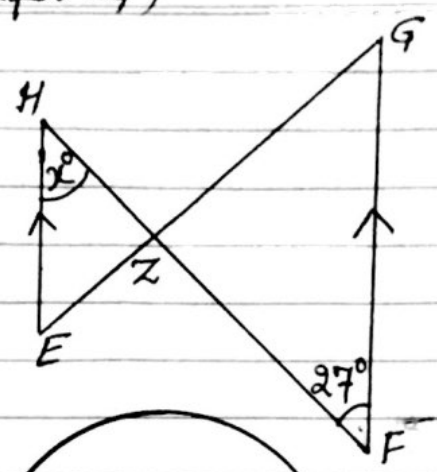


IG Maths
0580

Geometry
Exercise
Paper-4

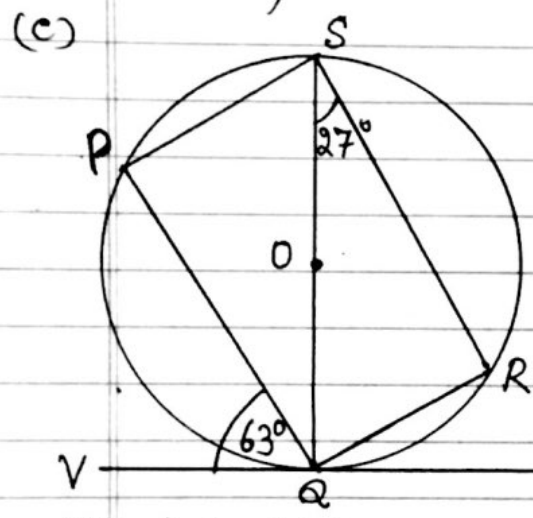
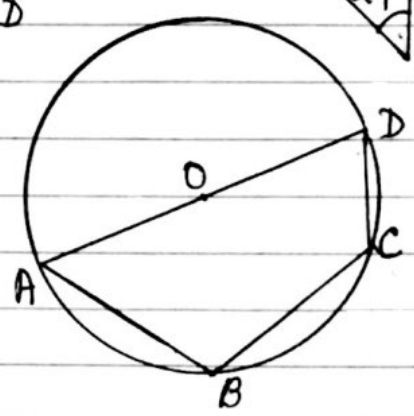
(Suresh Goel)

Q1 (a) In the diagram, EH is parallel to FG. The straight lines EG and FH intersect at Z. Angle ZFG = 27°



- (i) Find the value of x , --- [1]
- (ii) $EH = 5\text{cm}$, $FG = 9\text{cm}$, and $ZG = 7\text{cm}$, Calculate EZ, ---- [2]

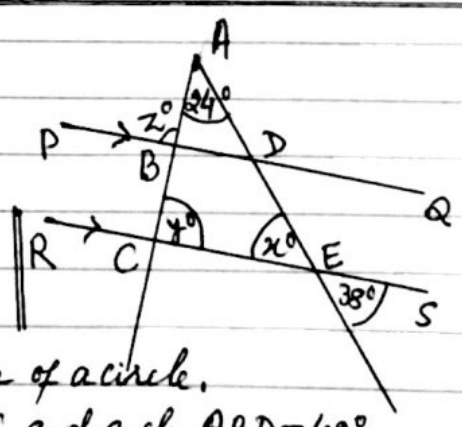
(b) The diagram shows points A, B, C and D on the circumference of a circle, centre O, AD is a straight line, $AB = BC$ and angle OAB = 52° Find angle ADC, --- [3]



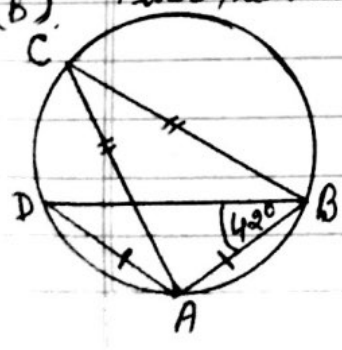
The diagram shows points P, Q, R and S on the circumference of a circle, centre O, VT is tangent to the circle at Q. Complete the statements:

- (i) Angle QPS = Angle QRS = ---° because --- [2]
- (ii) Angle SQP = ---° because --- [2]
- (iii) Part (c)(i) and part (c)(ii) show that, M-17/42/Q6 the cyclic quadrilateral PQRS is a --- [1]

Q2(a) PQ is parallel to RS. ABC and ADE are straight lines.



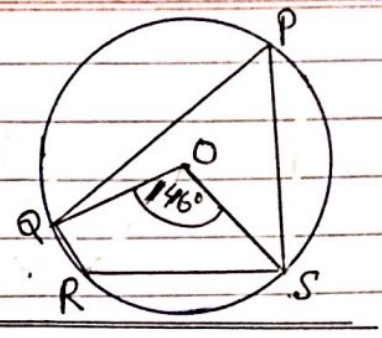
(b) Find the values of x , y and z . --- [3]



The points A, B, C and D lie on the circumference of a circle. $AB = AD$ and $AC = BC$ and angle ABD = 42° Find angle CAB. (continued) --- [3]

