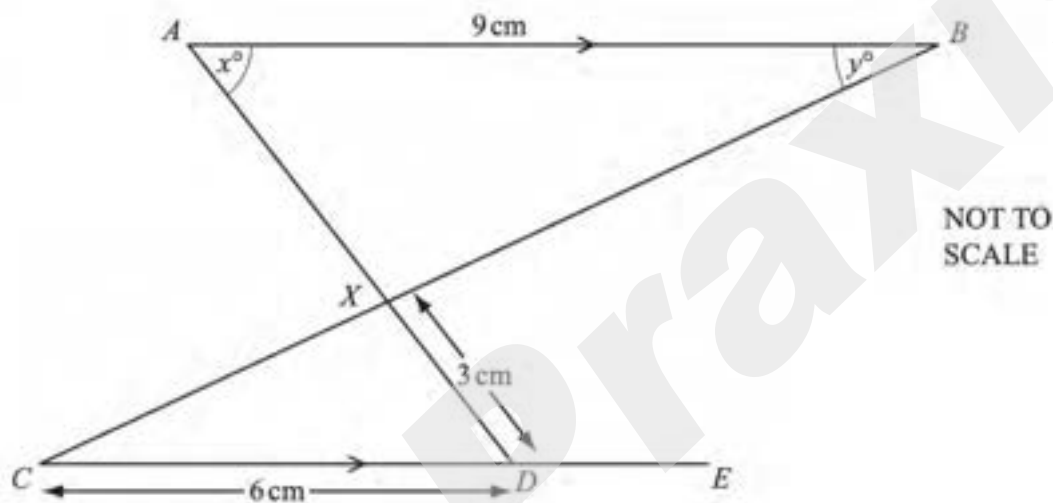


Geometry

(Past Year Topical Questions 2010-2015)

May/June 2010 (42)

9 (a)



The lines AB and CDE are parallel.
 AD and CB intersect at X .
 $AB = 9$ cm, $CD = 6$ cm and $DX = 3$ cm.

(i) Complete the following statement.

Triangle ABX is to triangle DCX . [1]

(ii) Calculate the length of AX .

Answer(a)(ii) $AX =$ cm [2]

(iii) The area of triangle DCX is 6 cm^2 .

Calculate the area of triangle ABX .

Answer(a)(iii) cm^2 [2]

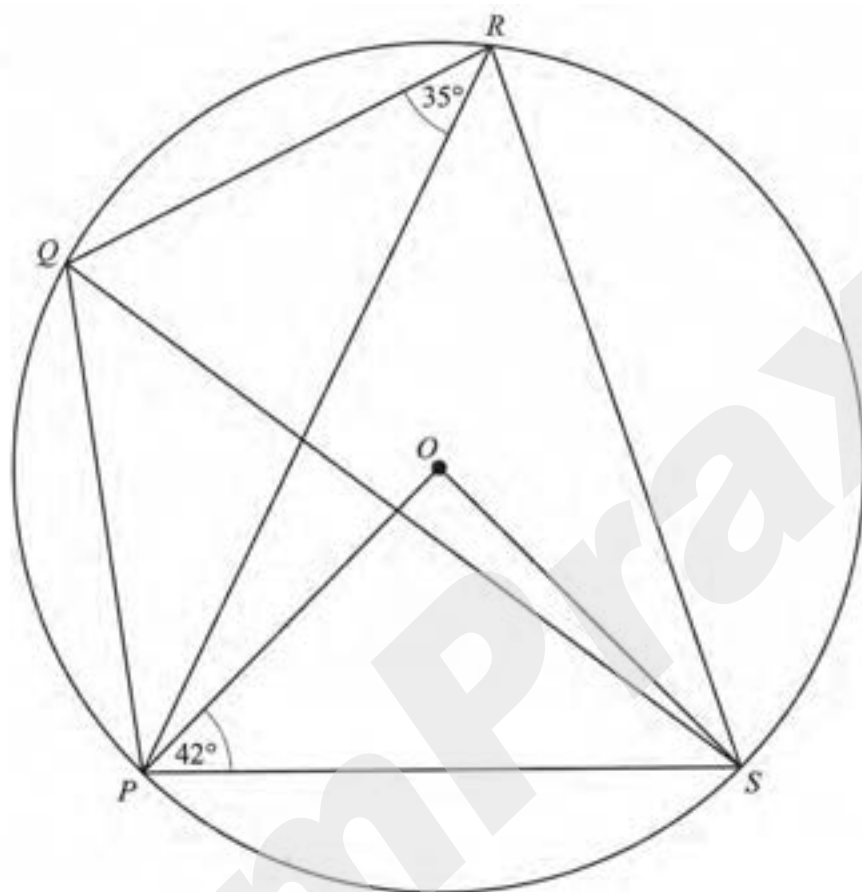
(iv) Angle $BAX = x^\circ$ and angle $ABX = y^\circ$.

Find angle AXB and angle XDE in terms of x and/or y .

Answer(a)(iv) Angle $AXB =$

Angle $XDE =$ [2]

(b)



NOT TO SCALE

P, Q, R and S lie on a circle, centre O .
 Angle $OPS = 42^\circ$ and angle $PRQ = 35^\circ$.

Calculate

 (i) angle POS ,

 Answer(b)(i) Angle $POS = \dots\dots\dots$ [1]

 (ii) angle PRS ,

 Answer(b)(ii) Angle $PRS = \dots\dots\dots$ [1]

 (iii) angle SPQ ,

 Answer(b)(iii) Angle $SPQ = \dots\dots\dots$ [1]

 (iv) angle PSQ .

 Answer(b)(iv) Angle $PSQ = \dots\dots\dots$ [1]

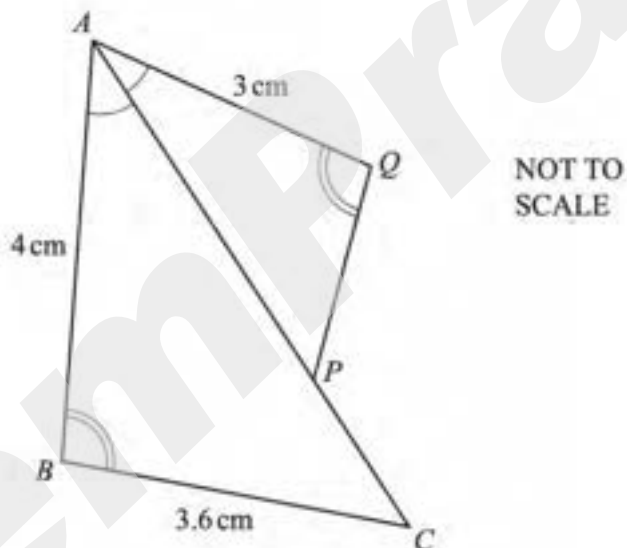
(c) The interior angle of a regular polygon is 8 times as large as the exterior angle.

Calculate the number of sides of the polygon.

Answer(c) [3]

May/June 2010 (43)

5 (a)



The diagram shows two triangles ACB and APQ .

Angle $PAQ =$ angle BAC and angle $AQP =$ angle ABC .

$AB = 4$ cm, $BC = 3.6$ cm and $AQ = 3$ cm.

(i) Complete the following statement.

Triangle ACB is to triangle APQ . [1]

(ii) Calculate the length of PQ .

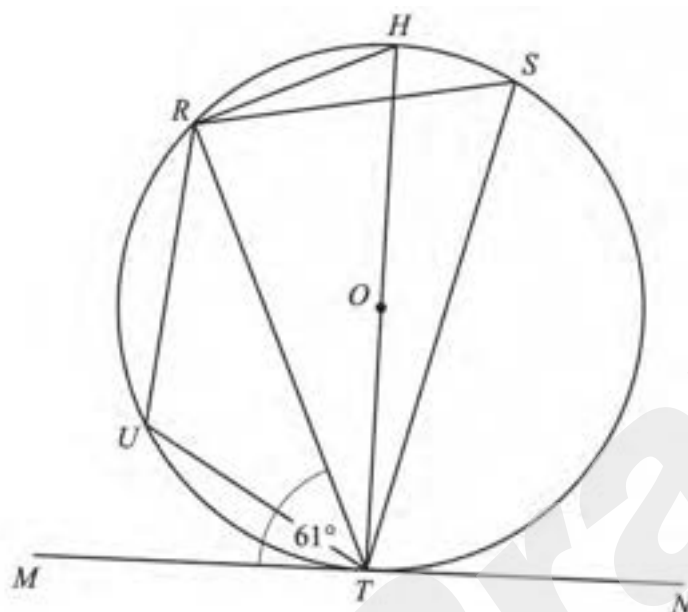
Answer(a)(ii) $PQ =$ cm [2]

(iii) The area of triangle ACB is 5.6 cm^2 .

Calculate the area of triangle APQ .

Answer(a)(iii) cm^2 [2]

(b)



R, H, S, T and U lie on a circle, centre O .
 HT is a diameter and MN is a tangent to the circle at T .
 Angle $RTM = 61^\circ$.

Find

 (i) angle RTH ,

 Answer(b)(i) Angle $RTH = \dots\dots\dots$ [1]

 (ii) angle RHT ,

 Answer(b)(ii) Angle $RHT = \dots\dots\dots$ [1]

 (iii) angle RST ,

 Answer(b)(iii) Angle $RST = \dots\dots\dots$ [1]

 (iv) angle RUT .

 Answer(b)(iv) Angle $RUT = \dots\dots\dots$ [1]

(c) $ABCDEF$ is a hexagon.

The interior angle B is 4° greater than interior angle A .

The interior angle C is 4° greater than interior angle B , and so on, with each of the next interior angles 4° greater than the previous one.

(i) By how many degrees is interior angle F greater than interior angle A ?

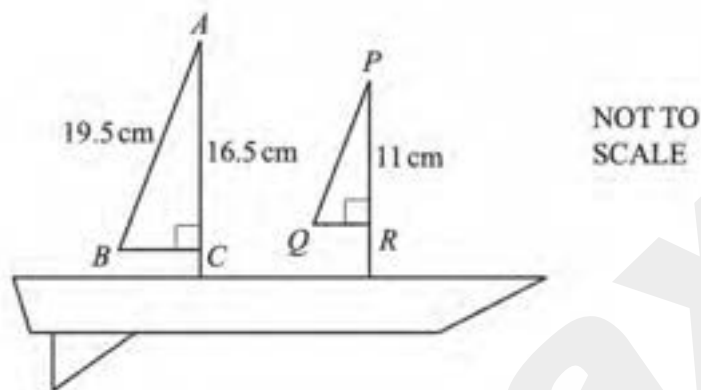
Answer(c)(i) [1]

(ii) Calculate interior angle A .

Answer(c)(ii) [3]

October/November 2010 (41)

6 (a)



The diagram shows a toy boat.
 $AC = 16.5$ cm, $AB = 19.5$ cm and $PR = 11$ cm.
 Triangles ABC and PQR are **similar**.

(i) Calculate PQ .

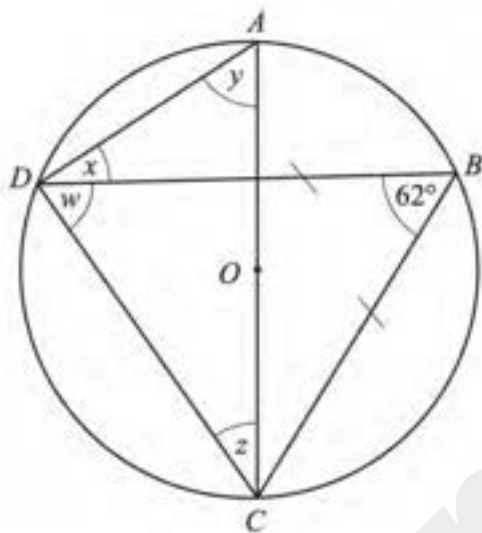
Answer(a)(i) $PQ =$ cm [2]

(iv) The toy boat is mathematically similar to a real boat.
 The length of the real boat is 32 times the length of the toy boat.
 The fuel tank in the toy boat holds 0.02 litres of diesel.

