

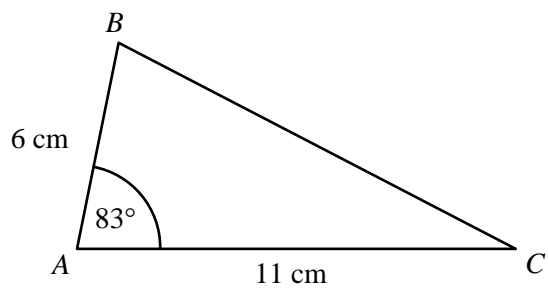


# Area of a Triangle (Trigonometry)



← **REVISE THIS TOPIC**

1 Here is triangle *ABC*.



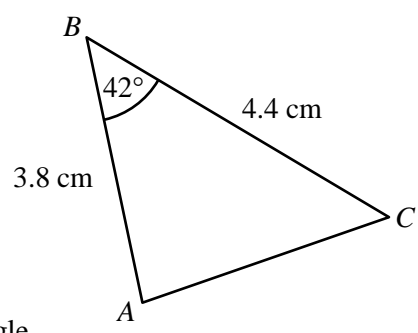
Work out the area of the triangle.  
Give your answer to 1 decimal place.

$$\frac{1}{2} \times 6 \times 11 \times \sin(83)$$

.....**32.8**.....cm<sup>2</sup>

(Total for Question 1 is 2 marks)

2 Here is triangle *ABC*.



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

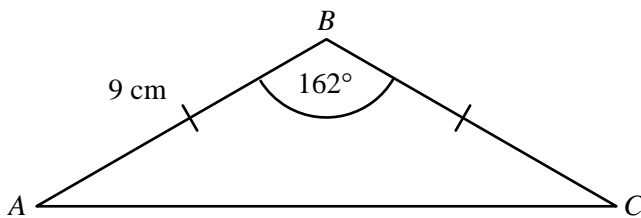
$$\frac{1}{2} \times 3.8 \times 4.4 \times \sin(42)$$

.....**5.6**.....cm<sup>2</sup>

(Total for Question 2 is 2 marks)



3 Here is triangle  $ABC$ .



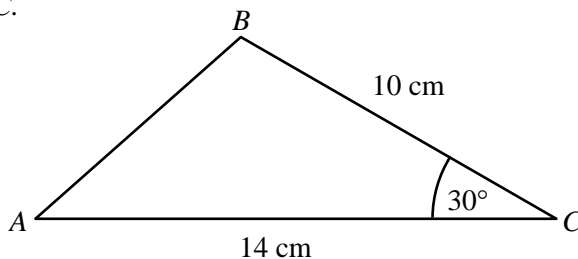
Work out the area of the triangle.  
Give your answer to 1 decimal place.

$$\frac{1}{2} \times 9 \times 9 \times \sin(162)$$

.....**12.5**..... $\text{cm}^2$

(Total for Question 3 is 2 marks)

4 Here is triangle  $ABC$ .



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

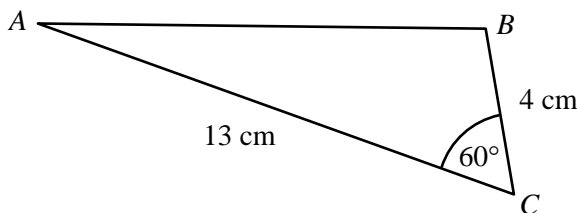
$$\begin{aligned} & \frac{1}{2} \times 10 \times 14 \times \sin(30) \\ &= \frac{1}{2} \times 10 \times 14 \times \frac{1}{2} \\ &= 5 \times 7 \end{aligned}$$

.....**35**..... $\text{cm}^2$

(Total for Question 4 is 3 marks)



5 Here is triangle  $ABC$ .



Work out the area of the triangle.

