

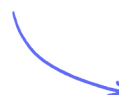
Exam Questions

Sine, Cosine Rule & Area of Triangles

The Sine Rule / The Cosine Rule / Area of a Triangle / Deciding the Trigonometric Rule

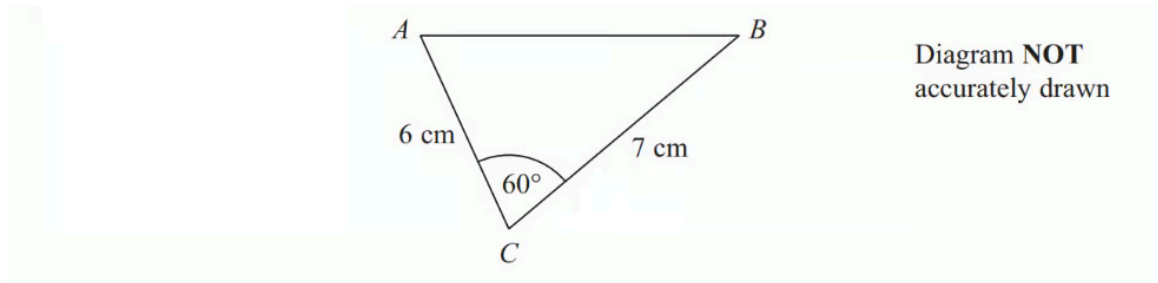
Medium (19 questions)	/68
Hard (14 questions)	/72
Very Hard (16 questions)	/85
Total Marks	/225

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Medium Questions

1 (a) ABC is a triangle.



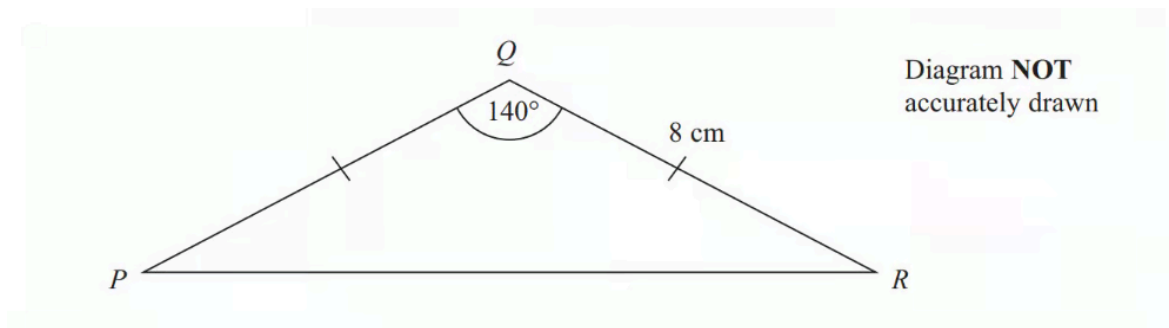
Work out the area of triangle ABC .
Give your answer correct to 3 significant figures.

(2 marks)

(b) Work out the length of the side AB .
Give your answer correct to 3 significant figures.

(3 marks)

2



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

(3 marks)

3 (a) The diagram shows parallelogram $EFGH$.

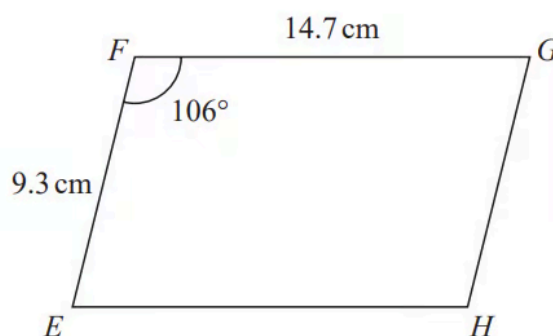


Diagram **NOT**
accurately drawn

$$EF = 9.3 \text{ cm}$$

$$FG = 14.7 \text{ cm}$$

$$\text{Angle } EFG = 106^\circ$$

Work out the area of the parallelogram.

Give your answer correct to 3 significant figures.

.....cm²

(2 marks)

(b) Work out the length of the diagonal EG of the parallelogram. Give your answer correct to 3 significant figures.

.....cm

(3 marks)

- 4 The diagram shows triangle PQR .

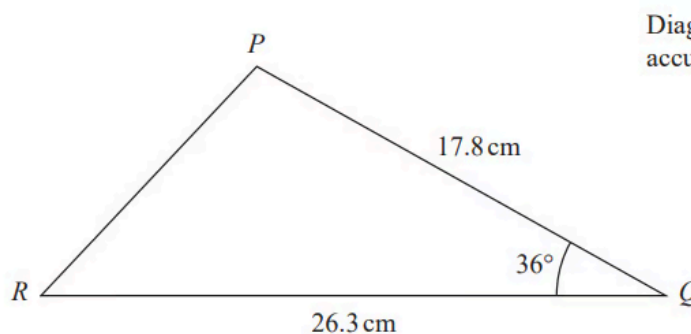


Diagram **NOT**
accurately drawn

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

.....cm

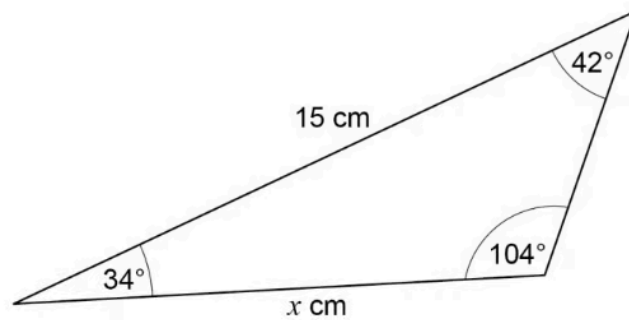
(3 marks)

- 5 A triangle has sides of length 8 cm, 10 cm and 14 cm.

Work out the size of the largest angle of the triangle.
Give your answer correct to 1 decimal place.

(3 marks)

6 Here is a triangle.



Not drawn
accurately

Choose the correct equation.