Calculate how many litres of diesel the fuel tank of the real boat holds.

Answer(a)(iv) litres [2]

7 (a)


 NOT TO
SCALE

A, B, C and D are points on the circumference of a circle centre O .
 AC is a diameter.
 $BD = BC$ and angle $DBC = 62^\circ$.

Work out the values of w, x, y and z .
 Give a reason for each of your answers.

$w =$ because [2]

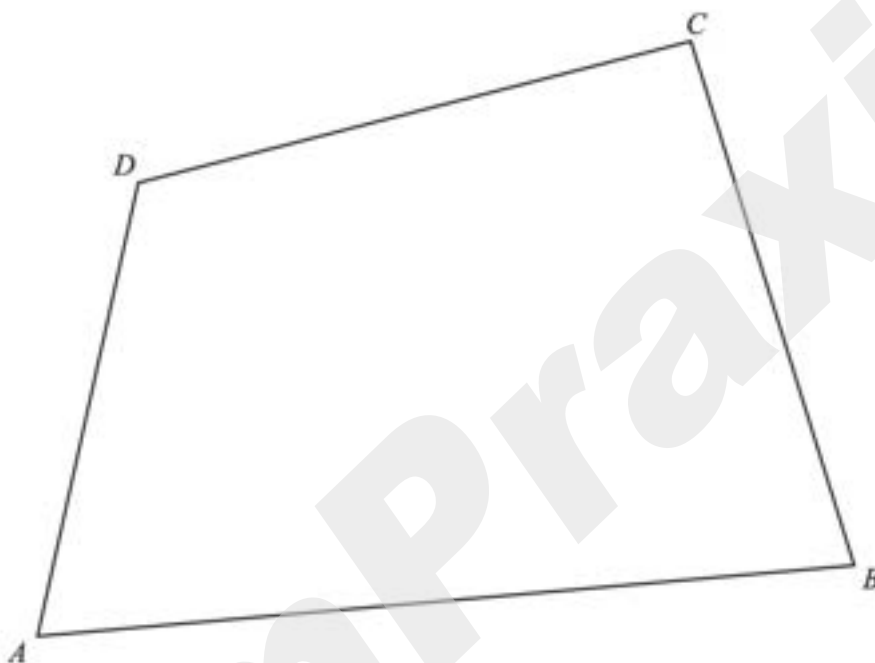
$x =$ because [2]

$y =$ because [2]

$z =$ because [2]

October/November 2010 (43)

5



The diagram shows an area of land $ABCD$ used for a shop, a car park and gardens.

- (b) The shop is on the land nearer to D than to C and nearer to AD than to AB .

Write the word SHOP in this region on the diagram.

[1]

- (c) (i) The scale of the diagram is 1 centimetre to 20 metres.
The gardens are the part of the land less than 100 m from B .
Draw the boundary for the gardens.

[1]

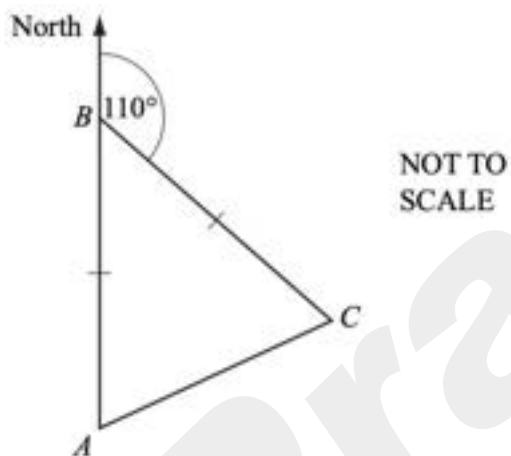
- (ii) The car park is the part of the land not used for the shop and not used for the gardens.
Shade the car park region on the diagram.

[1]

May/June 2011 (41)

Question 1b

(b) The route for the sponsored walk in winter is triangular.

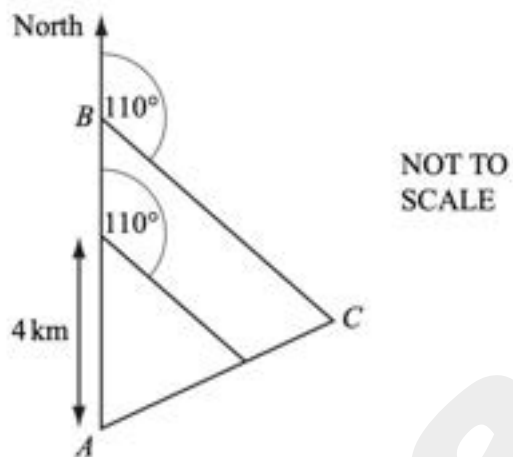


- (i) Senior students start at A , walk North to B , then walk on a bearing 110° to C . They then return to A .
 $AB = BC$.

Calculate the bearing of A from C .

Answer(b)(i) [3]

(ii)


 $AB = BC = 6 \text{ km.}$

Junior students follow a **similar** path but they only walk 4 km North from A , then 4 km on a bearing 110° before returning to A .

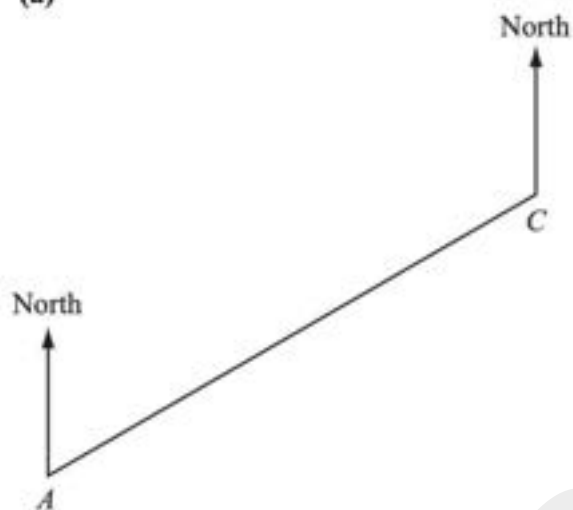
Senior students walk a total of 18.9 km.

Calculate the distance walked by junior students.

Answer(b)(ii) km [3]

May/June 2011 (42)

3 (a)



The scale drawing shows the positions of two towns *A* and *C* on a map. On the map, 1 centimetre represents 20 kilometres.

- (i) Find the distance in kilometres from town *A* to town *C*.

Answer(a)(i) km [2]

- (ii) Measure and write down the bearing of town *C* from town *A*.

Answer(a)(ii) [1]

- (iii) Town *B* is 140 km from town *C* on a bearing of 150° .

Mark accurately the position of town *B* on the scale drawing. [2]

(iv) Find the bearing of town *C* from town *B*.

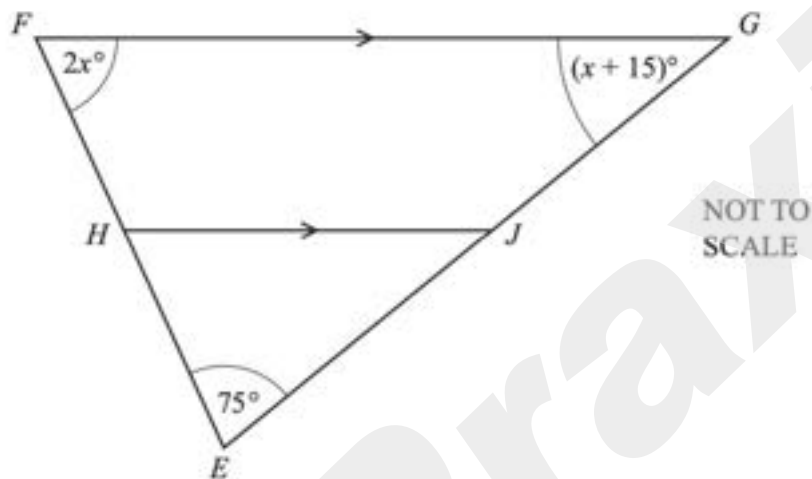
Answer(a)(iv) [1]

(v) A lake on the map has an area of 0.15 cm^2 .

Work out the actual area of the lake.

Answer(a)(v) km^2 [2]

May/June 2011 (43)

Question 10b
(b)


EFG is a triangle.
HJ is parallel to *FG*.
 Angle *FEG* = 75° .
 Angle *EFG* = $2x^\circ$ and angle *FGE* = $(x + 15)^\circ$.

(i) Find the value of x .

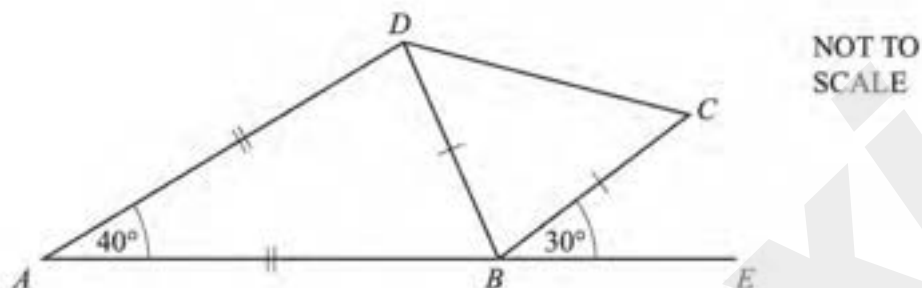
 Answer(b)(i) $x =$ [2]

(ii) Find angle *HJG*.

 Answer(b)(ii) Angle *HJG* = [1]

October/November 2011 (43)

3 (a)



$ABCD$ is a quadrilateral with angle $BAD = 40^\circ$.
 AB is extended to E and angle $EBC = 30^\circ$.
 $AB = AD$ and $BD = BC$.

(i) Calculate angle BCD .

Answer(a)(i) Angle $BCD =$ [3]

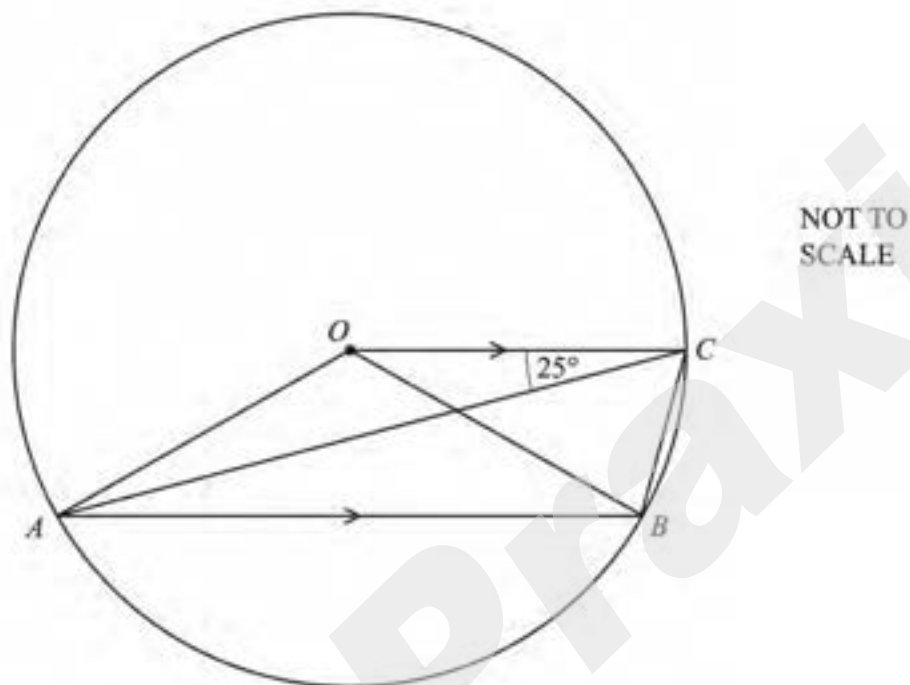
(ii) Give a reason why DC is not parallel to AE .

Answer(a)(ii) [1]

- (b) A regular polygon has n sides.
Each exterior angle is $\frac{5n}{2}$ degrees.
Find the value of n .

