Extended Mathematics
Topic : Geometry
Year :May 2013 -May 2024
Paper -2
Questions Booklet

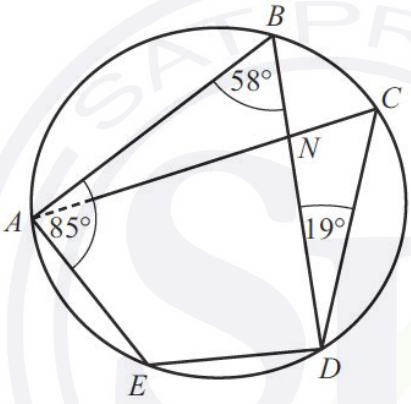
Question 1

The volumes of two similar cones are $36\pi\,cm^3$ and $288\pi\,cm^3$.
The base radius of the smaller cone is 3 cm.

Calculate the base radius of the larger cone.

Answer ..... cm [3]

Question 2



NOT TO SCALE

A, *B*, *C*, *D* and *E* are points on a circle.
Angle *ABD* = 58°, angle *BAE* = 85° and angle *BDC* = 19°.
BD and *CA* intersect at *N*.

Calculate

(a) angle *BDE*,

Answer(a) Angle *BDE* = ... [1]

(b) angle *AND*.

Answer(b) Angle *AND* = ... [2]

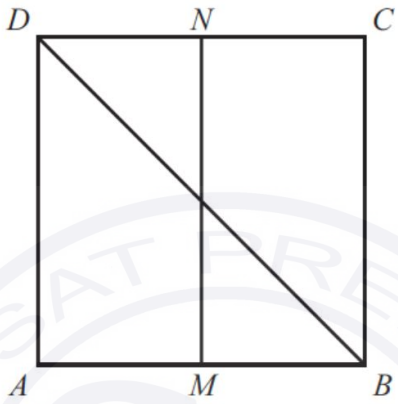
Question 3

A car, 4.4 metres long, has a fuel tank which holds 65 litres of fuel when full.
The fuel tank of a mathematically similar model of the car holds 0.05 litres of fuel when full.

Calculate the length of the model car in centimetres.

Answer ..... cm [3]

Question 4



The diagram shows a square $ABCD$.
M is the midpoint of AB and N is the midpoint of CD.

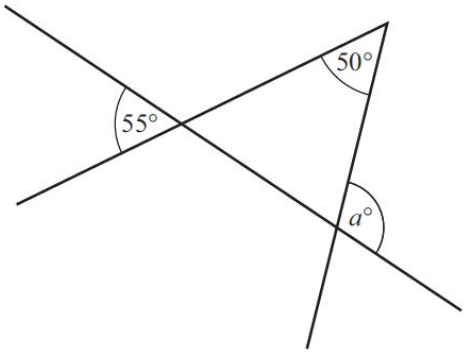
(a) Complete the statement.

The line MN is the locus of points inside the square which are

..... [1]

(b) Shade the region inside the square containing points which are nearer to AB than to BC **and** nearer to A than to B. [1]

Question 5

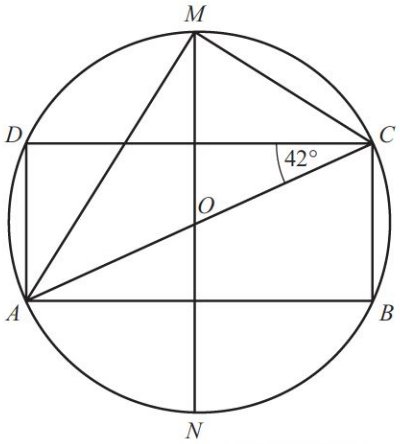


NOT TO SCALE

Use the information in the diagram to find the value of a.

Answer $a =$ ..... [2]

Question 6



NOT TO SCALE

The vertices of the rectangle $ABCD$ lie on a circle centre O.
MN is a line of symmetry of the rectangle.
AC is a diameter of the circle and angle $ACD = 42°$.

Calculate

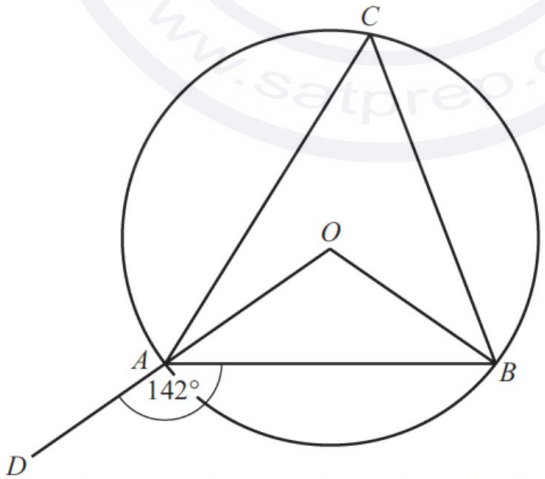
(a) angle CAM,

Answer(a) Angle CAM = ... [2]

(b) angle DCM.

Answer(b) Angle DCM = ... [2]

Question 7



NOT TO SCALE

A, B and C are points on the circumference of a circle centre O.
OAD is a straight line and angle $DAB = 142°$.

Answer Angle ACB = ... [3]

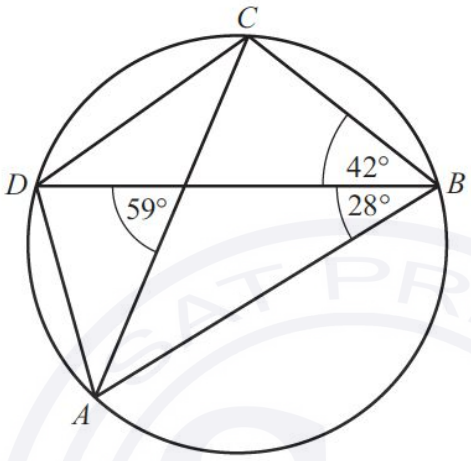
Question 8

The exterior angle of a regular polygon is 36°.

What is the name of this polygon?

Answer ..... [3]

Question 9



NOT TO SCALE

A, *B*, *C* and *D* lie on the circle.

Find

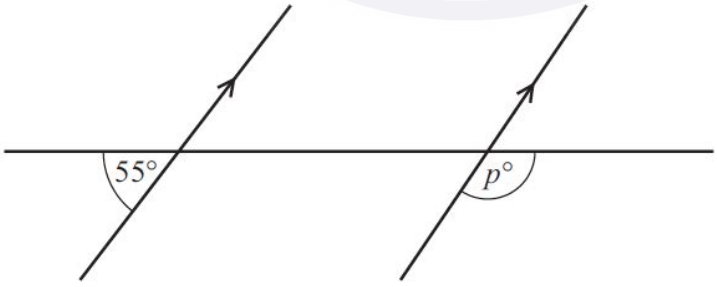
(a) angle *ADC*,

Answer(a) Angle *ADC* = ... [1]

(b) angle *ADB*.

Answer(b) Angle *ADB* = ... [2]

Question 10



NOT TO SCALE

Find the value of *p*.

Answer p = ... [2]

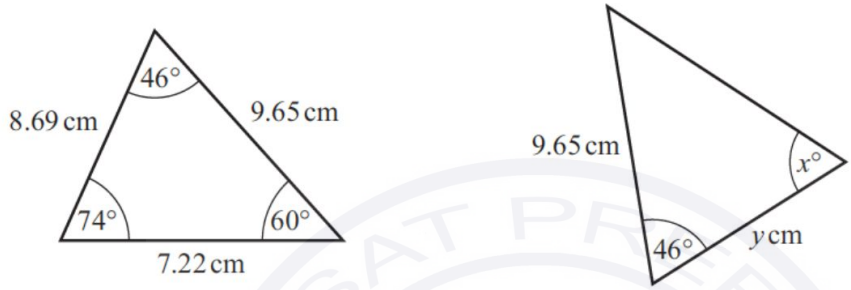
Question 11

Hans draws a plan of a field using a scale of 1 centimetre to represent 15 metres.
The actual area of the field is 10 800 m^2.

Calculate the area of the field on the plan.

Answer ..... cm^2 [2]

Question 12



NOT TO SCALE

These two triangles are congruent.
Write down the value of

(a) x,

Answer(a) x = ... [1]

(b) y.

Answer(b) y = ... [1]

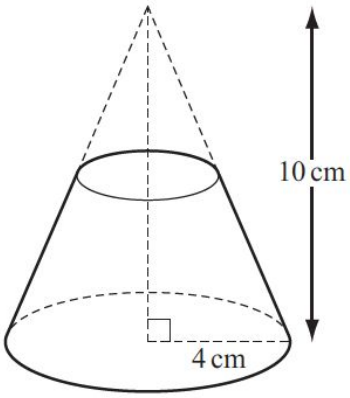
Question 13

NOT TO SCALE

The two containers are mathematically similar in shape.
The larger container has a volume of 3456 cm^3 and a surface area of 1024 cm^2.
The smaller container has a volume of 1458 cm^3.
Calculate the surface area of the smaller container.

Answer ..... cm^2 [4]

Question 14



NOT TO SCALE

A **solid** cone has base radius 4 cm and height 10 cm.
A mathematically similar cone is removed from the top as shown in the diagram.
The volume of the cone that is removed is $\frac{1}{8}$ of the volume of the original cone.

(a) Explain why the cone that is removed has radius 2 cm and height 5 cm.

Answer(a)

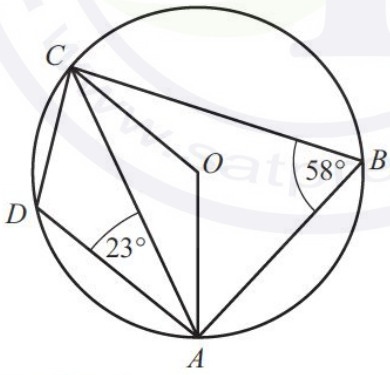
[2]

(b) Calculate the volume of the remaining solid.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

Answer(b) ..... cm^3 [4]

Question 15



NOT TO SCALE

A, B, C and D lie on a circle centre O.
Angle $ABC = 58°$ and angle $CAD = 23°$.

Calculate

(a) angle OCA,

Answer(a) Angle OCA = ... [2]

(b) angle DCA.

Answer(b) Angle DCA = ... [2]

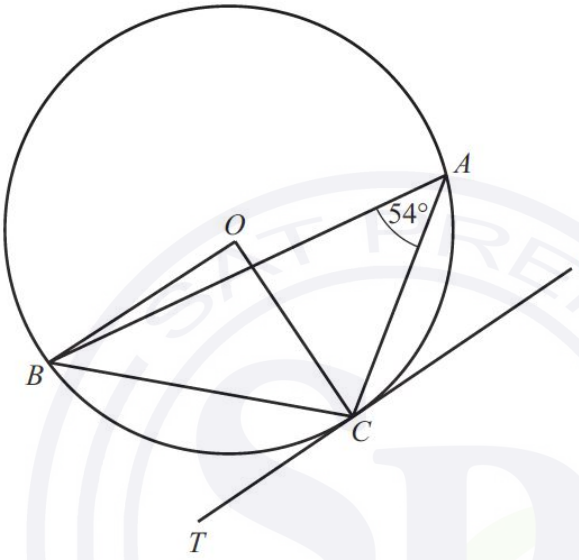
Question 16

Find the interior angle of a regular polygon with 18 sides.

Answer ..... [3]

Question 17

A, *B* and *C* are points on a circle, centre *O*.
TCD is a tangent to the circle.
Angle *BAC* = 54°.



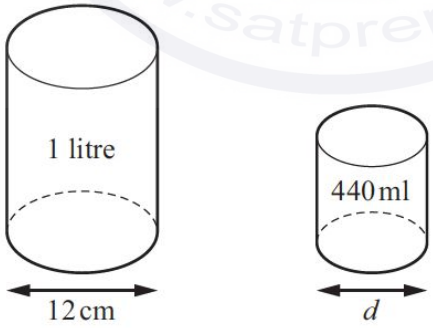
NOT TO SCALE

Find angle *BOC*, giving a reason for your answer.

Answer(a) Angle *BOC* = ... because .....

..... [2]

Question 18



NOT TO SCALE

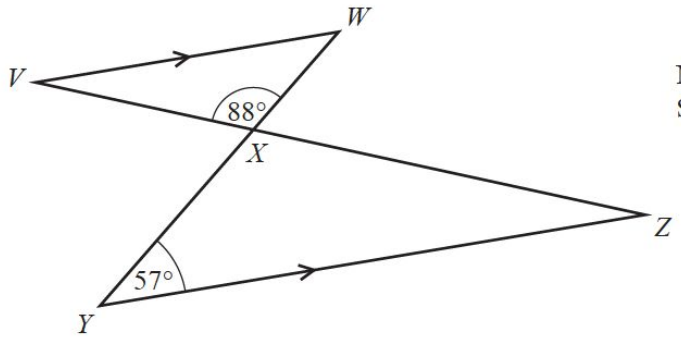
Two cylindrical cans are mathematically similar.
The larger can has a capacity of 1 litre and the smaller can has a capacity of 440 ml.

Calculate the diameter, *d*, of the 440 ml can.

Answer d = ... cm [3]

Question 19

(a)



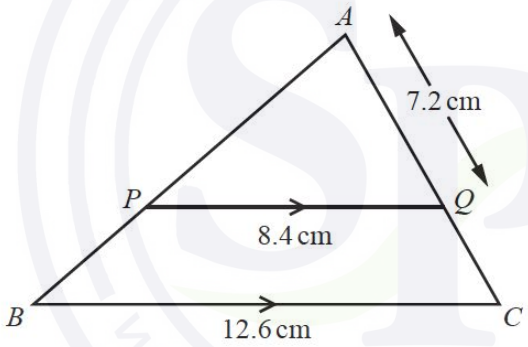
NOT TO SCALE

Two straight lines VZ and YW intersect at X.
VW is parallel to YZ, angle $XYZ = 57°$ and angle $VXW = 88°$.

Find angle WVX.

Answer(a) Angle WVX = ... [2]

(b)



NOT TO SCALE

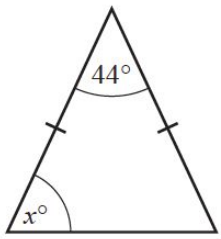
ABC is a triangle and PQ is parallel to BC.
$BC = 12.6$ cm, $PQ = 8.4$ cm and $AQ = 7.2$ cm.

Find AC.

Answer(b) AC = ... cm [2]

Question 20

(a)



NOT TO SCALE

The diagram shows an isosceles triangle.

Find the value of x.

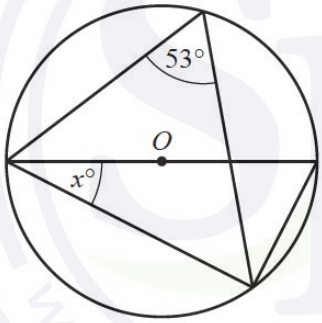
Answer(a) x = ... [1]

(b) The exterior angle of a regular polygon is 24°.

Find the number of sides of this regular polygon.

Answer(b) ..... [2]

Question 21



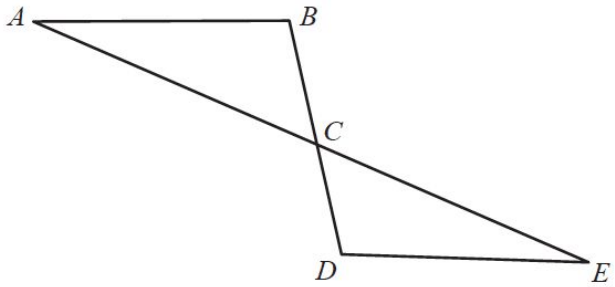
NOT TO SCALE

The diagram shows a circle, centre O.

Find the value of x.

Answer x = ... [2]

Question 22



NOT TO SCALE

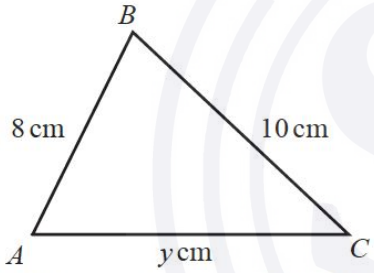
The diagram shows two straight lines, AE and BD, intersecting at C.
Angle ABC = angle EDC.
Triangles ABC and EDC are congruent.

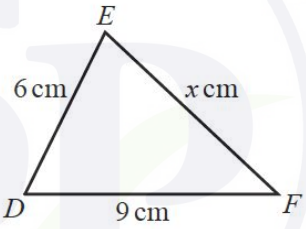
Write down **two** properties of line segments AB and DE.