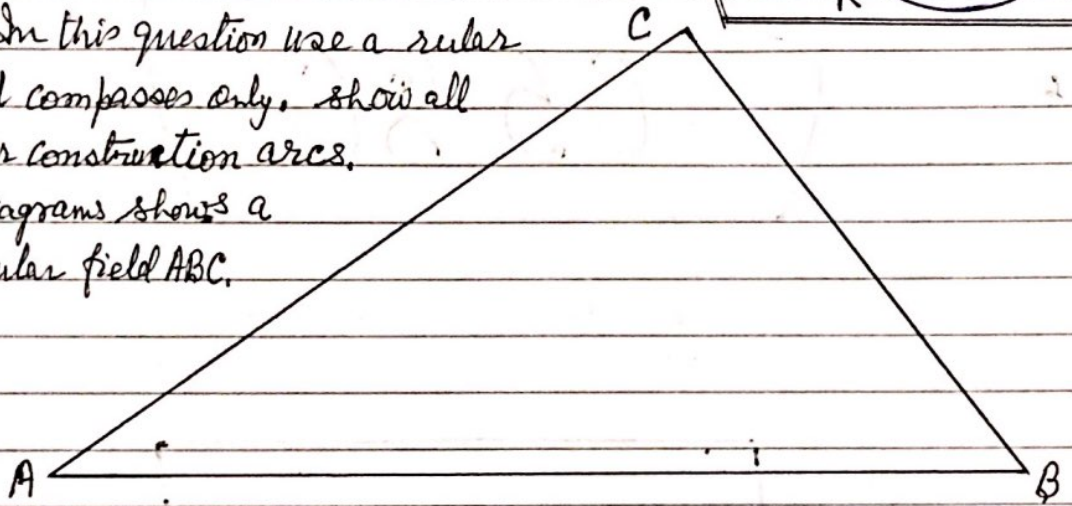
(Continued →)

Q2(C) The points P, Q, R and S lie on the circumference of the circle, centre O.
Angle QOS = 146° , find angle QRS. --- [2]



S-17/43/Q2

Q3. In this question use a ruler and compasses only. Show all your construction arcs. The diagram shows a triangular field ABC.

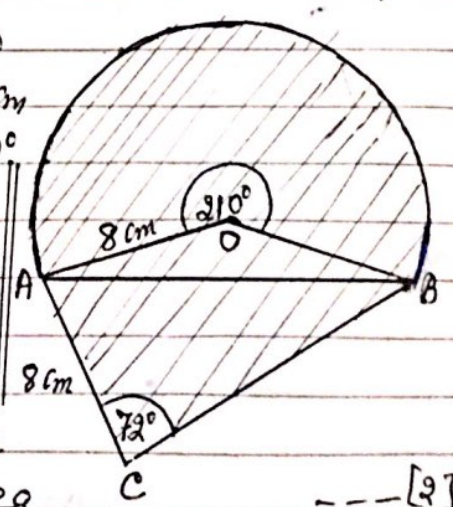


The scale is 1 centimetre represents 50 metres.

- (a) Construct the locus of points that are equidistant from A and B. --- [2]
- (b) Construct the locus of points that are equidistant from the lines AB and AC. --- [2]
- (c) The loci intersect at the point E. Construct the locus of points that are 250m from E. --- [2]
- (d) Shade any region inside the field ABC that is:
 - more than 250m from E and
 - closer to AC than to AB. --- [2]

M-16/42/Q2

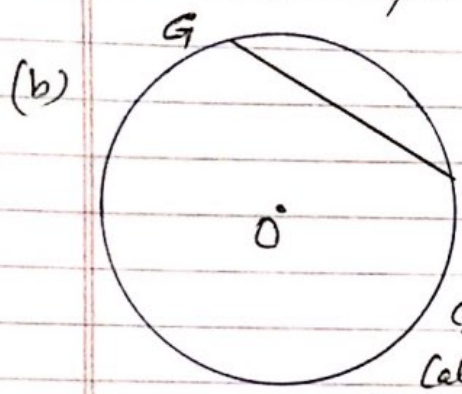
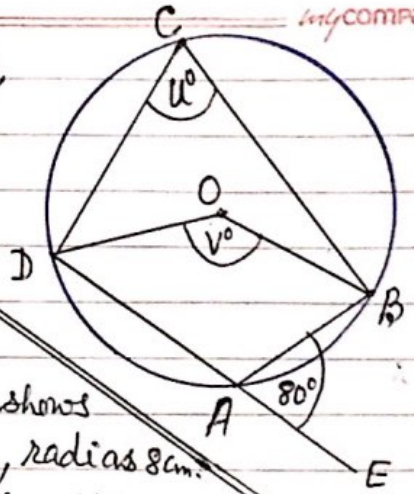
Q4 The diagram shows a design for a logo made from a sector, centre O, has radius 8cm and sector angle 210° . $AC = 8\text{cm}$, angle $ACD = 72^\circ$



- (a) Show that angle $CAB = 15^\circ$. --- [2]
- (b) Calculate the length of the straight line AB. --- [4]
- (c) Calculate angle ABC. --- [3]
- (d) Calculate the total area of the logo design. --- [6]
- (e) The logo design is an enlargement with scale factor 4 of the actual logo. Calculate the area of the actual logo. --- [2]

S-16/42/Q7

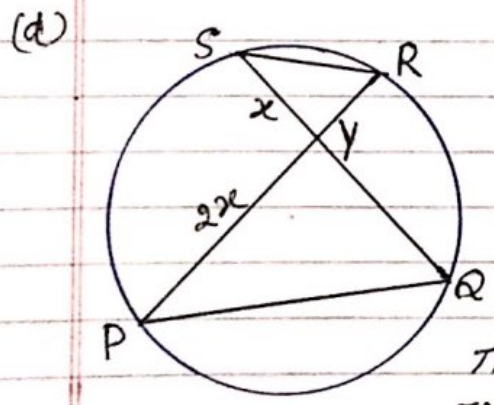
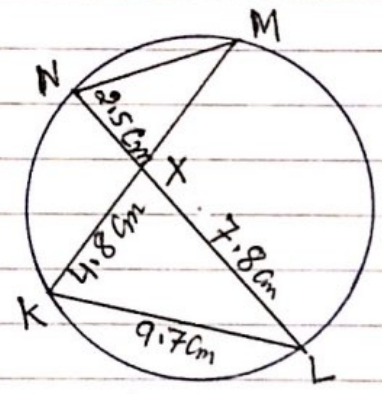
Q5 (a) A, B, C and D lie on the circle, centre O, DAE is a straight line. --- [2]
Find the value of u and the value of v .



The diagram shows a circle, centre O, radius 8cm. GH is a chord of length 10cm. Calculate the length of the perpendicular from O to GH. --- [3]

(c) K, L, M and N lie on a circle. KM and LN intersect at X.