Answer(b) $n =$ [3]

(c)



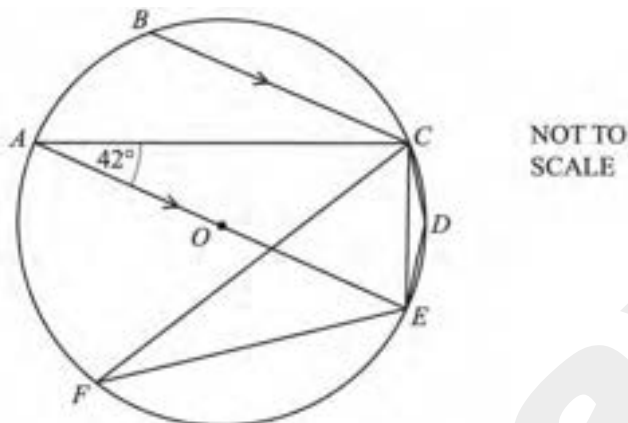
The diagram shows a circle centre O .
 A , B and C are points on the circumference.
 OC is parallel to AB .
 Angle $OCA = 25^\circ$.

Calculate angle OBC .

Answer(c) Angle $OBC = \dots\dots\dots$ [3]

May/June 2012 (42)

4 (a)



A, B, C, D, E and F are points on the circumference of a circle centre O .
 AE is a diameter of the circle.
 BC is parallel to AE and angle $CAE = 42^\circ$.

Giving a reason for each answer, find

(i) angle BCA ,

Answer(a)(i) Angle $BCA = \dots\dots\dots$

Reason $\dots\dots\dots$ [2]

(ii) angle ACE ,

Answer(a)(ii) Angle $ACE = \dots\dots\dots$

Reason $\dots\dots\dots$ [2]

(iii) angle CFE ,

Answer(a)(iii) Angle $CFE = \dots\dots\dots$

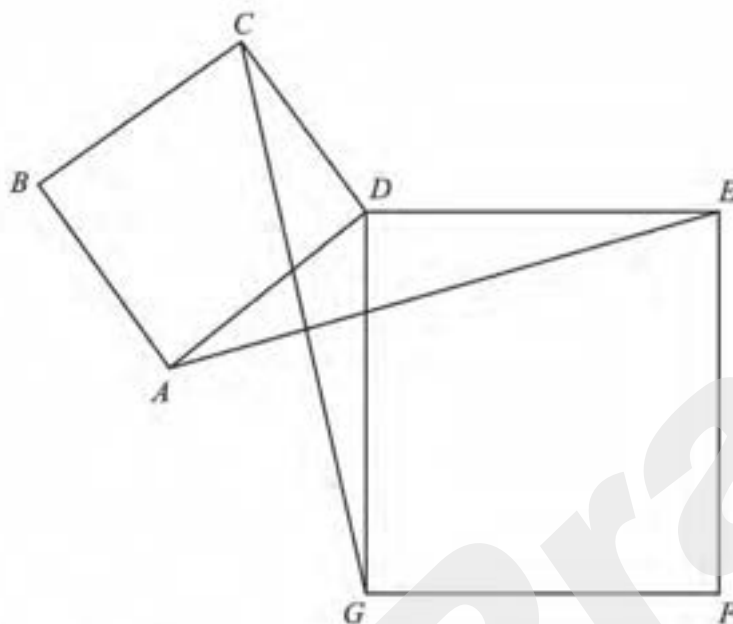
Reason $\dots\dots\dots$ [2]

(iv) angle CDE .

Answer(a)(iv) Angle $CDE = \dots\dots\dots$

Reason $\dots\dots\dots$ [2]

(c)


 NOT TO
SCALE

In the diagram, $ABCD$ and $DEFG$ are squares.

- (i) In the triangles CDG and ADE , explain with a reason which sides and/or angles are equal.

Answer (c)(i)

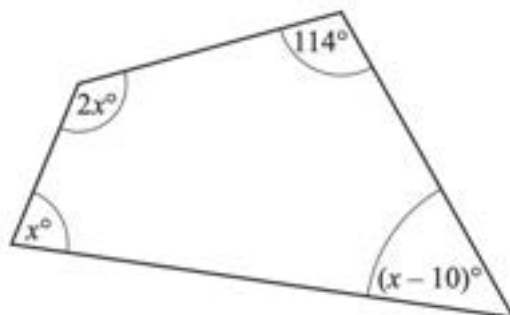
[3]

- (ii) Complete the following statement.

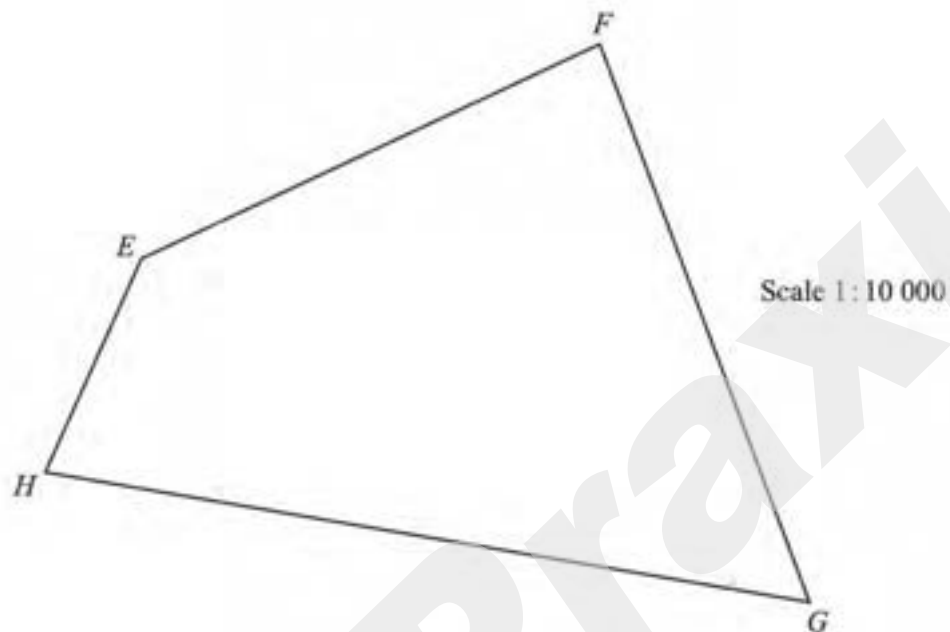
Triangle CDG is to triangle ADE .

[1]

6 (a)

NOT TO
SCALEFind the value of x .Answer (a) $x =$ [3]

9



The diagram is a scale drawing of a park $EFGH$. The scale is $1:10\,000$.

A statue is to be placed in the park so that it is

- nearer to G than to H
- nearer to HG than to FG
- more than 550 metres from F .

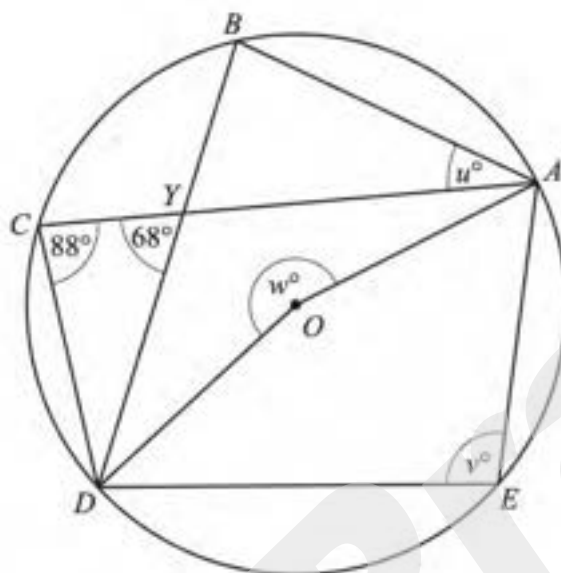
Construct accurately the boundaries of the region R in which the statue can be placed.

Leave in all your construction arcs and shade the region R .

[7]

May/June 2012 (43)

8 (a)


 NOT TO
SCALE

A, B, C, D and E lie on the circle, centre O .
 CA and BD intersect at Y .
 Angle $DCA = 88^\circ$ and angle $CYD = 68^\circ$.
 Angle $BAC = u^\circ$, angle $AED = v^\circ$ and reflex angle $AOD = w^\circ$.

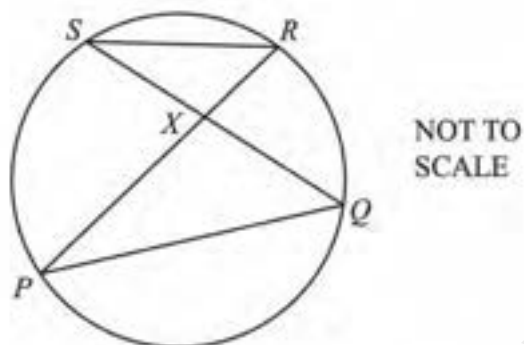
Calculate the values of u , v and w .

Answer(a) $u = \dots\dots\dots$

$v = \dots\dots\dots$

$w = \dots\dots\dots$ [4]

(b)

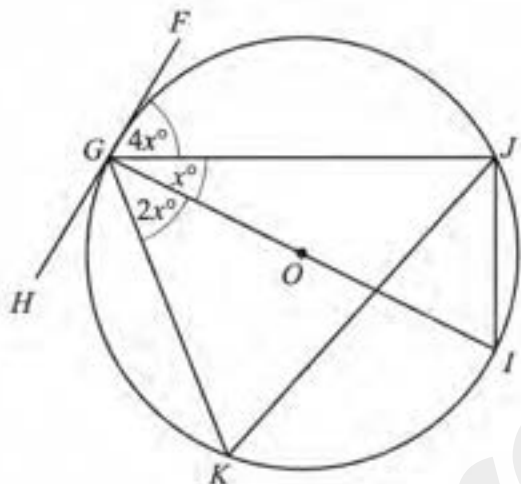


P , Q , R and S lie on the circle. PR and QS intersect at X .
The area of triangle $RSX = 1.2 \text{ cm}^2$ and $PX = 3 SX$.

Calculate the area of triangle PQX .

Answer(b) cm^2 [2]

(c)


 NOT TO
SCALE

GI is a diameter of the circle.
 FGH is a tangent to the circle at G .
 J and K also lie on the circle.
 Angle $JGI = x^\circ$, angle $FGJ = 4x^\circ$ and angle $KGI = 2x^\circ$.

Find

 (i) the value of x ,

 Answer(c)(i) $x = \dots\dots\dots$ [2]

 (ii) the size of angle JKG ,

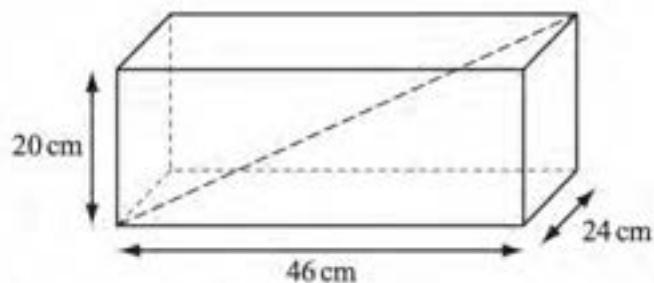
 Answer(c)(ii) Angle $JKG = \dots\dots\dots$ [2]

 (iii) the size of angle GJK .

 Answer(c)(iii) Angle $GJK = \dots\dots\dots$ [1]

October/November 2012 (41)

5 (a)



NOT TO
SCALE

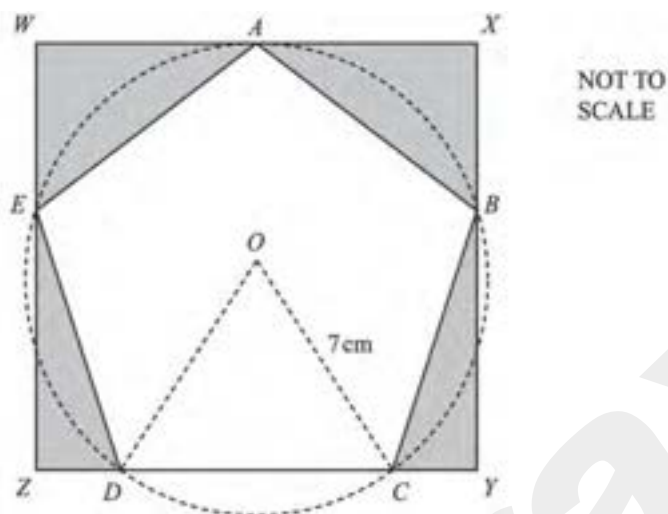
Jose has a fish tank in the shape of a cuboid measuring 46 cm by 24 cm by 20 cm.

