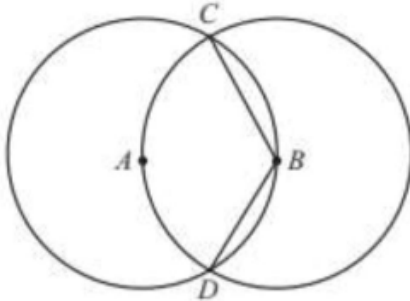




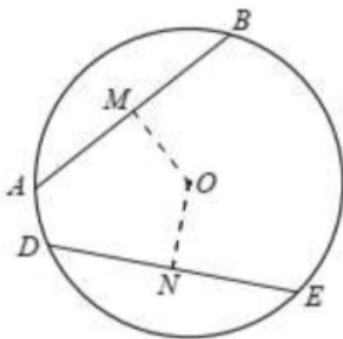
1. Two circles, centres A and B, are each of radius 8cm and intersect at C and D. Each circle passes through the centre of the other circle.

(a) Explain why angle CBD is 120° . [1]



0580/21/O/N/14 Q19(a)

2. The diagram shows a circle, centre O.



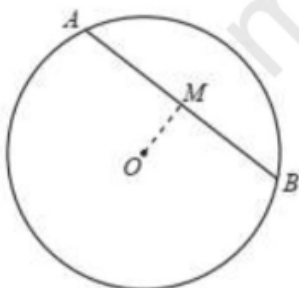
AB and DE are chords of the circle.

M is the mid-point of AB and N is the mid-point of DE.

AB = DE = 9cm and OM = 5cm. Find ON. [1]

0580/22/O/N/18 Q2)

3. The diagram shows a circle, centre O.



AB is a chord of length 24cm.

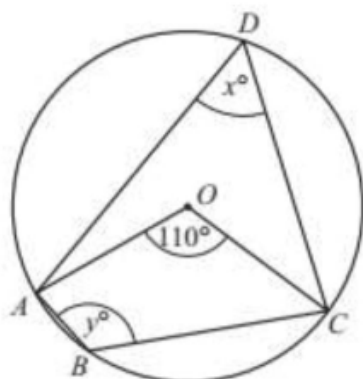
M is the mid-point of AB and OM = 5cm.

Calculate the radius of the circle. [3]

0580/22/M/J/18 Q16)



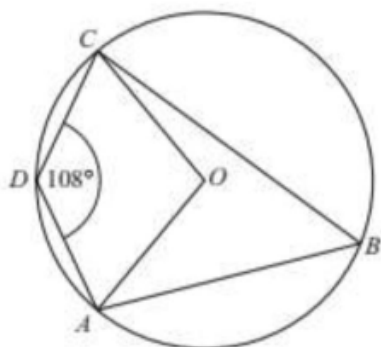
4. A, B, C and D lie on the circle, centre O.



Find the value of x and the value of y [2]

0580/21/O/N/16 Q9)

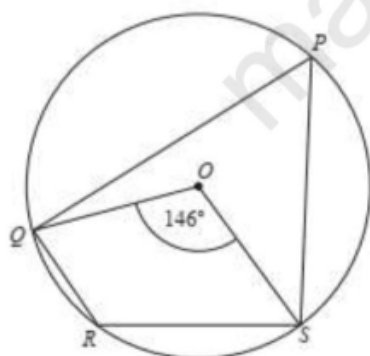
5. A, B, C and D lie on a circle centre O. Angle ADC = 108° .



Work out the obtuse angle AOC [2]

0580/21/O/N/12 Q6)

6. The points P, Q, R and S lie on the circumference of the circle, centre O.

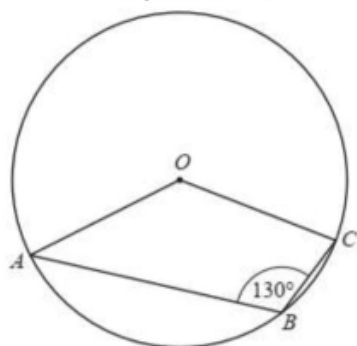


Angle QOS = 146° . Find angle QRS. [2]

0580/43/M/J/17 Q2)(c)



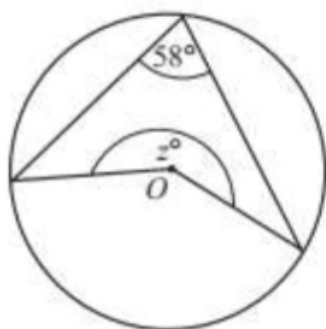
7. A, B and C are points on the circle, centre O.



