Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

Circle Theorems - Proofs and Reasons

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

Write your name in the space provided.

Write your answers in the spaces provided in this question paper.

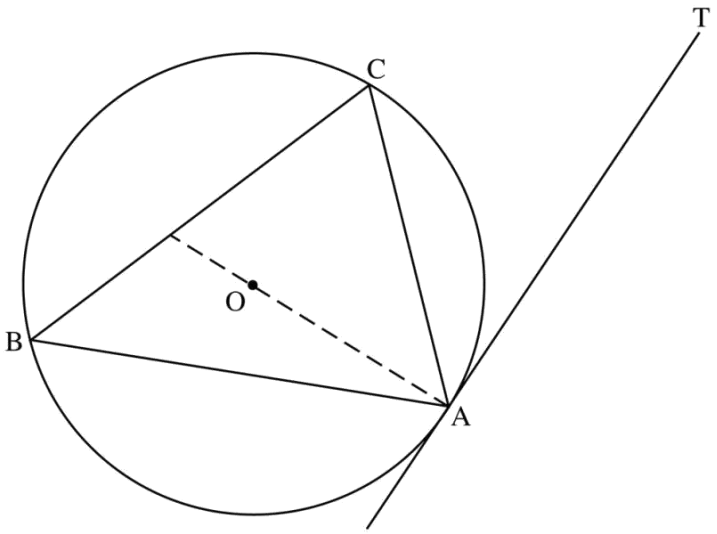
Answer ALL questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You should have a ruler, compass and protractor where required.

Total Marks :

1)



AT is a tangent to the circle, centre O.
Prove that the angles CAT and CBA are equal. [3]

2)

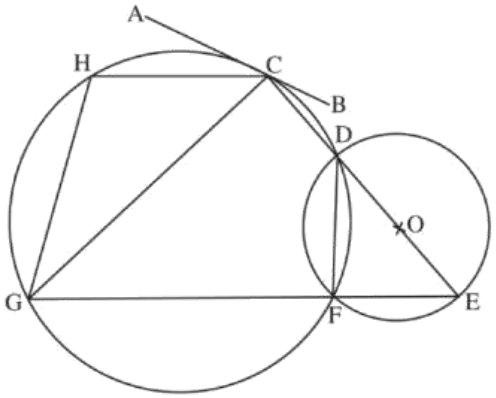


Diagram not drawn accurately

C, D, F, G and H are points on the circumference of the large circle.
The circle, centre O, has diameter DE.
The two circles intersect at D and F.
CDE and EFG are straight lines.

Find

(a) angle DFE.

Answer _____° [1]

(b) Explain why angle DCG is a right angle.

_____

_____ [2]

ACB is a tangent to the large circle touching at C.
Angle BCD = 21°.

(c) Calculate angle CHG.

Answer _____° [3]

3) **(a)** In the diagram O is the centre of the circle.
SOQ is a straight line.
Angle ORQ = 41° and angle PQS = 24°

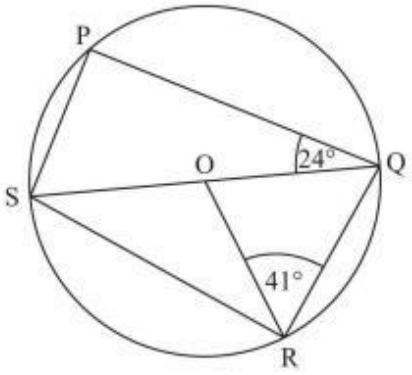


diagram not drawn accurately

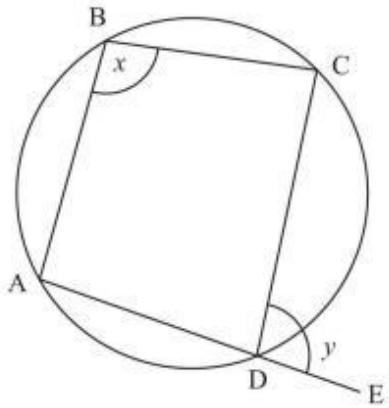
Find the size of the following angles:

(i) OQR = _____ ° [1]

(ii) PSQ = _____ ° [1]

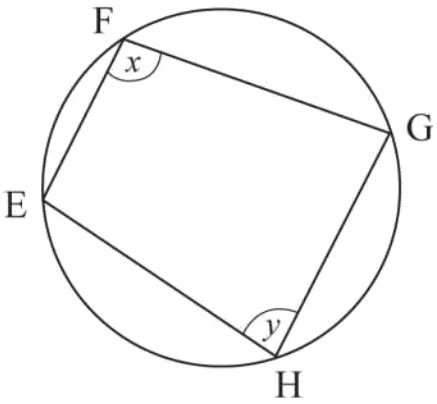
(iii) PSR = _____ ° [1]

(b) Prove that the exterior angle of the cyclic quadrilateral equals the interior opposite angle (i.e. $x = y$)



[3]

4)



Prove that opposite angles of a cyclic quadrilateral add up to 180°

[3]

5) The points D, E and F lie on the circumference of another circle.
GH is a tangent to the circle at F.

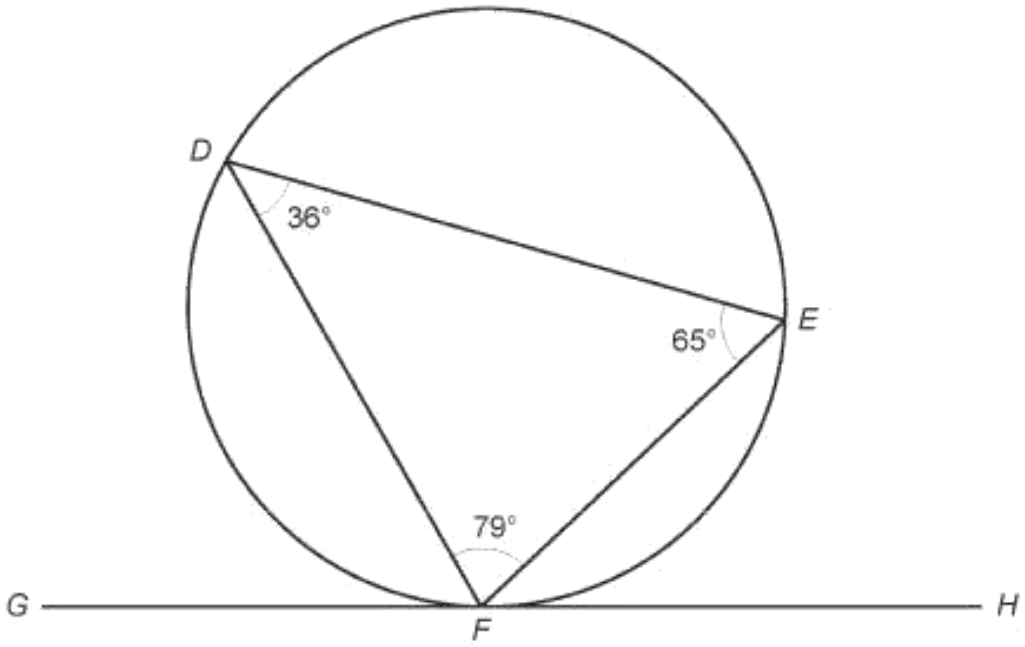


Diagram not drawn to scale

Write down the size of $\hat{EFH}$, giving a reason for your answer. [2]

$\hat{EFH}$ = ... °

Reason: .....

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6) Two circles of equal radius intersect as shown in the diagram below.