(c) Lorenzo's fish tank is mathematically similar to Jose's and double the volume.

Calculate the dimensions of Lorenzo's fish tank.

Answer(c) cm by cm by cm [3]

7



The vertices A , B , C , D and E of a regular pentagon lie on the circumference of a circle, centre O , radius 7 cm.

They also lie on the sides of a rectangle $WXYZ$.

(a) Show that

(i) angle $DOC = 72^\circ$,

Answer(a)(i)

[1]

(ii) angle $DCB = 108^\circ$,

Answer(a)(ii)

[2]

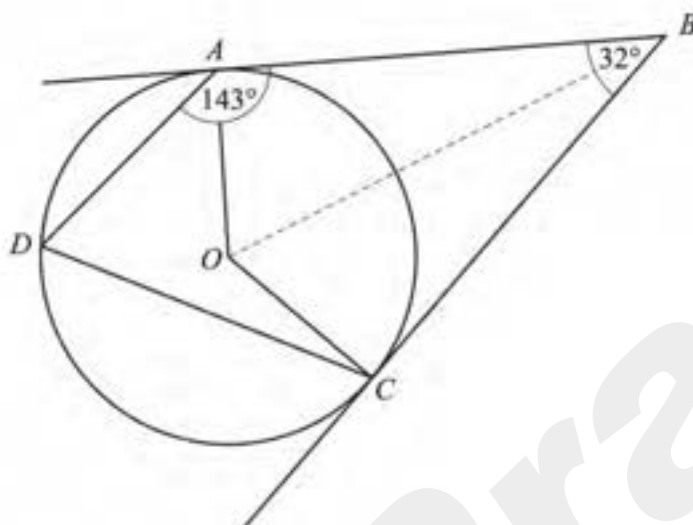
(iii) angle $CBY = 18^\circ$.

Answer(a)(iii)

[1]

October/November 2012 (42)

4 (a)


 NOT TO
SCALE

Points A , C and D lie on a circle centre O .
 BA and BC are tangents to the circle.
 Angle $ABC = 32^\circ$ and angle $DAB = 143^\circ$.

(i) Calculate angle AOC in quadrilateral $AOCB$.

Answer(a)(i) Angle $AOC =$ [2]

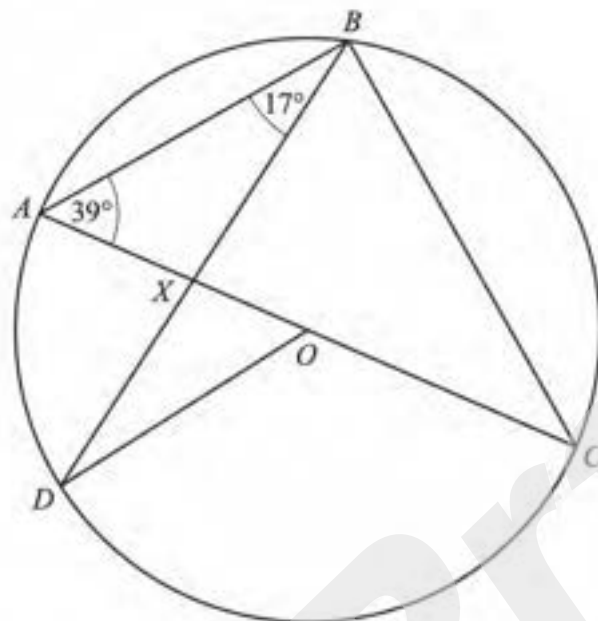
(ii) Calculate angle ADC .

Answer(a)(ii) Angle $ADC =$ [1]

(iii) Calculate angle OCD .

Answer(a)(iii) Angle $OCD =$ [2]

(b)


 NOT TO
SCALE

A, B, C and D are on the circumference of the circle centre O .
 AC is a diameter.
 Angle $CAB = 39^\circ$ and angle $ABD = 17^\circ$.

 (i) Calculate angle ACB .

 Answer(b)(i) Angle $ACB = \dots\dots\dots$ [2]

 (ii) Calculate angle BXC .

 Answer(b)(ii) Angle $BXC = \dots\dots\dots$ [2]

 (iii) Give the reason why angle DOA is 34° .

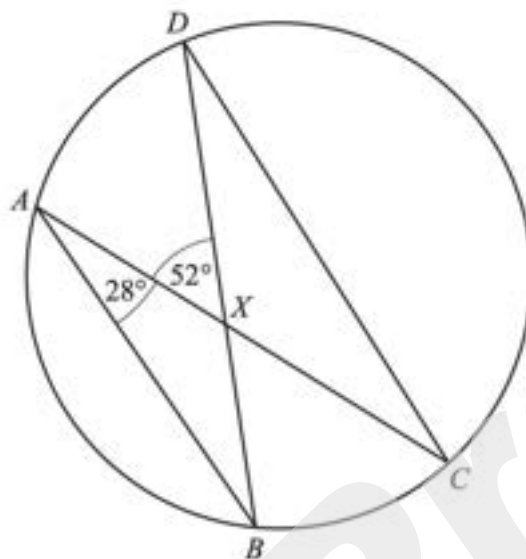
 Answer(b)(iii) $\dots\dots\dots$ [1]

 (iv) Calculate angle BDO .

 Answer(b)(iv) Angle $BDO = \dots\dots\dots$ [1]

October/November 2012 (43)

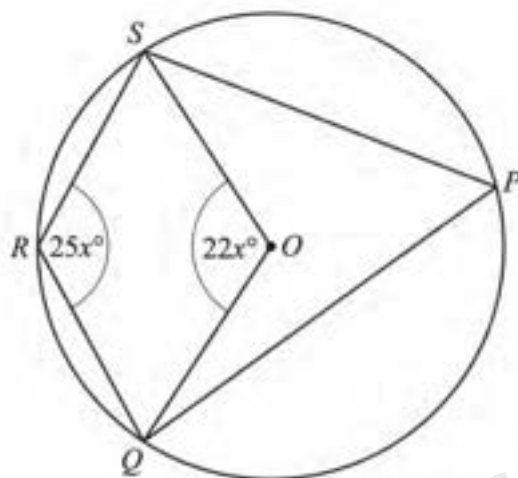
8 (a)

NOT TO
SCALE

A, B, C and D lie on a circle.
The chords AC and BD intersect at X .
Angle $BAC = 28^\circ$ and angle $AXD = 52^\circ$.
Calculate angle XCD .

Answer(a) Angle $XCD = \dots\dots\dots$ [3]

(b)

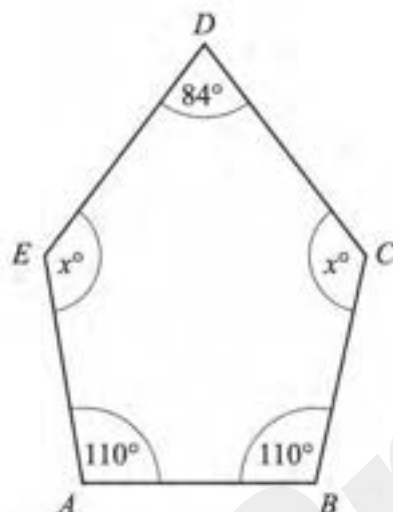

 NOT TO
SCALE

$PQRS$ is a cyclic quadrilateral in the circle, centre O .
 Angle $QOS = 22x^\circ$ and angle $QRS = 25x^\circ$.
 Find the value of x .

Answer(b) $x =$ [3]

May/June 2013 (41)

8 (a)


 NOT TO
SCALE

In the pentagon $ABCDE$, angle $EAB = \text{angle } ABC = 110^\circ$ and angle $CDE = 84^\circ$.
Angle $BCD = \text{angle } DEA = x^\circ$.

- (i) Calculate the value of x .

Answer(a)(i) $x = \dots\dots\dots$ [2]

- (ii) $BC = CD$.
Calculate angle CBD .

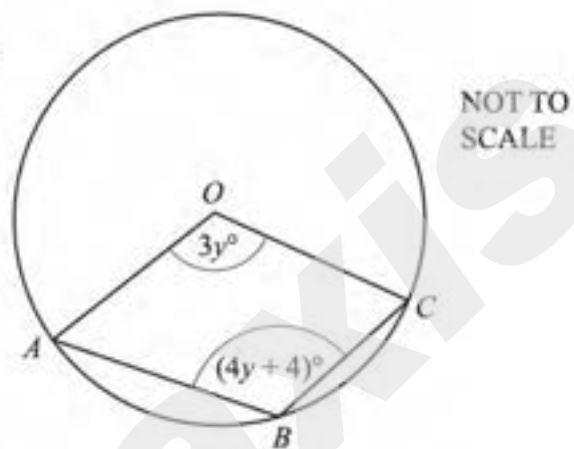
Answer(a)(ii) Angle $CBD = \dots\dots\dots$ [1]

- (iii) This pentagon also has one line of symmetry.
Calculate angle ADB .

Answer(a)(iii) Angle $ADB = \dots\dots\dots$ [1]

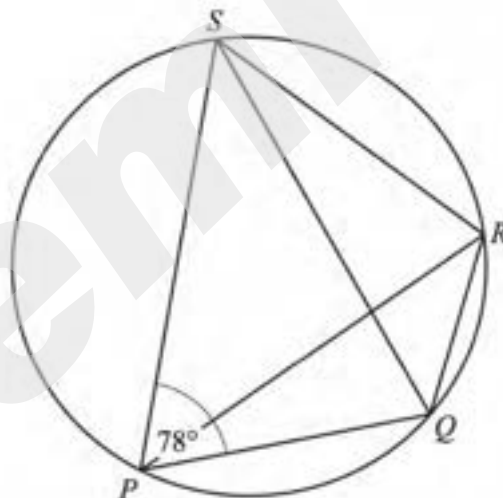
- (b) A, B and C lie on a circle centre O .
 Angle $AOC = 3y^\circ$ and angle $ABC = (4y + 4)^\circ$.

Find the value of y .



Answer(b) $y = \dots\dots\dots$ [4]

- (c)



NOT TO SCALE

In the cyclic quadrilateral $PQRS$, angle $SPQ = 78^\circ$.

- (i) Write down the geometrical reason why angle $QRS = 102^\circ$.

Answer(c)(i) $\dots\dots\dots$ [1]

(ii) Angle PRQ : Angle $PRS = 1:2$.

Calculate angle PQS .

Answer(c)(ii) Angle $PQS = \dots\dots\dots$ [3]

(d)



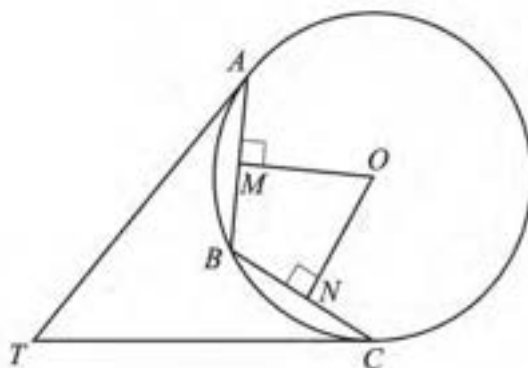
The diagram shows two similar figures.
 The areas of the figures are 5 cm^2 and 7.2 cm^2 .
 The lengths of the bases are $l \text{ cm}$ and 6.9 cm .

Calculate the value of l .