Find the obtuse angle AOC [2]

0580/21/M/J/19 Q8)

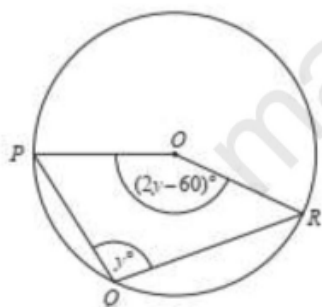
8. The diagram shows a circle, centre O.



Find the value of z . [2]

0580/22/F/M/16 Q18 (c)

9. P, Q and R lie on a circle, centre O.



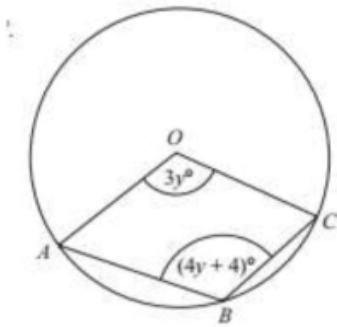
Angle $PQR = y^\circ$ and angle $POR = (2y - 60)^\circ$.

Find the value of y . [4]

0580/41/O/N/17 Q2(b)



10. A, B and C lie on a circle centre O.

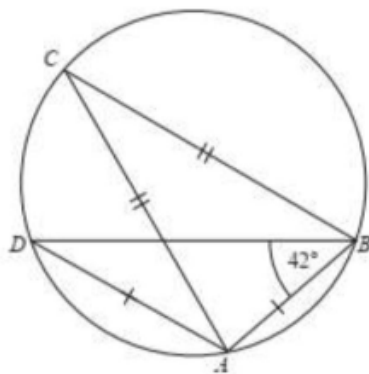


Angle $AOC = 3y^\circ$ and angle $ABC = (4y + 4)^\circ$.

Find the value of y [4]

0580/41/M/J/13 Q8(b)

11. (a) The points A, B, C and D lie on the circumference of the circle.



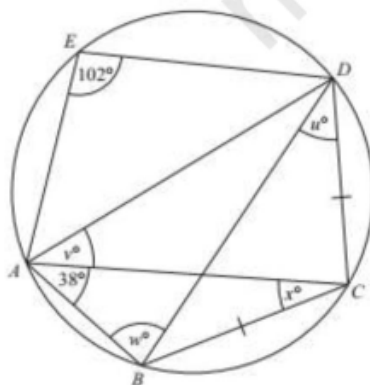
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$AB = AD$, $AC = BC$ and angle $ABD = 42^\circ$.

Find angle CAB . [3]

0580/43/M/J/17 Q2(b)

12. (a) 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]

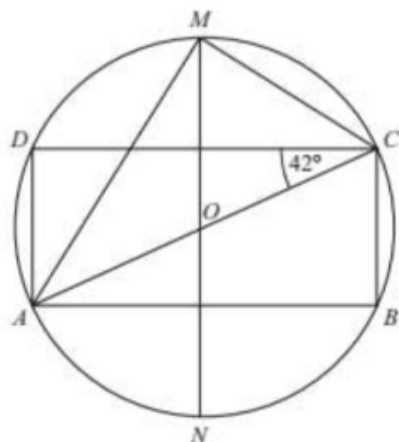
(ii) v , [1]

(iii) w , [1]

(iv) x , [1]

0580/43/O/N/15 Q8 (b)

13. 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 $ACD = 42^\circ$.

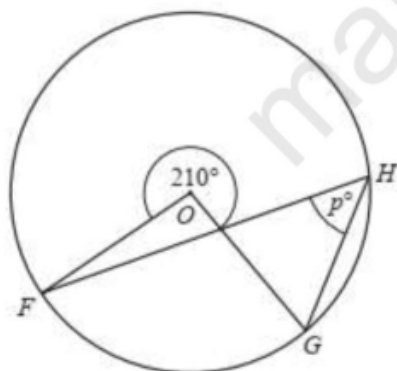
Calculate

(a) angle CAM, [2]

(b) angle DCM. [2]

0580/23/O/N/13 Q13)

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

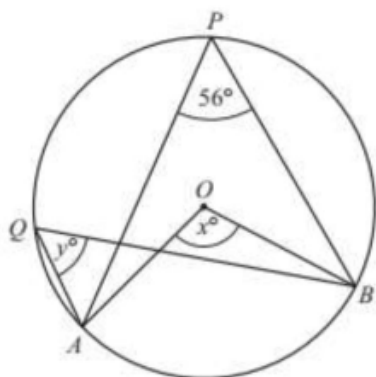


Find the value of p . [2]

0580/21/M/J/17 Q21 (b)



15. A, B, P and Q lie on the circle, centre O.



Angle $APB = 56^\circ$.