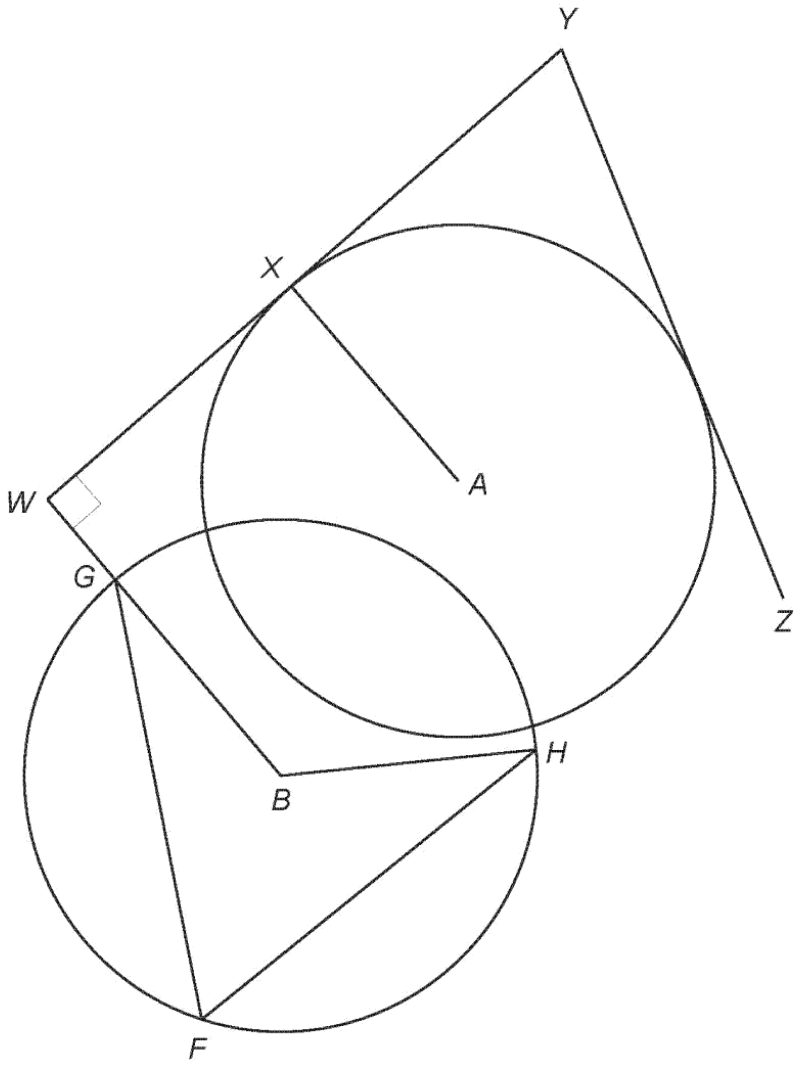

Diagram not drawn to scale

The centres of the circles are A and B.
The straight lines WXY and YZ are tangents to the circle with centre A and $\hat{GFH} = 80°$.

(a) Indicate on one of the lines on the diagram on the previous page, where the point P lies, so that $YP = YX$. [1]

(b) Explain why XA is parallel to WB. [2]

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(c) Given that a straight line drawn between the centres of the two circles bisects $H\hat{B}G$, calculate the size of $X\hat{A}B$. You must give reasons for your answer. [4]

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7) The points A and B lie on the circumference of a circle with centre O.
The straight lines PAQ and RBQ are tangents to the circle.

