Name: _____

GCSE (1 – 9)

Finding the Area of Any Triangle

Instructions

• Use **black** ink or ball-point pen.
• Answer all questions.
• Answer the questions in the spaces provided
– *there may be more space than you need.*
• Diagrams are **NOT** accurately drawn, unless otherwise indicated.
• You must **show all your working out.**
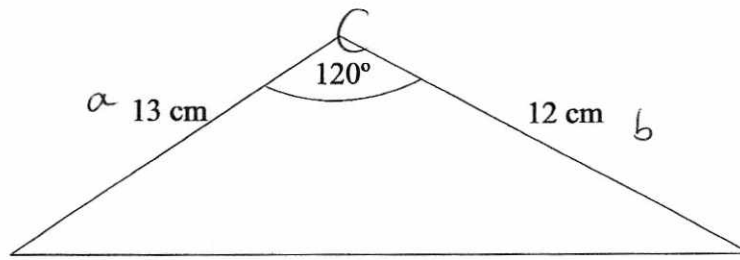
Information

• The marks for each question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

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
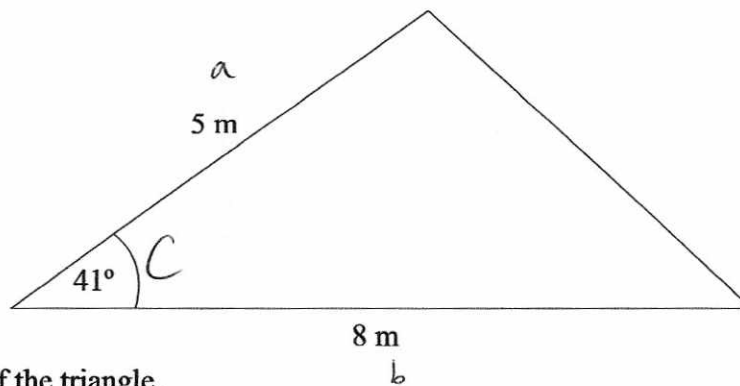
1

$$\text{Area} = \frac{1}{2}ab\sin C$$

Work out the area of the triangle.
Give your answer to 1 decimal place.

$$\frac{1}{2}(13)(12)\sin(120)$$

$$= 67.5 \ (1dp)$$
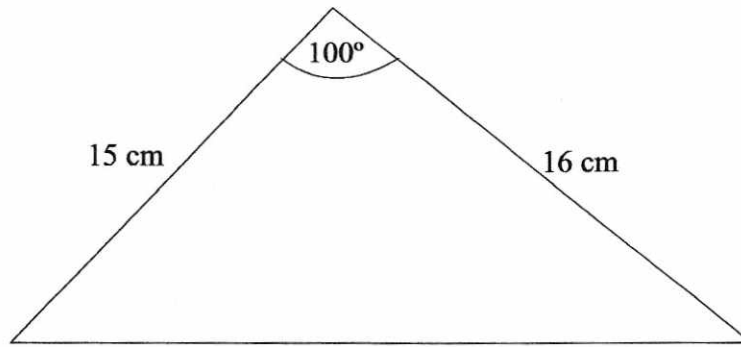
.....**67.5**.....cm²

(Total for question 1 is 2 marks)

2

Work out the area of the triangle.
Give your answer to 3 significant figures.

$$\frac{1}{2}(5)(8)\sin(41)$$

$$= 13.1 \quad 3sf$$

.....**13.1**.....m²

(Total for question 2 is 2 marks)

3

Work out the area of the triangle.
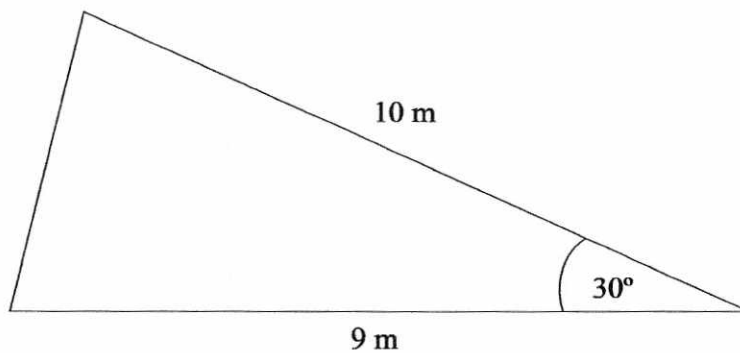Give your answer to 3 significant figures.