Find the value of

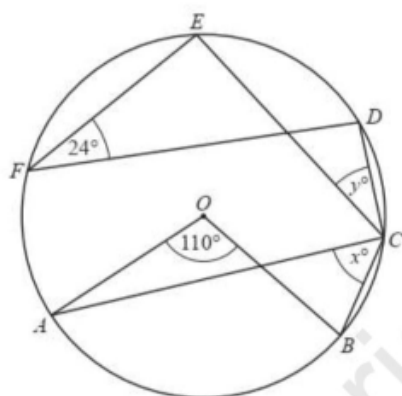
(a) x , [1]

(b) y , [1]

0580/21/M/J/16 Q11)

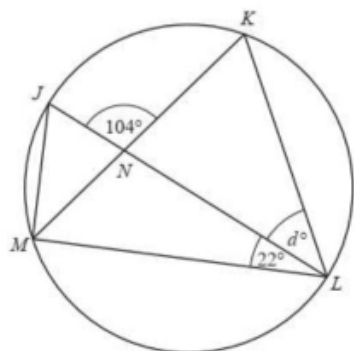
16. Points A, B, C, D, E and F lie on the circle, centre O.

Find the value of x and the value of y .



0580/21/M/J/20 Q10

17. J, K, L and M are points on the circumference of a circle with diameter JL.

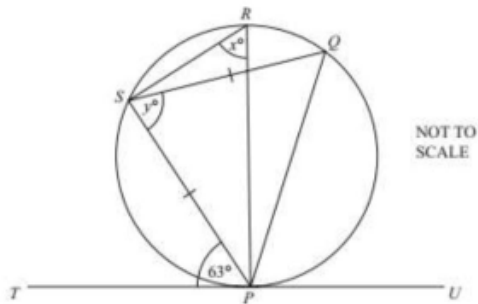




JL and KM intersect at N. Angle JNK = 104° and angle MLJ = 22° . Work out the value of d. [4]

0580/23/M/J/19 Q19)

18. 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° .

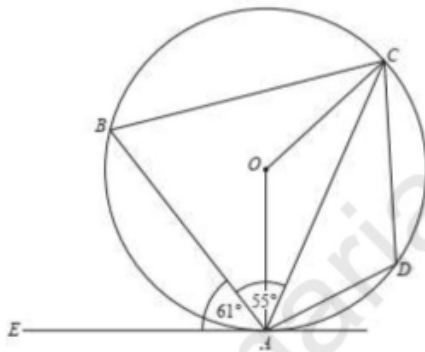
Find the value of

(i) x , [2]

(ii) y . [2]

0580/43/M/J/14 Q7(b)

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



EA is a tangent to the circle at A.

Angle EAB = 61° and angle BAC = 55° .

(a) Find angle BAO. [1]

(b) Find angle AOC. [2]

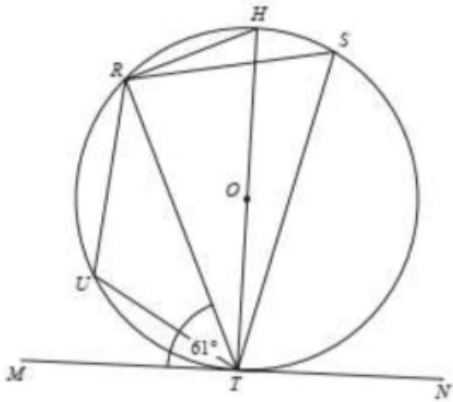
(c) Find angle ABC. [1]

(d) Find angle CDA. [1]

0580/42/O/N/18 Q7)



20. 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.

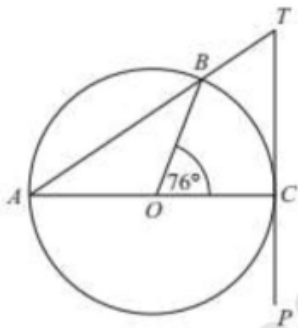
Angle $RTM = 61^\circ$.