A. $\frac{\sin x}{42} = \frac{\sin 15^\circ}{104}$

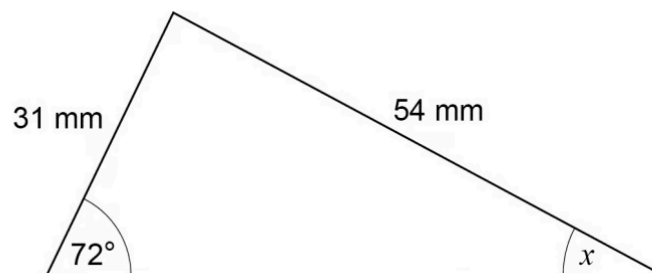
B. $\frac{x}{\sin 42^\circ} = \frac{15}{\sin 104^\circ}$

C. $\frac{\sin x}{34} = \frac{\sin 15^\circ}{104}$

D. $\frac{x}{\sin 42^\circ} = \frac{15}{\sin 34^\circ}$

(1 mark)

7 Here is a triangle.



Not drawn
accurately

Leah tries to use the sine rule to work out the size of angle x .
Here are the first two lines of her working.

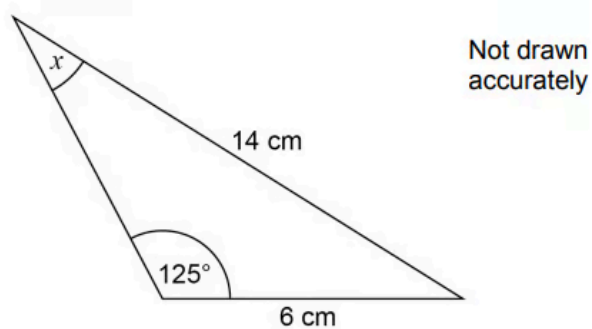
$$\frac{x}{\sin 31} = \frac{54}{\sin 72}$$

$$x = \frac{54 \sin 31}{\sin 72}$$

What error has she made in this working?

(1 mark)

8 Work out the size of angle x .

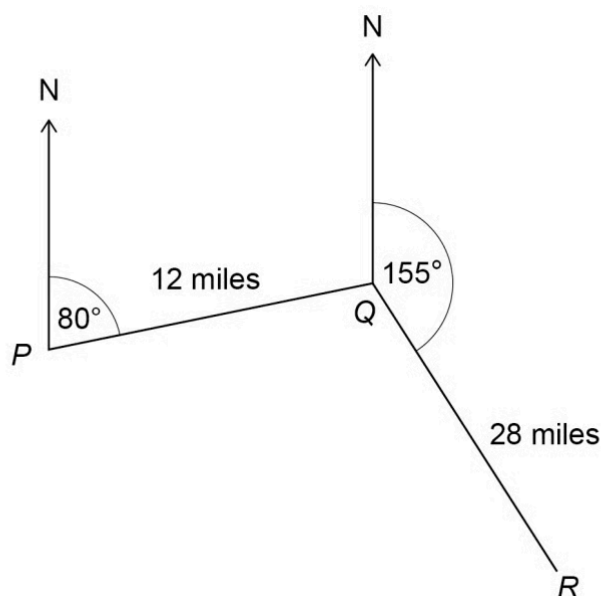


.....degrees

(3 marks)

9 A ship sails from P to Q and then from Q to R .

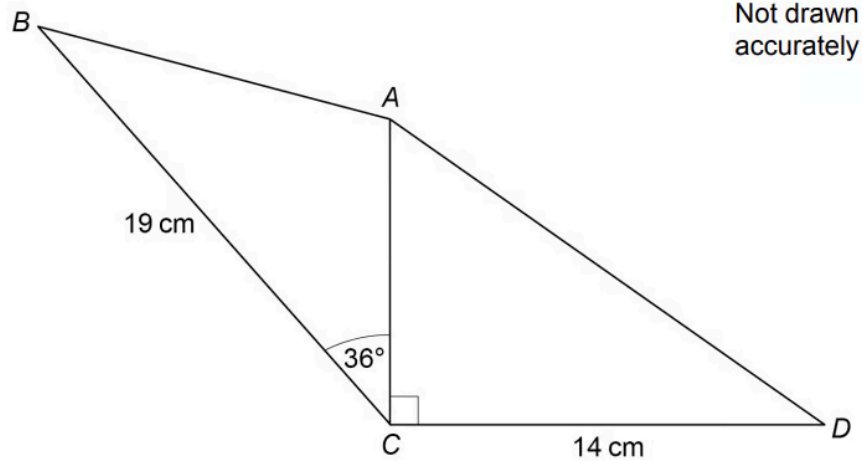
Q is 12 miles from P , on a bearing of 080°
 R is 28 miles from Q , on a bearing of 155°



Work out the direct distance from P to R .

(4 marks)

10 ABC and ACD are triangles.



The area of ACD is 80.5 cm^2

Work out the area of ABC .

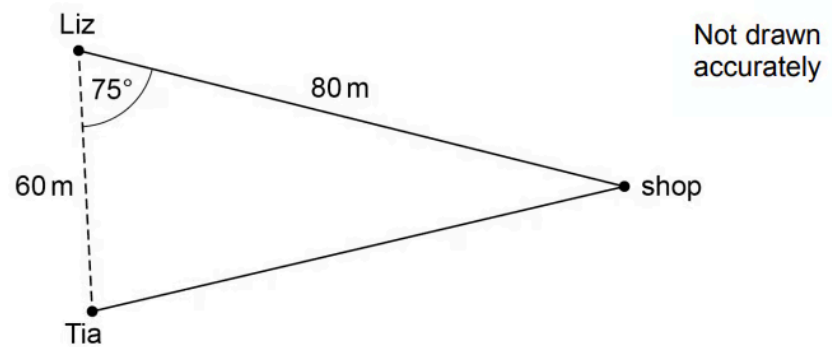
Give your answer to 3 significant figures.

..... cm^2

(4 marks)

11 (a) Liz and Tia are walking towards a shop along different straight paths.

The diagram shows their positions at 2 pm



Assume they walk at the same speed.

Who will arrive at the shop first?

You **must** show your working.

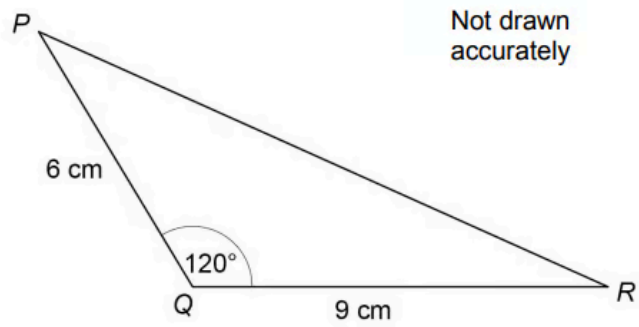
(3 marks)

(b) In fact, Liz walks at a faster speed than Tia.

How does this affect the answer to part (a)?