$$\frac{1}{2}(15)(16)\sin(100)$$

$$= 118 \quad (3sf)$$

..........118..........cm²

(Total for question 3 is 2 marks)
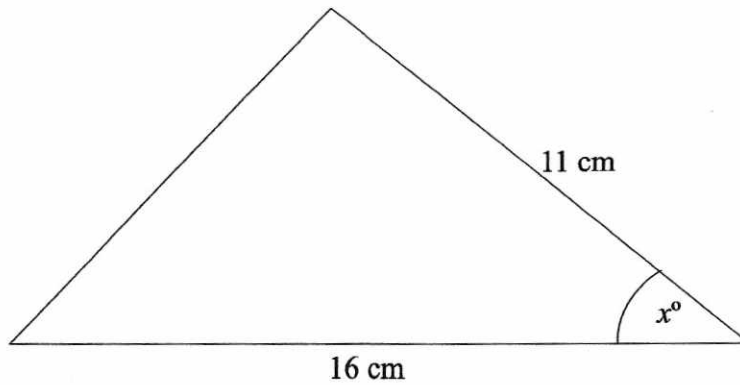
4

Work out the area of the triangle.

$$\frac{1}{2}(10)(9)\sin(30)$$

$$= 22.5$$

..........22.5..........m²

(Total for question 4 is 2 marks)

5

11 cm

16 cm

x°

The area of the triangle is 70cm^2
Work out the value of x.
Give your answer to 1 decimal place.

$$\frac{1}{2}(16)(11)\sin(x) = 70$$

$$88\sin(x) = 70$$

$$\sin(x) = \frac{70}{88}$$

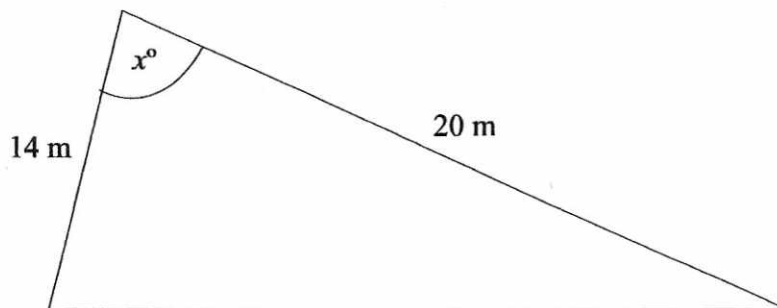$$x = \sin^{-1}\left(\frac{70}{88}\right)$$

$$= 52.7$$
$$(1dp)$$

52.7

(Total for question 5 is 3 marks)

6

x°

14 m

20 m

The area of the triangle is 100m^2
Work out the value of x.
Give your answer to 3 significant figures.

$$\frac{1}{2}(14)(20)\sin x = 100$$

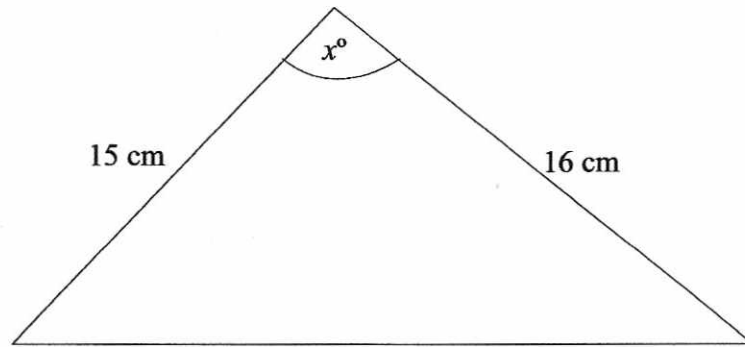$$140 \sin x = 100$$

$$\sin x = \frac{100}{140}$$

$$x = \sin^{-1}\left(\frac{100}{140}\right)$$

$$= 45.6 \ (3sf)$$

45.6

(Total for question 6 is 3 marks)

7

15 cm   16 cm

The area of the triangle is 105cm²
Work out the value of x.
Give your answer to 1 decimal place.