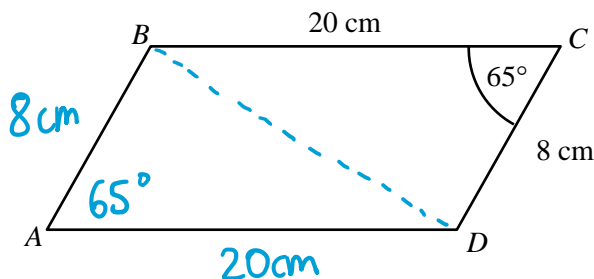
Give your answer in the form  $k\sqrt{3}$ , where  $k$  is an integer.

$$\begin{aligned}
 & \frac{1}{2} \times 4 \times 13 \times \sin(60) \\
 &= \frac{1}{2} \times 4 \times 13 \times \frac{\sqrt{3}}{2} \\
 &= \frac{52\sqrt{3}}{4}
 \end{aligned}$$

$$\dots\dots\dots 13\sqrt{3} \dots\dots\dots \text{cm}^2$$

(Total for Question 5 is 3 marks)

6  $ABCD$  is a parallelogram.



Work out the area of the parallelogram.

Give your answer to 1 decimal place.

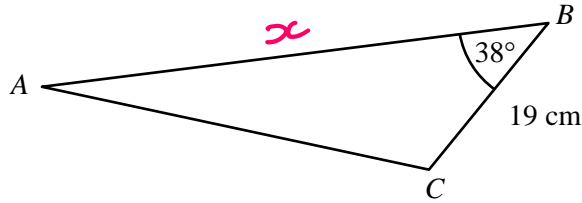
$$\begin{aligned}
 & \frac{1}{2} \times 20 \times 8 \times \sin(65) = 72.50462296 \\
 & 72.50462296 \times 2 = 145.0092459
 \end{aligned}$$

$$\dots\dots\dots 145.0 \dots\dots\dots \text{cm}^2$$

(Total for Question 6 is 3 marks)



7 Here is triangle  $ABC$ .



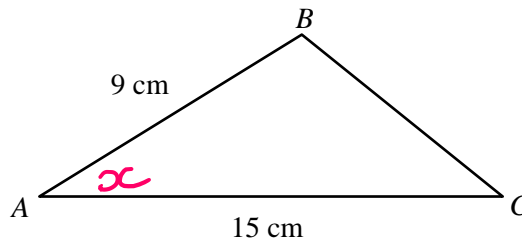
The area of the triangle is  $350\text{ cm}^2$   
 Work out the length of  $AB$ .  
 Give your answer to 1 decimal place.

$$\begin{aligned}
 \times 2 \left( \frac{1}{2} \times 19 \times x \times \sin(38) = 350 \right) \times 2 \\
 19 \sin(38) x = 700 \\
 x = \frac{700}{19 \sin(38)}
 \end{aligned}$$

59.8 cm

(Total for Question 7 is 3 marks)

8 Here is triangle  $ABC$ .



The area of the triangle is  $23\text{ cm}^2$   
 Work out the size of the acute angle,  $BAC$ .  
 Give your answer to 1 decimal place.

$$\begin{aligned}
 \times 2 \left( \frac{1}{2} \times 9 \times 15 \times \sin(x) = 23 \right) \times 2 \\
 135 \sin(x) = 46 \\
 \sin(x) = \frac{46}{135}
 \end{aligned}$$

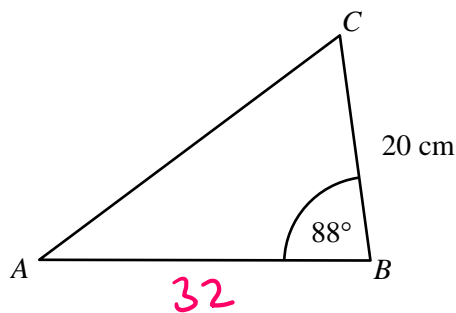
$$x = \sin^{-1}\left(\frac{46}{135}\right)$$

19.9 °

(Total for Question 8 is 3 marks)



9 Here is triangle  $ABC$ .



$AB : BC = 8 : 5$

Work out the area of the triangle.

Give your answer to 1 decimal place.