(1 mark)

12 Here is a triangle.

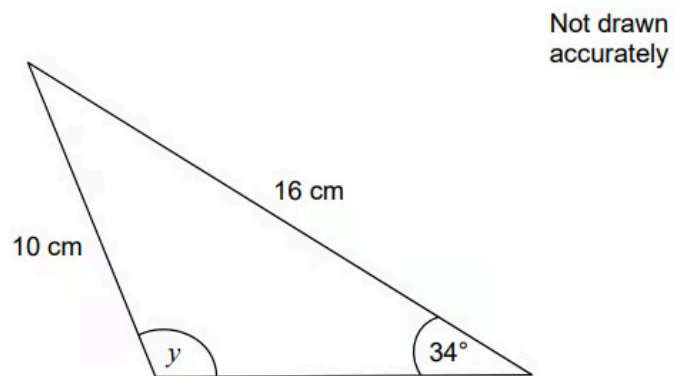


Work out the length PR .

.....cm

(3 marks)

13 In the triangle, angle y is obtuse.

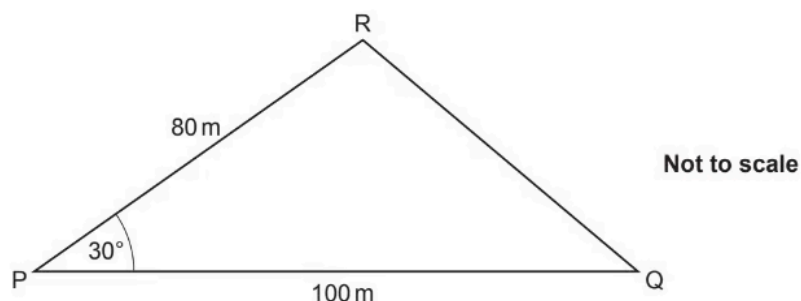


Work out the size of angle y .

.....degrees

(3 marks)

14 (a) The diagram shows a triangular field PQR which is used to grow organic carrots.



PQ = 100 m, PR = 80 m and angle RPQ = 30° .

In recent years, an average of 2.5 kg of carrots has been harvested from each square metre of the field.

Use this information to work out the total mass of carrots that might have been harvested from the field in 2019.

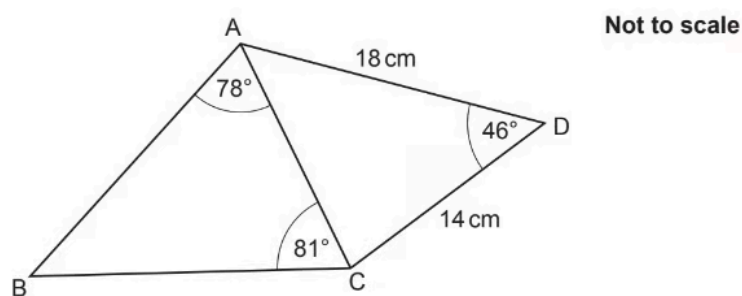
.....kg

(4 marks)

(b) Why might the answer to part **(a)** be unreliable?

(1 mark)

15 (a) ABC and ACD are triangles.



Show that $AC = 13.0$ cm, correct to 3 significant figures.

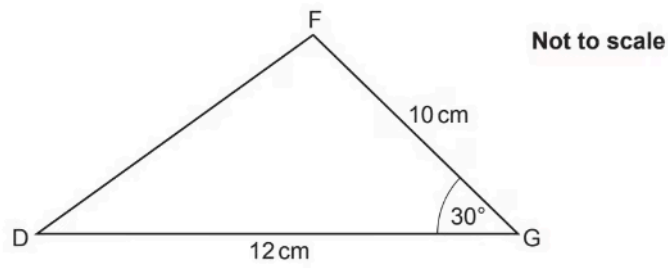
(4 marks)

(b) Calculate BC.

..... cm

(3 marks)

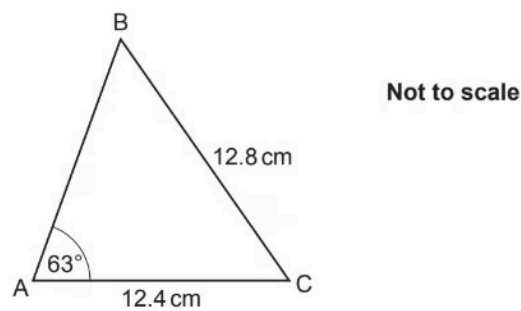
16 Calculate length DF in this triangle.



..... cm

(3 marks)

17 Calculate angle ACB in this triangle.

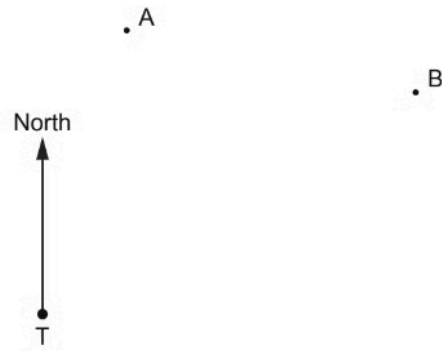


(4 marks)

18 T is a radar tower.
A and B are two aircraft.
At 3pm

- aircraft A is 3250km from T on a bearing of 015°
- aircraft B is 4960km from T on a bearing of 057° .

Not to scale

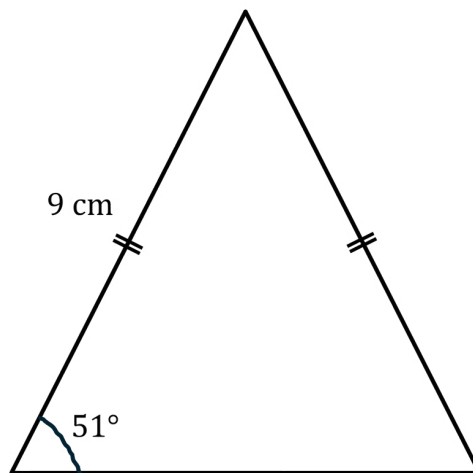


Calculate the distance that was between aircraft A and aircraft B at 3pm.