$KL = 9.7\text{cm}$, $KX = 4.8\text{cm}$
 $LX = 7.8\text{cm}$ and $NX = 2.5\text{cm}$.
Calculate MN. --- [2]

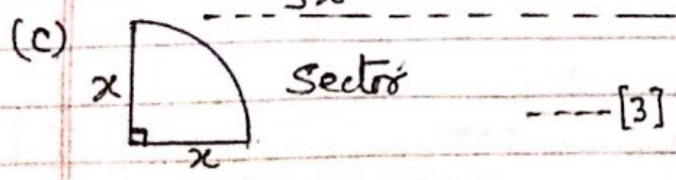
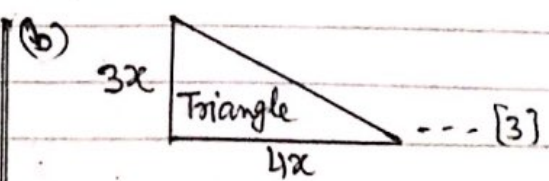
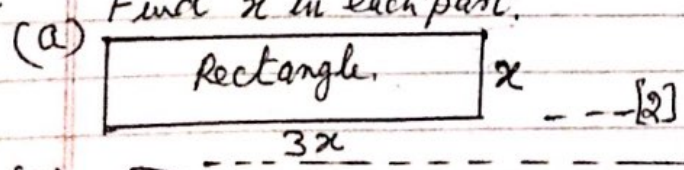


All lengths are in centimetres. P, Q, R and S lie on the circle. PR and QS intersect at Y. $PY = 2x$ and $YS = x$

The area of triangle YRS = $\frac{5}{12}x(x-1)$
The area of triangle YQP = $x(x+1)$

Find the value of x . W-16/42/Q8 - [4]

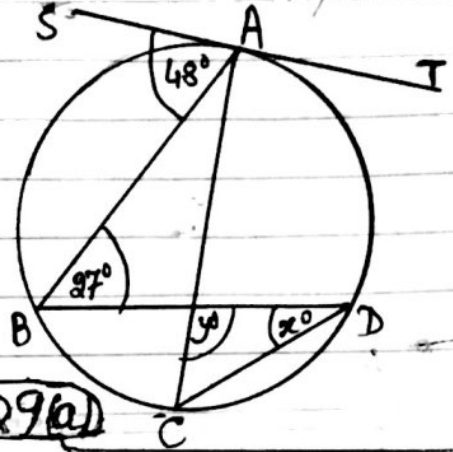
Q6 The perimeter of each of the three shapes is 60 cm. Find x in each part.



W-16/42/Q10

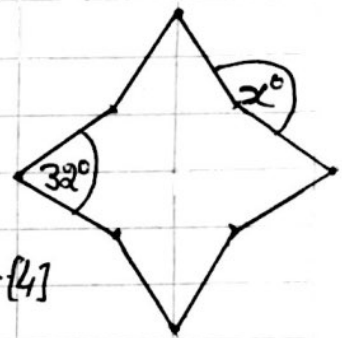
Q7 (a) The points A, B, C and D lie on a circle,
AC is a diameter of the circle.
ST is the tangent to the circle at A.
Find the value of

- (i) x , --- [2]
- (ii) y , --- [2]



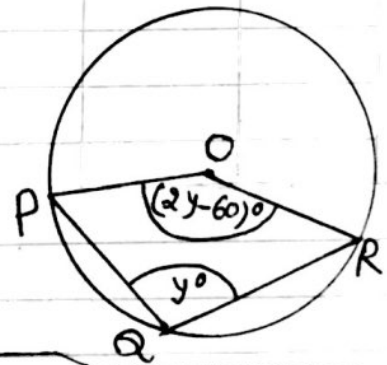
S-15/41/Q7(a)

Q8 (a) The diagram shows an octagon.
All the sides are the same length.
Four of the interior angles are each 32° .
The other four interior angles are equal.
Find the value of x . --- [4]



(b) P, Q and R lie on a circle,
Centre O. Angle PQR = y° and
Angle POR = $(2y - 60)^\circ$

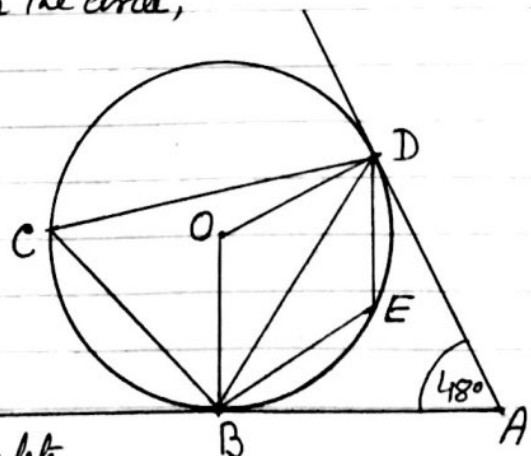
Find the value of y . --- [3]



W-17/41/Q2

Q9 In diagram, B, C, D and E lie on the circle,
centre O. AB and AD are tangents
to the circle. Angle BAD = 48°

- (a) Find (i) angle ABD. --- [1]
- (ii) Angle OBD --- [1]
- (iii) Angle BCD --- [2]
- (iv) Angle BED --- [1]

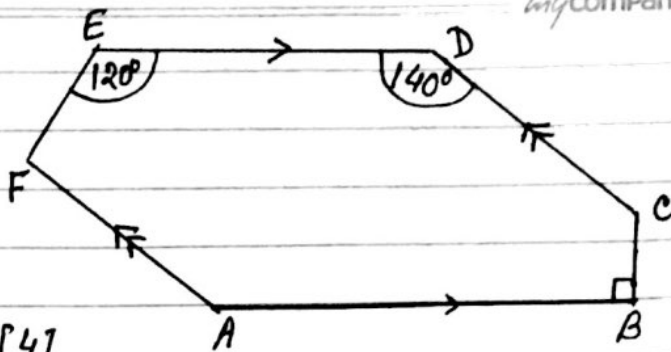


(b) The radius of the circle is 15cm. Calculate
the area of triangle BOD. --- [2]