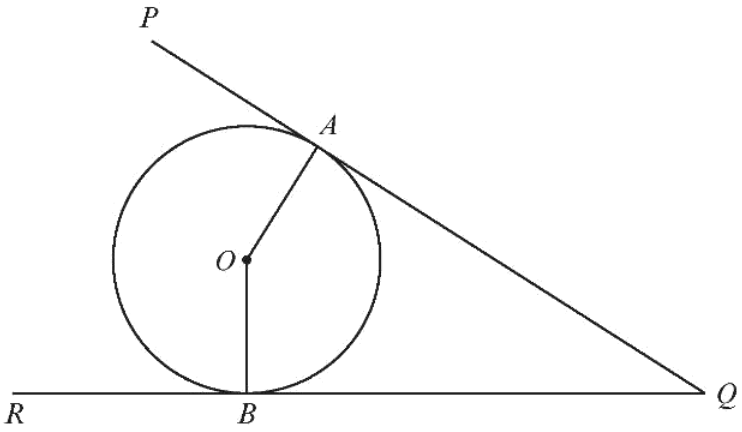

Diagram not drawn to scale

You are given that $A\hat{Q}B = 2x$, where x is measured in degrees.

Write down the size of $A\hat{O}Q$ in terms of x.
Give reasons in your answer.

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[4]

8) The diagram shows a circle with centre O.
The straight lines AC and CE are tangents to the circle at B and D respectively.
$B\hat{F}D = 78°$.

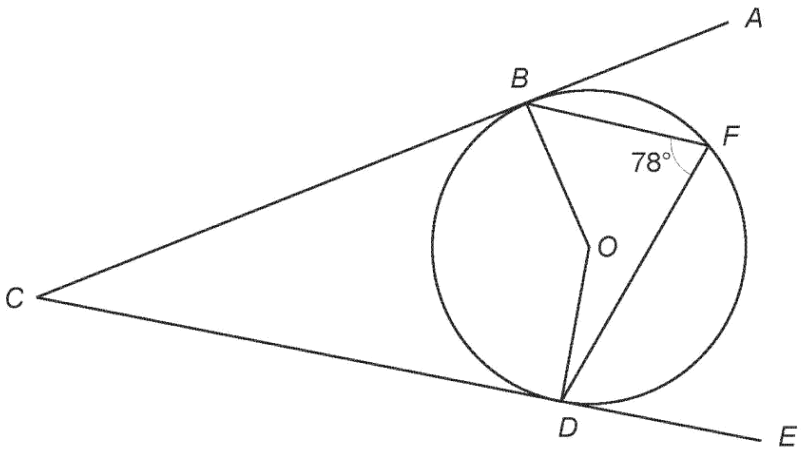

Diagram not drawn to scale

Find the size of $B\hat{C}D$. You **must** give reasons in your solution. [4]

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9) The points P, Q and R lie on the circumference of a circle, centre O.
PQ is a diameter of the circle.
The straight line ARB is a tangent to the circle.

$\widehat{QRB} = x$, where x is measured in degrees.