Answer AB and DE are .....

and ..... [2]

Question 23





NOT TO SCALE

Triangle ABC is similar to triangle DEF.

Calculate the value of

(a) x,

Answer(a) x = ... [2]

(b) y.

Answer(b) y = ... [2]

Question 24

Two containers are mathematically similar.
Their volumes are 54 cm^3 and 128 cm^3.
The height of the smaller container is 4.5 cm.

Calculate the height of the larger container.

Answer ..... cm [3]

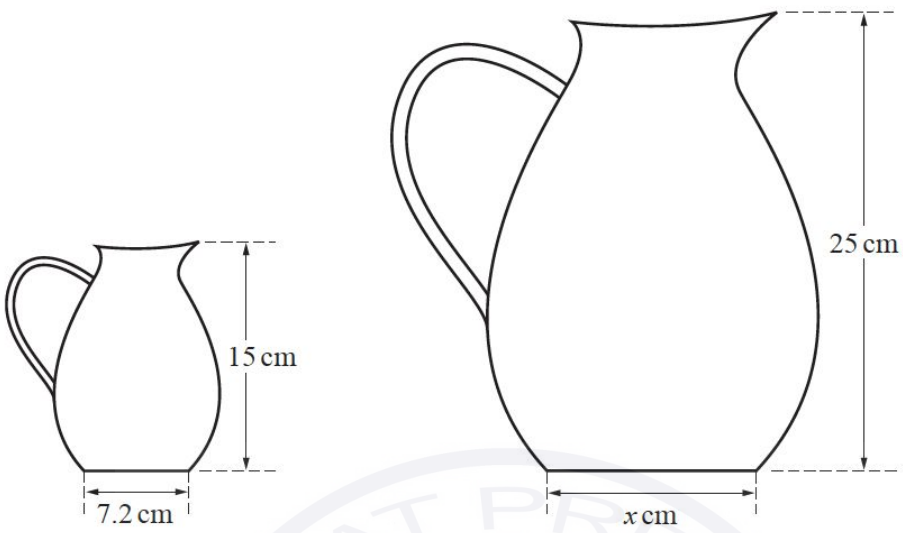
Question 25

Find the sum of the interior angles of a 25-sided polygon.

Answer ..... [2]

Question 26

(a)



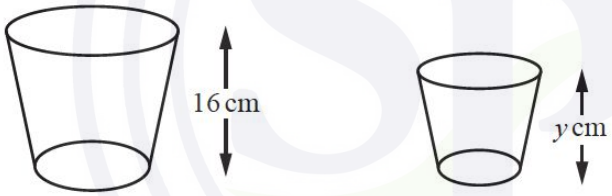
NOT TO SCALE

The diagram shows two jugs that are mathematically similar.

Find the value of x.

Answer(a) $x =$ ..... [2]

(b)



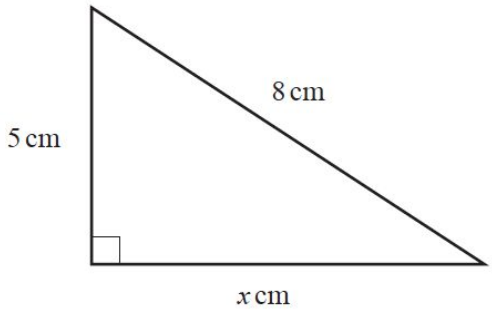
NOT TO SCALE

The diagram shows two glasses that are mathematically similar.
The height of the larger glass is 16 cm and its volume is 375 cm^3.
The height of the smaller glass is y cm and its volume is 192 cm^3.

Find the value of y.

Answer(b) $y =$ ..... [3]

Question 27



NOT TO SCALE

Calculate the value of x.

Answer x = ... [3]

Question 28

The scale on a map is 1 : 50 000.
The area of a field on the map is 1.2 square centimetres.

Calculate the actual area of the field in square kilometres.

Answer ..... km^2 [2]

Question 29

Parallelogram Trapezium Rhombus

Write down which one of these shapes has

- rotational symmetry of order 2

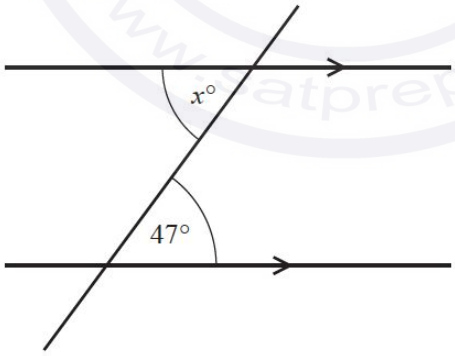
and

- no line symmetry.

Answer ..... [1]

Question 30

(a)



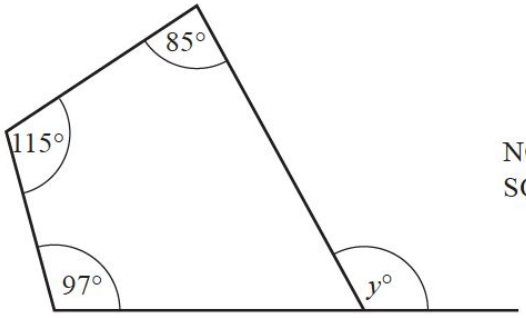
NOT TO SCALE

Find the value of x.

x = ... [1]

Continue on the next page...

(b)

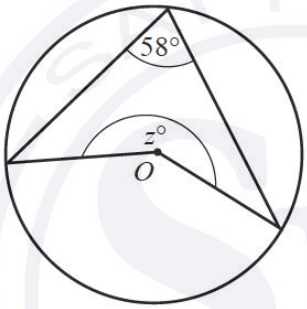


NOT TO SCALE

Find the value of y.

$y =$ ..... [2]

(c)



NOT TO SCALE

The diagram shows a circle, centre O.

Find the value of z.

$z =$ ..... [2]

Question 31

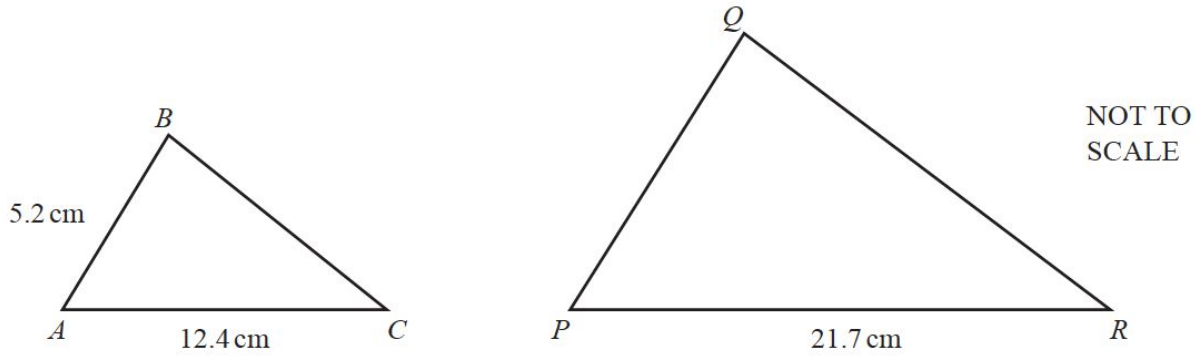
The scale on a map is 1 : 20 000.
The area of a lake on the map is 1.6 square centimetres.

Calculate the actual area of the lake.
Give your answer in square metres.

.....m^2 [3]

Question 32

Triangle ABC is similar to triangle PQR.

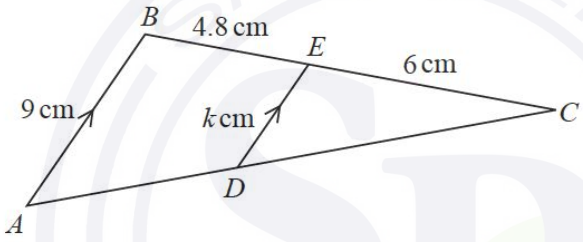


Find PQ.

$PQ =$ ..... cm [2]

Question 33

(a)

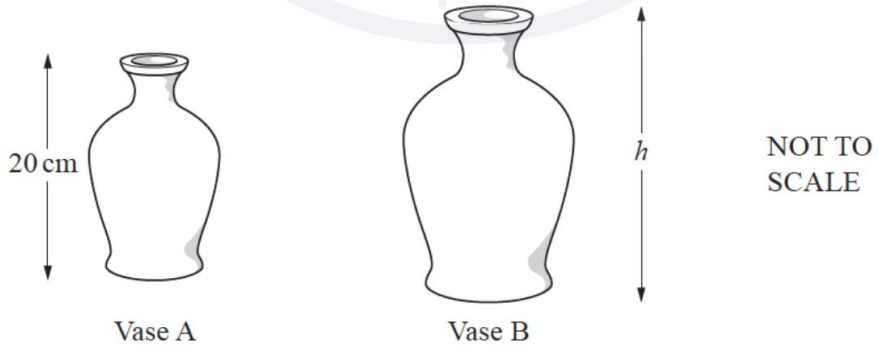


Triangles CBA and CED are similar.
AB is parallel to DE.
$AB = 9$ cm, $BE = 4.8$ cm, $EC = 6$ cm and $ED = k$ cm.

Work out the value of k.

$k =$ ..... [2]

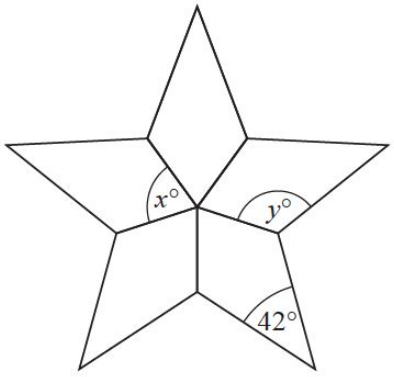
(b)



The diagram shows two mathematically similar vases.
Vase A has height 20 cm and volume 1500 cm^3.
Vase B has volume 2592 cm^3.
Calculate h, the height of vase B.

$h =$ ..... cm [3]

Question 34



NOT TO SCALE

The diagram is made from 5 congruent kites.

Work out the value of

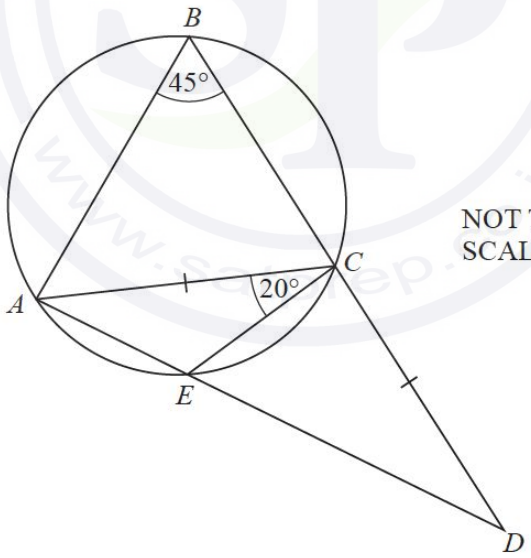
(a) x,

$x =$ ..... [1]

(b) y.

$y =$ ..... [2]

Question 35

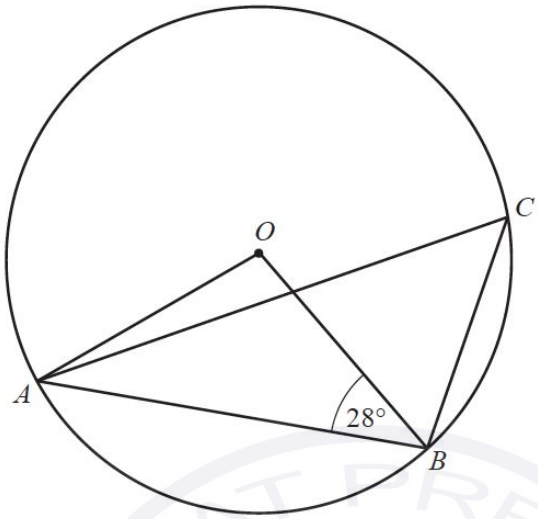


NOT TO SCALE

$ABCE$ is a cyclic quadrilateral.
AED and BCD are straight lines.
$AC = CD$, angle $ABC = 45°$ and angle $ACE = 20°$.
Work out angle ECD.

Angle $ECD =$ ..... [3]

Question 36



NOT TO SCALE

In the diagram, A, B and C lie on the circumference of a circle, centre O.
Work out the size of angle ACB.
Give a reason for each step of your working.

Angle ACB = ... [4]

Question 37

A regular polygon has an interior angle of 172°.

Find the number of sides of this polygon.

..... [3]

Question 38

A map is drawn to a scale of 1 : 1 000 000.
A forest on the map has an area of 4.6 cm^2.
Calculate the actual area of the forest in square kilometres.

..... km^2 [2]

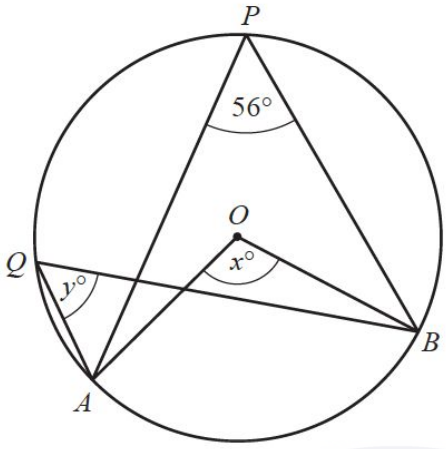
Question 39

Five angles of a hexagon are each 115°.

Calculate the size of the sixth angle.

..... [3]

Question 40



NOT TO SCALE

A, B, P and Q lie on the circle, centre O.
Angle $APB = 56°$.

Find the value of

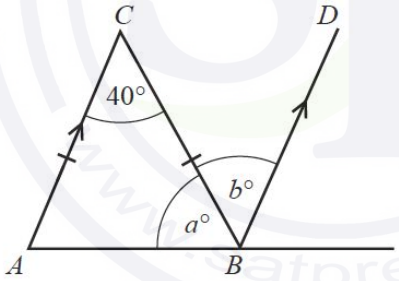
(a) x,

$x =$ ..... [1]

(b) y.

$y =$ ..... [1]

Question 41



NOT TO SCALE

Triangle ABC is isosceles and AC is parallel to BD.

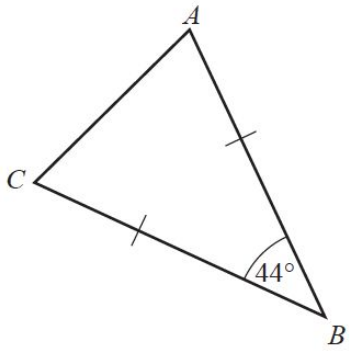
Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [2]

Question 42

(a)



NOT TO SCALE

Triangle ABC is an isosceles triangle with $AB = CB$.
Angle $ABC = 44°$.

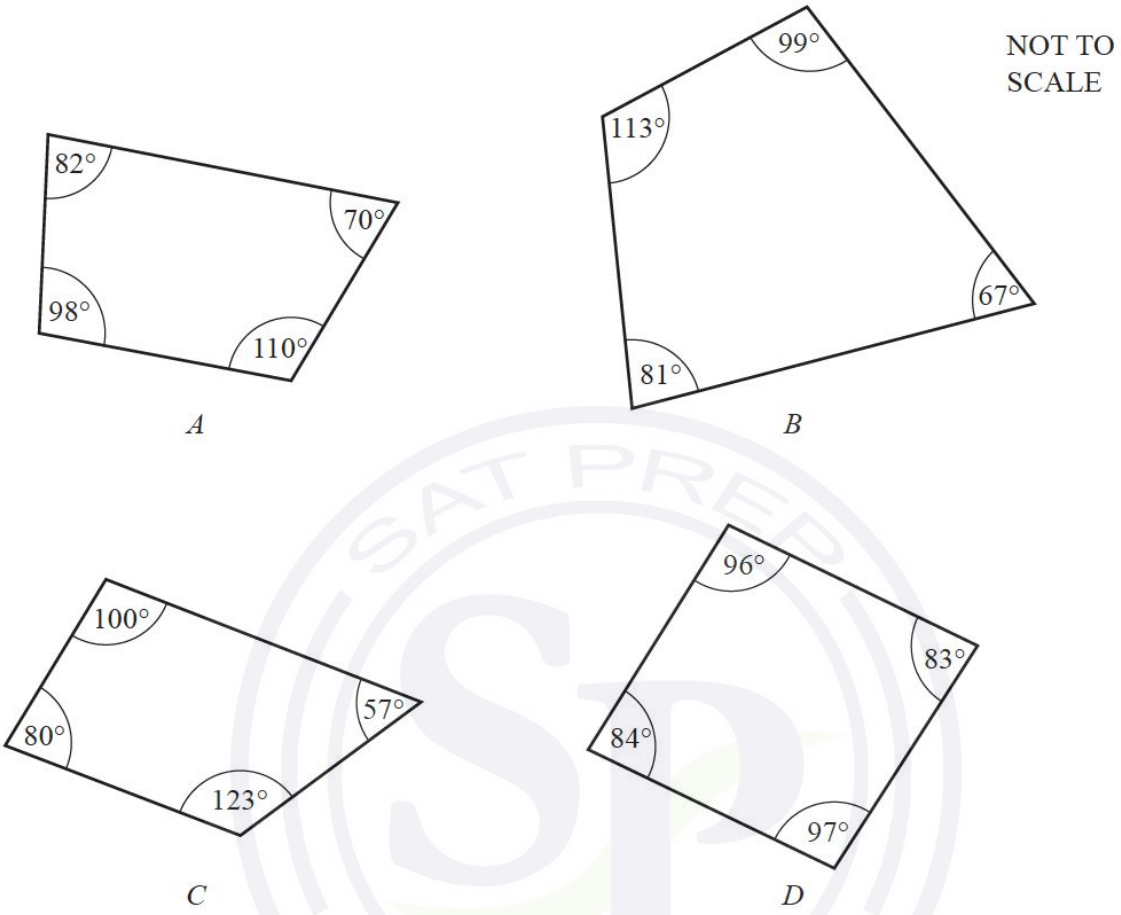
Find angle ACB.