(c) Give a reason why ABOD is a cyclic quadrilateral. --- [1]

S-15/42/Q2

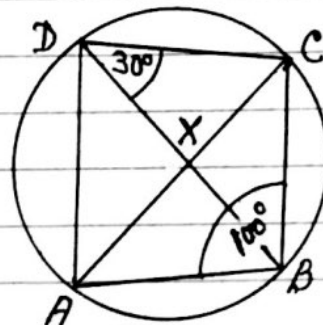
Q10 (a) In the hexagon ABCDEF,
AB is parallel to ED and
AF is parallel to CD.
Angle ABC = 90°, Angle CDE = 140°
and Angle DEF = 120°



Calculate angle EFA ---- [4]

(b)

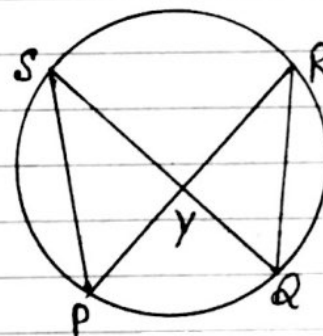
In cyclic quadrilateral ABCD,
angle ABC = 100° and angle BDC = 30°
The diagonals intersect at X.



- (i) Calculate angle ACB ---- [2]
(ii) Angle BXC = 89°, Calculate angle CAD. --- [2]
(iii) Complete the statement.

Triangles AXD and BXC are ---- [1]

- (c) 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. --- [2]



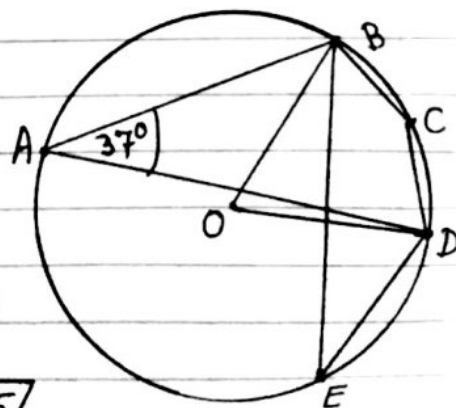
- (d) A regular polygon has n sides.
Each exterior angle is $\frac{n}{10}$ degrees.

- (i) Find the value of n . ---- [3]
(ii) Find the size of an interior angle of this polygon. --- [2]

S-15/43/Q6

Q11 A, B, C, D and E are points on the
circle, centre O, angle BAD = 37°
Complete the following statements.

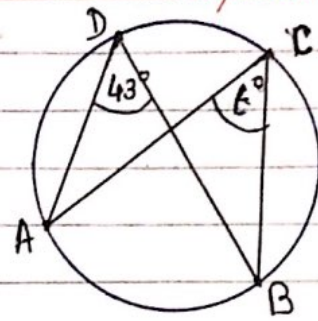
- (a) Angle BED = ---- because ---- [2]
(b) Angle BOD = ---- because ---- [2]
(c) Angle BCD = ---- because ---- [2]



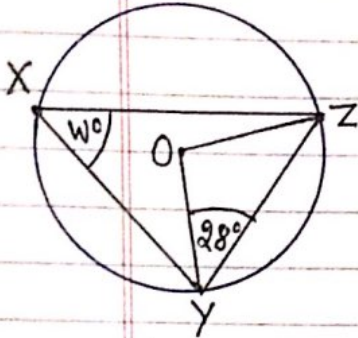
W-15/41/Q5

Q12 (a) (i) A, B, C and D lie on the circumference of a circle.

Find the value of t . --- [1]

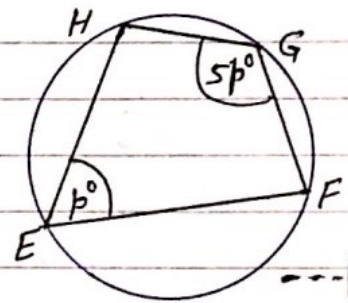


(ii) X, Y and Z lie on the circumference of the circle, centre O.



Find the value of w , giving reasons for your answer. --- [3]

(iii) E, F, G and H lie on the circumference of the circle, find the value of p , giving a reason for your answer.



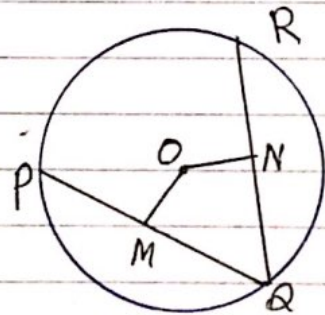
(b)

The diagram shows a circle, centre O. PQ and QR are chords.

OM is the perpendicular from O to PQ,

(i) Complete the statement. $PM: PQ = \dots; \dots$ [1]

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



Complete the statement to show that triangle OMR is congruent to triangle ONR,

----- is a common side, --- [4]

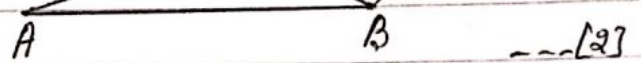
----- = ----- because M is the mid point of PQ and N is the mid point of QR.

----- = ----- because equal chords are equidistant from -----

W-15/42/Q6

Q13 (a) In the diagram, D is on AC so that angle $ADB = \text{angle } ABC$.

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



(ii) Complete the statement, Triangle ABD and ACB are ----- [1]

(iii) $AB = 12 \text{ cm}$, $BC = 11 \text{ cm}$ and $AC = 16 \text{ cm}$. Calculate the length of BD. [2]

(b) A, B, C, D and E lie on the circle.

Angle $AED = 102^\circ$ and angle $BAC = 38^\circ$, $BC = CD$.