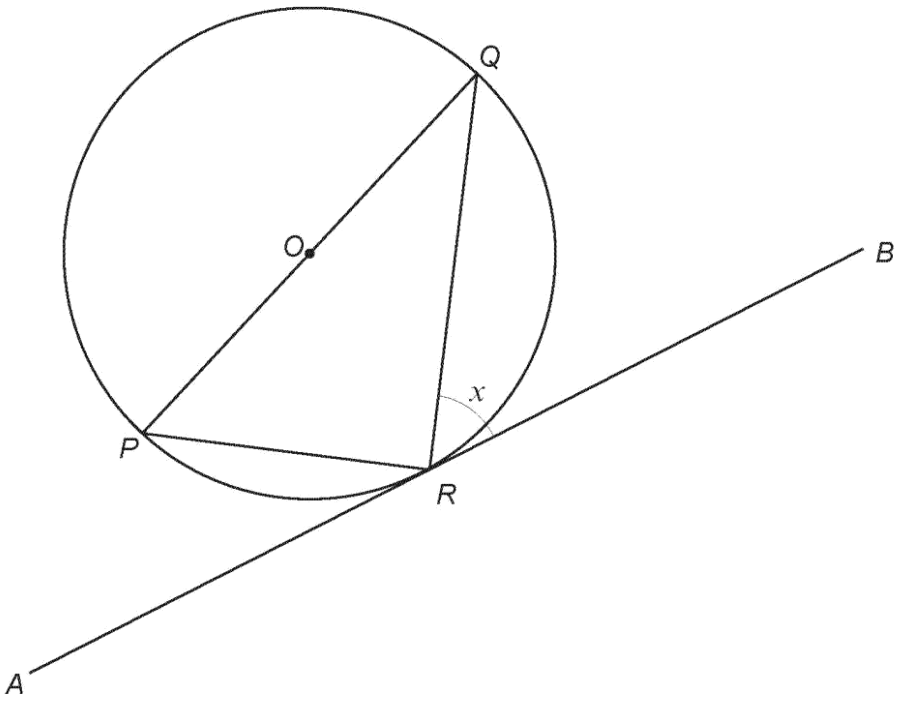

Diagram not drawn to scale

Calculate the size of $\widehat{PQR}$ in terms of x.
You must give a reason for each step of your solution. [4]

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10) The points A, B, C and D lie on the circumference of a circle, centre O.

AE and CE are tangents to the circle.
$C\hat{D}A = 108°$.

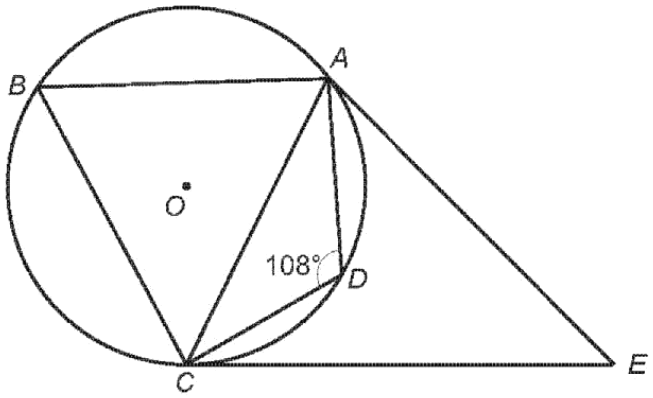

Diagram not drawn to scale

Giving **reasons** for your answers, find

(a) the size of $A\hat{B}C$, [2]

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(b) the size of $C\hat{E}A$. [3]

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11) The three points A, B and C lie on the circumference of a circle centre O.
The tangent XAY touches the circle at A.

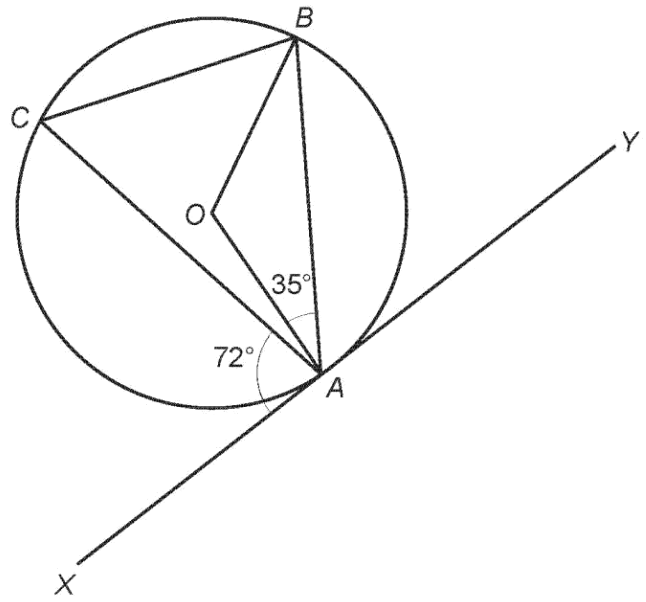

Diagram not drawn to scale

Find each of the following angles.
Give reasons for your answers.

(a) $C\hat{B}O$ [2]

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(b) $B\hat{C}A$ [2]

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12) The points A, B, C and D lie on the circumference of the circle with centre O.
$B\hat{C}D = x$, where x is measured in degrees.