Angle ACB = ... [1]

(b) A regular polygon has an exterior angle of 40°.
Work out the number of sides of this polygon.

..... [2]

Question 43



The diagram shows four quadrilaterals A, B, C and D.

Which one of these could be a cyclic quadrilateral?

.....[1]

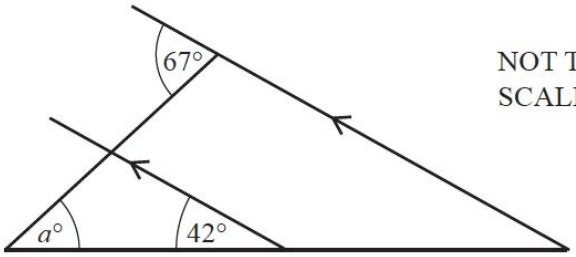
Question 44

The length of a backpack of capacity 30 litres is 53 cm.

Calculate the length of a mathematically similar backpack of capacity 20 litres.

..... cm [3]

Question 45



NOT TO SCALE

Find the value of a.

$a =$ ..... [2]

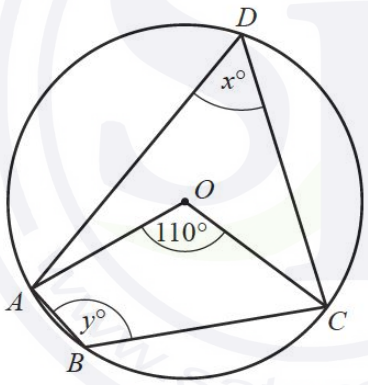
Question 46

Two cups are mathematically similar.
The larger cup has capacity 0.5 litres and height 8 cm.
The smaller cup has capacity 0.25 litres.

Find the height of the smaller cup.

..... cm [3]

Question 47



NOT TO SCALE

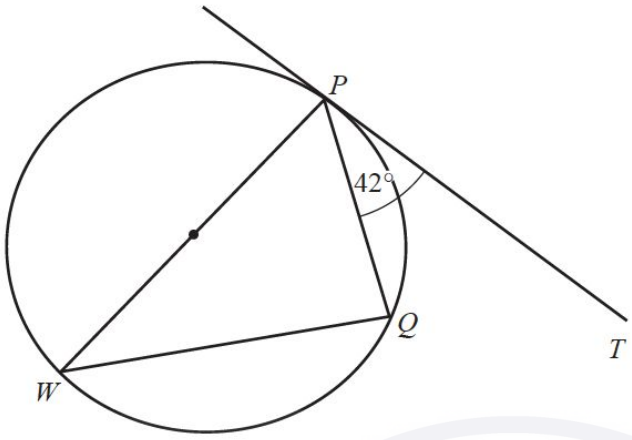
A, B, C and D lie on the circle, centre O.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [2]

Question 48



NOT TO SCALE

In the diagram, PT is a tangent to the circle at P.
PW is a diameter and angle $TPQ = 42°$.

Find angle PWQ.

Angle PWQ = ... [2]

Question 49

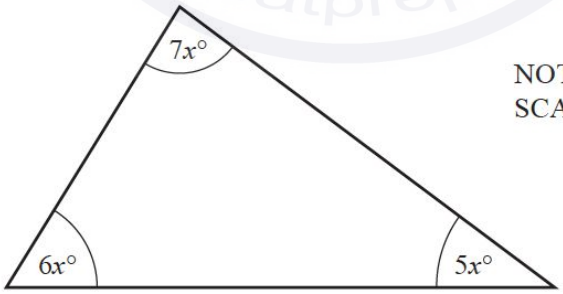
Two bottles and their labels are mathematically similar.
The smaller bottle contains 0.512 litres of water and has a label with area 96 cm^2.
The larger bottle contains 1 litre of water.

Calculate the area of the larger label.

.....cm^2 [3]

Question 50

The three angles in a triangle are $5x°$, $6x°$ and $7x°$.



NOT TO SCALE

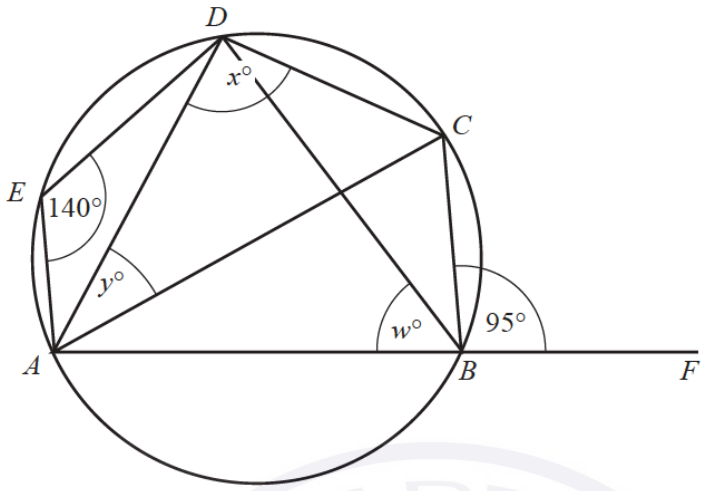
(a) Find the value of x.

x = ... [2]

(b) Work out the size of the largest angle in the triangle.

..... [1]

Question 51



NOT TO SCALE

A, B, C, D and E lie on the circle.
AB is extended to F.
Angle $AED = 140°$ and angle $CBF = 95°$.

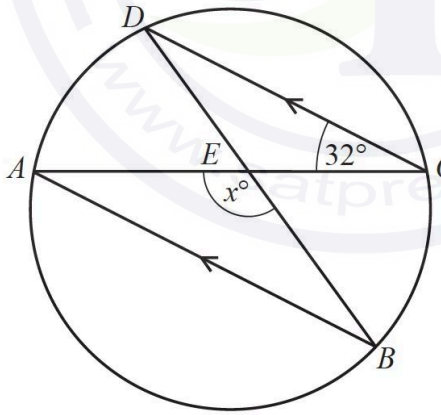
Find the values of w, x and y.

$w =$ .....

$x =$ .....

$y =$ ..... [5]

Question 52



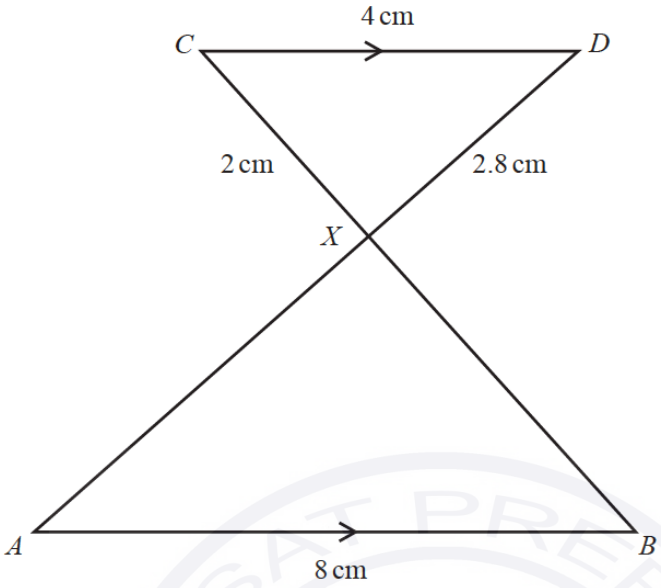
NOT TO SCALE

A, B, C and D are points on a circle.
AB is parallel to DC and angle $ACD = 32°$.
Chords AC and DB intersect at E.

Find the value of x.

$x =$ ..... [2]

Question 52



NOT TO SCALE

In the diagram, AB and CD are parallel.
AD and BC intersect at X.
$AB = 8$ cm, $CD = 4$ cm, $CX = 2$ cm and $DX = 2.8$ cm.

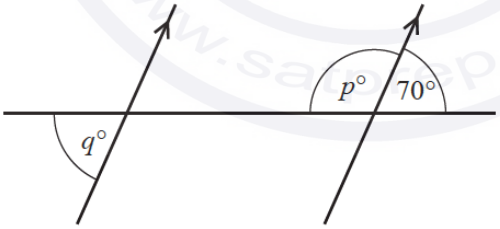
(a) Complete this mathematical statement.

Triangle ABX is ..... to triangle DCX. [1]

(b) Calculate AX.

..... cm^2 [1]

Question 53



NOT TO SCALE

The diagram shows a straight line intersecting two parallel lines.

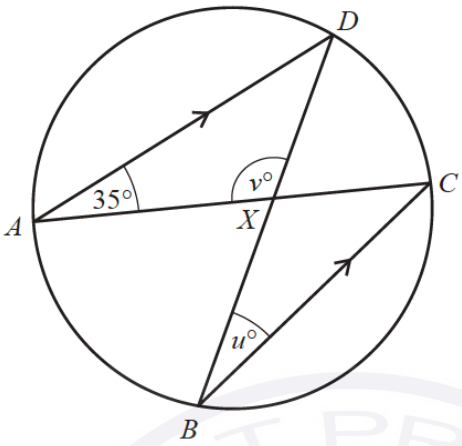
Find the value of p and the value of q.

$p =$ .....

$q =$ ..... [2]

Question 54

(a)



NOT TO SCALE

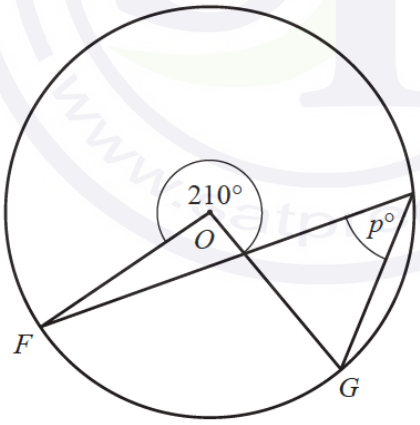
A, B, C and D are points on the circle.
AD is parallel to BC.
The chords AC and BD intersect at X.

Find the value of u and the value of v.

$u =$ .....

$v =$ ..... [3]

(b)



NOT TO SCALE

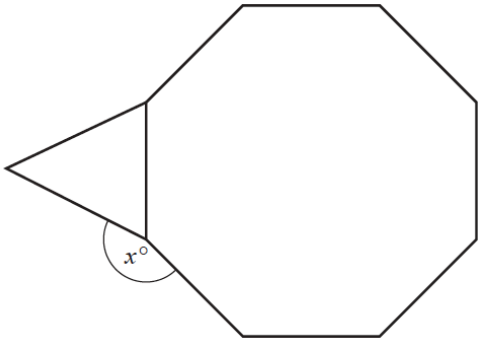
F, G and H are points on the circle, centre O.

Find the value of p.

$p =$ ..... [2]

Question 55

The diagram shows a regular octagon joined to an equilateral triangle.



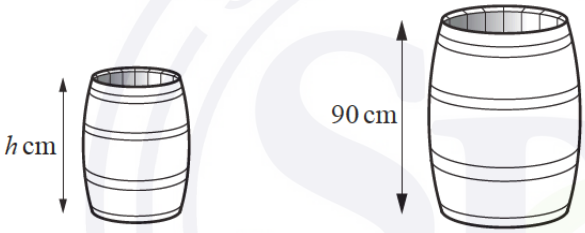
NOT TO SCALE

Work out the value of x.

$x =$ ..... [3]

Question 56

The two barrels in the diagram are mathematically similar.

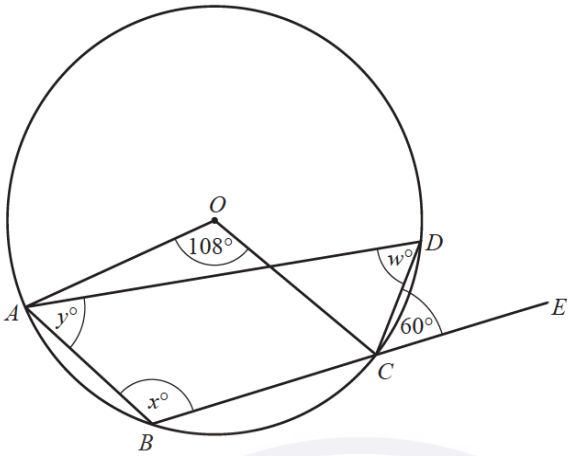


NOT TO SCALE

The smaller barrel has a height of h cm and a capacity of 100 litres.
The larger barrel has a height of 90 cm and a capacity of 160 litres.
Work out the value of h.

$h =$ ..... [3]

Question 57



NOT TO SCALE

A, B, C and D are points on the circle, centre O.
BCE is a straight line.
Angle $AOC = 108°$ and angle $DCE = 60°$.
Calculate the values of w, x and y.

$w =$ .....

$x =$ .....

$y =$ ..... [3]

Question 58

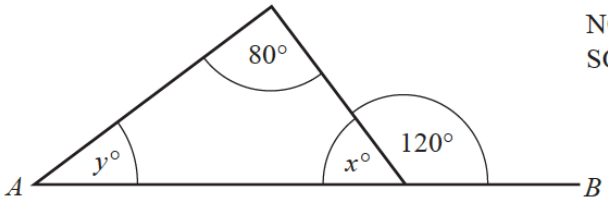
NOT TO SCALE

The diagram shows part of a regular polygon.
The exterior angle is $x°$.
The interior angle is $29x°$.

Work out the number of sides of this polygon.

..... [3]

Question 59



NOT TO SCALE

In the diagram, AB is a straight line.

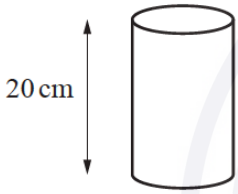
Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [2]

Question 60

(a)



NOT TO SCALE

A cylinder has height 20 cm.
The area of the circular cross section is 74 cm^2.

Work out the volume of this cylinder.

..... cm^3 [1]

(b) Cylinder A is mathematically similar to cylinder B.

NOT TO SCALE

The height of cylinder A is 10 cm and its surface area is 440 cm^2.
The surface area of cylinder B is 3960 cm^2.

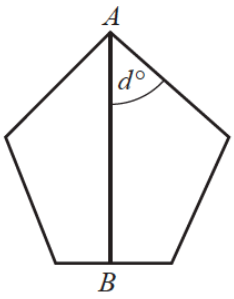
Calculate the height of cylinder B.

..... cm [3]

Question 61

The diagram shows a regular pentagon.
AB is a line of symmetry.

Work out the value of d.



NOT TO SCALE

$d =$ ..... [3]

Question 62

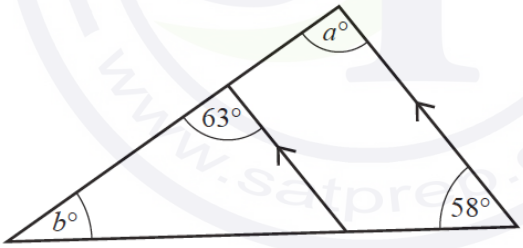
NOT TO SCALE

The diagram shows a quadrilateral.

Find the value of x.

$x =$ ..... [1]

Question 63



NOT TO SCALE

Complete the statements.

