

Edexcel GCSE

Mathematics (Linear) – 1MA0

SINE AND COSINE RULES & AREA OF TRIANGLES

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil

**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

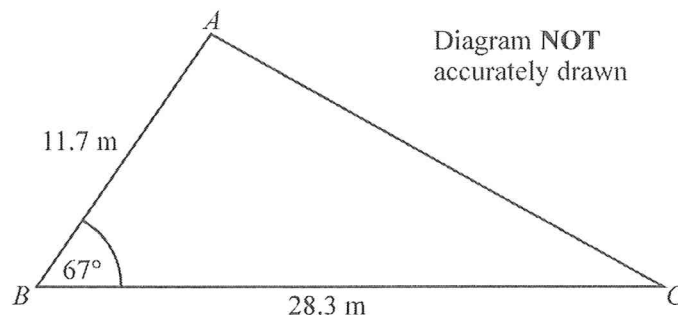
Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

1.



$$AB = 11.7 \text{ m.}$$

$$BC = 28.3 \text{ m.}$$

$$\text{Angle } ABC = 67^\circ.$$

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

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

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

$$= 152.394181 \text{ m}^2$$

$$= 152 \text{ (3 sf)}$$

$$\dots\dots\dots 152 \dots\dots\dots \text{m}^2$$

(2)

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

using

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

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

$$a^2 = 679.0300321$$

$$a = 26.0582047 \text{ cm}$$

$$= 26.1 \text{ (3 sf)}$$

$$\dots\dots\dots 26.1 \dots\dots\dots \text{m}$$

(3)

(Total 5 marks)

2.

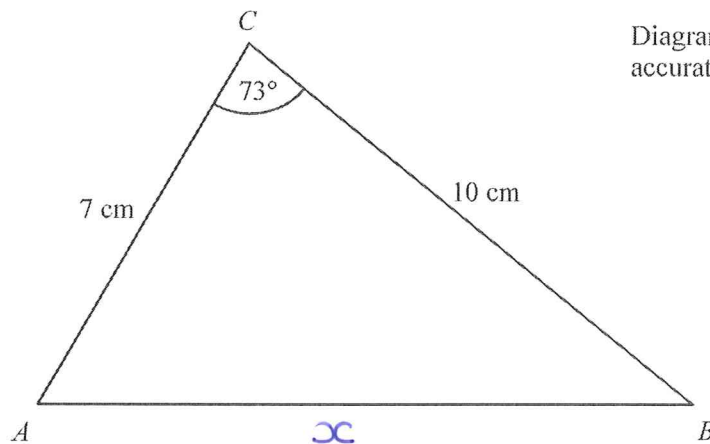


Diagram **NOT**
accurately drawn

In triangle ABC ,
 $AC = 7$ cm,
 $BC = 10$ cm,
angle $ACB = 73^\circ$.

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

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

$$x^2 = 108.06796$$

$$x = \sqrt{108.06796}$$

$$x = 10.395574 \text{ cm}$$

$$x = 10.4 \text{ (3 sf)}$$

10.4 cm
(Total 4 marks)

3.

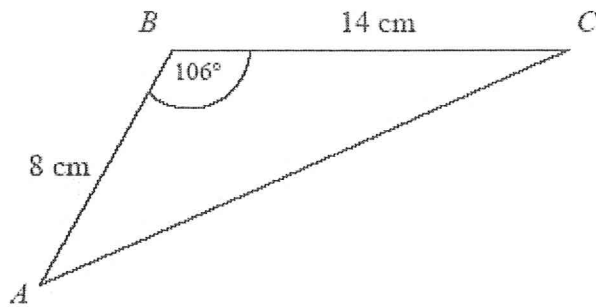


Diagram NOT
accurately drawn

ABC is a triangle.

$AB = 8 \text{ cm}$

$BC = 14 \text{ cm}$

Angle $ABC = 106^\circ$

Calculate the area of the triangle.

Give your answer correct to 3 significant figures.

$$\begin{aligned}\text{Area} &= \frac{1}{2}(8)(14)\sin 106 \\ &= 53.83065497 \text{ cm}^2 \\ &= 53.8 \text{ cm}^2 \text{ (3 sf)}\end{aligned}$$

..... 53.8 cm^2
(Total 3 marks)

4.