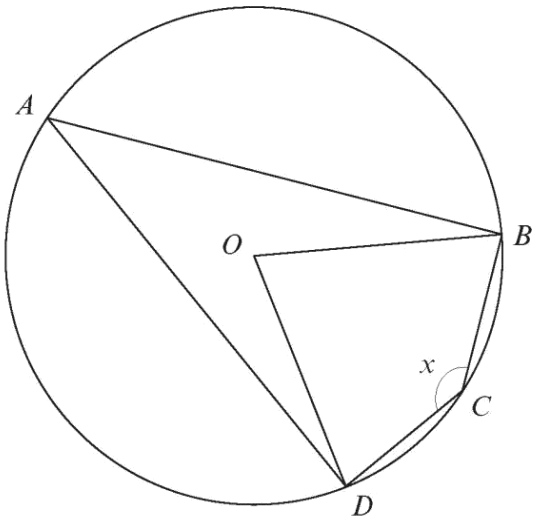

Diagram not drawn to scale

Show, giving reasons in your answer, that the size of $D\hat{O}B$ in degrees is $360 - 2x$.

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[4]

13) The diagram shows a circle with centre O and a tangent PT that touches the circle at C.

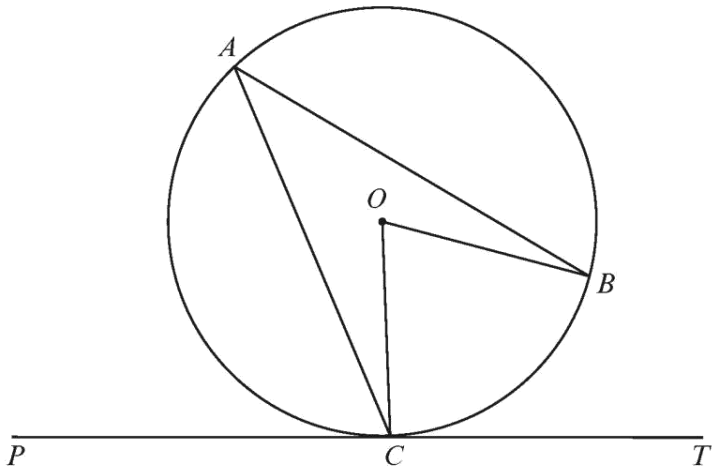

Diagram not drawn to scale

The reflex angle at the centre of the circle is 280°.
Find the size of each of the following angles.
You must give a reason for each answer.

(a) $B\hat{A}C$

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[2]

(b) $B\hat{C}P$

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[3]

14) *In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Points *A*, *B*, *C* and *D* lie on the circumference of a circle, centre *O*.
BD is a diameter of the circle.
The straight line *BC* = 4·7 cm and $B\hat{A}C = 28°$.

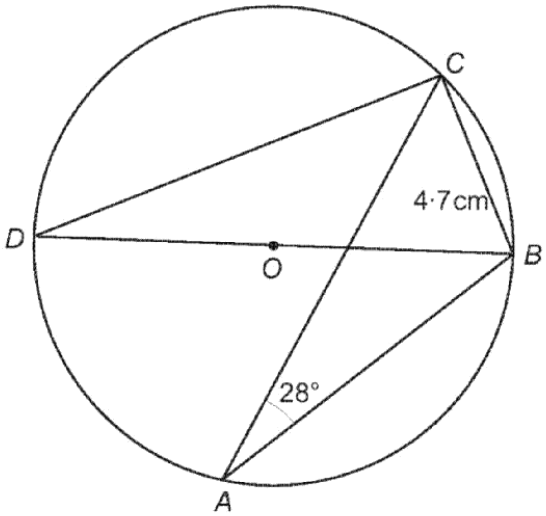

Diagram not drawn to scale

Write down the size of $B\hat{D}C$.
Hence, calculate the length *BD*.
You must show all your working. [5 + 2 OCW]