..... km

(4 marks)

19 Here is an isosceles triangle.



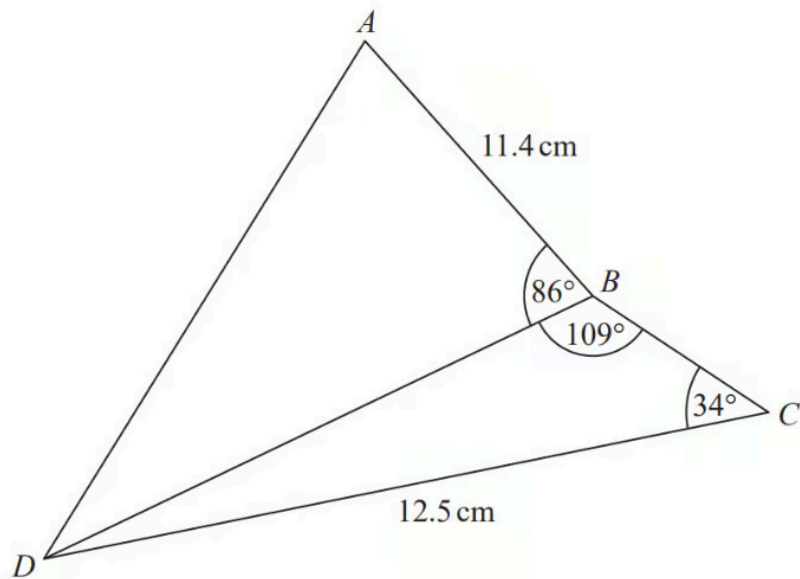
Find the area of the triangle.

Give your answer correct to 3 significant figures.

(3 marks)

Hard Questions

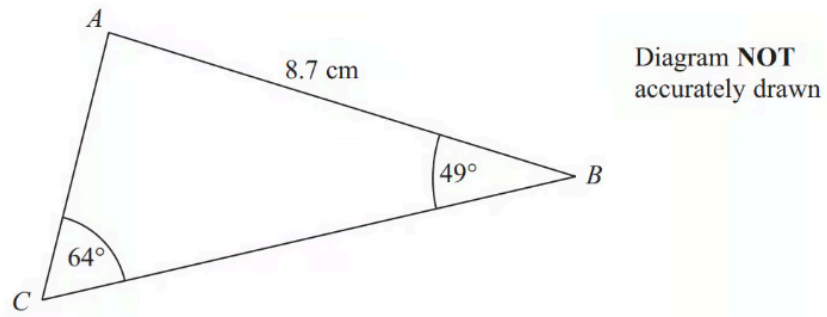
1



Work out the length of AD .
Give your answer correct to 3 significant figures.

(5 marks)

2



ABC is a triangle.

$AB = 8.7$ cm.

Angle $ABC = 49^\circ$.

Angle $ACB = 64^\circ$.

Calculate the area of triangle ABC .

Give your answer correct to 3 significant figures.

(5 marks)

3 The diagram shows triangle LMN .

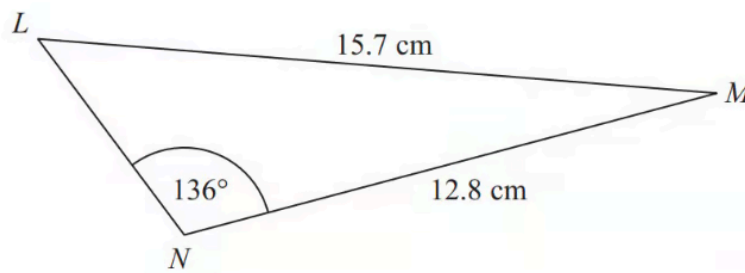


Diagram **NOT**
accurately drawn

Calculate the length of LN .

Give your answer correct to 3 significant figures.

(5 marks)

4

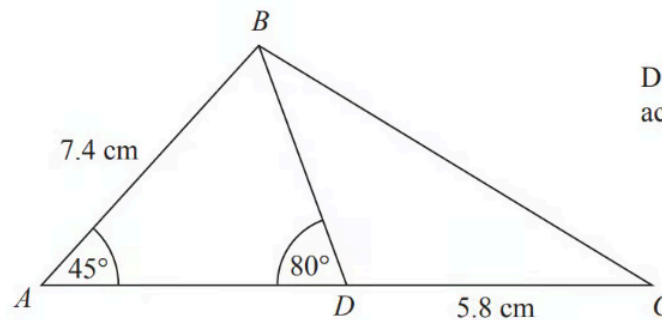


Diagram **NOT**
accurately drawn

ABC is a triangle.

D is a point on AC .

Angle $BAD = 45^\circ$

Angle $ADB = 80^\circ$

$AB = 7.4 \text{ cm}$

$DC = 5.8 \text{ cm}$

Work out the length of BC .
Give your answer correct to 3 significant figures.

(5 marks)

5 ABC is a triangle.

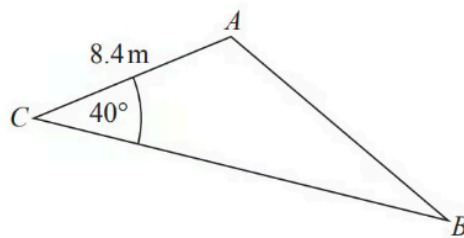


Diagram **NOT**
accurately drawn

$AC = 8.4\text{m}$
Angle $ACB = 40^\circ$

The area of the triangle = 100 m^2 .

Work out the length of AB .
Give your answer correct to 3 significant figures.
You must show all your working.

(5 marks)

6 (a) In triangle RPQ ,

$$RP = 8.7 \text{ cm}$$

$$PQ = 5.2 \text{ cm}$$

$$\text{Angle } PRQ = 32^\circ$$

Assuming that angle PQR is an acute angle, calculate the area of triangle RPQ .
Give your answer correct to 3 significant figures.

(4 marks)

(b) If you did not know that angle PQR is an acute angle, what effect would this have on your calculation of the area of triangle RPQ ?

(1 mark)

7 The diagram shows the triangle PQR .

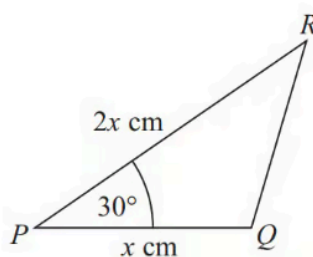


Diagram NOT
accurately drawn

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

$$PR = 2x \text{ cm}$$

$$\text{Angle } QPR = 30^\circ$$

$$\text{The area of triangle } PQR = A \text{ cm}^2$$

$$\text{Show that } x = \sqrt{2A}$$

(3 marks)

8 ABC is an isosceles triangle.

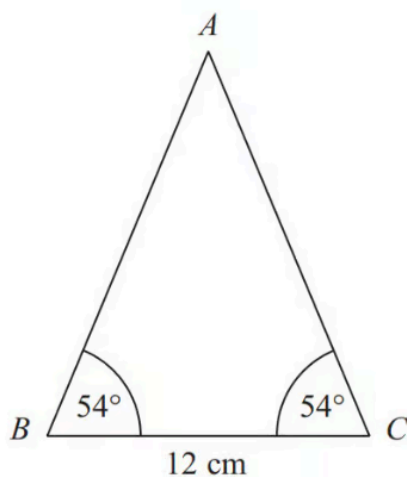


Diagram **NOT**
accurately drawn

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

(4 marks)