Find

- (i) angle RTH, [1]
- (ii) angle RHT, [1]
- (iii) angle RST, [1]
- (iv) angle RUT. [1]

0580/43/M/J/10 Q5(b)

21. AOC is a diameter of the circle, centre O.



AT is a straight line that cuts the circle at B.

PT is the tangent to the circle at C.

Angle $COB = 76^\circ$.

(a) Calculate angle ATC. [2]

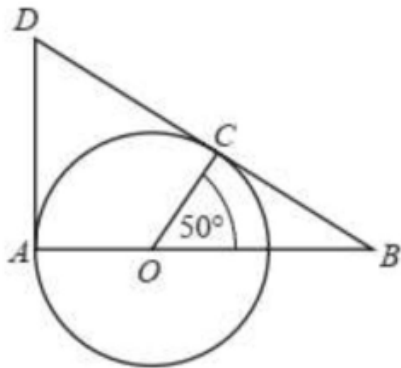
(b) T is due north of C.

Calculate the bearing of B from C [2]

0580/22/O/N/11 Q13)



22. O is the centre of the circle.



DA is the tangent to the circle at A and DB is the tangent to the circle at C.

AOB is a straight line. Angle COB = 50° .

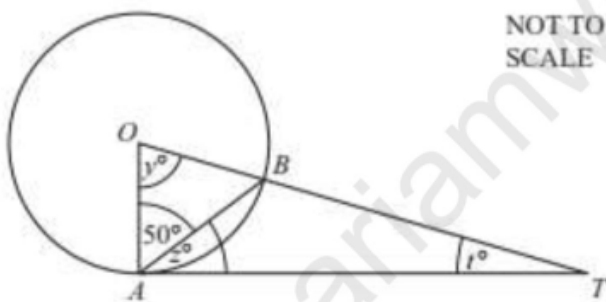
Calculate

(a) angle CBO, [1]

(b) angle DOC. [1]

0580/22/O/N/10 Q4)

23. TA is a tangent at A to the circle, centre O.



Angle OAB = 50° .

Find the value of

(a) y , [1]

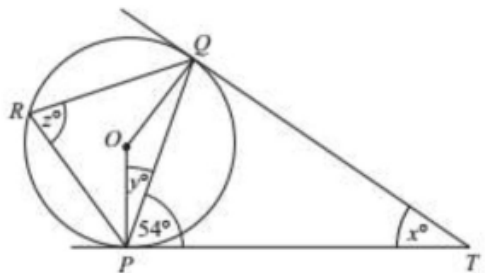
(b) z , [1]

(c) t , [1]

0580/21/O/N/11 Q7)



24. The points P, Q and R lie on a circle, centre O.



TP and TQ are tangents to the circle.

Angle $TPQ = 54^\circ$.

Calculate the value of

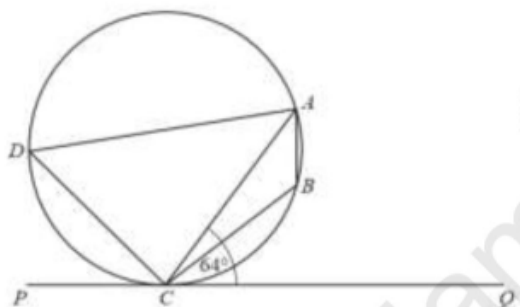
(a) x , [1]

(b) y , [1]

(c) z , [2]

0580/22/M/J/11 Q13)

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



PCQ is a tangent to the circle at C.

Angle $ACQ = 64^\circ$.

Work out angle ABC, giving reasons for your answer.

Angle ABC = because

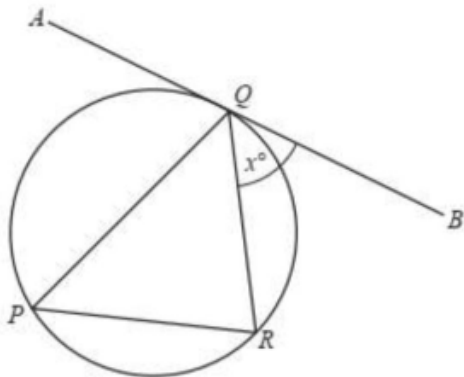
.....