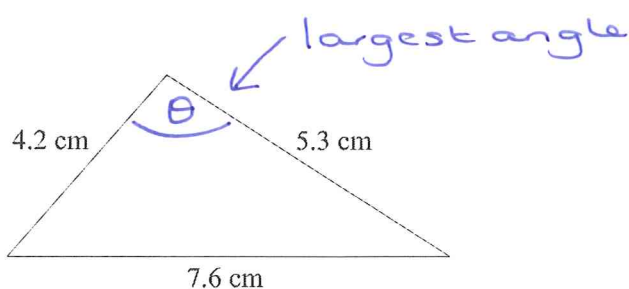


Diagram NOT accurately drawn

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.

$$\begin{aligned}
 7.6^2 &= 4.2^2 + 5.3^2 - 2(4.2)(5.3)\cos\theta \\
 7.6^2 - 4.2^2 - 5.3^2 &= -2(4.2)(5.3)\cos\theta \\
 \frac{7.6^2 - 4.2^2 - 5.3^2}{-2(4.2)(5.3)} &= \cos\theta \\
 -0.2702156 &= \cos\theta \\
 \theta &= \cos^{-1}(-0.2702156) \\
 \theta &= 105.6770987 \dots 105.7 \dots^\circ \\
 \theta &= 105.7^\circ \text{ (1 dp)}
 \end{aligned}$$

(3)

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

$$\begin{aligned}
 \text{Area} &= \frac{1}{2}(4.2)(5.3)\sin(105.7) \\
 &= 10.71475914 \text{ cm}^2 \\
 &= 10.7 \text{ (3 sf)}
 \end{aligned}$$

$$\dots 10.7 \dots \text{ cm}^2$$

(3)

(Total 6 marks)

5.

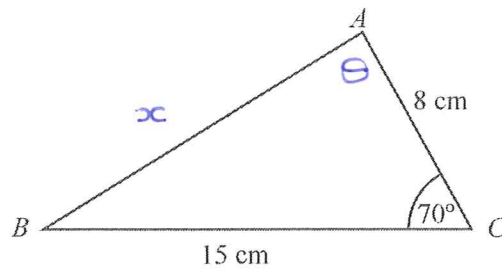


Diagram **NOT** accurately drawn

In triangle ABC ,
 $AC = 8$ cm,
 $BC = 15$ cm,
Angle $ACB = 70^\circ$.

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

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

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

(3)

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

$$\begin{aligned} \frac{\sin \theta}{15} &= \frac{\sin 70}{14.3845} \\ \sin \theta &= 15 \times \frac{\sin 70}{14.3845} \\ \sin \theta &= 0.979898 \\ \theta &= 78.49235 \\ &= 78.5^\circ \text{ (1dp)} \end{aligned}$$

.....78.5..... °

(2)

(Total 5 marks)

6.

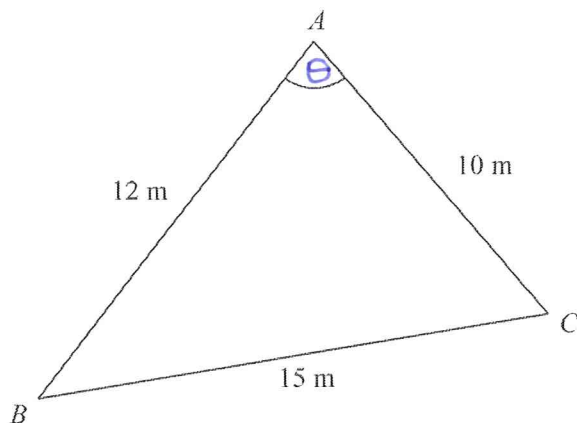


Diagram NOT accurately drawn

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.

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

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

$$0.079166 = \cos \theta$$

$$\theta = 85.4593$$

$$\theta = 85.5^\circ \text{ (1dp)}$$

85.5°

(Total 3 marks)

7.

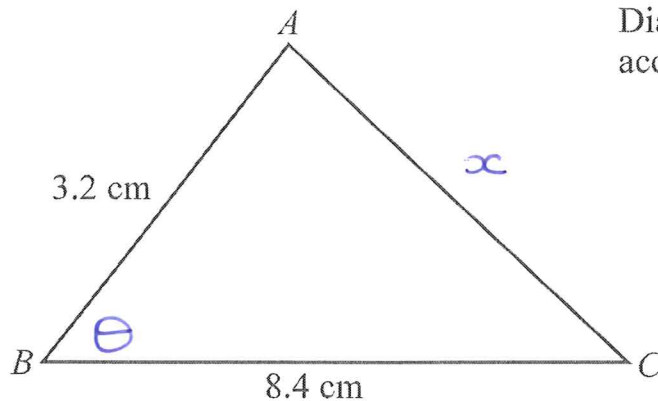


Diagram **NOT**
accurately drawn

$$AB = 3.2 \text{ cm}$$

$$BC = 8.4 \text{ cm}$$

The area of triangle ABC is 10 cm^2 .

Calculate the perimeter of triangle ABC .

Give your answer correct to three significant figures.

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

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

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

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

$$0.7440476 = \sin \theta$$

$$\theta = 48.07736$$

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

$$x^2 = 44.88151331$$

$$x = 6.6993666$$

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

$$= 18.2993666$$

$$= 18.3 \text{ cm}$$

$$\dots\dots\dots 18.3 \text{ cm}$$

(Total 6 marks)