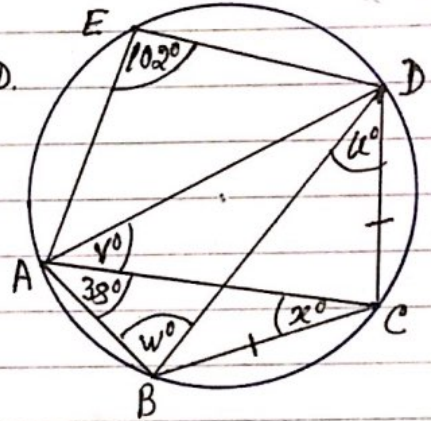
Find the value of:

(i) u ----- [1]

(ii) v ----- [1]

(iii) w ----- [1]

(iv) x ----- [1]

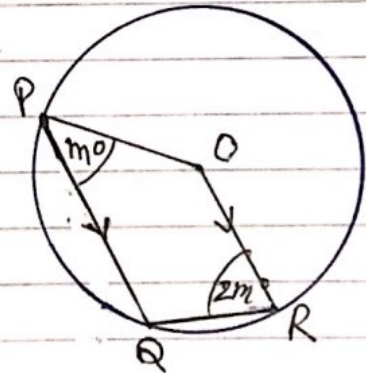


(c)

In the diagram, P, Q and R lie on the circle, centre O.

PQ is parallel to CR.

Find the value of m . ----- [5]



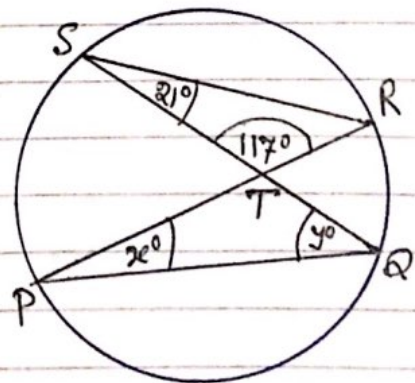
W-15/43/Q8

Q14 (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 . ----- [2]

(ii) $SR = 8.93 \text{ cm}$, $RT = 3.31 \text{ cm}$ and $PQ = 9.43 \text{ cm}$.

Calculate the length of TQ. ----- [2]



(Continued →)

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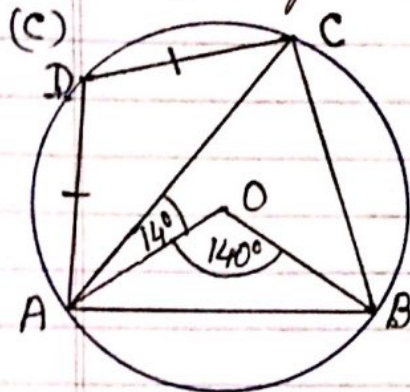
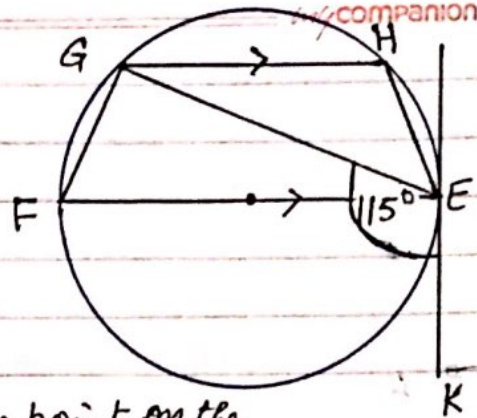
Q14(b) EFGH is a cyclic quadrilateral.

EF is a diameter of the circle.

KE is the tangent to the circle at E.

GH is parallel FE and angle $KEG = 115^\circ$.

Calculate angle GEH --- [4]



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 --- [5]

S-14/42/Q6

Q15(a) 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 $EFA = 90^\circ$

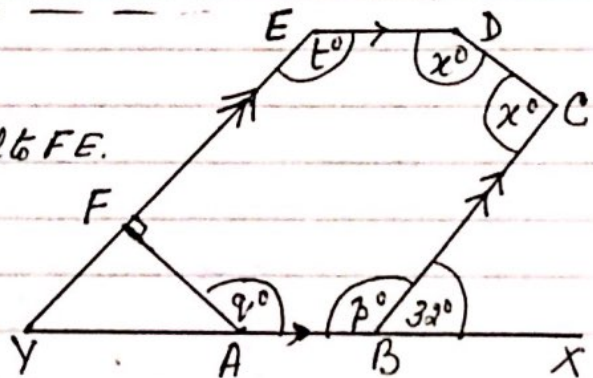
Calculate the value of,

(i) p , --- [1]

(ii) q , --- [2]

(iii) t , --- [1]

(iv) x , --- [3]



(b) P, Q, R and S are points on a circle.

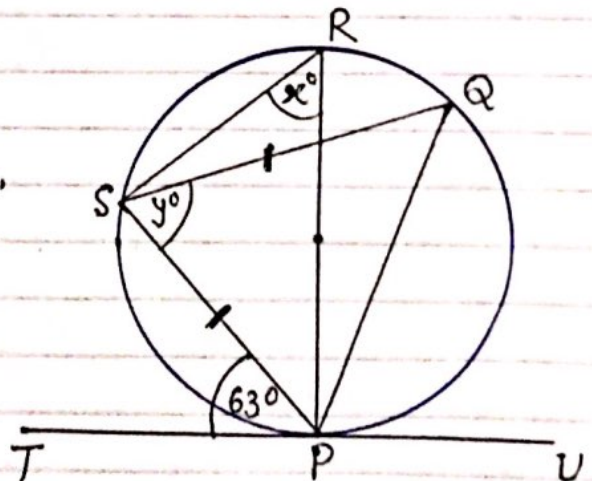
$PS = SQ$. PR is a diameter and

T, P, U is the tangent to the circle at P.