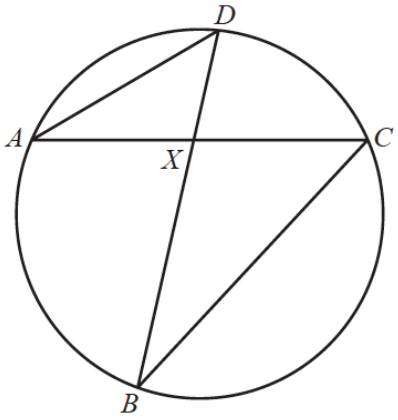
$a =$ ..... because .....

.....

$b =$ ..... because .....

..... [4]

Question 64



NOT TO SCALE

A, B, C and D are points on the circumference of the circle.
AC and BD intersect at X.

(a) Complete the statement.

Triangle ADX is ..... to triangle BCX. [1]

(b) The area of triangle ADX is $36\,cm^2$ and the area of triangle BCX is $65.61\,cm^2$.
$AX = 8.6\,cm$ and $DX = 7.2\,cm$.

Find BX.

$BX =$ ..... cm [3]

Question 65

The diagram shows a regular pentagon and a kite.

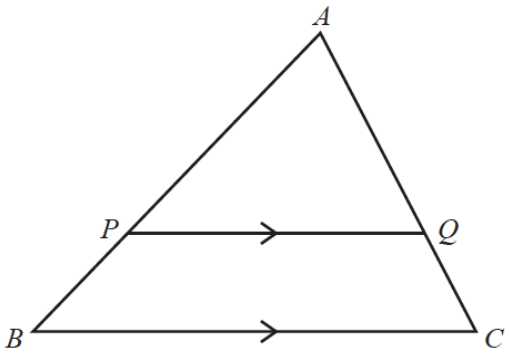
Complete the following statements.

(a) The regular pentagon has ..... lines of symmetry. [1]

(b) The kite has rotational symmetry of order ..... . [1]

Question 66

(a)



NOT TO SCALE

In the diagram, PQ is parallel to BC.
APB and AQC are straight lines.
$PQ = 8$ cm, $BC = 10$ cm and $AB = 9$ cm.

Calculate PB.

$PB =$ ..... cm [2]

(b)

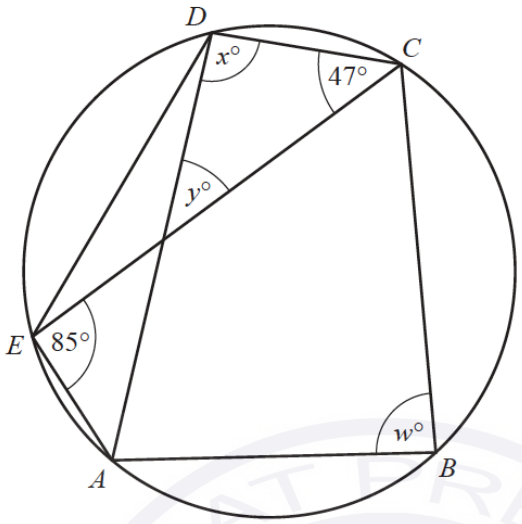
NOT TO SCALE

The diagram shows two glasses which are mathematically similar.
The larger glass has a capacity of 0.5 litres and the smaller glass has a capacity of 0.25 litres.
The height of the larger glass is 13 cm.

Calculate the height of the smaller glass.

..... cm [3]

Question 67



NOT TO SCALE

The points A, B, C, D and E lie on the circumference of the circle.
Angle $DCE = 47°$ and angle $CEA = 85°$.

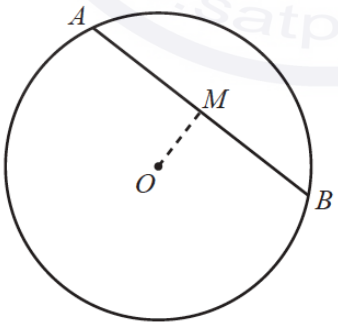
Find the values of w, x and y.

$w =$ .....

$x =$ .....

$y =$ ..... [3]

Question 68



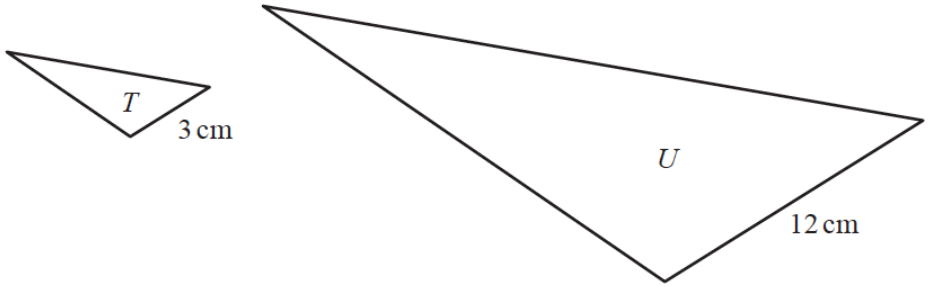
NOT TO SCALE

The diagram shows a circle, centre O.
AB is a chord of length 12 cm.
M is the mid-point of AB and $OM = 4.5$ cm.

Calculate the radius of the circle.

..... cm [3]

Question 69

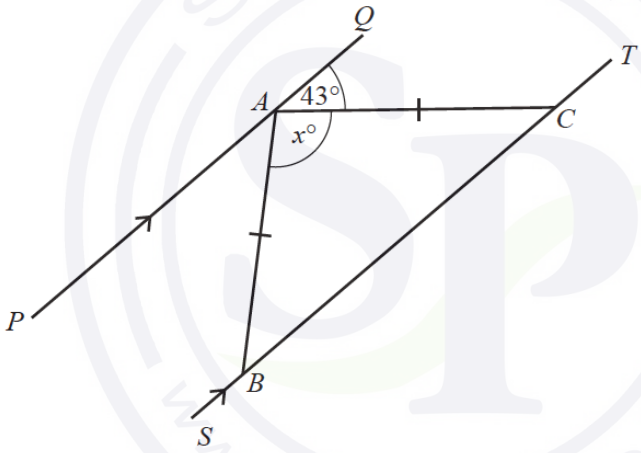


NOT TO SCALE

The diagram shows two mathematically similar triangles, T and U.
Two corresponding side lengths are 3 cm and 12 cm.
The area of triangle T is 5 cm^2.
Find the area of triangle U.

..... cm^2 [2]

Question 70



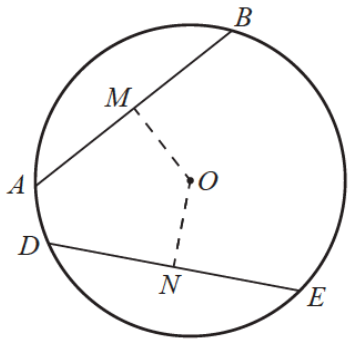
NOT TO SCALE

The diagram shows two parallel lines PAQ and $SBCT$.
$AB = AC$ and angle $QAC = 43°$.

Find the value of x.

$x =$ ..... [2]

Question 71



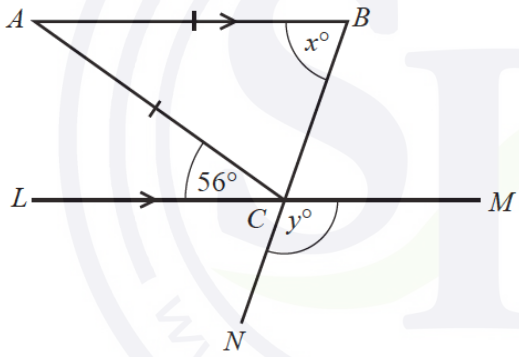
NOT TO SCALE

The diagram shows a circle, centre O.
AB and DE are chords of the circle.
M is the mid-point of AB and N is the mid-point of DE.
$AB = DE = 9$ cm and $OM = 5$ cm.

Find ON.

$ON =$ ..... cm [1]

Question 72



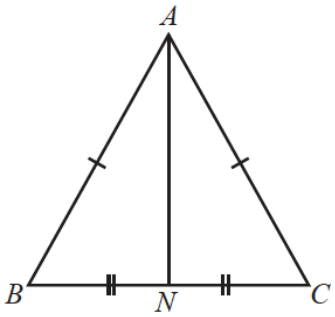
NOT TO SCALE

The diagram shows an isosceles triangle ABC with $AB = AC$.
LCM and BCN are straight lines and LCM is parallel to AB.
Angle $ACL = 56°$.

$x =$ .....

$y =$ ..... [4]

Question 73



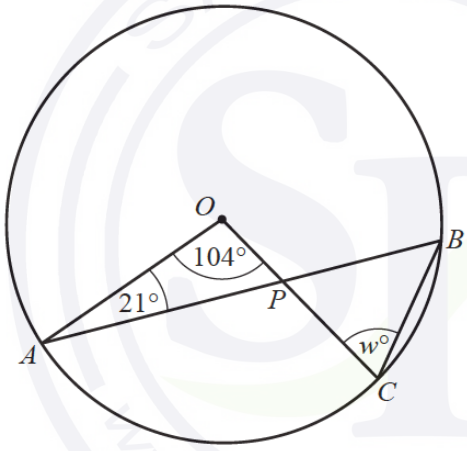
NOT TO SCALE

In the diagram, $AB = AC$ and $BN = NC$.

Complete the statement using a mathematical term.

Triangle ABN is ..... to triangle ACN. [1]

Question 74



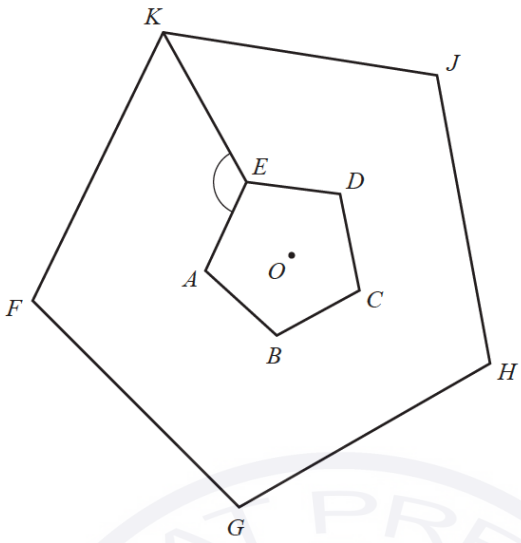
NOT TO SCALE

A, B and C are points on the circle, centre O.
AB and OC intersect at P.

Find the value of w.

$w =$ ..... [3]

Question 75



NOT TO SCALE

The diagram shows two regular pentagons.
Pentagon *FGHJK* is an enlargement of pentagon *ABCDE*, centre *O*.

(a) Find angle *AEK*.

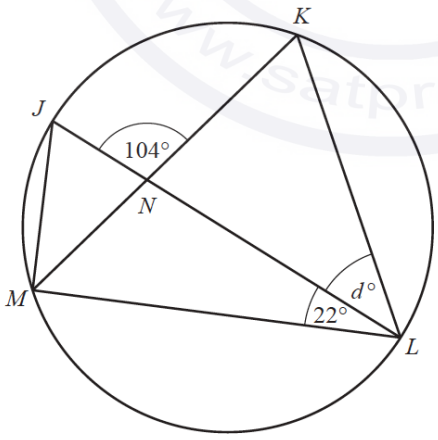
Angle *AEK* = ... [4]

(b) The area of pentagon *FGHJK* is 73.5 cm^2.
The area of pentagon *ABCDE* is 6 cm^2.

Find the ratio perimeter of pentagon *FGHJK* : perimeter of pentagon *ABCDE* in its simplest form.

..... : ..... [2]

Question 76



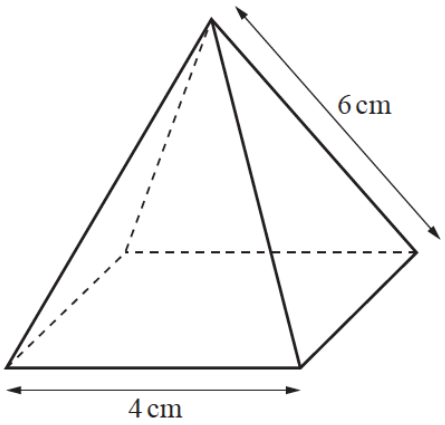
NOT TO SCALE

J, *K*, *L* and *M* are points on the circumference of a circle with diameter *JL*.
JL and *KM* intersect at *N*.
Angle *JNK* = 104° and angle *MLJ* = 22°.

Work out the value of *d*.

d = ... [4]

Question 77



NOT TO SCALE

The diagram shows a pyramid with a square base.
The triangular faces are congruent isosceles triangles.
Write down the number of planes of symmetry of this pyramid.

..... [1]

Question 78

On a map with scale 1 : 25 000, the area of a lake is 33.6 square centimetres.

Calculate the actual area of the lake, giving your answer in square kilometres.

..... km^2 [2]

Question 79

Complete each statement.

(a) A quadrilateral with only one pair of parallel sides is called a ..... . [1]

(b) An angle greater than 90° but less than 180° is called ..... . [1]

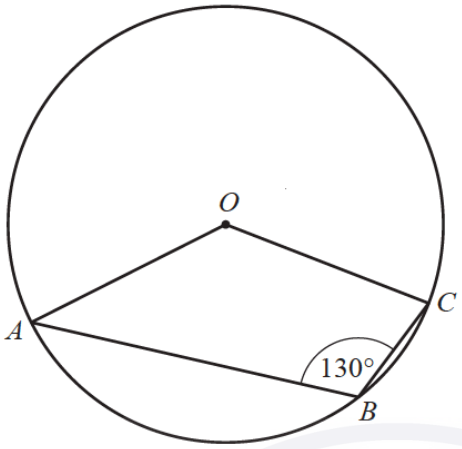
Question 80

A model of a car has a scale 1 : 20.
The volume of the actual car is 12 m^3.

Find the volume of the model.
Give your answer in cubic centimetres.

..... cm^3 [3]

Question 81



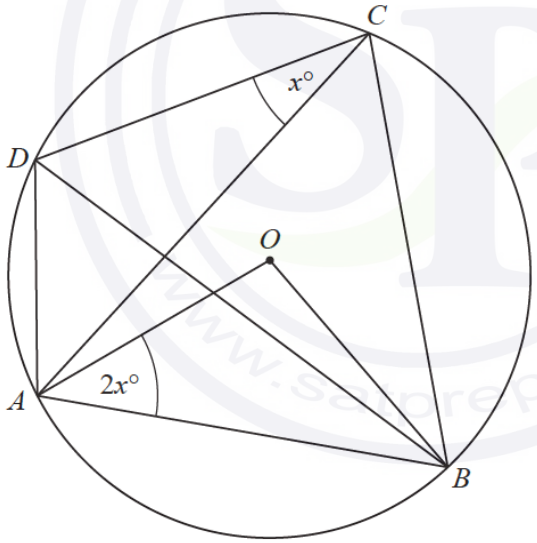
NOT TO SCALE

A, B and C are points on the circle, centre O.

Find the obtuse angle AOC.

Angle AOC = ... [2]

Question 82



NOT TO SCALE

In the diagram, A, B, C and D lie on the circumference of a circle, centre O.
Angle $ACD = x°$ and angle $OAB = 2x°$.

Find an expression, in terms of x, in its simplest form for

(a) angle AOB,

Angle AOB = ... [1]

(b) angle ACB,

Angle ACB = ... [1]

(c) angle DAB.

Angle DAB = ... [2]

Question 83

Two mathematically similar containers have heights of 30 cm and 75 cm.
The larger container has a capacity of 5.5 litres.

Calculate the capacity of the smaller container.
Give your answer in millilitres.

..... ml [3]

Question 84

A regular polygon has an interior angle of 176°.

Find the number of sides of this polygon.

..... [3]

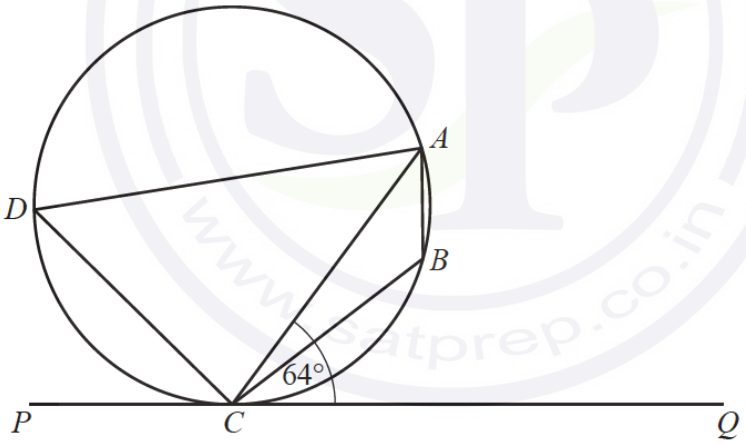
Question 85

The scale of a map is 1 : 10 000 000.
On the map, the area of Slovakia is 4.9 cm^2.