9 Here is a triangle XYZ .

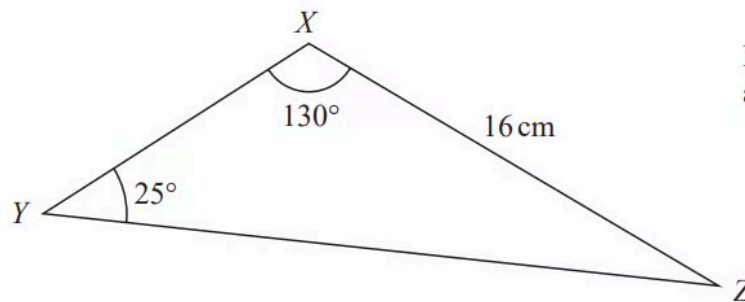


Diagram **NOT**
accurately drawn

The length XZ and the angles YXZ and XYZ are each given correct to 2 significant figures.

Calculate the upper bound for the length YZ .
Give your answer correct to one decimal place.
Show your working clearly.

..... cm

(3 marks)

10 Here is a quadrilateral $PQRS$.

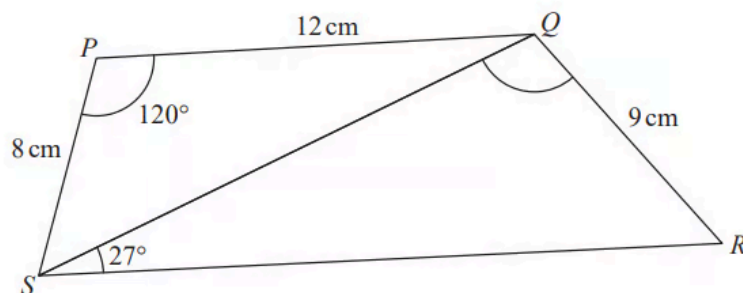


Diagram **NOT**
accurately drawn

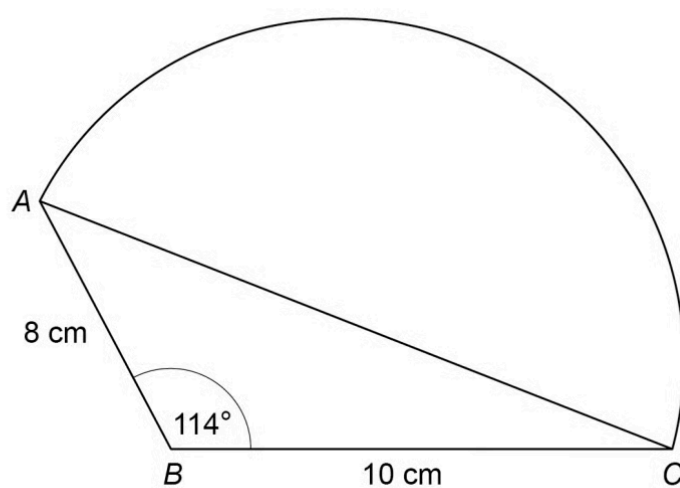
Angle SRQ is acute.

Work out the size of angle SQR .
Give your answer correct to 1 decimal place.

(6 marks)

- 11 A shape is made by joining triangle ABC to a semicircle with diameter AC .

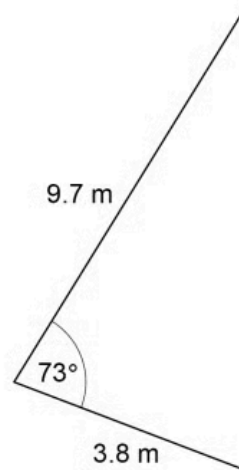
Not drawn
accurately



Work out the **total** area of the shape.

(5 marks)

12 (a) Here is a triangular sail.



Not drawn
accurately

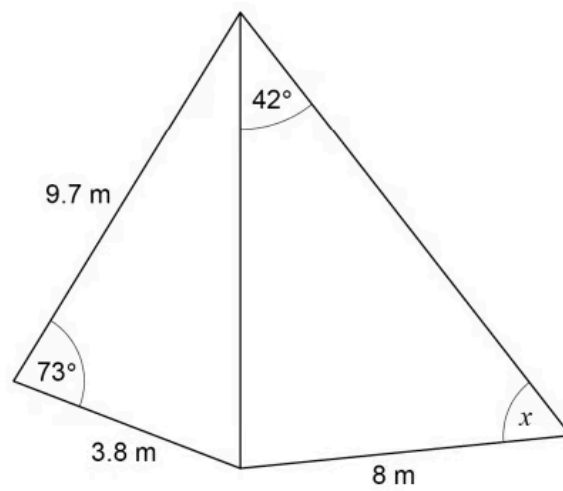
Vicky needs to buy waterproofing liquid for the sail.

She will put **3 coats** of liquid on each side of the sail.
A litre of liquid covers 8.5 square metres of sail.

How many 1-litre bottles of liquid does Vicky need?

(3 marks)

(b) Another sail is joined to the first sail as shown.



Not drawn
accurately

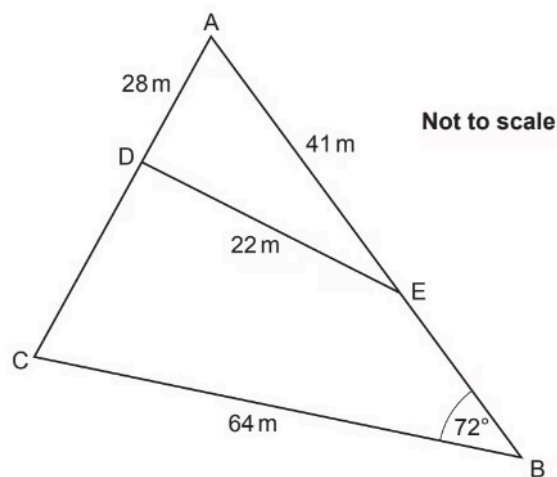
x is an acute angle.

Work out the size of angle x .

(5 marks)

13 The diagram shows triangle ABC with D on AC and E on AB.

DE is a straight line.