Answer(d) $l = \dots\dots\dots$ [3]

May/June 2013 (42)

4



NOT TO
SCALE

A , B and C lie on the circle centre O , radius 8.5 cm.

$AB = BC = 10.7$ cm.

OM is perpendicular to AB and ON is perpendicular to BC .

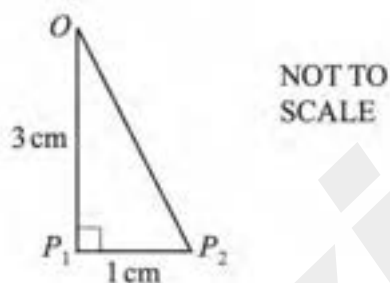
(e) The tangents to the circle at A and at C meet at T .

Explain clearly why triangle ATB is congruent to triangle CTB .

Answer(e)

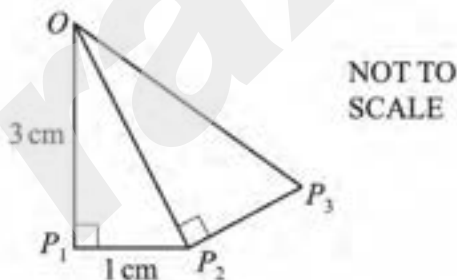
[3]

- 11 Sidney draws the triangle OP_1P_2 .
 $OP_1 = 3$ cm and $P_1P_2 = 1$ cm.
 Angle $OP_1P_2 = 90^\circ$.



- (a) Show that $OP_2 = \sqrt{10}$ cm.

- (b) Sidney now draws the lines P_2P_3 and OP_3 .
 Triangle OP_2P_3 is mathematically similar
 to triangle OP_1P_2 .



- (i) Write down the length of P_2P_3 in the form $\frac{\sqrt{a}}{b}$ where a and b are integers.

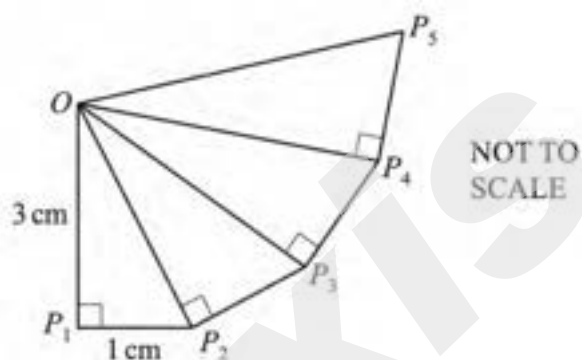
Answer(b)(i) $P_2P_3 = \dots\dots\dots$ cm [1]

- (ii) Calculate the length of OP_3 , giving your answer in the form $\frac{c}{d}$ where c and d are integers.

Answer(b)(ii) $OP_3 = \dots\dots\dots$ cm [2]

- (c) Sidney continues to add mathematically similar triangles to his drawing.

Find the length of OP_5 .

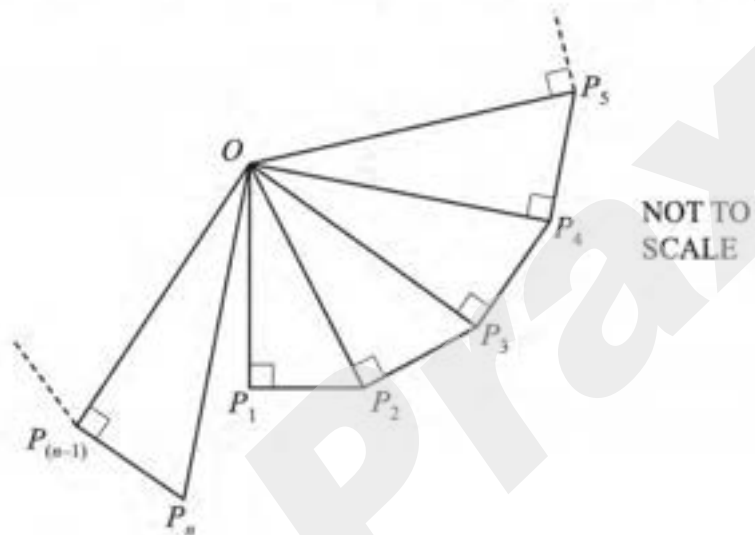


Answer(c) $OP_5 = \dots\dots\dots$ cm [2]

(d) (i) Show that angle $P_1OP_2 = 18.4^\circ$, correct to 1 decimal place.

Angle $P_2OP_3 = 18.4^\circ$.

(iii) The last triangle Sidney can draw without covering his first triangle is triangle $OP_{(n-1)}P_n$.



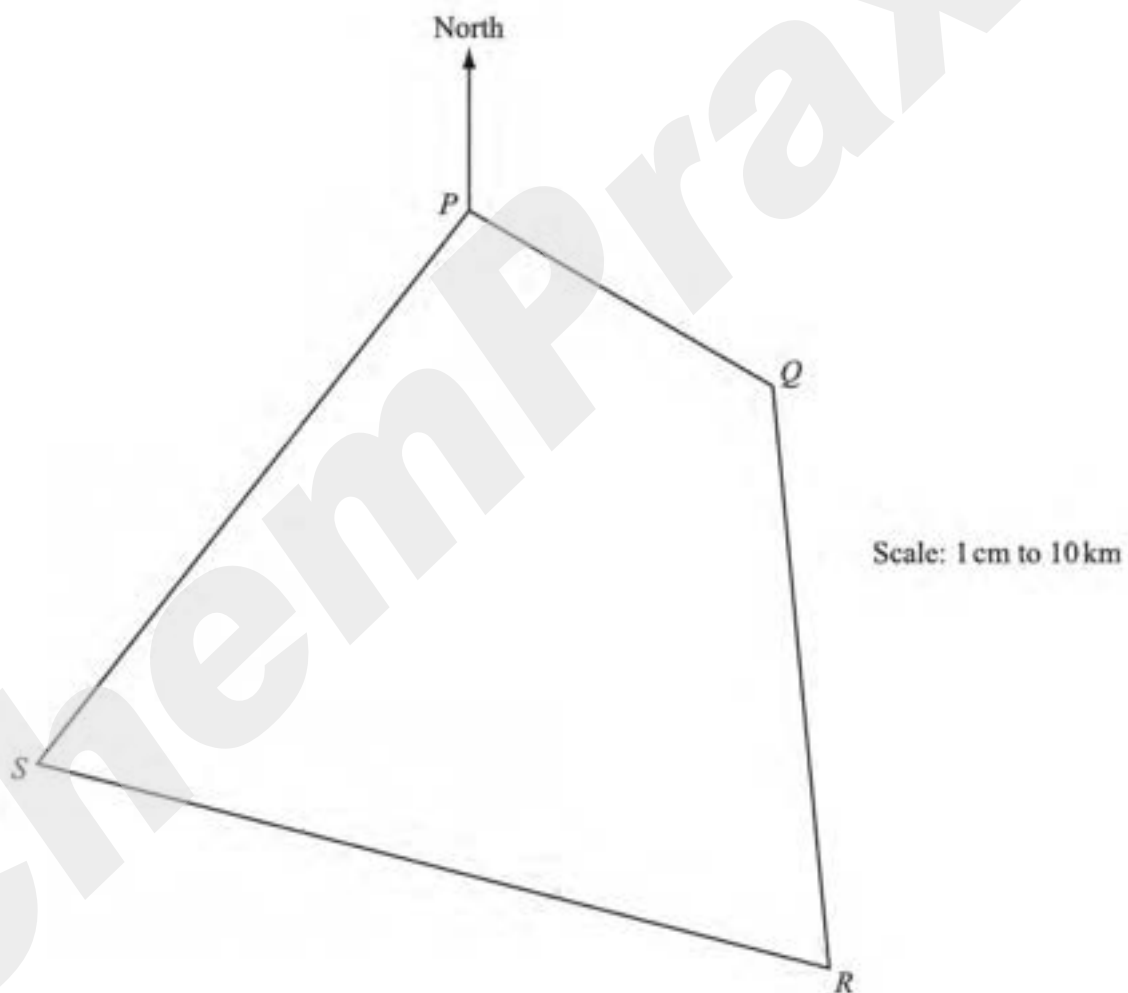
Calculate the value of n .

Answer(d)(iii) $n = \dots\dots\dots$ [3]

May/June 2013 (43)

- 2 (a) In this question show all your construction arcs and use only a ruler and compasses to draw the boundaries of your region.

This scale drawing shows the positions of four towns, P , Q , R and S , on a map where 1 cm represents 10 km.



A nature reserve lies in the quadrilateral $PQRS$.

The boundaries of the nature reserve are:

- equidistant from Q and from R
- equidistant from PS and from PQ
- 60 km from R
- along QR .

(i) Shade the region which represents the nature reserve.

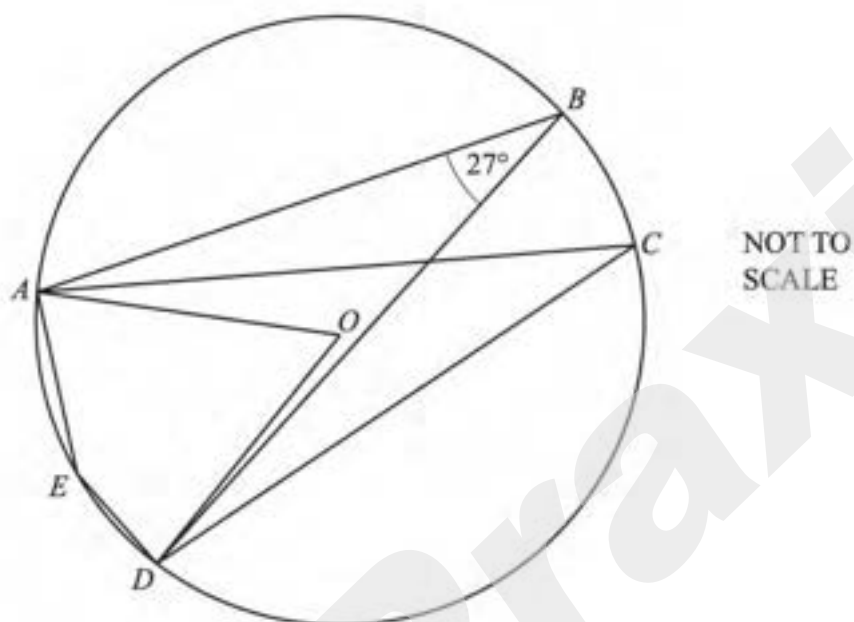
[7]

(ii) Measure the bearing of S from P .

Answer(a)(ii)

[1]

8 (a)



A, B, C, D and E are points on the circle centre O .
 Angle $ABD = 27^\circ$.

Find

(i) angle ACD ,

Answer(a)(i) Angle $ACD = \dots\dots\dots$ [1]

(ii) angle AOD ,

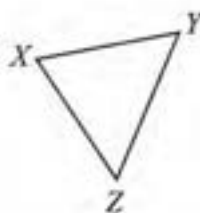
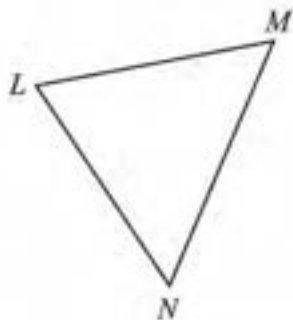
Answer(a)(ii) Angle $AOD = \dots\dots\dots$ [1]

(iii) angle AED .

Answer(a)(iii) Angle $AED = \dots\dots\dots$ [1]

Question 8b

- (iii) Another triangle XYZ is mathematically similar to triangle LMN .

NOT TO
SCALE

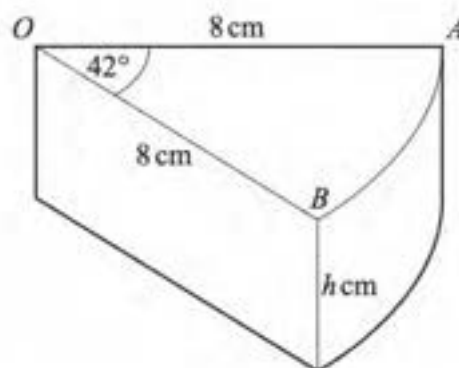
$XZ = 16$ cm and the area of triangle LMN is 324 cm².

