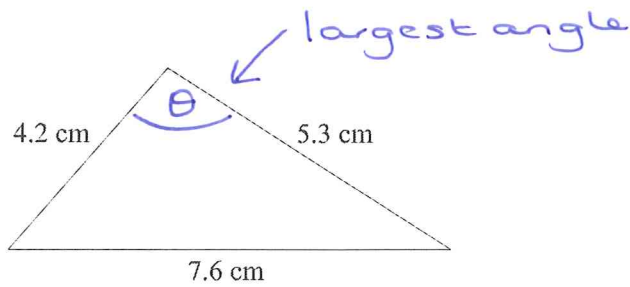
4.

largest angle

4.2 cm θ 5.3 cm

7.6 cm

Diagram **NOT** accurately drawn

The lengths of the sides of a triangle are 4.2 cm, 5.3 cm and 7.6 cm.

(a) Calculate the size of the largest angle of the triangle.
Give your answer correct to 1 decimal place.

$$7.6^2 = 4.2^2 + 5.3^2 - 2(4.2)(5.3)\cos\theta$$

$$7.6^2 - 4.2^2 - 5.3^2 = -2(4.2)(5.3)\cos\theta$$

$$\frac{7.6^2 - 4.2^2 - 5.3^2}{-2(4.2)(5.3)} = \cos\theta$$

$$-0.2702156 = \cos\theta$$

$$\theta = \cos^{-1}(-0.2702156)$$
$$\theta = 105.6770987 \quad \underline{105.7} \quad °$$
$$\theta = 105.7° \ (1\,dp)$$

(3)

(b) Calculate the area of the triangle.
Give your answer correct to 3 significant figures.

$$\text{Area} = \frac{1}{2}(4.2)(5.3)\sin(105.7)$$

$$= 10.71475914 \text{ cm}^2$$

$$= 10.7 \ (3sf)$$

.....10.7..... cm²

(3)

(Total 6 marks)

5.
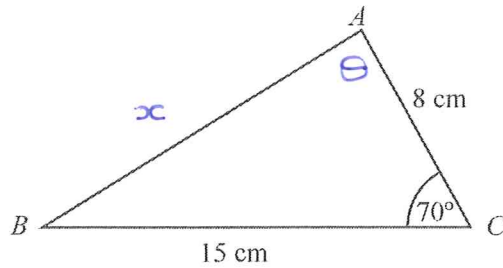

Diagram **NOT** accurately drawn

In triangle ABC,
$AC = 8$ cm,
$BC = 15$ cm,
Angle $ACB = 70°$.

(a)   Calculate the length of AB.
       Give your answer correct to 3 significant figures.

$$x^2 = 15^2 + 8^2 - 2(15)(8)\cos 70$$
$$x^2 = 206.9151656$$
$$x = 14.384546 \text{ cm}$$
$$= 14.4 \ (3sf)$$

...........14.4........... cm

(3)

(b)   Calculate the size of angle BAC.
       Give your answer correct to 1 decimal place.

$$\frac{\sin \theta}{15} = \frac{\sin 70}{14.3845}$$

$$\sin \theta = 15 \times \frac{\sin 70}{14.3845}$$

$$\sin \theta = 0.979898$$

$$\theta = 78.49235$$

$$= 78.5° \ (1dp)$$

...........78.5........... °
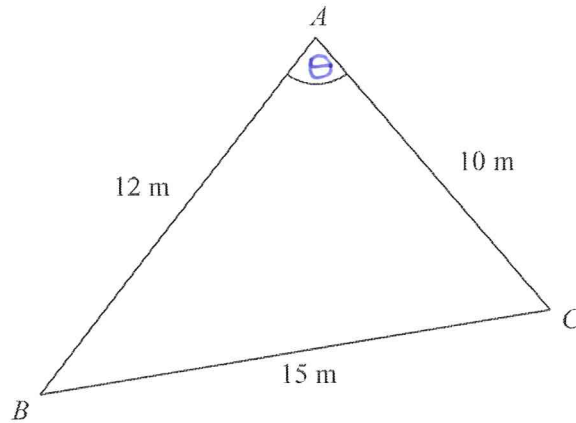
(2)

(Total 5 marks)

6.

Diagram **NOT** accurately drawn

ABC is a triangle.
AB = 12 m.
AC = 10 m.
BC = 15 m.

Calculate the size of angle *BAC*.
Give your answer correct to one decimal place.

$$15^2 = 12^2 + 10^2 - 2(12)(10)\cos\theta$$

$$\frac{15^2 - 12^2 - 10^2}{-2(12)(10)} = \cos\theta$$

$$0.079166 = \cos\theta$$

$$\theta = 85.4593$$

$$\theta = 85.5° \ (1dp)$$

.........85.5.........°

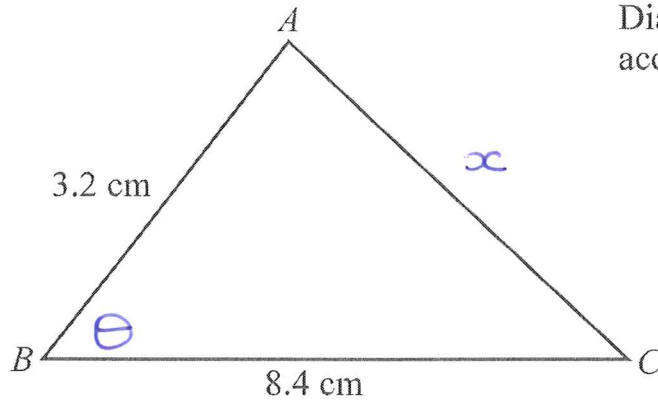**(Total 3 marks)**

7.

Diagram **NOT** accurately drawn

3.2 cm

8.4 cm

x

θ

A B C

$AB = 3.2$ cm
$BC = 8.4$ cm

The area of triangle ABC is 10 cm^2.

Calculate the perimeter of triangle ABC.
Give your answer correct to three significant figures.

$$\text{Area} = \frac{1}{2}(3.2)(8.4)\sin\theta$$

$$10 = \frac{1}{2}(3.2)(8.4)\sin\theta$$

$$20 = (3.2)(8.4)\sin\theta$$

$$\frac{20}{(3.2)(8.4)} = \sin\theta$$

$$0.7440476 = \sin\theta$$

$$\theta = 48.07736$$

$$x^2 = 3.2^2 + 8.4^2 - 2(3.2)(8.4)\cos(48.07736)$$

$$x^2 = 44.88151331$$

$$x = 6.6993666$$

$$\text{Perimeter} = 3.2 + 8.4 + 6.6993666$$

$$= 18.2993666$$

$$= 18.3 \text{ cm}$$

.......18.3...... cm

(Total 6 marks)