 [3]

0580/22/F/M/20 Q15)



26. P, R and Q are points on the circle.



AB is a tangent to the circle at Q.

QR bisects angle PQB.

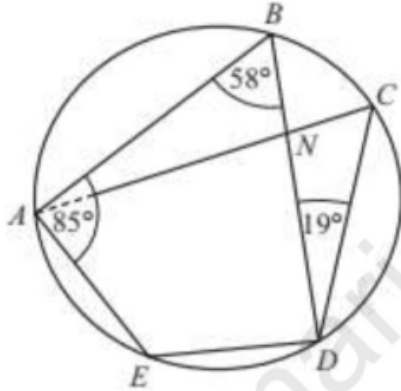
Angle BQR = x° and $x < 60$.

Use this information to show that triangle PQR is an isosceles triangle.

Give a geometrical reason for each step of your work. [3]

0580/21/M/J/20 Q15)

27. 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

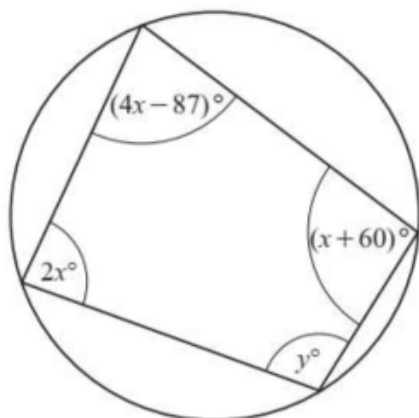
(a) angle BDE, [1]

(b) angle AND. [2]

0580/22/M/J/13 Q10)



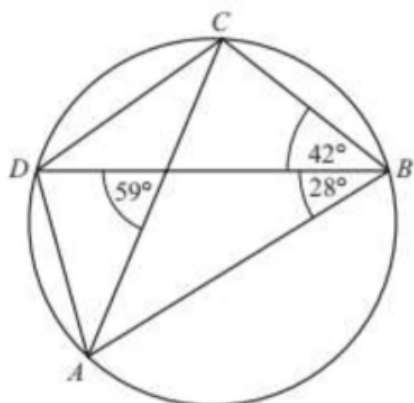
28. The diagram shows a cyclic quadrilateral.



Find the value of y [4]
0580/21/O/N/20 Q20

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

Find

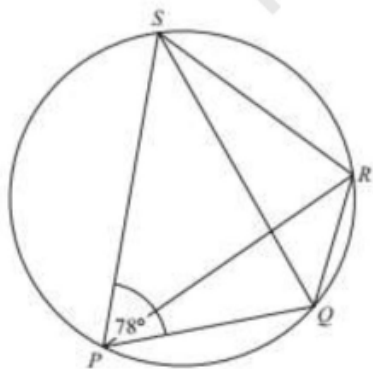


(a) angle ADC, [1]

(b) angle ADB. [2]

0580/21/O/N/13 Q12)

30. In the cyclic quadrilateral PQRS, angle SPQ = 78° .





(i) Write down the geometrical reason why angle QRS = 102° .

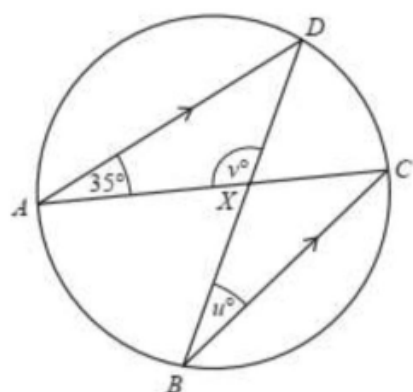
[1]

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

Calculate angle PQS. [3]

0580/41/M/J/13 8(c)

31. (a) A, B, C and D are points on the circle.



AD is parallel to BC.

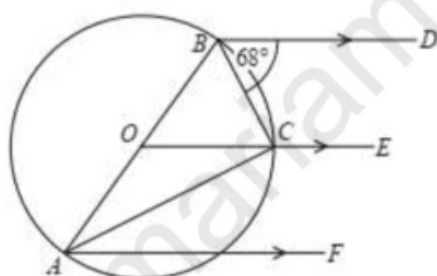
The chords AC and BD intersect at X.

Find the value of u and the value of v . [2]

0580/21/M/J/17 Q21

32. Points A, B and C lie on a circle, centre O, with diameter AB.

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BD, OCE and AF are parallel lines.