Calculate the area of triangle XYZ .

Answer(b)(iii) cm² [2]

October/November 2013 (42)

4



NOT TO SCALE

A wedge of cheese in the shape of a prism is cut from a cylinder of cheese of height h cm. The radius of the cylinder, OA , is 8 cm and the angle $AOB = 42^\circ$.

(a) (i) The volume of the wedge of cheese is 90 cm^3 .

Show that the value of h is 3.84 cm correct to 2 decimal places.

(b) A mathematically similar wedge of cheese has a volume of 22.5 cm^3 .

Calculate the height of this wedge.

Answer(b) cm [3]

October/November 2013 (43)

- 4 (a) One angle of an isosceles triangle is 48° .

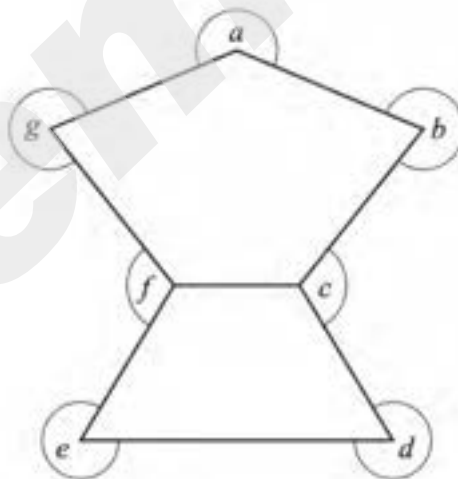
Write down the possible pairs of values for the remaining two angles.

Answer(a) and
..... and [2]

- (b) Calculate the sum of the interior angles of a pentagon.

Answer(b) [2]

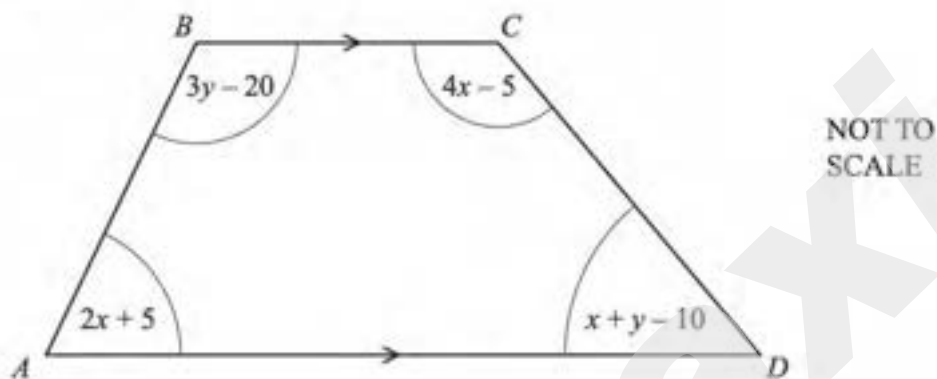
- (c) Calculate the sum of the angles a, b, c, d, e, f and g shown in this diagram.



NOT TO
SCALE

Answer(c) [2]

- (d) The trapezium, $ABCD$, has four angles as shown.
All the angles are in degrees.



- (i) Show that $7x + 4y = 390$.

Answer(d)(i)

[1]

- (ii) Show that $2x + 3y = 195$.

Answer(d)(ii)

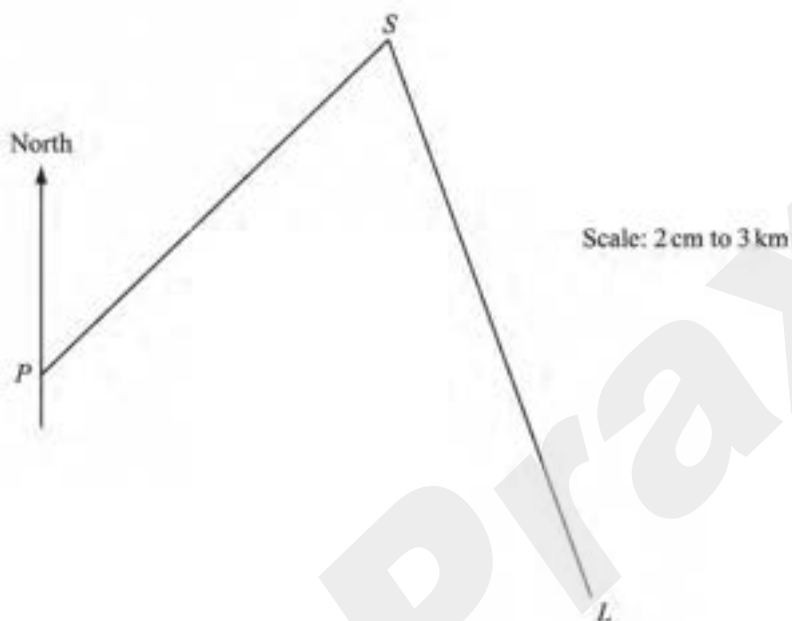
[1]

- (iv) Use your answer to part (d)(iii) to find the sizes of all four angles of the trapezium.

Answer(d)(iv) [1]

May/June 2014 (41)

5



In the scale drawing, *P* is a port, *L* is a lighthouse and *S* is a ship.
The scale is 2 centimetres represents 3 kilometres.

(a) Measure the bearing of S from P .

Answer(a) [1]

(b) Find the actual distance of S from L .

Answer(b) km [2]

(c) The bearing of L from S is 160° .

Calculate the bearing of S from L .

Answer(c) [1]

(d) Work out the scale of the map in the form $1:n$.

Answer(d) 1: [2]

(e) A boat B is

- equidistant from S and L
- and
- equidistant from the lines PS and SL .

On the diagram, using a **straight edge and compasses only**, construct the position of B . [5]

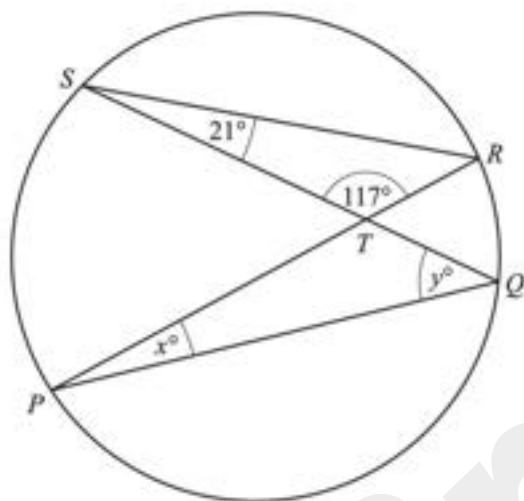
(f) The lighthouse stands on an island of area 1.5 cm^2 on the scale drawing.

Work out the actual area of the island.

Answer(f) km^2 [2]

May/June 2014 (42)

6



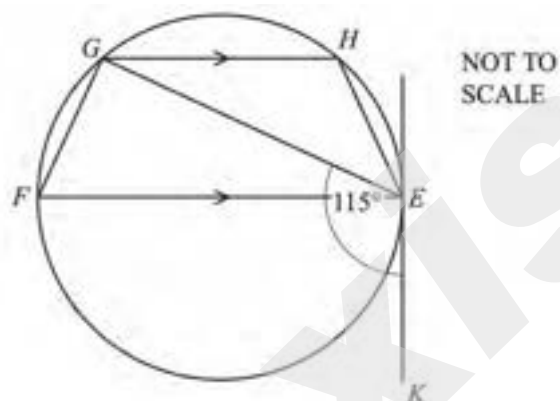
NOT TO
SCALE

- (a) The chords PR and SQ of the circle intersect at T .
Angle $RST = 21^\circ$ and angle $STR = 117^\circ$.
- (i) Find the values of x and y .

Answer(a)(i) $x = \dots\dots\dots$

$y = \dots\dots\dots$ [2]

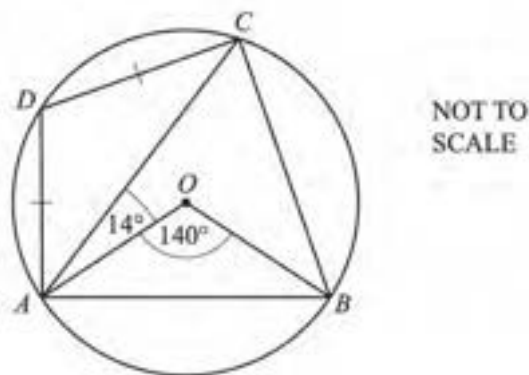
- (b) $EFGH$ is a cyclic quadrilateral.
 EF is a diameter of the circle.
 KE is the tangent to the circle at E .
 GH is parallel to FE and angle $KEG = 115^\circ$.



Calculate angle GEH .

Answer(b) Angle $GEH = \dots\dots\dots$ [4]

- (c) A, B, C and D are points on the circle centre O .
 Angle $AOB = 140^\circ$ and angle $OAC = 14^\circ$.
 $AD = DC$.

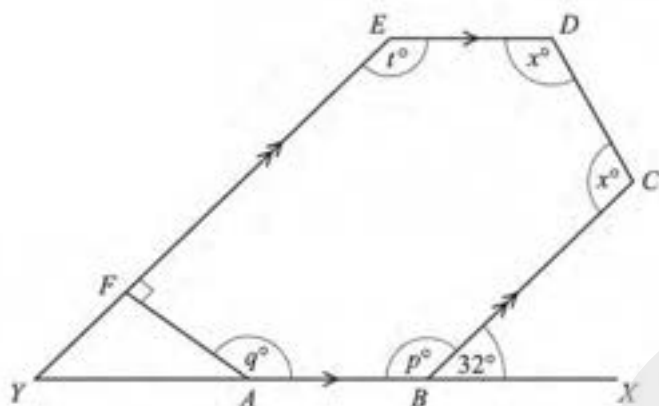


Calculate angle ACD .

Answer(c) Angle $ACD = \dots\dots\dots$ [5]

May/June 2014 (43)

7 (a)


 NOT TO
SCALE

$ABCDEF$ is a hexagon.
 AB is parallel to ED and BC is parallel to FE .
 YFE and $YABX$ are straight lines.
 Angle $CBX = 32^\circ$ and angle $EFA = 90^\circ$.

Calculate the value of

 (i) p ,

 Answer(a)(i) $p = \dots\dots\dots$ [1]

 (ii) q ,

 Answer(a)(ii) $q = \dots\dots\dots$ [2]

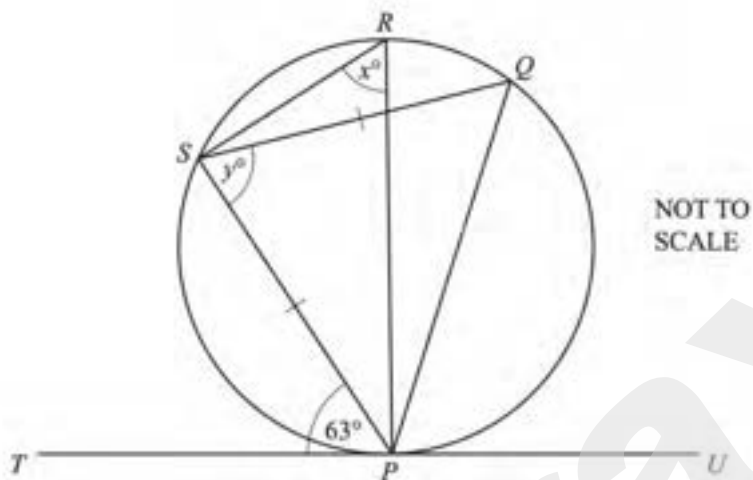
 (iii) t ,

 Answer(a)(iii) $t = \dots\dots\dots$ [1]

 (iv) x .

 Answer(a)(iv) $x = \dots\dots\dots$ [3]

(b)



P , Q , R and S are points on a circle and $PS = SQ$.
 PR is a diameter and TPU is the tangent to the circle at P .
 Angle $SPT = 63^\circ$.