$$\frac{1}{2}(15)(16)\sin x = 105$$

$$120 \sin x = 105$$

$$\sin x = \frac{105}{120}$$

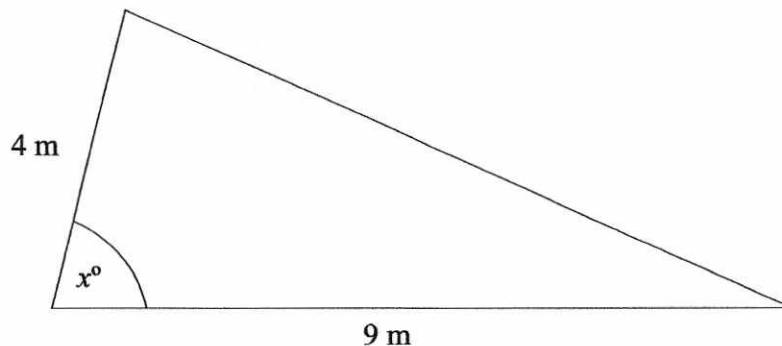$$x = \sin^{-1}\left(\frac{105}{120}\right)$$

$$= 61.0 \quad (1dp)$$

<u>61.0</u>

(Total for question 7 is 4 marks)

8

4 m

$x°$

9 m

The area of the triangle is 15m²
Work out the value of x.
Give your answer to 3 significant figures.

$$\frac{1}{2}(4)(9)\sin x = 15$$

$$18 \sin x = 15$$

$$\sin x = \frac{15}{18}$$
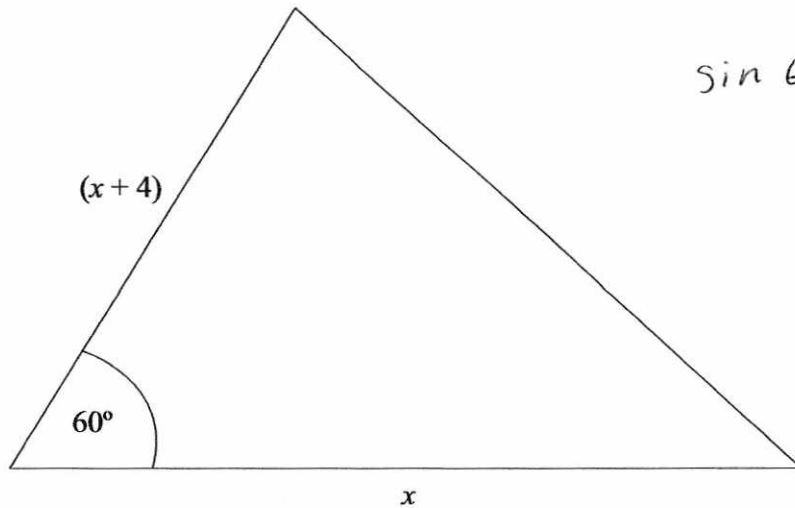
$$x = \sin^{-1}\left(\frac{15}{18}\right)$$

$$= 56.4 \quad (3sf)$$

<u>56.4</u>

(Total for question 8 is 4 marks)

9

$$\sin 60 = \frac{\sqrt{3}}{2}$$

The area of the triangle is $15\sqrt{3}$ cm^2.
Work out the value of x.