Angle CBD = 68° .

Calculate

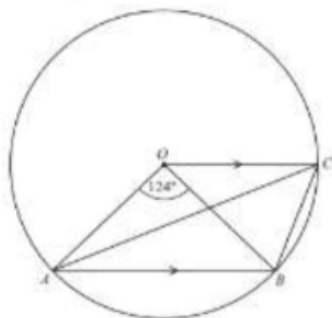
(a) angle BOC, [2]

(b) angle ACE. [2]

0580/21/O/N/09 Q19)



33. In the diagram, O is the centre of the circle which passes through A, B and C.



OC is parallel to AB.

Angle AOB = 124° .

Find

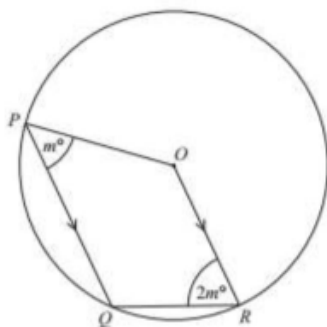
(a) angle BOC, [2]

(b) angle OBC, [1]

(c) angle CAB. [1]

0580/27/M/J/14 Q18)

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



NOT TO
SCALE

PQ is parallel to OR.

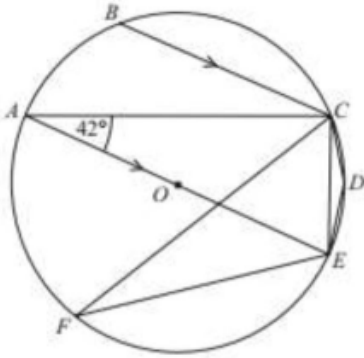
Angle QPO = m° and angle QRO = $2m^\circ$.

Find the value of m. [5]

0580/43/O/N/15 Q8 (c)



35. A, B, C, D, E and F are points on the circumference of a circle centre O.



AE is a diameter of the circle.

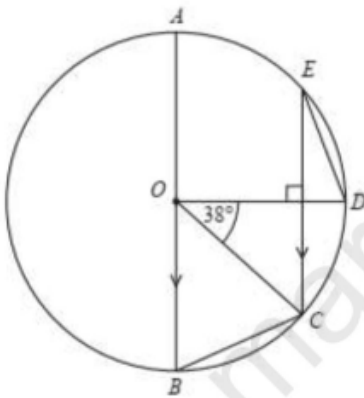
BC is parallel to AE and angle $CAE = 42^\circ$.

Giving a reason for each answer, find

- (i) angle BCA, [2]
- (ii) angle ACE, [2]
- (iii) angle CFE, [2]
- (iv) angle CDE. [2]

0580/42/M/J/12 Q4(a)

36. AB is the diameter of a circle, centre O. C, D and E lie on the circle.



EC is parallel to AB and perpendicular to OD. Angle DOC is 38° .

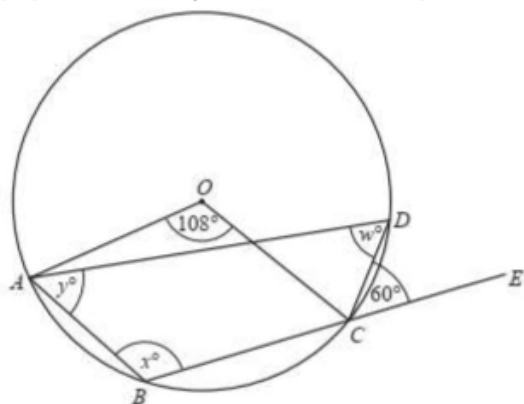
Work out

- (a) angle BOC, [1]
- (b) angle CBO, [1]
- (c) angle EDO [2]

0580/21/M/J/10 Q17)



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



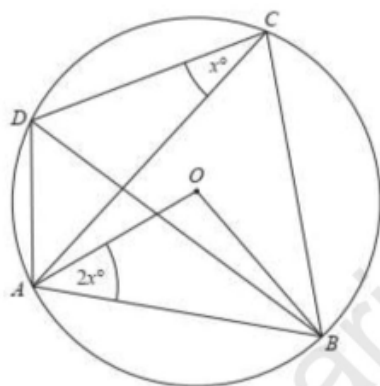
BCE is a straight line.