Angle $SPT = 63^\circ$. Find the value of,

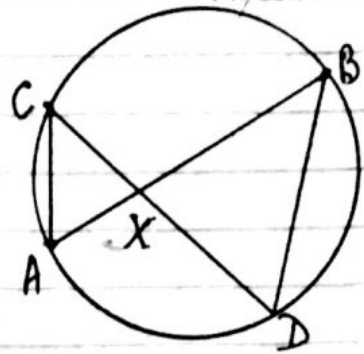
(i) x --- [2]

(ii) y --- [2]



S-14/43/Q7

Q16 (a) The diagram shows a circle with two chords, AB and CD, intersecting at X. ... [2]



(i) Show that triangle ACX and DBX are similar. --- [2]

(ii) $AX = 3.2\text{ cm}$, $BX = 12.5\text{ cm}$, $CX = 4\text{ cm}$ and angle $AXC = 110^\circ$

(a) Find DX --- [2]

(b) Use cosine rule to find AC. --- [4]

(c) Find the area of triangle BXD. --- [2]

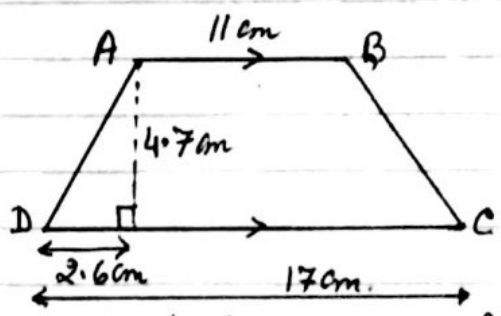
W-14/41/Q7(a)

Q17 (a) ABCD is a trapezium.

(i) Calculate the length of AD. --- [2]

(ii) Calculate the size of angle BCD. --- [3]

(iii) Calculate the area of trapezium ABCD. --- [2]



(b) A similar trapezium has

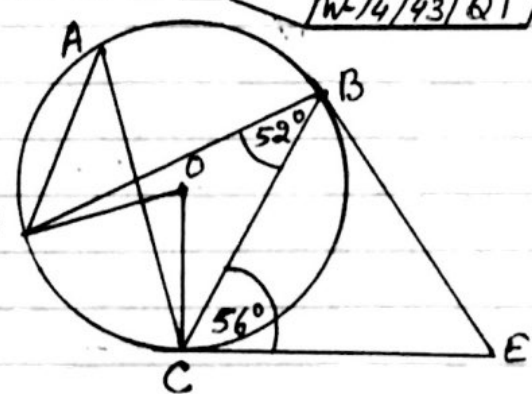
perpendicular height 9.4 cm. Calculate the area of this trapezium. --- [3]

W-14/43/Q1

Q18 A, B, C and D are points on a circle, Centre O.

CE is tangent to the circle at C.

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



(i) Angle DAC = --- because --- --- [2]

(ii) Angle DOC = --- because --- --- [2]

(iii) Angle BCO = --- because --- --- [2]

(b) $CE = 8.9\text{ cm}$ and $CB = 7\text{ cm}$.

(i) Calculate the length of BE --- [4]

(ii) Calculate angle BEC. --- [3]

W-14/43/Q3

Q19 (a) In the pentagon ABCDE,

angle EAB = angle ABC = 110°

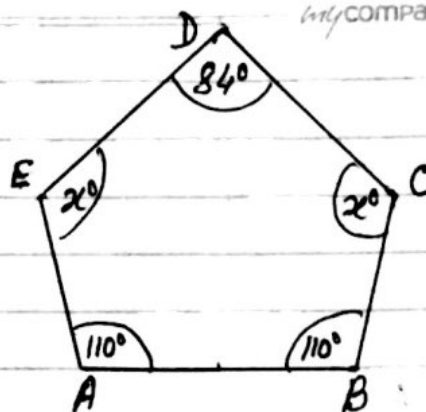
and angle CDE = 84° .

angle BCD = angle DEA = x°

(i) Calculate the value of x . --- [2]

(ii) $BC = CD$, Calculate angle CBD. --- [1]

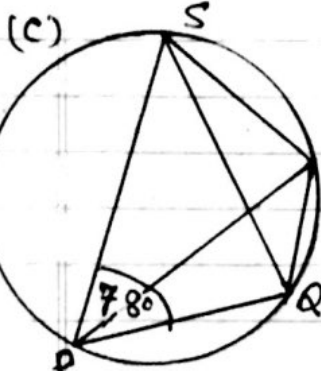
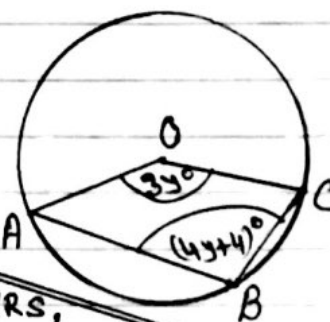
(iii) This pentagon also has one line of symmetry. Calculate angle ADB. --- [1]



(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 . --- [4]



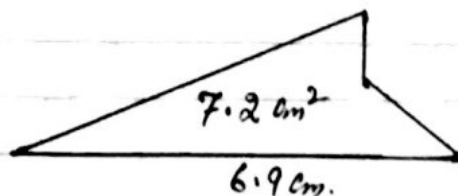
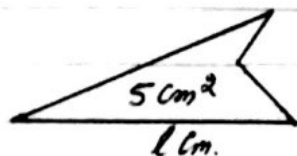
In the cyclic quadrilateral PQRS,

angle SPQ = 78°

(i) Write down the geometrical reason why angle QRS = 102° --- [1]

(ii) Angle PRQ : Angle PRS = 1 : 2
Calculate angle PQS. --- [3]

(d)



The diagram shows two similar figures.

The area 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 . --- [3]

S-13/41/28

Q20

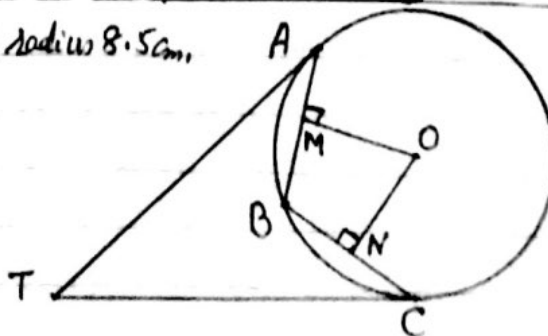
A, B and C lie on a circle centre O, radius 8.5 cm .