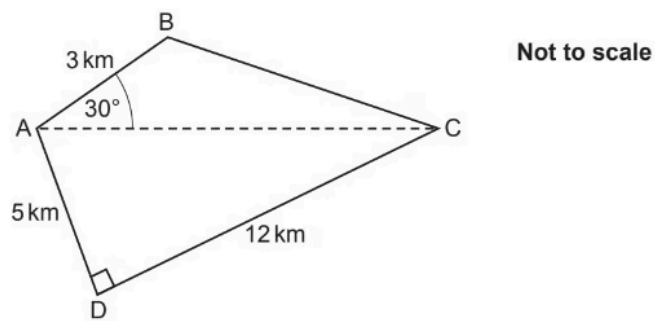


AD = 28 m, AE = 41 m, DE = 22 m and BC = 64 m.
Calculate the length CD.

..... m

(6 marks)

- 14 The diagram shows some land in the shape of a quadrilateral, ABCD.



$AB = 3\text{ km}$, $AD = 5\text{ km}$, $CD = 12\text{ km}$ and angle $BAC = 30^\circ$.

The land is sold for £10 million per square kilometre.

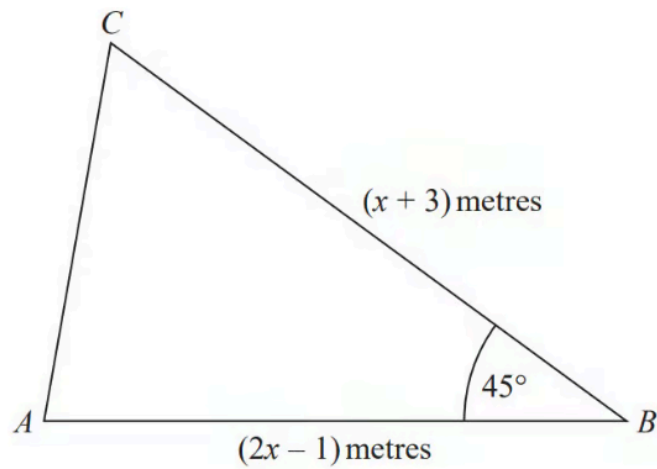
Calculate the total cost of the land.

£ million

(7 marks)

Very Hard Questions

1



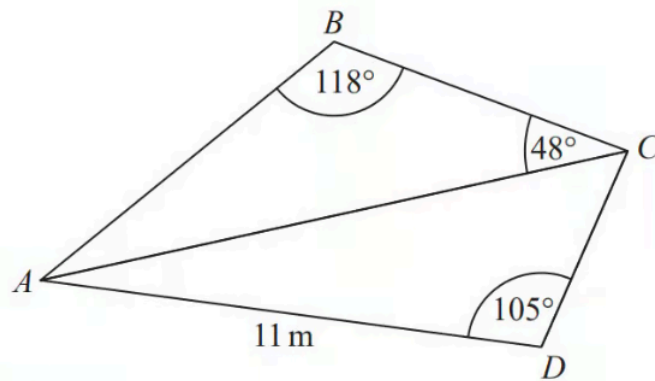
The area of triangle ABC is $6\sqrt{2}$ m².

Calculate the value of x .

Give your answer correct to 3 significant figures.

(5 marks)

2 ABC and ADC are triangles.



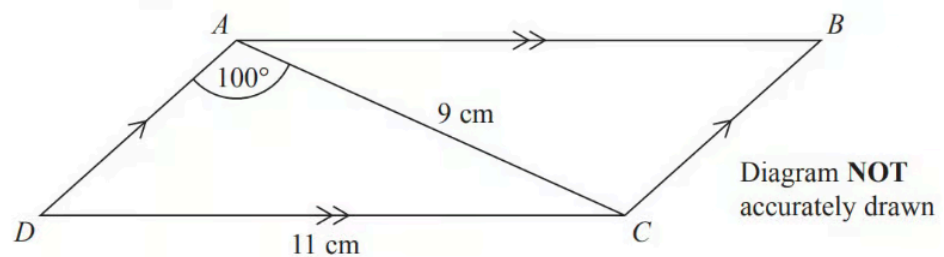
The area of triangle ADC is 56 m^2

Work out the length of AB .

Give your answer correct to 1 decimal place.

(5 marks)

3 $ABCD$ is a parallelogram.



$$AC = 9\text{ cm}$$

$$DC = 11\text{ cm}$$

$$\text{Angle } DAC = 100^\circ$$

Calculate the area of the parallelogram.
Give your answer correct to 3 significant figures.

(5 marks)

4

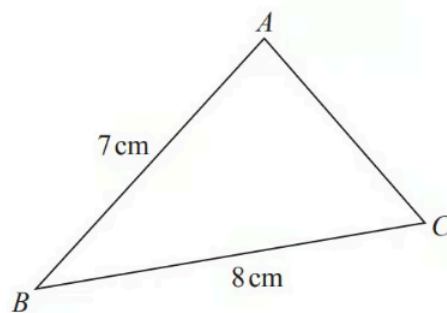


Diagram NOT
accurately drawn

ABC is an acute-angled triangle.

$BA = 7\text{ cm}$

$BC = 8\text{ cm}$

The area of triangle ABC is 18 cm^2 .

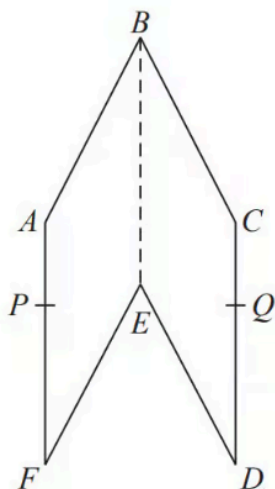
Work out the size of angle BAC .

Give your answer correct to 3 significant figures.

You must show all your working.

(6 marks)

- 5 The diagram shows a hexagon $ABCDEF$.



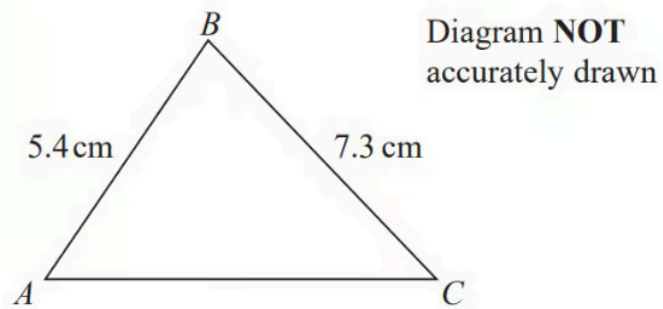
$ABEF$ and $CBED$ are congruent parallelograms where $AB = BC = x$ cm.
 P is the point on AF and Q is the point on CD such that $BP = BQ = 10$ cm.