Angle $AOC = 108^\circ$ and angle $DCE = 60^\circ$.

Calculate the values of w , x and y . [3]

0580/22/O/N/17 Q22)

38. In the diagram, A, B, C and D lie on the circumference of a circle, centre O.



Angle $ACD = x^\circ$ and angle $OAB = 2x^\circ$.

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

(a) angle AOB , [1]

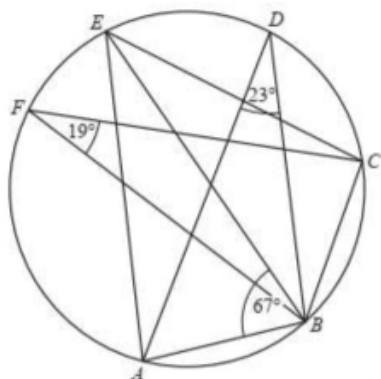
(b) angle ACB , [1]

(c) angle DAB . [2]

0580/22/O/N/19 Q19)



39. In the diagram, points A, B, C, D, E and F lie on the circumference of the circle.



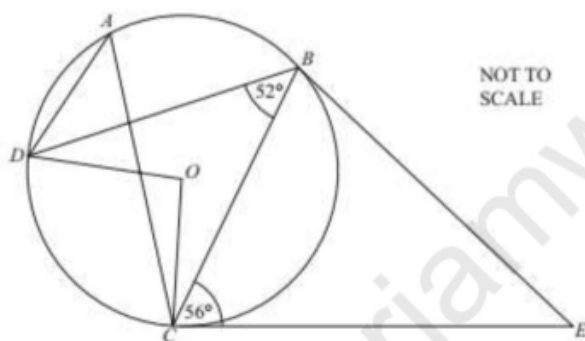
Angle $BFC = 19^\circ$, angle $ADB = 23^\circ$ and angle $ABE = 67^\circ$.

Work out

- angle BEC , [1]
- angle ABC , [3]
- angle BCE . [2]

0580/23/O/N/17 Q22)

40. A, B, C and D are points on a circle, centre O.



CE is a tangent to the circle at C.

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

(i) Angle $DAC = \dots\dots\dots$

because.....
 [2]

(ii) Angle $DOC = \dots\dots\dots$

because.....
 [2]

(iii) Angle $BCO = \dots\dots\dots$

because[2]

 [2]

0580/43/O/N/14 Q3(a)

Answers

1) equilateral triangle	15) $x = 112^\circ$, $y = 56^\circ$	29) (a) 110° (b) 79°
2) 5	16) $x = 55^\circ$, $y = 24^\circ$	30) (i) Opposite angles [cyclic quad] add to 180 (ii) 68
3) 13	17) 36°	31) (a) $u = 35^\circ$, $v = 110^\circ$
4) $x = 55^\circ$, $y = 125^\circ$	18) (i) 63(ii) 54	32) (a) 44° (b) 158°
5) 144°	19) (a) 29 (b) 128 (c) 64 (d) 116	33) (a) 28° (b) 76° (c) 14°
6) 107°	20) (i) 29 (ii) 61 (iii) 61 (iv) 119	34) 36
7) 100°	21) (a) 52° (b) 322°	35) (i) 42 Alternate (ii) 90 semicircle (iii) 42 same segment (iv) 138 cyclic quad
8) 244°	22) (a) 40° (b) 65	36) (a) 52° (b) 64° (c) 71°
9) 105°	23) (a) 80° (b) 40° (c) 10°	37) 54° , 126° , 60°
10) 32	24) (a) 72° (b) 36° (c) 54°	38) (a) $180 - 4x$ (b) $90 - 2x$ (c) $90 + x$
11) 69	25) 116° , alternate segment theorem, angles in opposite segments are supplementary or cyclic quadrilateral or angles at a point on a straight line	39) 19° , 138° , 90°
12) (i) 38 (ii) 38 (iii) 78 (iv) 26	26) $\angle RQP = x^\circ$ QR bisects angle PQB, $\angle RPQ = x^\circ$ alternate segment theorem, triangle PQR has two equal angles both less than 60 (so can't be equilateral) so must be isosceles	40) (i) 52 Angles in same segment (ii) 104 Angle at centre is twice angle at Circumference (iii) 34 Angle between tangent and radius = 90
13) (a) 24° (b) 24°	27) (a) 95° (b) 77°	
14) 75°	28) 107	