Find the value of

 (i) x .

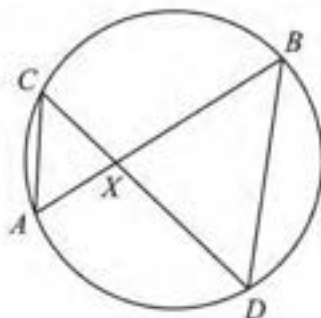
 Answer(b)(i) $x = \dots\dots\dots$ [2]

 (ii) y .

 Answer(b)(ii) $y = \dots\dots\dots$ [2]

October/November 2014 (41)

- 7 (a) The diagram shows a circle with two chords, AB and CD , intersecting at X .



NOT TO
SCALE

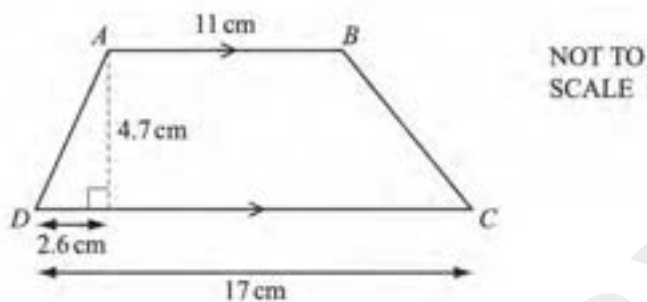
- (i) Show that triangles ACX and DBX are similar.

Answer(a)(i)

[2]

October/November 2014 (43)

1. (a) $ABCD$ is a trapezium.



- (iii) Calculate the area of the trapezium $ABCD$.

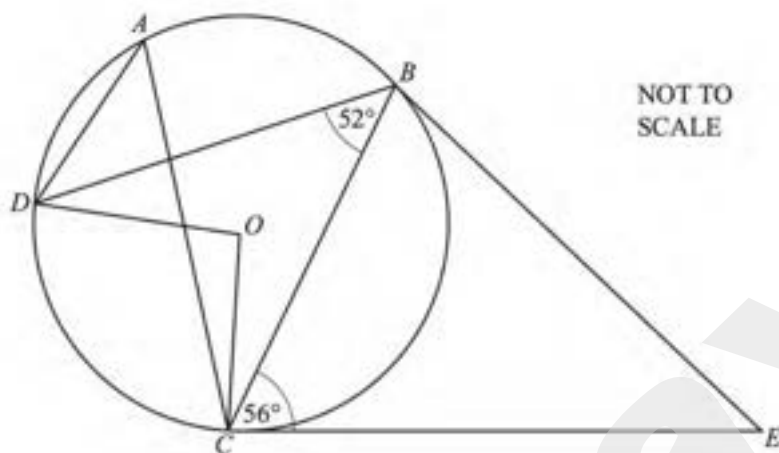
Answer(a)(iii) cm^2 [2]

- (b) A similar trapezium has perpendicular height 9.4 cm.

Calculate the area of this trapezium.

Answer(b) cm^2 [3]

3



A, B, C and D are points on a circle, centre O .
 CE is a tangent to the circle at C .

(a) Find the sizes of the following angles and give a reason for each answer.

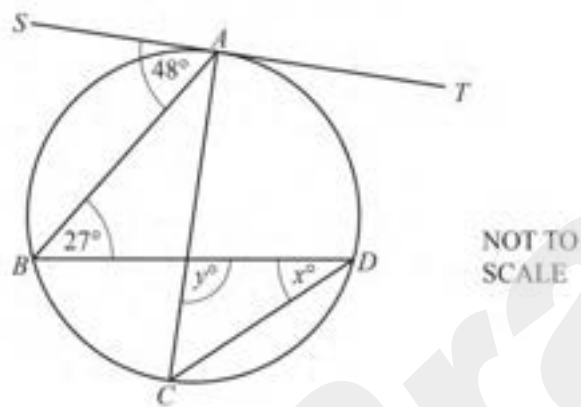
(i) Angle $DAC = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

(ii) Angle $DOC = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

(iii) Angle $BCO = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

May/June 2015 (41)

- 9 (a) The points A , B , C and D lie on a circle.
 AC is a diameter of the circle.
 ST is the tangent to the circle at A .



Find the value of

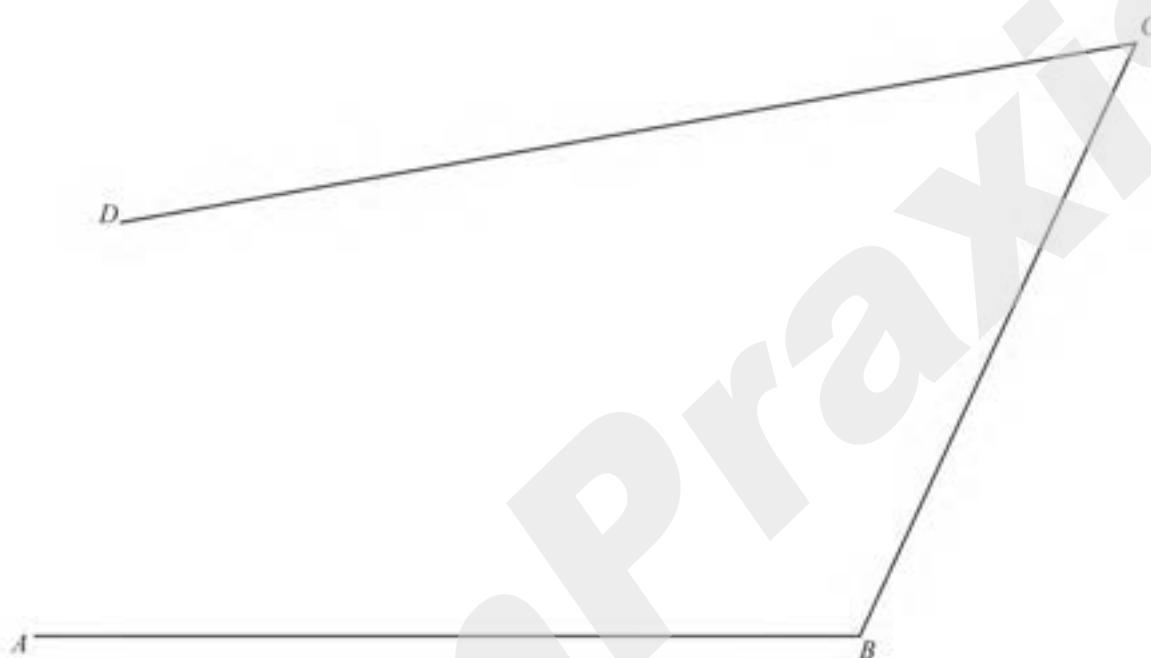
(i) x ,

Answer(a)(i) $x = \dots\dots\dots$ [2]

(ii) y .

Answer(a)(ii) $y = \dots\dots\dots$ [2]

- 10 The diagram is a scale drawing of three straight roads, AB , BC and CD .
The scale is 1 : 5000.



Scale 1 : 5000

- (a) Find the actual length of the road BC .
Give your answer in metres.

Answer(a) m [2]

- (b) Another straight road starts at M , the midpoint of AB .
This road is perpendicular to AB and it meets the road CD at X .

Using a straight edge and compasses only, construct MX . [2]

- (c) There is a park in the area enclosed by the four roads.

The park is

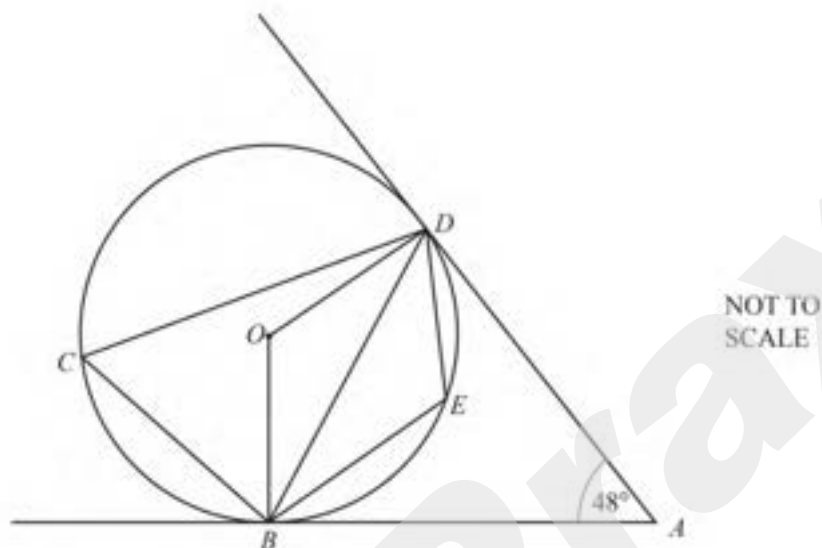
- less than 290 m from B
- and
- nearer to CD than to CB .

Using a ruler and compasses only, construct the boundaries of the park.

Leave in all your construction arcs and label the park P . [5]

May/June 2015 (42)

2



In the diagram, B , C , D and E lie on the circle, centre O .
 AB and AD are tangents to the circle.
 Angle $BAD = 48^\circ$.

(a) Find

(i) angle ABD ,

Answer(a)(i) Angle $ABD = \dots\dots\dots$ [1]

(ii) angle OBD ,

Answer(a)(ii) Angle $OBD = \dots\dots\dots$ [1]

(iii) angle BCD ,

Answer(a)(iii) Angle $BCD = \dots\dots\dots$ [2]

(iv) angle BED .

Answer(a)(iv) Angle $BED = \dots\dots\dots$ [1]

(c) Give a reason why $ABOD$ is a cyclic quadrilateral.

Answer(c) $\dots\dots\dots$
 $\dots\dots\dots$ [1]

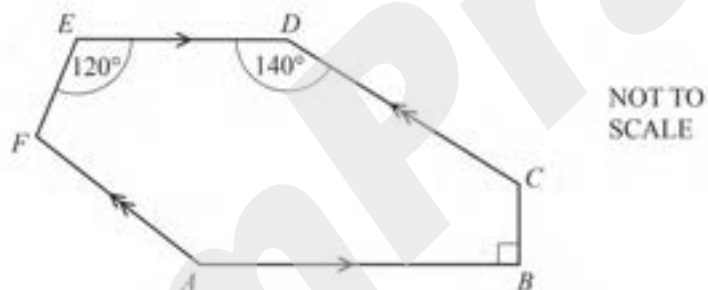
Question 4c

- (c) Some cones are mathematically similar.
 For these cones, the mass, M grams, is proportional to the cube of the base radius, r cm.
 One of the cones has mass 1458 grams and base radius 4.5 cm.
- (i) Find an expression for M in terms of r .

Answer(c)(i) $M = \dots\dots\dots$ [2]

May/June 2015 (43)

6 (a)

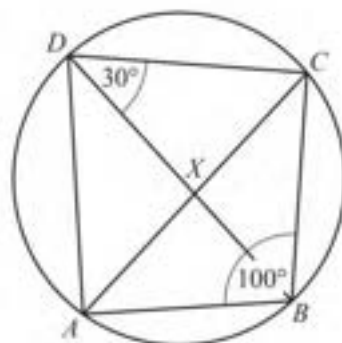


In the hexagon $ABCDEF$, AB is parallel to ED and AF is parallel to CD .
 Angle $ABC = 90^\circ$, angle $CDE = 140^\circ$ and angle $DEF = 120^\circ$.

Calculate angle EFA .

Answer(a) Angle $EFA = \dots\dots\dots$ [4]

(b)



NOT TO
SCALE

In the cyclic quadrilateral $ABCD$, angle $ABC = 100^\circ$ and angle $BDC = 30^\circ$.
The diagonals intersect at X .

(i) Calculate angle ACB .

Answer(b)(i) Angle $ACB = \dots\dots\dots$ [2]

(ii) Angle $BXC = 89^\circ$.