$20 \div 5 = 4$

$8 \times 4 = 32$

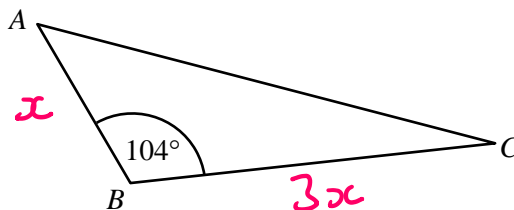
$\frac{1}{2} \times 20 \times 32 \times \sin(88)$

$319.8$

.....cm<sup>2</sup>

(Total for Question 9 is 3 marks)

10 Here is triangle  $ABC$ .



$AB : BC = 1 : 3$

The area of triangle  $ABC$  is  $123$  cm<sup>2</sup>

Work out the length of  $AB$ .

Give your answer to 1 decimal place.

$\frac{1}{2} \times x \times 3x \times \sin(104) = 123$

$3x^2 \sin(104) = 246$

$x^2 = \frac{246}{3 \sin(104)}$

$x = \sqrt{\frac{246}{3 \sin(104)}}$

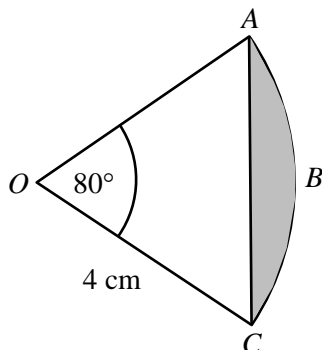
$9.2$

.....cm

(Total for Question 10 is 3 marks)



11  $OABC$  is a sector with centre  $O$ .



Calculate the area of the shaded region.  
Give your answer to 1 decimal place.

$$\begin{aligned} \text{Area of sector} &= \frac{80}{360} \times \pi \times 4^2 \\ &= 11.17010721 \end{aligned}$$

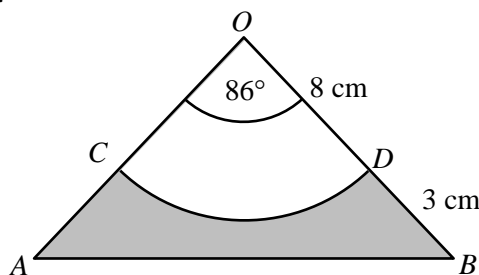
$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} \times 4 \times 4 \times \sin(80) \\ &= 7.878462024 \end{aligned}$$

$$11.17... - 7.87...$$

$$\dots\dots\dots 3.3 \dots\dots\dots \text{cm}^2$$

(Total for Question 11 is 4 marks)

12  $AOB$  is an isosceles triangle with  $OA = OB$   
 $COD$  is a sector, centre  $O$ .



Work out the area of the shaded region.

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} \times 11 \times 11 \times \sin(86) \\ &= 60.35262504 \end{aligned}$$

$$\begin{aligned} \text{Area of sector} &= \frac{86}{360} \times \pi \times 3^2 \\ &= 48.03146101 \end{aligned}$$

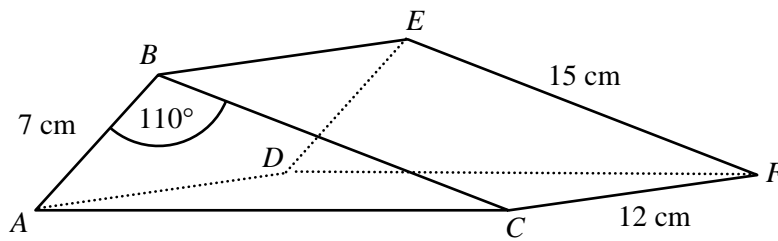
$$60.35... - 48.03...$$

$$\dots\dots\dots 12.3 \dots\dots\dots \text{cm}^2$$

(Total for Question 12 is 4 marks)



13  $ABCDEF$  is a triangular prism.