Calculate the actual area of Slovakia.
Give your answer in square kilometres.

..... km^2 [3]

Question 86



NOT TO SCALE

A, B, C and D lie on the circle.
PCQ is a tangent to the circle at C.
Angle $ACQ = 64°$.

Work out angle ABC, giving reasons for your answer.

Angle ABC = ... because .....

.....

..... [3]

Question 87

Find the interior angle of a regular polygon with 24 sides.

……...……[2]

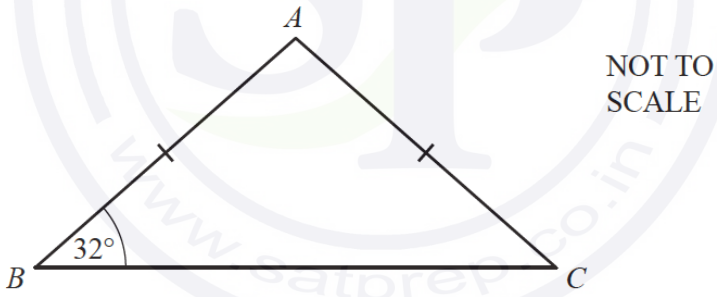
Question 88

The diagram shows two shapes that are mathematically similar.
The smaller shape has area 52.5 cm^2 and the larger shape has area 134.4 cm^2.

Calculate the value of m.

m = ... [3]

Question 89

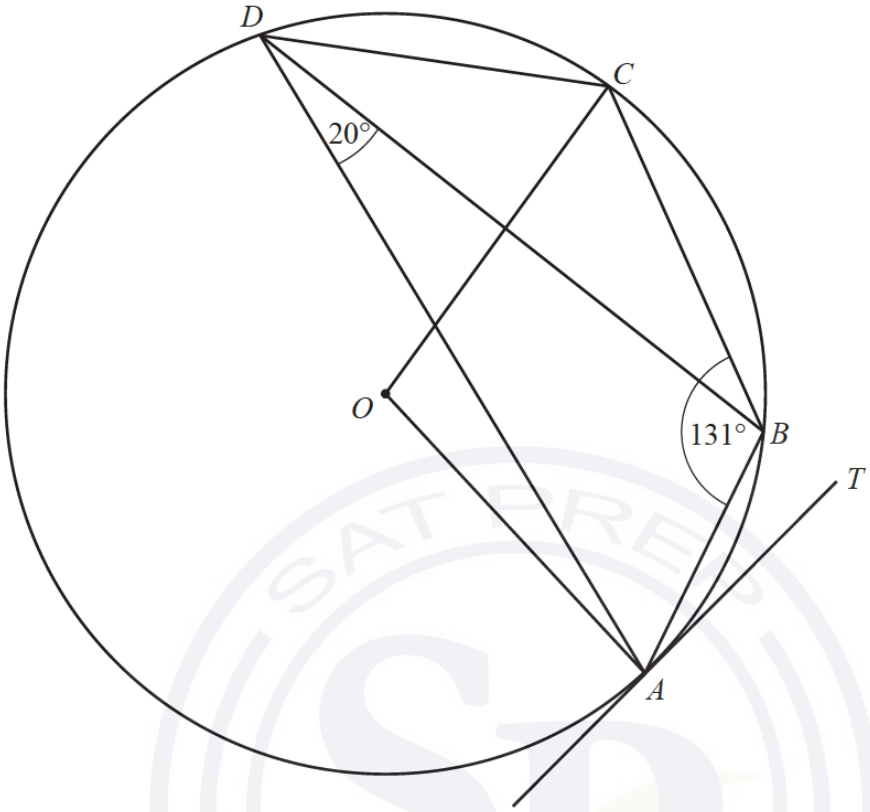


Triangle ABC is isosceles.
Angle $ABC = 32°$ and $AB = AC$.

Find angle BAC.

Angle BAC = ... [2]

Question 90



NOT TO SCALE

A, B, C and D lie on the circle, centre O.
TA is a tangent to the circle at A.
Angle $ABC = 131°$ and angle $ADB = 20°$.

Find

(a) angle ADC,

Angle ADC = ... [1]

(b) angle AOC,

Angle AOC = ... [1]

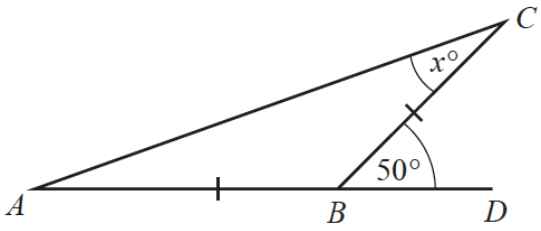
(c) angle BAT,

Angle BAT = ... [1]

(d) angle OAB.

Angle OAB = ... [1]

Question 91



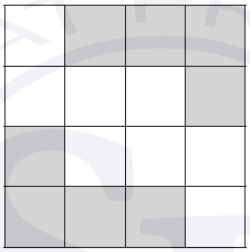
NOT TO SCALE

$AB = BC$ and ABD is a straight line.

Find the value of x.

$x =$ ..... [2]

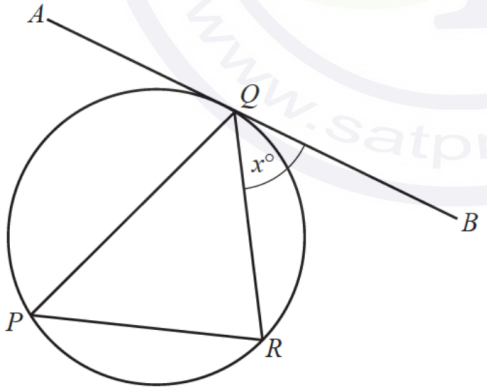
Question 92



Write down the order of rotational symmetry of the diagram.

..... [1]

Question 93



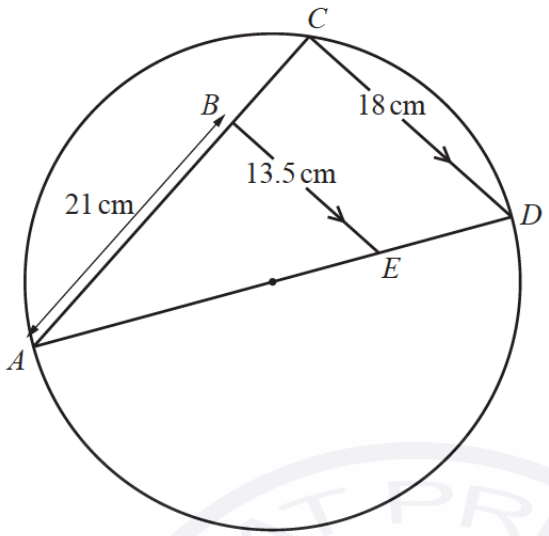
NOT TO SCALE

P, R and Q are points on the circle.
AB is a tangent to the circle at Q.
QR bisects angle PQB.
Angle $BQR = x°$ and $x < 60$.

Use this information to show that triangle PQR is an isosceles triangle.
Give a geometrical reason for each step of your work.

[3]

Question 94



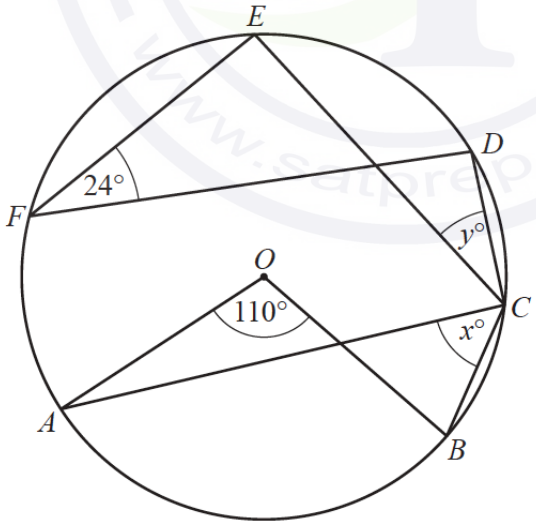
NOT TO SCALE

C lies on a circle with diameter AD.
B lies on AC and E lies on AD such that BE is parallel to CD.
$AB = 21$ cm, $CD = 18$ cm and $BE = 13.5$ cm.

Work out the radius of the circle.

..... cm [5]

Question 95



NOT TO SCALE

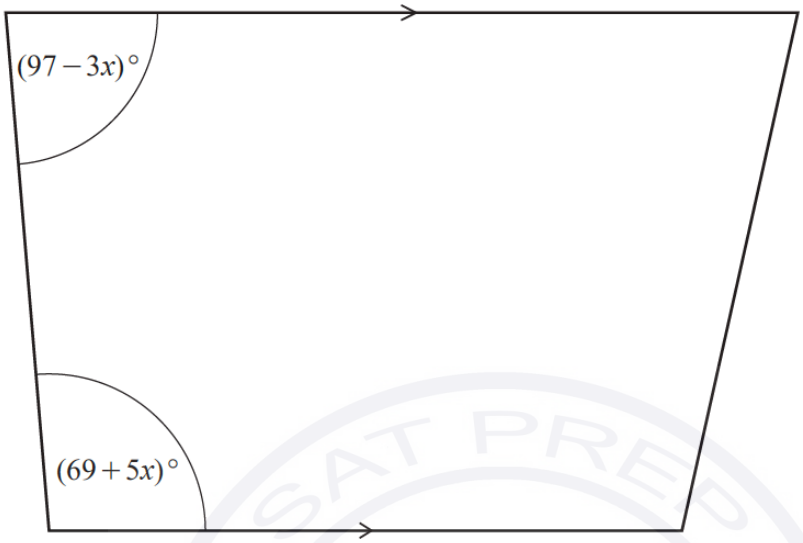
Points A, B, C, D, E and F lie on the circle, centre O.

Find the value of x and the value of y.

x = ...[1]
y = ...[1]

Question 96

The diagram shows a trapezium.

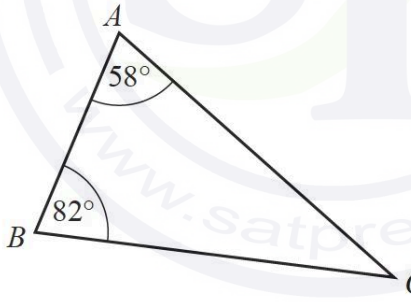


NOT TO SCALE

Work out the value of x.

$x =$ ..... [3]

Question 97



NOT TO SCALE

The diagram shows triangle ABC.
The triangle is reflected in the line BC to give a quadrilateral $ABDC$.

(a) Write down the mathematical name of the quadrilateral $ABDC$.

..... [1]

..... [1]

(b) Find angle ACD.

Angle $ACD =$ ..... [2]

Question 98

In triangle ABC, $BC = 7.6\,\text{cm}$ and $AC = 6.2\,\text{cm}$.

Using a ruler and compasses only, construct triangle ABC.
Leave in your construction arcs.
The side AB has been drawn for you.

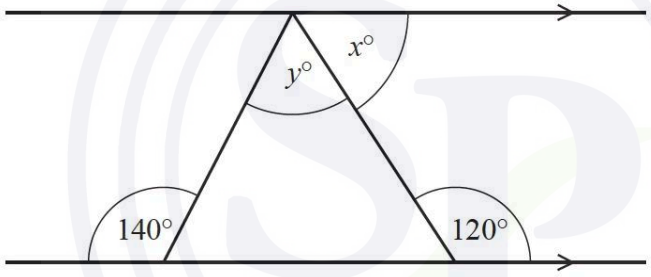
[2]

Question 99

Calculate the size of one interior angle of a regular polygon with 40 sides.

..... [2]

Question 100



NOT TO SCALE

The diagram shows a triangle drawn between a pair of parallel lines.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [3]

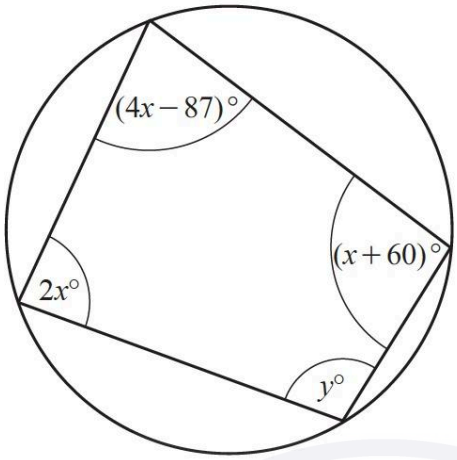
Question 101

The interior angle of a regular polygon with n sides is 156°.

Work out the value of n.

$n =$ ..... [2]

Question 102



NOT TO SCALE

The diagram shows a cyclic quadrilateral.

Find the value of y.

$y =$ ..... [4]

Question 103

A field, ABC, is in the shape of a triangle.
$AC = 500$ m and $BC = 650$ m.

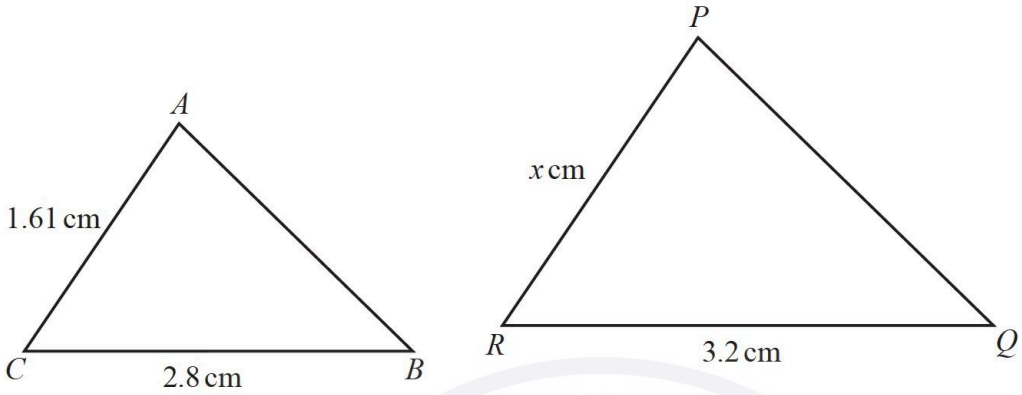
Using a ruler and compasses only, complete the scale drawing of the field ABC.
Leave in your construction arcs.
Use a scale of 1 cm to represent 100 m.
The side AB has been drawn for you.

Scale: 1 cm to 100 m

[3]

Question 104

(a)



NOT TO SCALE

Triangle ABC is mathematically similar to triangle PQR.

Find the value of x.

$x =$ ..... [2]

(b)

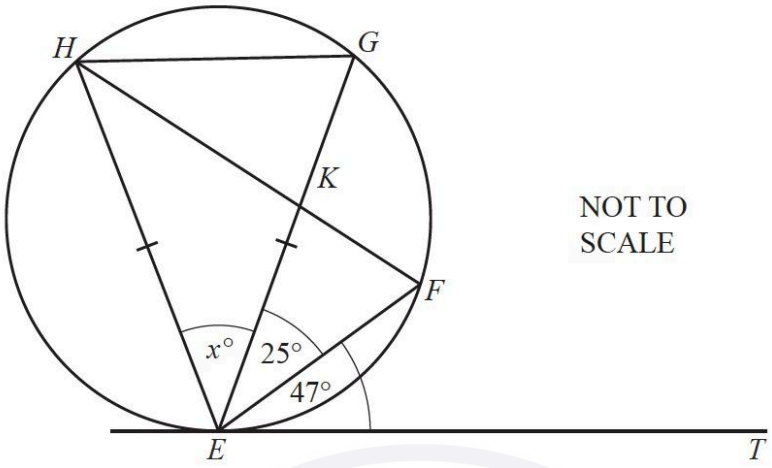
NOT TO SCALE

The diagram shows two mathematically similar bowls.
The larger bowl has capacity 7.8 litres and height 11.5 cm.
The smaller bowl has capacity 4 litres.

Calculate the height of the smaller bowl.