Given that angle $ABC = 30^\circ$,

prove that $\cos PBQ = 1 - \frac{(2 - \sqrt{3})}{200}x^2$

(5 marks)

6 ABC is an acute angled triangle.



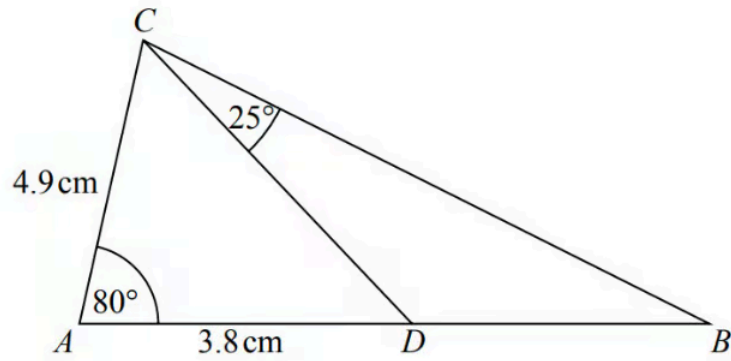
The area of triangle ABC is 19 cm^2 .

Work out the size of angle ACB .

Give your answer correct to 3 significant figures.

(6 marks)

7



ABC is a triangle.
 D is a point on AB .

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

(5 marks)

8 The diagram shows triangle PQR

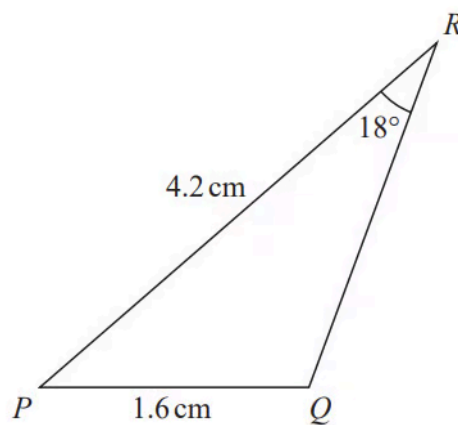


Diagram **NOT**
 accurately drawn

$PQ = 1.6 \text{ cm}$	$PR = 4.2 \text{ cm}$	Angle $PRQ = 18^\circ$
-----------------------	-----------------------	------------------------

Given that angle PQR is obtuse, work out the area of triangle PQR .
Give your answer correct to 3 significant figures.

(6 marks)

9 The diagram shows triangle ABC

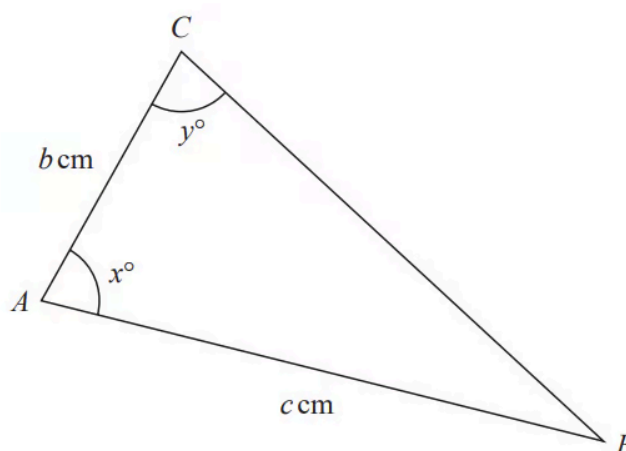


Diagram **NOT**
accurately drawn

$c = 11.5$ correct to one decimal place
 $x = 80$ correct to the nearest whole number
 $y = 75$ correct to the nearest whole number

Calculate the upper bound for the value of b
Show your working clearly.
Give your answer correct to 3 significant figures.

(4 marks)

10

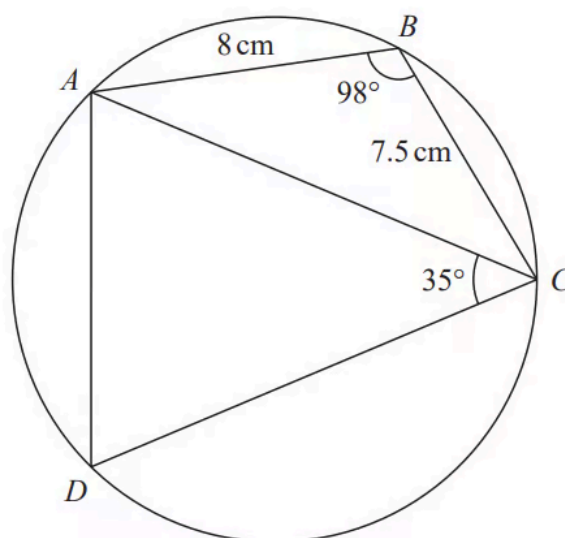


Diagram **NOT**
accurately drawn

$ABCD$ is a quadrilateral where A , B , C and D are points on a circle.

$AB = 8 \text{ cm}$

$BC = 7.5 \text{ cm}$

Angle $ABC = 98^\circ$

Angle $ACD = 35^\circ$

Work out the perimeter of quadrilateral $ABCD$.

Give your answer correct to one decimal place.

..... cm

(6 marks)

11 Here is a triangle XYZ .

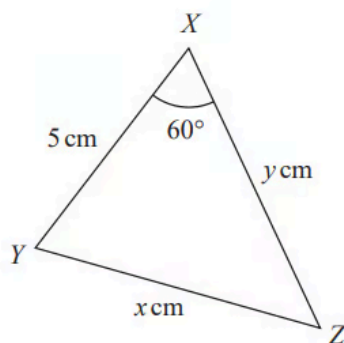


Diagram **NOT**
accurately drawn

The perimeter of the triangle is $k\text{ cm}$.

Given that $x = y - 1$

find the value of k .

Show your working clearly.

$k =$

(5 marks)

- 12 The diagram shows a regular octagon $ABCDEFGH$.

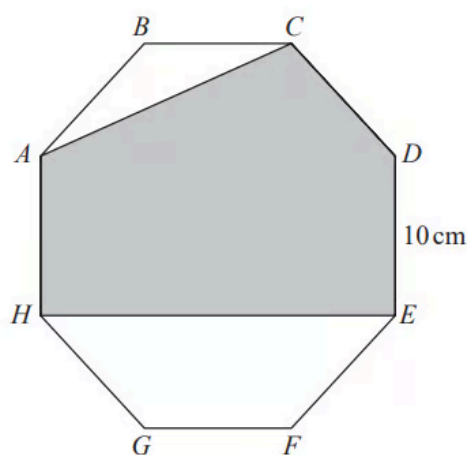


Diagram **NOT**
accurately drawn

Each side of the octagon has length 10 cm .