$$\frac{1}{2}(x)(x+4)\sin(60) = 15\sqrt{3}$$

$$\frac{1}{2}(x)(x+4)\frac{\sqrt{3}}{2} = 15\sqrt{3}$$

$$\frac{\sqrt{3}}{4}x(x+4) = 15\sqrt{3}$$

$$\sqrt{3}x(x+4) = 60\sqrt{3}$$

$$x(x+4) = 60$$

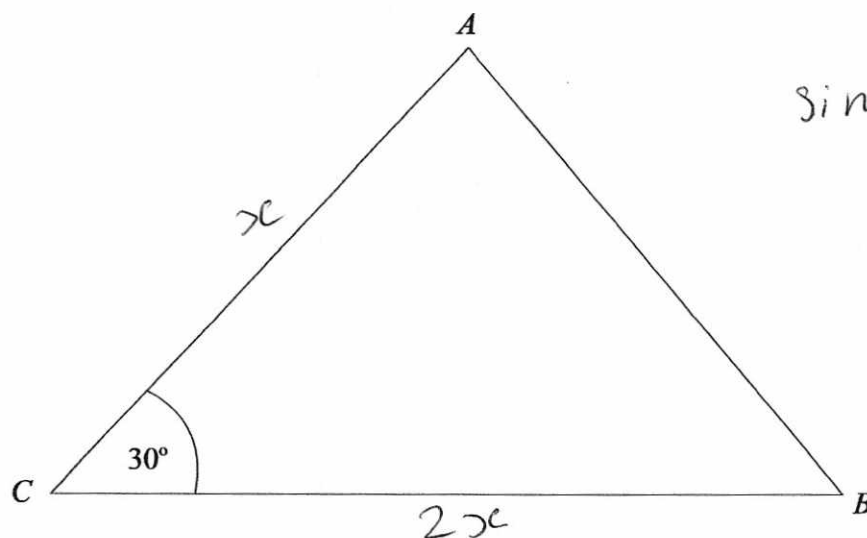$$x^2 + 4x = 60$$

$$x^2 + 4x - 60 = 0$$

$$(x+10)(x-6) = 0$$

$$x = -10 \qquad x = 6$$

a length cannot be negative $\therefore$ $\underline{\underline{x = 6}}$

6
....

(Total for question 9 is 4 marks)

10

$\sin 30 = \frac{1}{2}$

The ratio of the length BC to the length AC is 2:1
The area of the triangle is 50cm²

Work out the value of x.

$$\frac{1}{2}(x)(2x)\sin(30) = 50$$

$$\frac{1}{2}(x)(2x)\left(\frac{1}{2}\right) = 50$$

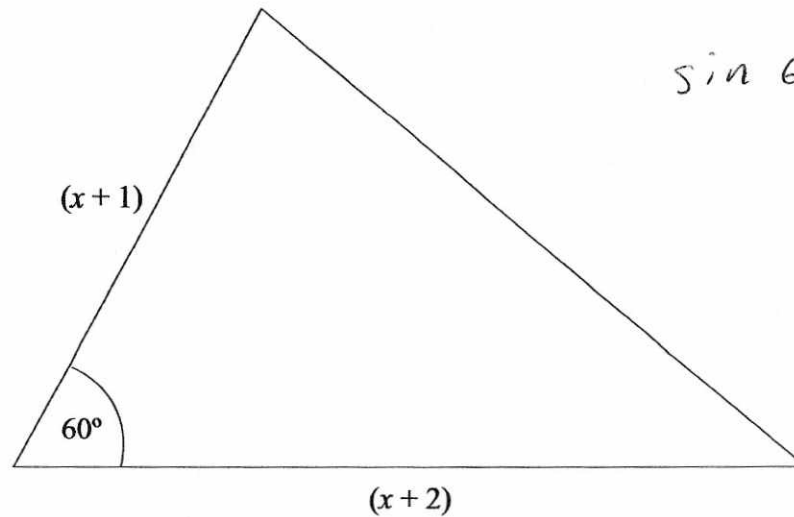$$\frac{1}{2}x^2 = 50$$

$$x^2 = 100$$

$$x = 10$$

(x cannot be -10 as a length can't be -ve)

10

11

$\sin 60 = \dfrac{\sqrt{3}}{2}$

$(x + 1)$

$60°$

$(x + 2)$

The area of the triangle is 25 cm².
Work out the value of x.
Give your answer to 3 significant figures.

$$\tfrac{1}{2}(x+1)(x+2) \sin 60 = 25$$

$$(x+1)(x+2)\left(\tfrac{\sqrt{3}}{2}\right) = 50$$

$$(x+1)(x+2) = \frac{100}{\sqrt{3}}$$

$$x^2 + 2x + x + 2 = \frac{100}{\sqrt{3}}$$

$$x^2 + 3x + 2 = \frac{100}{\sqrt{3}}$$

$$x^2 + 3x - {}^{"}55.735{}^{"} = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a = 1$
$b = 3$
$c = -55.735\ldots$

$= 6.11 \ (3sf)$ or $-9.11 \ (3sf)$

x ~~∈ lengths~~ cannot be negative.

$x = 6.11$

6.11

....

(Total for question 11 is 5 marks)