$AB = BC = 10.7\text{ cm}$.

OM is perpendicular to AB and

ON is perp. to BC.

(continued →)



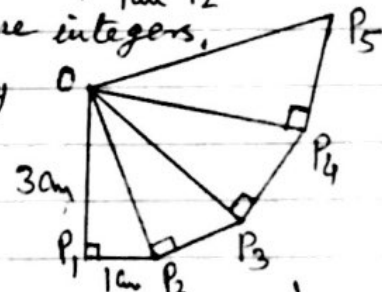
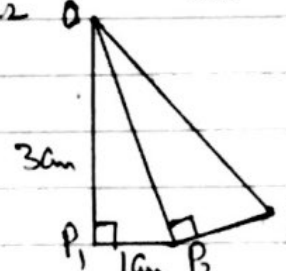
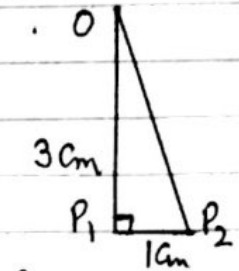
(Continued →)

- Q20 (a) Calculate the area of the circle. --- [2]
 (b) Write down the length of MB. --- [1]
 (c) Calculate angle MOB and show that it rounds to 39° correct to the nearest degree. --- [2]
 (d) Using angle $MOB = 39^\circ$, Calculate the length of the Major arc AC. --- [3]
 (e) The tangents to the circle at A and C meet at T. Explain clearly why triangle ATB is congruent to triangle CTB. --- [3]

S-13/43/Q4

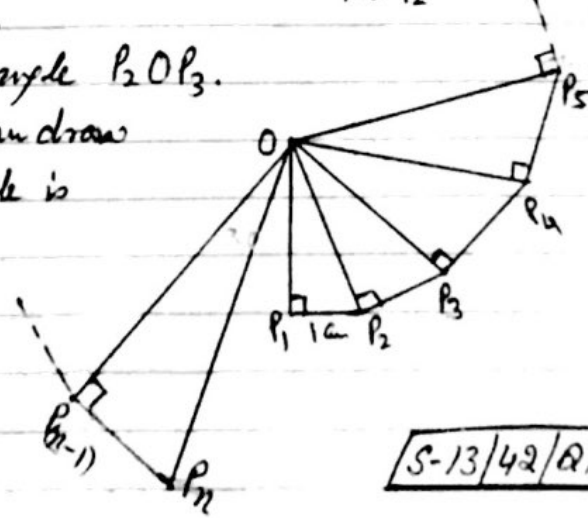
Q21 Sidney draws the triangle OP_1P_2 .
 $OP_1 = 3\text{cm}$ and $P_1P_2 = 1\text{cm}$, Angle $OP_1P_2 = 90^\circ$

- (a) Show that $OP_2 = \sqrt{10}\text{cm}$.
 (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.
 (ii) Calculate the length of OP_3 giving your answer in the form $\frac{c}{d}$ where c and d are integers.
 (c) Sidney continues to add mathematically similar triangles to his drawing.
 Find the length of OP_5 . --- [2]



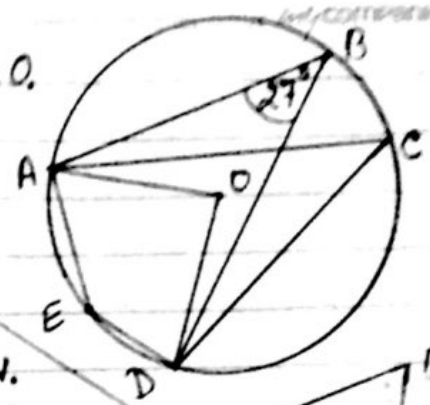
- (d) (i) Show that angle $P_1OP_2 = 18.4^\circ$, correct to 1 decimal place.
 (ii) Write down the size of angle P_2OP_3 . --- [1]
 (iii) The last triangle Sidney can draw without covering his first triangle is triangle $OP_{n-1}P_n$

Calculate the value of n.



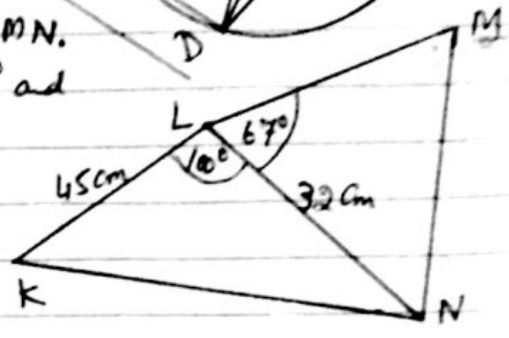
S-13/42/Q11

Q22(a) A, B, C, D and E are points of the circle Centre O.
Angle ABD = 27°



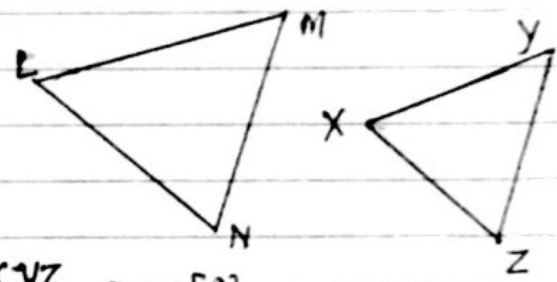
- Find (i) angle ACD, --- [1]
- (ii) angle AOD, -- [1]
- (iii) angle AED --- [1]

(b) The diagram shows quadrilateral KLMN.
KL = 45 cm, LN = 32 cm, angle KLN = 100° and
angle NLM = 67°



- (i) Calculate the length KN. -- [4]
- (ii) Area of triangle LMN is 324 cm²
Calculate the length LM. --- [3]

(iii) Another triangle XYZ is
mathematically similar to
triangle LMN.
XZ = 16 cm and the area of
triangle LMN is 324 cm².