Find the area of the shaded region $ACDEH$.

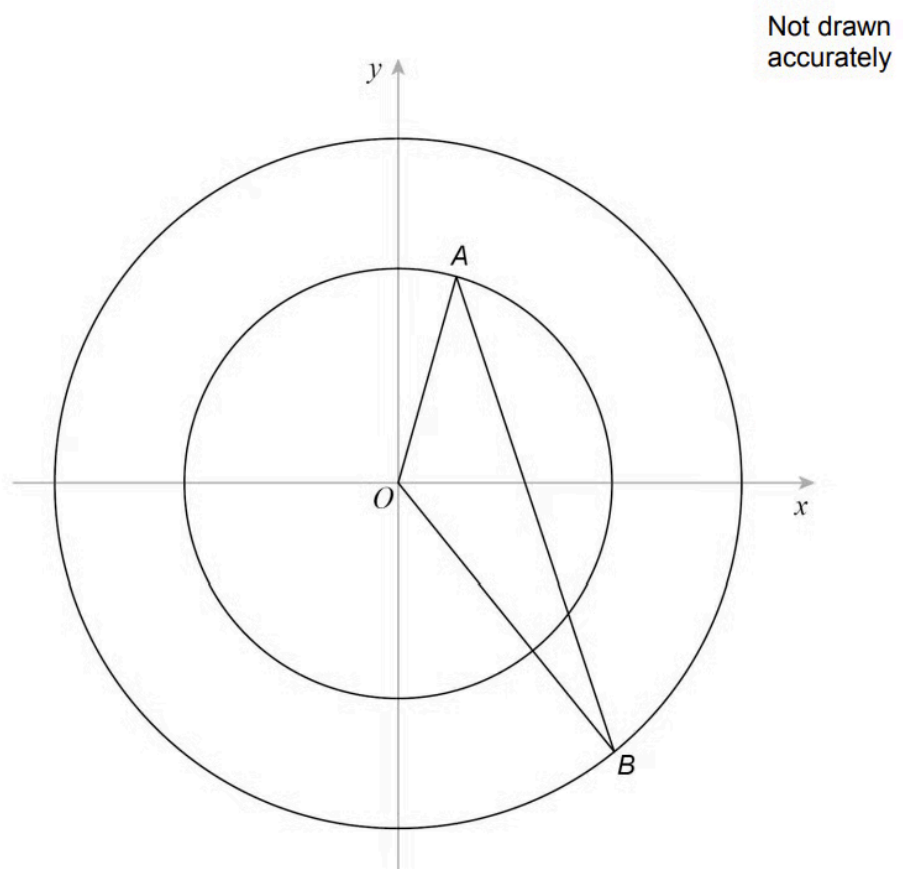
Give your answer correct to the nearest cm^2

..... cm^2

(6 marks)

- 13 In this question, all lengths are in centimetres.

A is a point on a circle, centre O .
 B is a point on a different circle, centre O .
 $AB = 20$



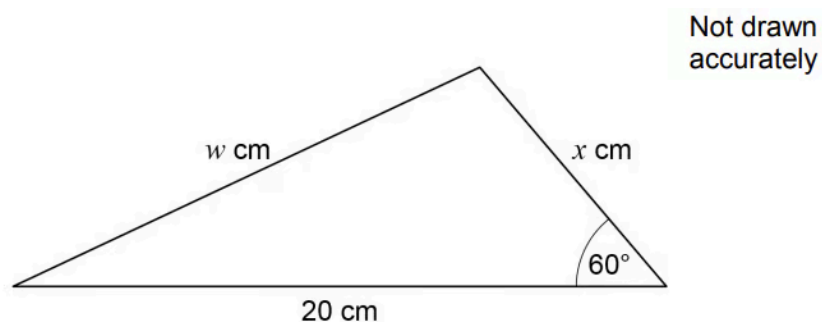
The equation of the larger circle is $x^2 + y^2 = 144$
 radius of smaller circle : radius of larger circle = 4 : 5

Work out the size of angle AOB

..... degrees

(5 marks)

- 14 The area of this triangle is $25\sqrt{3} \text{ cm}^2$



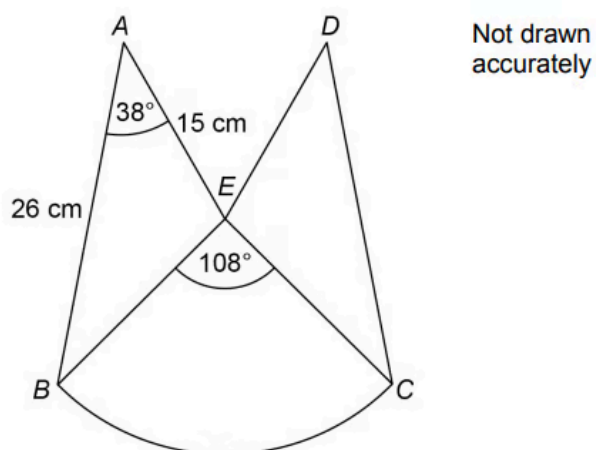
Work out the value of w .

Give your answer in the form $a\sqrt{b}$ where a and b are integers greater than 1.

(5 marks)

- 15 The diagram shows a logo.

ABE and DCE are congruent triangles.
 BCE is a sector of a circle, centre E .

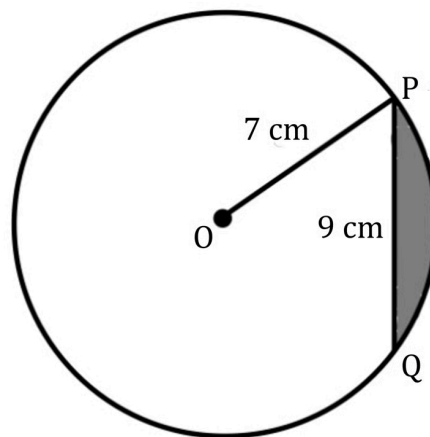


Show that the area of the logo is 510 cm^2 to 2 significant figures.

(5 marks)

16 PQ is a chord of a circle which has centre O and radius 7 cm.

$$PQ = 9 \text{ cm.}$$



Calculate the area of the shaded segment.

Give your answer to the nearest integer.

(6 marks)