..... cm [3]

Question 105



NOT TO SCALE

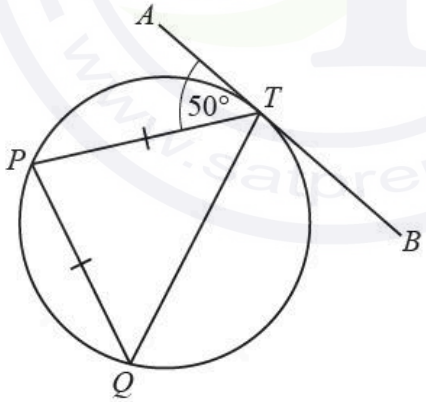
Points E, F, G and H lie on the circle and $EG = EH$.
HF and EG intersect at K.
ET is a tangent to the circle at E.
Angle $FET = 47°$ and angle $FEG = 25°$.

Find the value of x.

$x =$ ..... [2]

Question 106

(a)



NOT TO SCALE

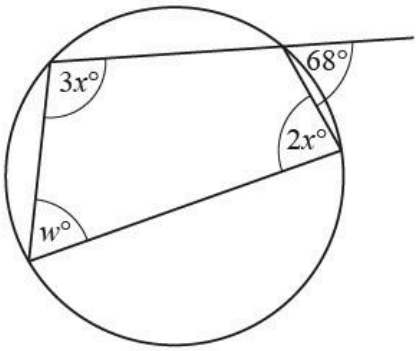
P, Q and T are points on a circle.
ATB is a tangent to the circle at T and $PT = PQ$.

Find angle TPQ.

Angle $TPQ =$ ..... [2]

Continue on the next page…

(b)



NOT TO SCALE

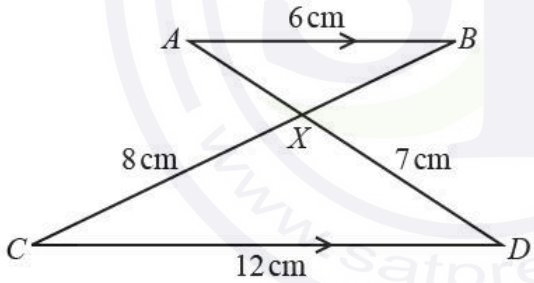
The diagram shows a cyclic quadrilateral with an exterior angle of 68°.

Find the value of w and the value of x.

$w =$ .....

$x =$ ..... [3]

Question 107



NOT TO SCALE

In the diagram, AB is parallel to CD.
AD and BC intersect at X.
$AB = 6$ cm, $CD = 12$ cm, $CX = 8$ cm and $DX = 7$ cm.

(a) Complete the statement.

Triangle ABX is ..... to triangle DCX. [1]

(b) Work out the length of BX.

BX = ... cm [2]

(c) The area of triangle DCX is $26.906\,\text{cm}^2$.

Use this value to find the area of

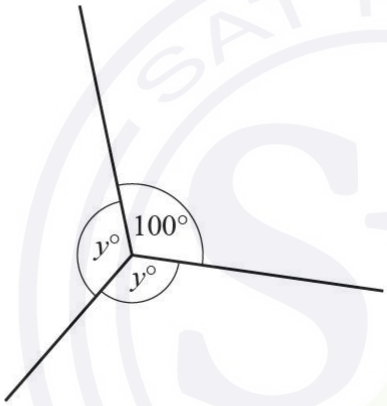
(i) triangle ABX,

..... cm^2 [2]

(ii) triangle ACX.

..... cm^2 [1]

Question 108

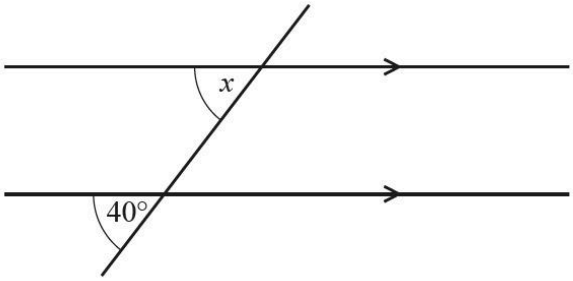


NOT TO SCALE

Find the value of y.

y = ... [2]

Question 109



NOT TO SCALE

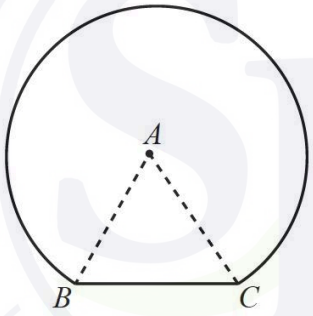
The diagram shows a pair of parallel lines and a straight line.

Complete the statement with the correct geometrical reason.

$x = 40°$ because the angles are ..... [1]

Question 110

(a)



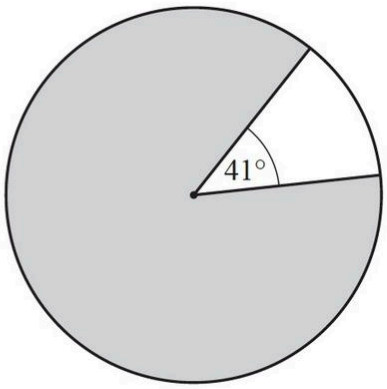
NOT TO SCALE

The diagram shows a shape made from an equilateral triangle ABC and a sector of a circle.
Points B and C lie on the circle, centre A.
The side length of the equilateral triangle is 12.4 cm.

Work out the perimeter of the shape.

..... cm [3]

(b)



NOT TO
SCALE

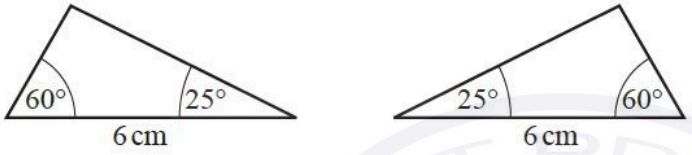
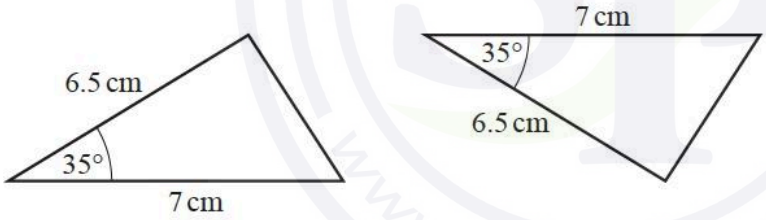
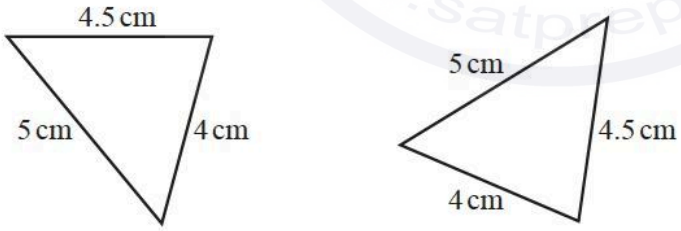
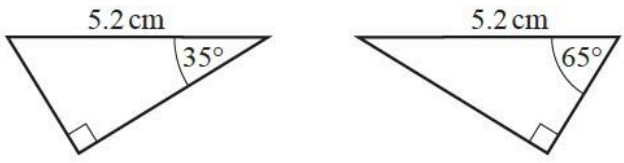
The diagram shows two sectors of a circle.
The major sector is shaded.
The area of the major sector is 74.5 cm^2.

Calculate the radius of the circle.

..... cm [3]

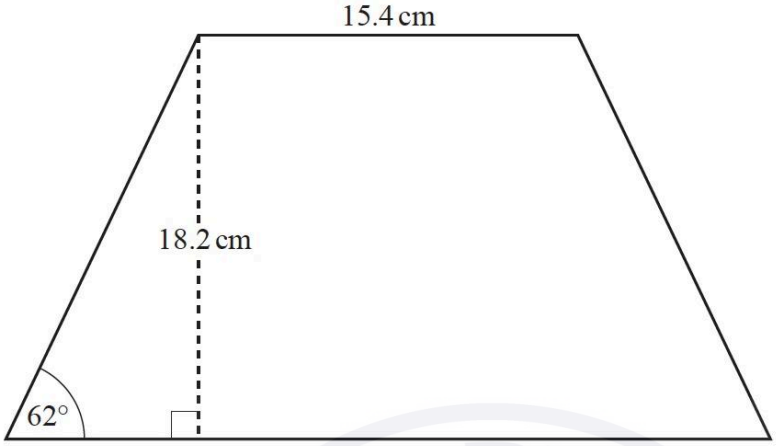
Question 111

Complete the table showing information about the congruence of pairs of triangles.
The first two rows have been completed for you.
All diagrams are not to scale.

Pair of triangles	Congruent or not congruent	Congruence criterion
	Congruent	ASA
	Not congruent	None
		
		
		

[3]

Question 112



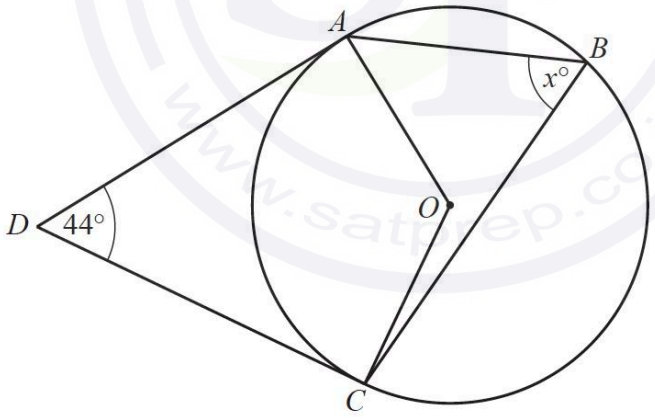
NOT TO SCALE

The diagram shows a trapezium.
The trapezium has one line of symmetry.

Work out the area of the trapezium.

..... cm^2 [4]

Question 113



NOT TO SCALE

A, B and C are points on a circle, centre O.
DA and DC are tangents.
Angle $ADC = 44°$.

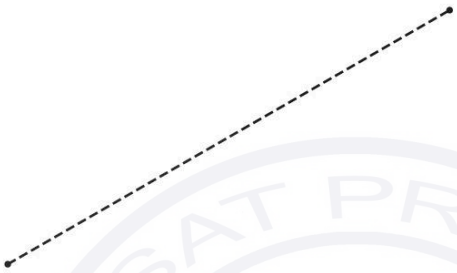
Work out the value of x.

$x =$ ..... [3]

Question 114

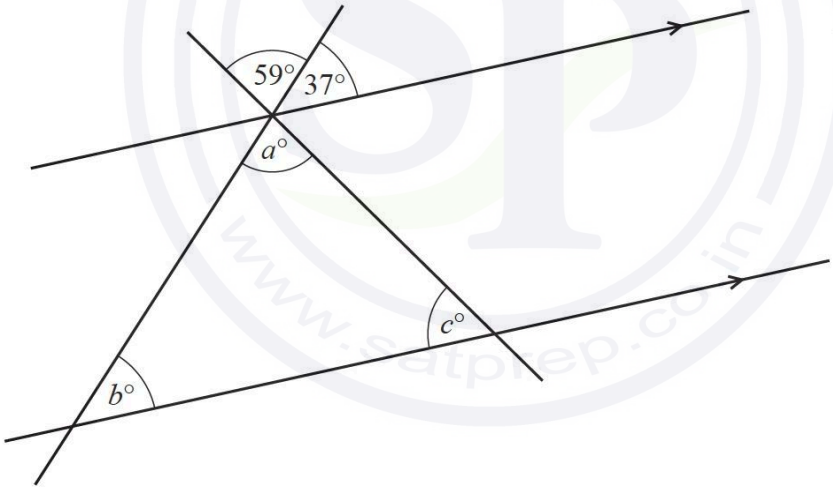
A rhombus has side length 6.5 cm.
The rhombus can be constructed by drawing two triangles.

Using a ruler and compasses only, construct the rhombus.
Leave in your construction arcs.
One diagonal of the rhombus has been drawn for you.



[2]

Question 115



NOT TO SCALE

The diagram shows two parallel lines intersected by two straight lines.

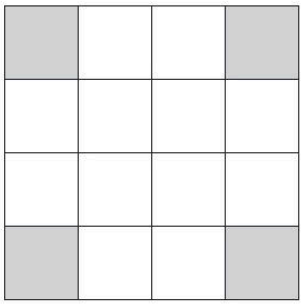
Find the values of a, b and c.

a = ...

b = ...

c = ... [3]

Question 116



(a) Write down the order of rotational symmetry of this diagram.

..... [1]

(b) On the diagram, draw all the lines of symmetry. [2]

Question 117

A lake has an area of 3 km^2.
On a map the area of the lake is 18.75 cm^2.

Find the scale of the map in the form 1 : n.

1 : ..... [3]

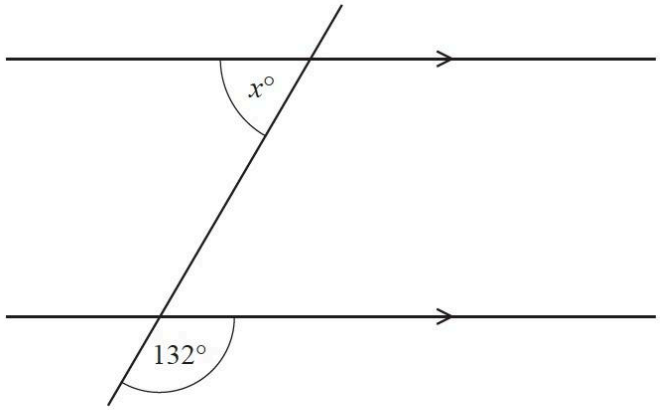
Question 118

Each interior angle of a regular polygon is 178.5°.

Calculate the number of sides of this polygon.

..... [2]

Question 119



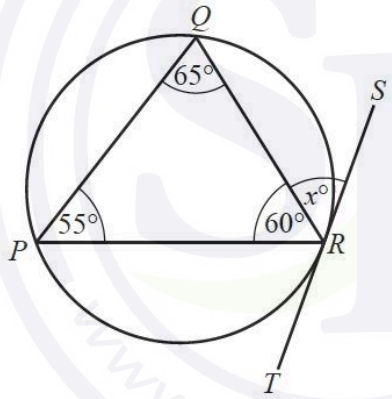
NOT TO SCALE

The diagram shows two parallel lines intersecting a straight line.

Find the value of x.

$x =$ ..... [2]

Question 120



NOT TO SCALE

P, Q and R are points on a circle.
ST is a tangent to the circle at R.

(a) Write down the value of x.
Give a geometrical reason for your answer.

$x =$ ..... because.....

..... [2]

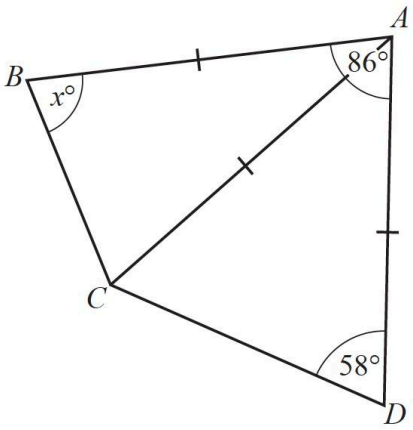
(b) Another tangent from the point S touches the circle at V.

Give a geometrical reason why triangle SVR is isosceles.

.....

..... [1]

Question 121



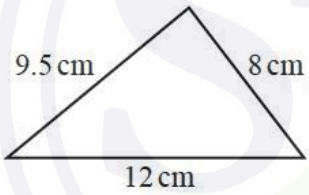
NOT TO SCALE

Triangle ABC and triangle ACD are isosceles.
Angle $DAB = 86°$ and angle $ADC = 58°$.

Find the value of x.

$x =$ ..... [3]

Question 122

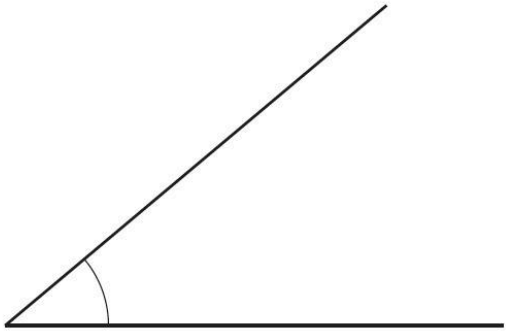


NOT TO SCALE

Using a ruler and compasses only, construct this triangle.
Leave in your construction arcs.
The side of length 12 cm has been drawn for you.

[2]

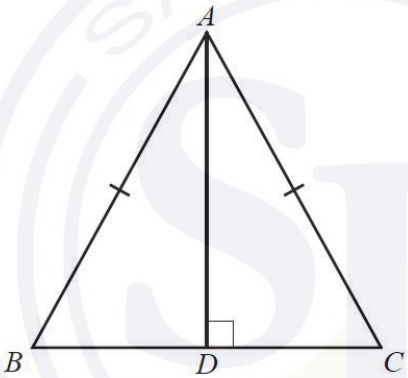
Question 123



Measure the marked angle.