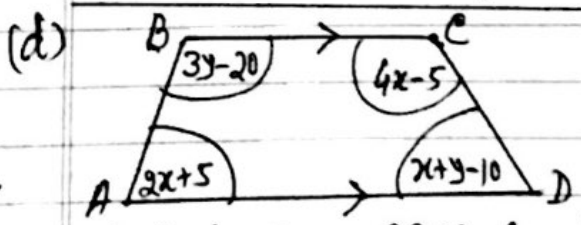
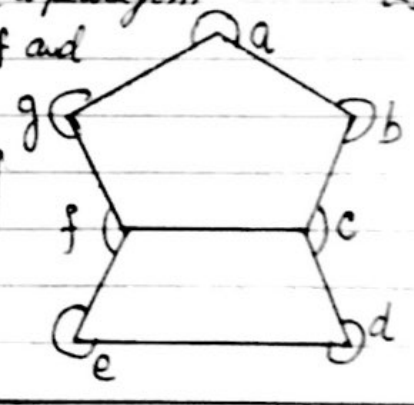
Calculate the area of triangle XYZ. --- [2]

S-13/43/Q8

Q23(a) One angle of an isosceles triangle is 48°. Write down the
possible pairs of values for the remaining two angles. --- [2]

(b) Calculate the sum of the interior angles of a pentagon. --- [2]

(c) Calculate the sum of the angles a, b, c, d, e, f and
g shown in this diagram. --- [2]



The trapezium, ABCD, has four angles.

All the angles are in degree. (i) Show that $7x + 4y = 390$ --- [1]

(ii) Show that $2x + 3y = 195$ --- [1]

(iii) Solve these simultaneous equations. --- [4]

(iv) Use your answer to part (d) (iii) to find the sizes of all four
angles of the trapezium. --- [1]

W-13/43/Q4

Answers

Q1 (a) (i) 27° (ii) 3.89 cm

(b) 76°

(c) (i) 90° angle in the semi-circle

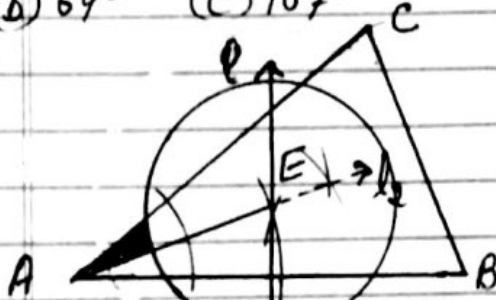
(ii) 27° tangent perp to radius

(iii) rectangle.

Q2 (a) 38° , 118° and 62°

(b) 69° (c) 107°

Q3



(a) draw the perp. bisector l_1 of AB.

(b) draw the angular bisector of $\angle C$ as l_2

(c) draw a circle centre E and $r = 5$ cm

(d) Shaded region

Q4 (a) $(360 - 216) = 150$

$(180 - 150) \div 2 = 15^\circ$ ✓

(b) 15.5

(c) 29.5° (d) 194

Q5 (a) $u = 80^\circ$ $v = 160^\circ$

(b) 6.24 (c) 5.05 (d) 4

Q6 (a) 7.5 (b) 5 (c) 16.8

Q7

(i) 42° (ii) 111

Q8 (a) 122° (b) 105°

Q9 (a) (i) 66° (ii) 24° (iii) 66° (iv) 114°

(b) 83.6

(c) Sum of opposite angles is 180°

Q10 (a) 100

(b) (i) 50° (ii) 41° (iii) Similar

(c) 27.8 (d) (i) 60 (ii) 174

Q11 (a) 37° angles in the same segment of circle are equal.

(b) 74° angle at the centre is double the angle at the circumference.

(c) 143° , opp. angles of cyclic quad. are supplementary.

Q12 (a) (i) 43° (ii) 62° OYZ is isosceles triangle and angle at centre is double the angle at centre.

(iii) 30° , opp. angles of cyclic quad. sum to 180°

(b) (i) 1:2

(ii) OA , $MA = NA$, $OM = ON$

Q13 (a) (i) angle A is common to both the triangles, \therefore third angles are equal in both the triangles

(ii) Similar (iii) 8.25

(b) (i) 38° (ii) 38° (iii) 78° (iv) 26°

(c) 36°

Q14 (a) (i) $x = 21^\circ$, $y = 42^\circ$ (ii) 3.79

(b) 40° (c) 38°

Q15 (a) (i) 148° (ii) 122° (iii) 148° (iv) 106.

(b) (i) 63 (ii) 54°

Q16 (a) (i) AAA similarity Three angles.

(ii) (a) 10 (b) 5.92 (c) 58.7

Q17 (a) (i) 5.37 cm (ii) 54.1° (iii) 65.8

(b) 263.2

Q18 (a) (i) 52° Angle in the same segment.

(ii) 104° angle at the centre is double the angle at the circumference.

(iii) 34° angle between tangent and radius 90°

(b) (i) 7.65 (ii) 49.3°

Answers

Q19(a) (i) 118° (ii) 31° (iii) 22°

(b) 32 (c) (i) opp. angles of a cyclic quad add to 180°

(c) (ii) 68° (d) 5.75 cm.

Q20 (a) 227 (b) 5.35 (c) 39°

(d) 30.2 (e) $AB = BC$
 $TA = TC$
 $TB = TB$

Q21 (a) $OP_2 = \sqrt{3^2 + 1^2} = \sqrt{10}$

(b) (i) $\frac{\sqrt{10}}{3}$ (ii) $\frac{10}{3}$

(c) 3.7

(d) (i) 18.43 (ii) 18.4 (iii) 20

Q22 (a) (i) 27° (ii) 54° (iii) 153°

(b) (i) 59.6 (ii) 22 (iii) 81

Q23 (a) 48° and 84° or 66° and 66°

(b) 540 (c) 1620

(d) (i) $2x + 5 + 3y - 20 + 4x - 5 + x + y - 10 = 360$

(ii) $2x + 5 + 3y - 20 = 180$ AD || BC

(iii) $x = 30$; $y = 45^\circ$

(iv) $65^\circ, 115^\circ, 115^\circ, 65^\circ$