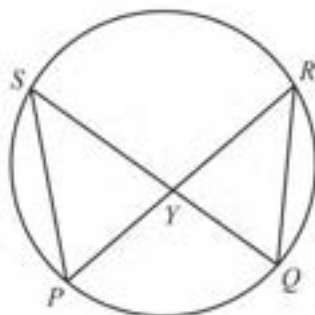
Calculate angle CAD .

Answer(b)(ii) Angle $CAD = \dots\dots\dots$ [2]

(iii) Complete the statement.

Triangles AXD and BXC are $\dots\dots\dots$ [1]

(c)

NOT TO
SCALE

P , Q , R and S lie on a circle.

PR and QS intersect at Y .

$PS = 11$ cm, $QR = 10$ cm and the area of triangle $QRY = 23$ cm².

Calculate the area of triangle PYS .

Answer(c) cm² [2]

- (d) A regular polygon has n sides.
Each exterior angle is equal to $\frac{n}{10}$ degrees.

(i) Find the value of n .

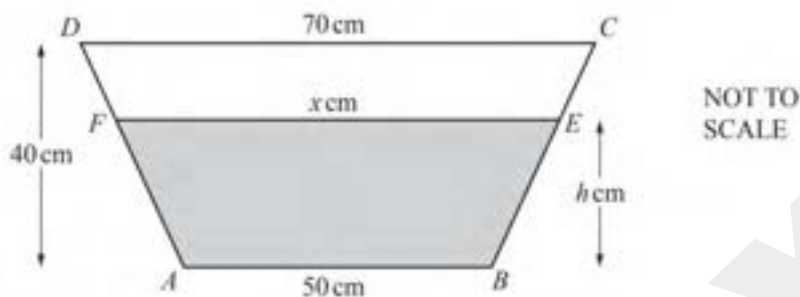
Answer(d)(i) $n = \dots\dots\dots$ [3]

(ii) Find the size of an interior angle of this polygon.

Answer(d)(ii) $\dots\dots\dots$ [2]

Question 8d

(d)



The $180\,000\text{ cm}^3$ of water reaches the level EF as shown above.
 $EF = x\text{ cm}$ and the height of the water is $h\text{ cm}$.

- (i) Using the properties of similar triangles, show that $h = 2(x - 50)$.

Answer(d)(i)

[2]

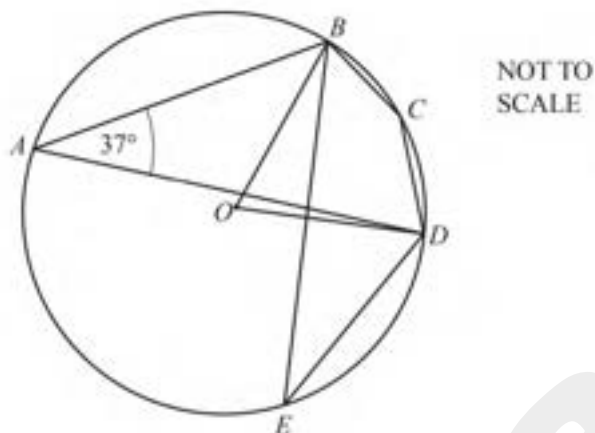
October/November 2015 (41)

Question 1e

- (e) Paint is sold in cylindrical tins of height 11 cm.
 Each tin holds 750 ml of paint.
- (iii) A mathematically similar tin has a height of 22 cm.
 How many litres of paint does this tin hold?

Answer(e)(iii) litres [2]

5



A, B, C, D and E are points on the circle, centre O .
 Angle $BAD = 37^\circ$.

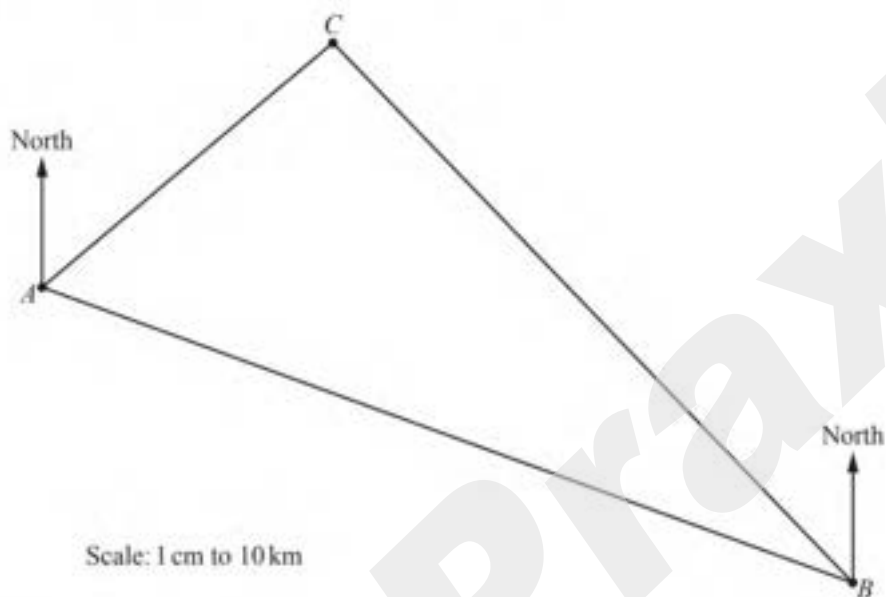
Complete the following statements.

(a) Angle $BED = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

(b) Angle $BOD = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

(c) Angle $BCD = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

- 7 The scale drawing shows the positions of three towns A , B and C on a map. The scale of the map is 1 centimetre represents 10 kilometres.



- (a) Find the actual distance AB .

Answer(a) km [1]

- (b) Measure the bearing of A from B .

Answer(b) [1]

- (c) Write the scale 1 cm to 10 km in the form $1 : n$.

Answer(c) 1 : [1]

- (d) A national park lies **inside** the triangle ABC . The four boundaries of the national park are

- equidistant from C and B
- equidistant from AC and CB
- 15 km from CB
- along AB .

On the scale drawing, shade the region which represents the national park. Leave in your construction arcs.

[7]

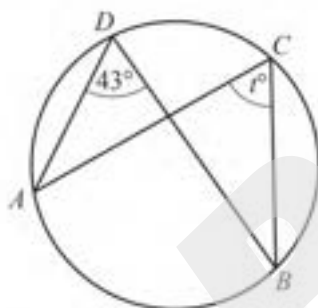
(e) On the scale drawing, a lake inside the national park has area 0.4 cm^2 .

Calculate the actual area of the lake.

Answer(e) km^2 [2]

October/November 2015 (42)

6 (a) (i) A, B, C and D lie on the circumference of the circle.

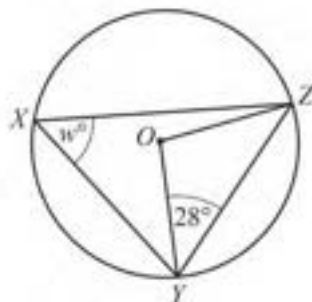


NOT TO
SCALE

Find the value of t .

Answer(a)(i) $t =$ [1]

- (ii) X , Y and Z lie on the circumference of the circle, centre O .



NOT TO
SCALE

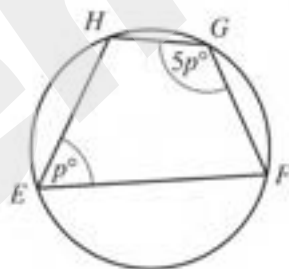
Find the value of w , giving reasons for your answer.

Answer(a)(ii) $w =$ because

.....

..... [3]

- (iii) E , F , G and H lie on the circumference of the circle.



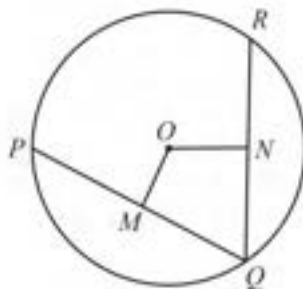
NOT TO
SCALE

Find the value of p , giving a reason for your answer.

Answer(a)(iii) $p =$ because

..... [3]

(b)



NOT TO
SCALE

The diagram shows a circle, centre O .
 PQ and QR are chords.
 OM is the perpendicular from O to PQ .

(i) Complete the statement.

$PM : PQ = \dots\dots\dots : \dots\dots\dots$ [1]

(ii) ON is the perpendicular from O to QR and $PQ = QR$.

Complete the statements to show that triangle OMQ is congruent to triangle ONQ .

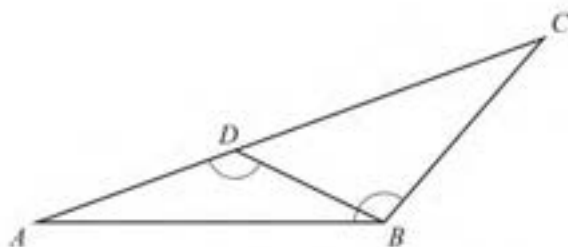
$\dots\dots\dots$ is a common side.

$\dots\dots\dots = \dots\dots\dots$ because M is the midpoint of PQ and N is the midpoint of QR .

$\dots\dots\dots = \dots\dots\dots$ because equal chords are equidistant from $\dots\dots\dots$ [4]

October/November 2015 (43)

8 (a)



NOT TO
SCALE

In the diagram, D is on AC so that angle $ADB =$ angle ABC .

(i) Show that angle ABD is equal to angle ACB .

Answer(a)(i)

[2]

(ii) Complete the statement.

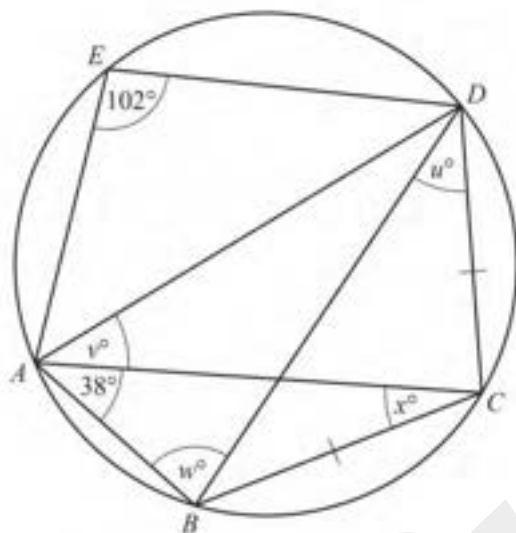
Triangles ABD and ACB are

[1]

(iii) $AB = 12$ cm, $BC = 11$ cm and $AC = 16$ cm.

Calculate the length of BD .

Answer(a)(iii) $BD =$ cm [2]

(b)

 NOT TO
SCALE

A, B, C, D and E lie on the circle.
 Angle $AED = 102^\circ$ and angle $BAC = 38^\circ$.
 $BC = CD$.

Find the value of

(i) u ,

 Answer(b)(i) $u = \dots\dots\dots$ [1]

(ii) v ,

 Answer(b)(ii) $v = \dots\dots\dots$ [1]

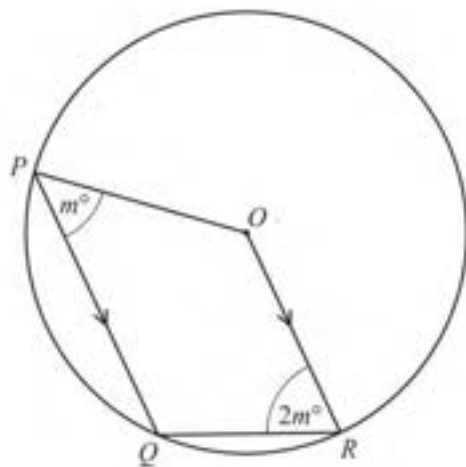
(iii) w ,

 Answer(b)(iii) $w = \dots\dots\dots$ [1]

(iv) x ,

 Answer(b)(iv) $x = \dots\dots\dots$ [1]

(c)



NOT TO
SCALE

In the diagram, P , Q and R lie on the circle, centre O .
 PQ is parallel to OR .
 Angle $QPO = m^\circ$ and angle $QRO = 2m^\circ$.

Find the value of m .

Answer(c) $m = \dots\dots\dots$ [5]