..... [1]

Question 124



NOT TO SCALE

In triangle ABC, $AC = AB$.
D is the point on BC such that AD is perpendicular to BC.

Complete the following statements to show that triangle ACD and triangle ABD are congruent.

AD is perpendicular to BC so that Angle ..... = Angle ..... = ... °

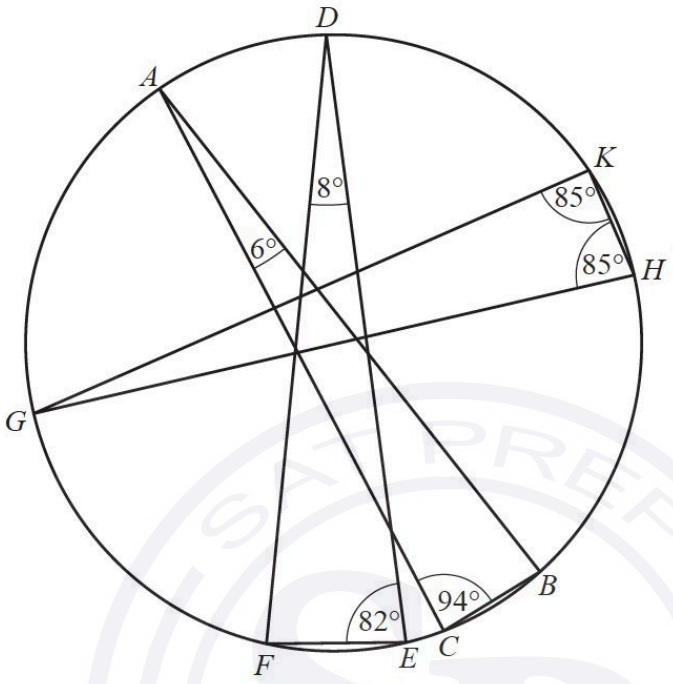
$AC = AB$ is given information.

Side ..... is common to both triangles.

Triangle ACD is congruent to triangle ABD because of the congruency criterion ..... [3]

Question 125

ABC, *DEF* and *GHK* are triangles with all vertices on the circumference of a circle.



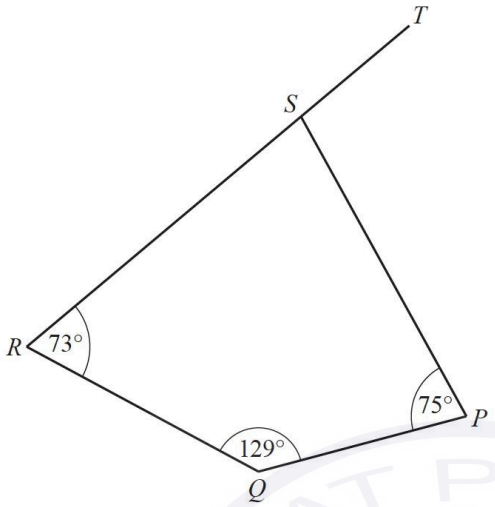
NOT TO SCALE

From the list, draw a ring around the line that is a diameter of the circle.

AB *AC* *DE* *DF* *GH* *GK*

[1]

Question 126



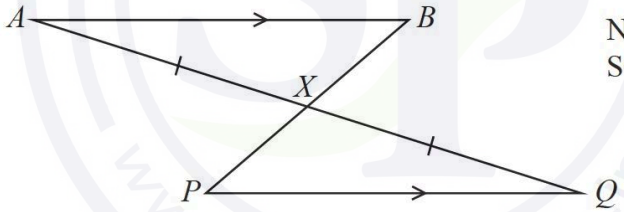
NOT TO SCALE

PQRS is a quadrilateral.
RST is a straight line.

Find angle *PST*.

Angle *PST* = ... [2]

Question 127



NOT TO SCALE

In the diagram, *AB* is parallel to *PQ*.
AQ and *PB* intersect at *X* with *AX* = *XQ*.

Complete the following statements.

In triangles *ABX* and *QPX*,

AX = *XQ* is given information.

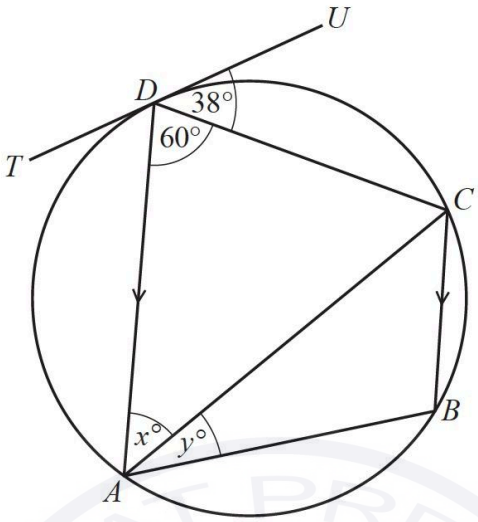
Angle *BAX* = Angle ..... because .....

Angle *AXB* = Angle ..... because .....

Triangle *ABX* is congruent to triangle *QPX* because of the congruency criterion .....

PX = ... because the triangles are congruent. [4]

Question 128



NOT TO SCALE

A, B, C and D are points on a circle.
TU is a tangent to the circle at D.
DA is parallel to CB.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [3]

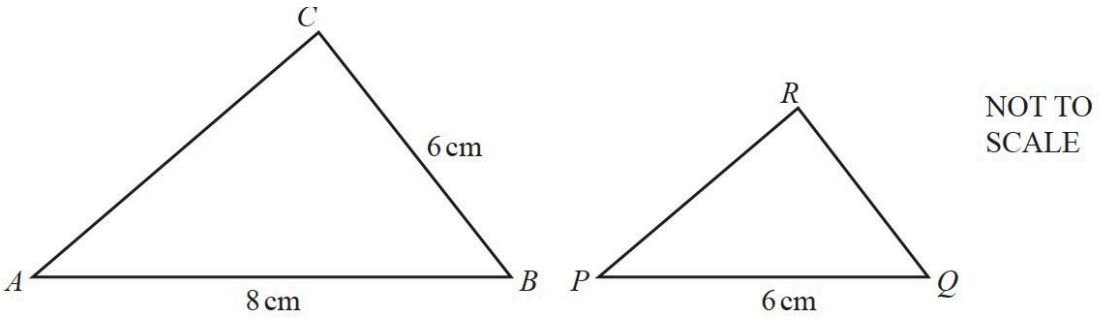
Question 129

The interior angles of a pentagon are in the ratio 4 : 5 : 5 : 7 : 9.

Find the size of the largest angle.

..... [3]

Question 130



Triangle ABC is mathematically similar to triangle PQR.

(a) Calculate QR.

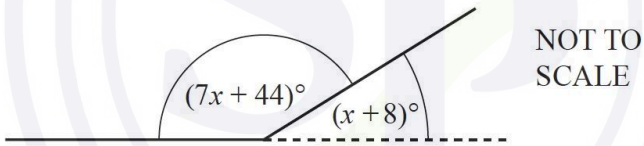
$QR =$ ..... cm [2]

(b) The two triangles are the cross-sections of two mathematically similar prisms.
The volume of the larger prism is $320\,cm^3$.

Calculate the volume of the smaller prism.

..... cm^3 [2]

Question 131

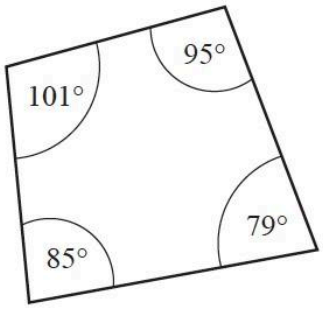


The diagram shows two sides of a regular polygon.
The interior angle of the polygon is $(7x+44)°$ and the exterior angle is $(x+8)°$.

Find the number of sides of this polygon.

..... [4]

Question 132



NOT TO SCALE

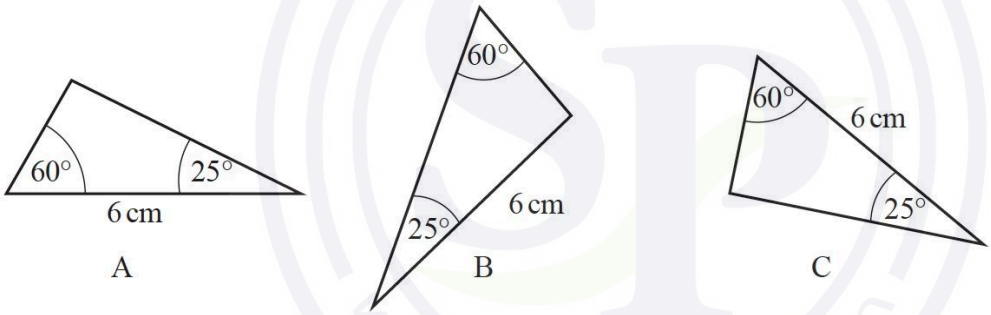
The diagram shows a quadrilateral.

Give a geometrical reason why this is a cyclic quadrilateral.

..... [1]

Question 133

The diagram shows three triangles A, B and C.



NOT TO SCALE

(a) Which two of the triangles A, B and C are congruent with each other?

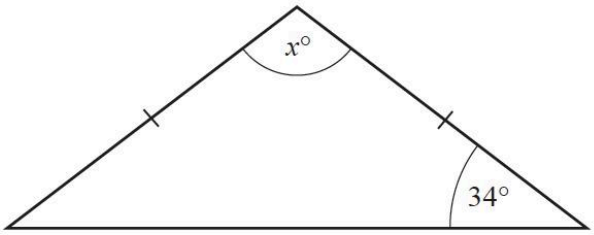
..... [1]

(b) Draw a ring around the congruence criterion that can be used to support your answer to **part (a)**.

SSS ASA SAS RHS

[1]

Question 134



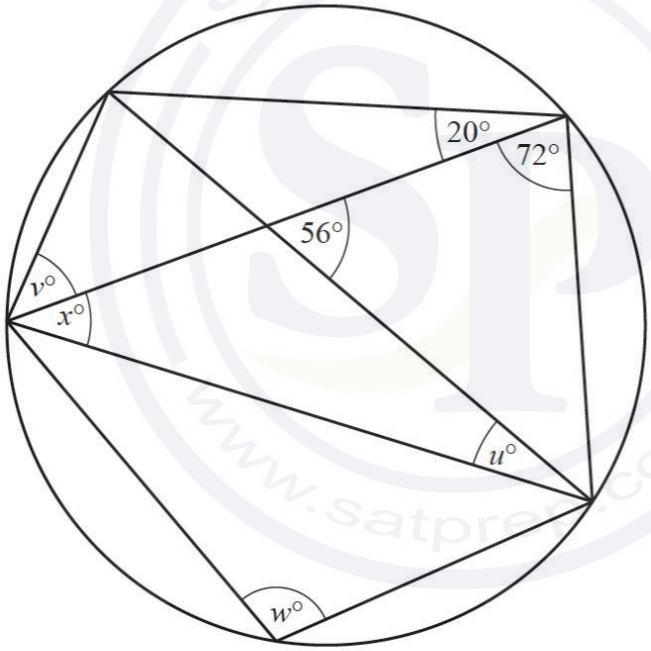
NOT TO SCALE

The diagram shows an isosceles triangle.

Find the value of x.

$x =$ ..... [2]

Question 135



NOT TO SCALE

The diagram shows a circle and eight chords.

Calculate the values of u, v, w and x.

$u =$ .....

$v =$ .....

$w =$ .....

$x =$ ..... [4]

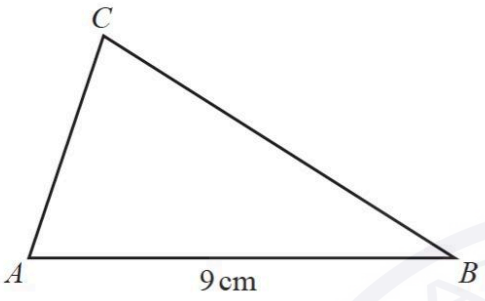
Question 136

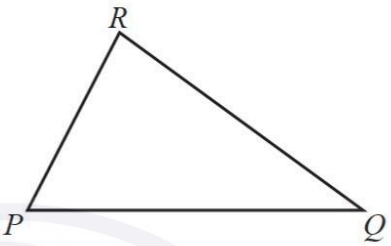
The perimeter of a sector of a circle with radius 8 cm is 26 cm.

Calculate the angle of this sector.

..... [3]

Question 137





NOT TO SCALE

Triangle PQR is similar to triangle ABC with $\frac{PR}{AC} = \frac{2}{3}$.

$AB = 9$ cm and the area of triangle ABC is 18 cm^2.

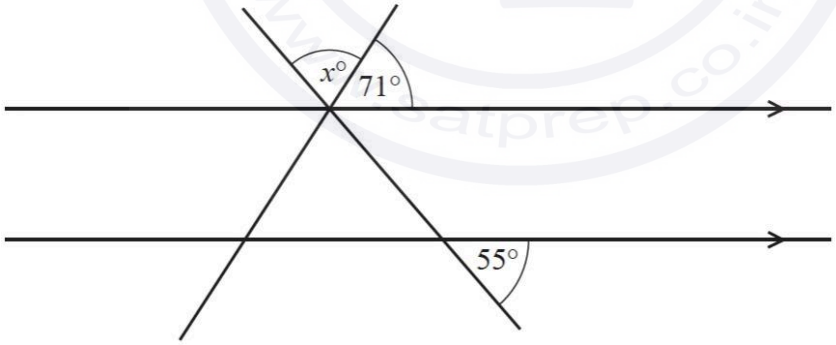
(a) Find the length of PQ.

..... cm [1]

(b) Find the area of triangle PQR.

..... cm^2 [2]

Question 138



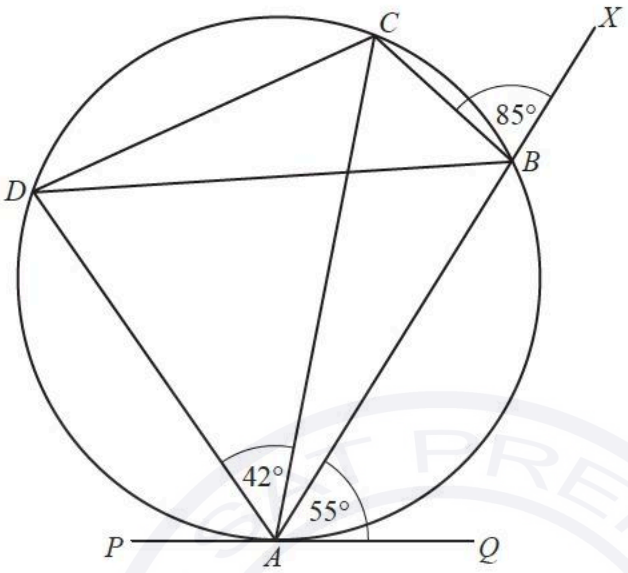
NOT TO SCALE

The diagram shows two straight lines intersecting two parallel lines.

Find the value of x.

$x =$ ..... [2]

Question 139



NOT TO SCALE

ABCD is a cyclic quadrilateral, *ABX* is a straight line and *PQ* is a tangent to the circle at *A*.
Angle *CBX* = 85°, angle *BAQ* = 55° and angle *CAD* = 42°.

Find

(a) angle *CBD*

Angle *CBD* = ... [1]

(b) angle *ACB*

Angle *ACB* = ... [1]

(c) angle *ADC*

Angle *ADC* = ... [1]

(d) angle *BCD*

Angle *BCD* = ... [2]

(e) angle *PAD*.

Angle *PAD* = ... [1]

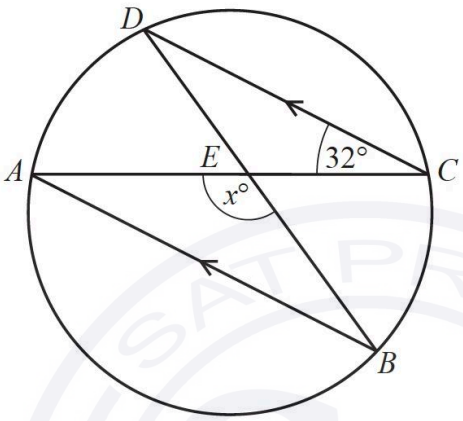
Question 140

In a regular polygon, the interior angle and the exterior angle are in the ratio interior : exterior = 11 : 1.

Find the number of sides of this regular polygon.