The prism has a mass of 0.5 kg.  
 Calculate the density of the prism in  $\text{g/cm}^3$   
 Give your answer to 3 significant figures.

$$\begin{aligned}
 \text{Area of triangle} &= \frac{1}{2} \times 7 \times 15 \times \sin(110) \\
 &= 49.33386259
 \end{aligned}$$

$$\begin{aligned}
 \text{Volume of prism} &= 49.3... \times 12 \\
 &= 592.0063511
 \end{aligned}$$

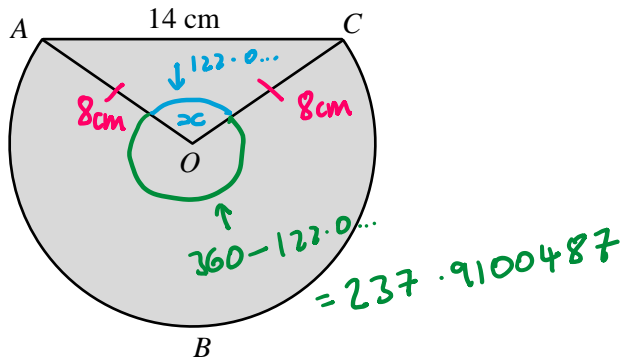
$$\begin{aligned}
 \text{Density} &= \frac{500\text{g}}{592.0... \text{cm}^3} \\
 &= 0.8445855337 \text{g/cm}^3
 \end{aligned}$$

$$0.845 \text{g/cm}^3$$

(Total for Question 13 is 5 marks)



14  $ABCO$  is a sector with centre  $O$ .



The perimeter of triangle  $AOC$  is 30 cm.  
 Calculate the shaded area.  
 Give your answer to 1 decimal place.

$$30 - 14 = 16 \quad 16 \div 2 = 8$$

$$\cos(x) = \frac{8^2 + 8^2 - 14^2}{2 \times 8 \times 8}$$

$$\cos(x) = -0.53125$$

$$x = \cos^{-1}(-0.53125)$$

$$x = 122.0899513$$

$$\begin{aligned}
 \text{Area of triangle} &= \frac{1}{2} \times 8 \times 8 \times \sin(122.0899513) \\
 &= 27.11088342
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of sector} &= \frac{237.9100487}{360} \times \pi \times 8^2 \\
 &= 132.8740376
 \end{aligned}$$

$$27.11088342 + 132.8740376 = 159.984921$$

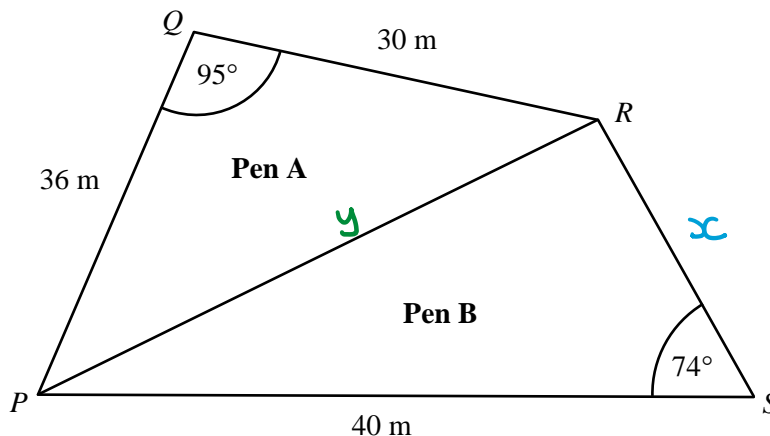
.....160.0..... $\text{cm}^2$

(Total for Question 14 is 6 marks)





15 PQRS is a farmer's field that is split into two pens.



Area of **Pen A** = Area of **Pen B**.

A fence is placed around the perimeter of the field and along the line PR.

Work out, to the nearest metre, the total length of all the fencing.

$$\begin{aligned} \text{Area of pen A} &= \frac{1}{2} \times 30 \times 36 \times \sin(95) \\ &= 537.945137 \end{aligned}$$

$$\frac{1}{2} \times 40 \times x \times \sin(74) = 537.9\dots$$

$$20 \sin(74) x = 537.9\dots$$

$$x = \frac{537.9\dots}{20 \sin(74)}$$

$$x = 27.98120113$$

$$y^2 = 30^2 + 36^2 - 2 \times 30 \times 36 \times \cos(95)$$

$$y^2 = 2384.256404$$

$$y = \sqrt{2384.256404}$$

$$y = 48.82884808$$

$$30 + 36 + 40 + 27.9\dots + 48.8\dots$$

183

.....m  
(Total for Question 15 is 6 marks)