..... [3]

Question 141



NOT TO SCALE

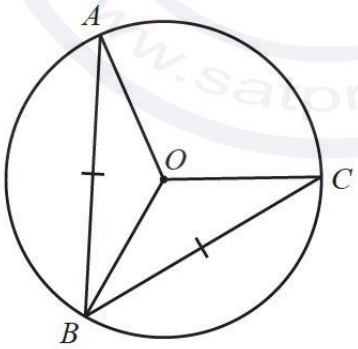
A, B, C and D are points on a circle.
AB is parallel to DC and angle $ACD = 32°$.
Chords AC and DB intersect at E.

Find the value of x.

$x =$ ..... [2]

Question 142

(a)



NOT TO SCALE

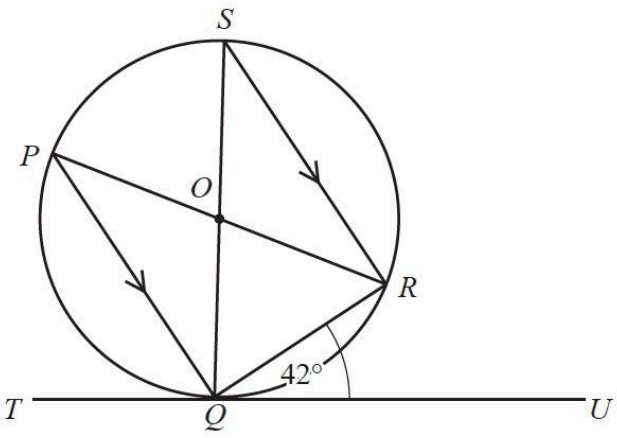
AO, OB and OC are all radii of the circle.
$AB = BC$.
Therefore triangle AOB is congruent to triangle COB.

Draw a ring around the correct criterion for this statement.

SAS *RHS* *SSS* *ASA*

[1]

(b)



NOT TO SCALE

P, Q, R and S are points on the circle and TQU is a tangent to the circle at Q.
PR and SQ intersect at the centre of the circle, O, and PQ is parallel to SR.
Angle $RQU = 42°$.

Calculate

(i) angle QSR

Angle QSR = ... [1]

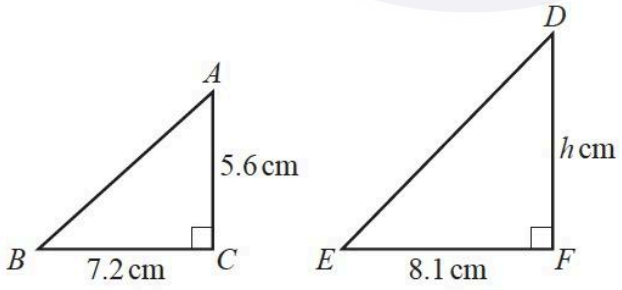
(ii) angle PQS

Angle PQS = ... [1]

(iii) angle POS.

Angle POS = ... [1]

Question 143



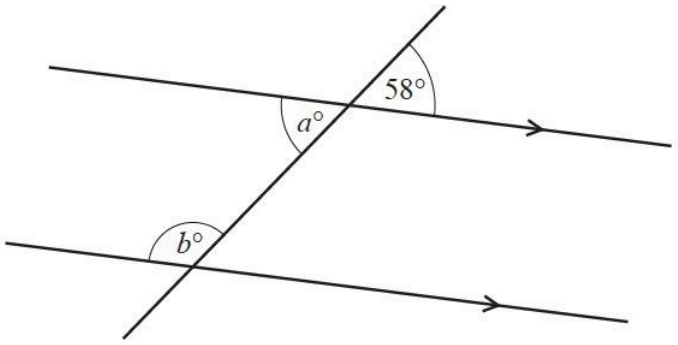
NOT TO SCALE

Triangle ABC is similar to triangle DEF.

Calculate the value of h.

h = ... [2]

Question 144



NOT TO SCALE

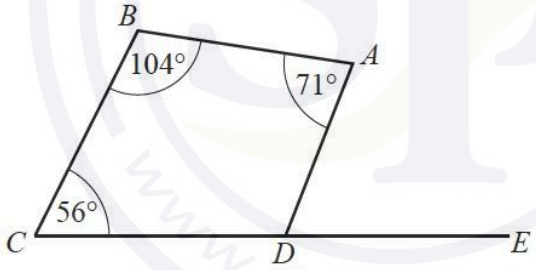
The diagram shows a straight line intersecting two parallel lines.

Find the value of a and the value of b, giving a geometrical reason for each answer.

a = ... because .....

b = ... because ..... [4]

Question 145



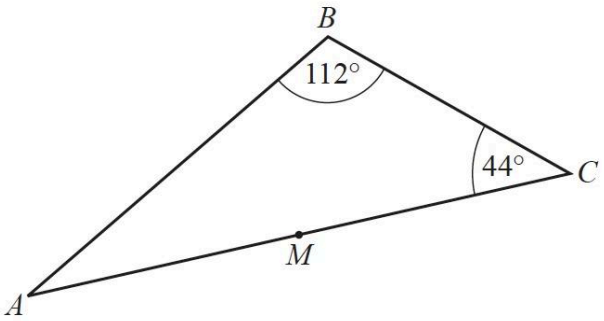
NOT TO SCALE

CDE is a straight line.

Find angle ADE.

..... [2]

Question 146



NOT TO SCALE

The diagram shows triangle ABC.
M is the midpoint of AC.

Triangle ABC is rotated 180° about centre M.
The image and the original triangle together form a quadrilateral $ABCD$.

(a) Write down the mathematical name of the quadrilateral $ABCD$.

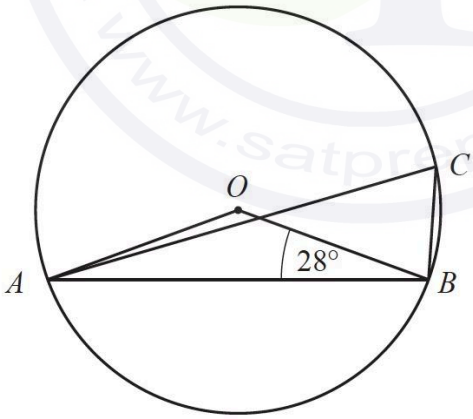
..... [1]

(b) Find angle BAD.

Angle BAD = ... [2]

Question 147

(a)



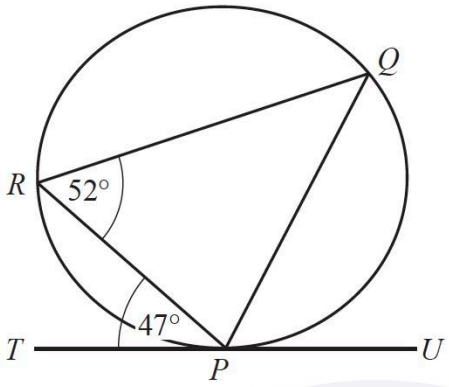
NOT TO SCALE

A, B and C are points on a circle, centre O.
Angle OBA = 28°.

Find angle ACB.

Angle ACB = ... [2]

(b)



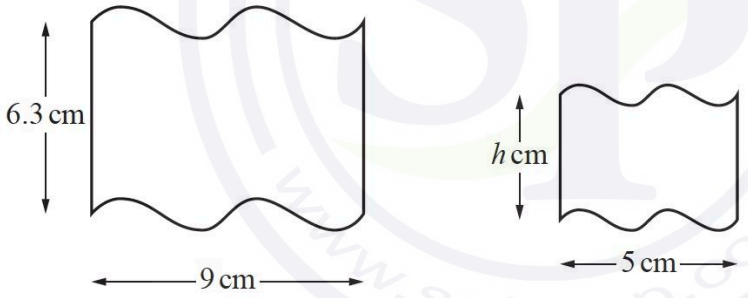
NOT TO SCALE

P, Q and R are points on a circle.
TU is a tangent to the circle at P.
Angle $TPR = 47°$ and angle $PRQ = 52°$.

Find angle RPQ.

Angle RPQ = ... [2]

Question 148



NOT TO SCALE

The two shapes are mathematically similar.

(a) Find the value of h.

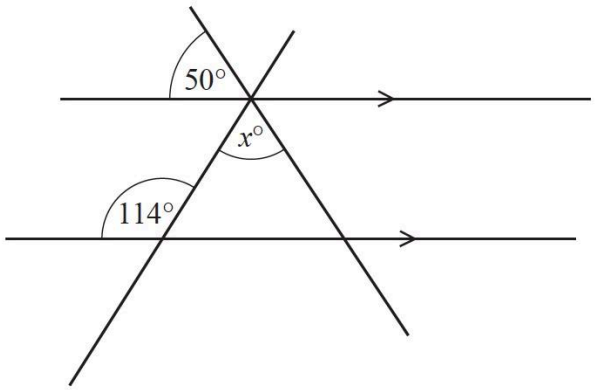
h = ... [2]

(b) The area of the smaller shape is $16\,cm^2$.

Calculate the area of the larger shape.

..... cm^2 [2]

Question 149



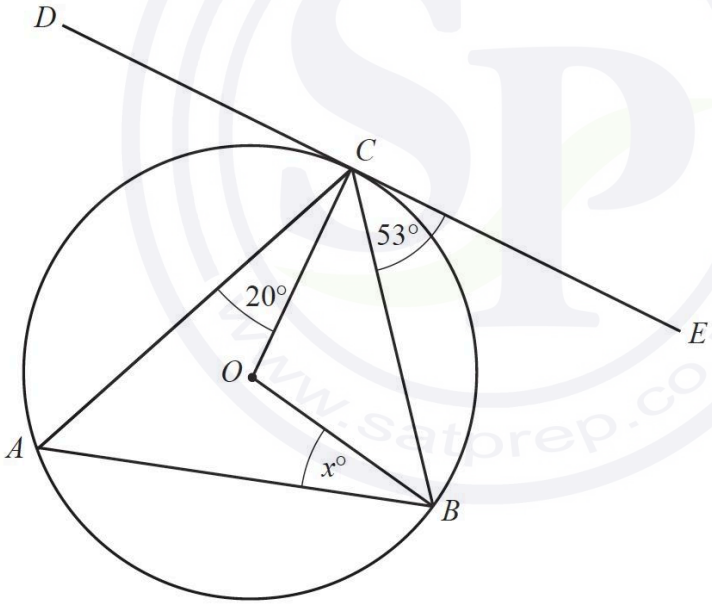
NOT TO SCALE

The diagram shows two intersecting straight lines crossing two parallel lines.

Find the value of x.

$x =$ ..... [2]

Question 150



NOT TO SCALE

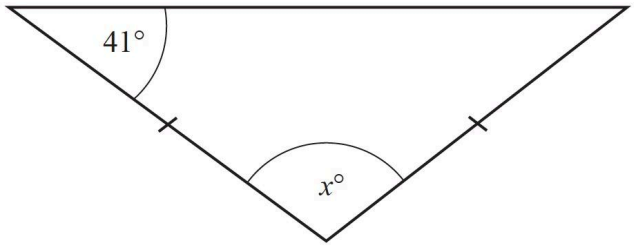
A, B and C are points on the circumference of a circle, centre O.
Tangent DE touches the circle at C.
Angle $BCE = 53°$ and angle $ACO = 20°$.

Find the value of x.

$x =$ ..... [3]

Question 151

The diagram shows an isosceles triangle.

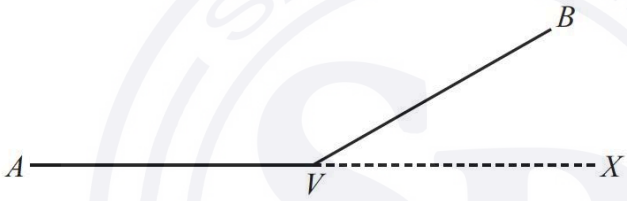


NOT TO SCALE

Find the value of x.

$x =$ ..... [2]

Question 152



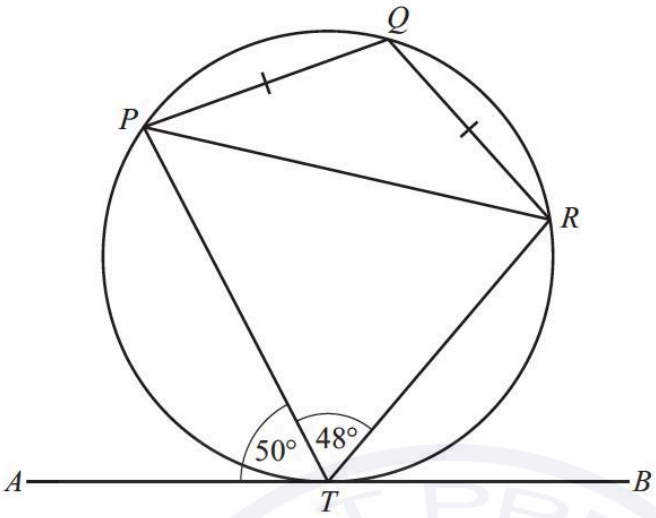
NOT TO SCALE

The diagram shows two sides, VA and VB, of a regular polygon.
AVX is a straight line.
Angle $BVX = y°$ and angle $AVB = 11.5y°$.

Find the number of sides of this polygon.

..... [3]

Question 153



NOT TO SCALE

P, Q, R and T are points on the circle.
AB is a tangent to the circle at T.
Angle $ATP = 50°$, angle $PTR = 48°$ and $PQ = QR$.

(a) Find angle PRT.

Angle PRT = ... [1]

(b) Find angle QPR.

Angle QPR = ... [2]

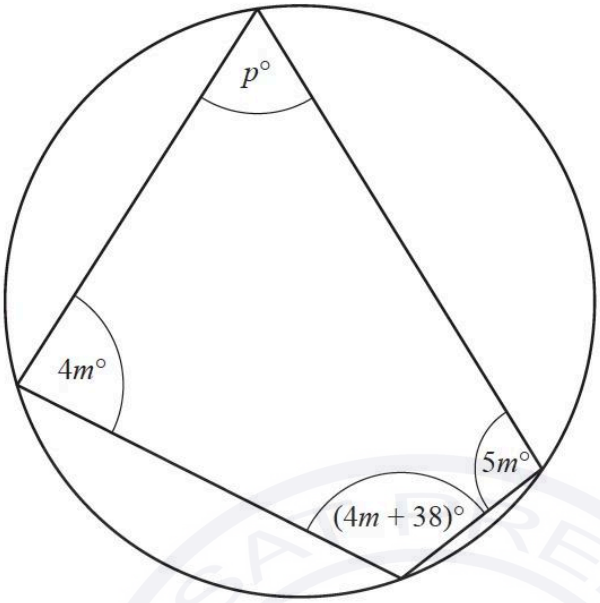
Question 154

Two parcels are mathematically similar.
The larger parcel has volume $80\,cm^3$ and height $5.2\,cm$.
The smaller parcel has volume $33.75\,cm^3$.

Calculate the height of the smaller parcel.

..... cm [3]

Question 155



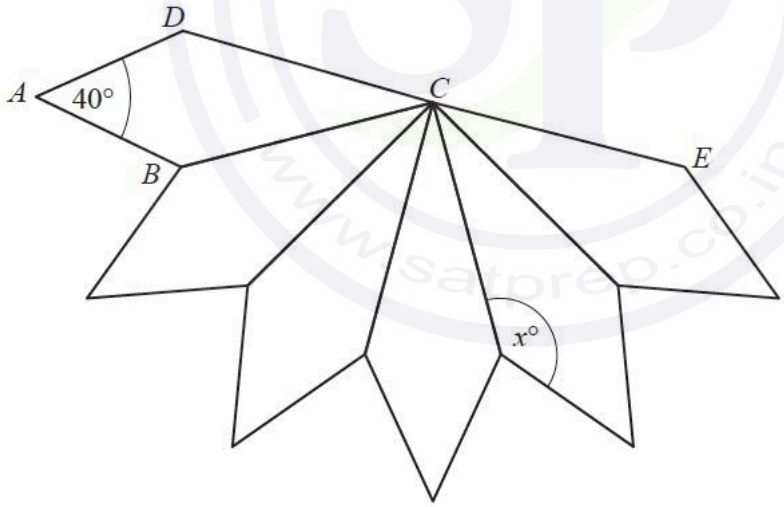
NOT TO SCALE

The diagram shows a cyclic quadrilateral.

Find the value of p.

$p =$ ..... [3]

Question 156



NOT TO SCALE

The diagram shows 5 kites that are congruent to kite $ABCD$.
Each kite is joined to the next kite along one edge.
Angle $DAB = 40°$ and DCE is a straight line.

Find the value of x.

$x =$ ..... [3]