

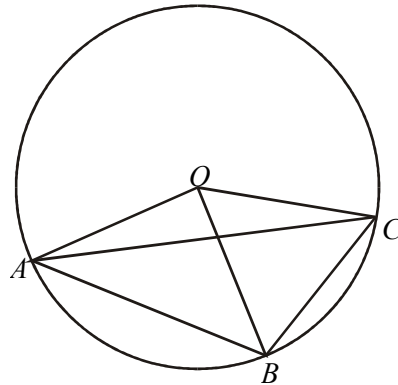
GCSE MATHEMATICS Higher Tier, topic sheet.

CIRCLE THEOREMS

1. In the diagram, O is the centre of the circle.
Angle $OAC = 12^\circ$ and angle $BOC = 80^\circ$.

Calculate the size of the following angles, giving a geometrical reason for each of your answers.

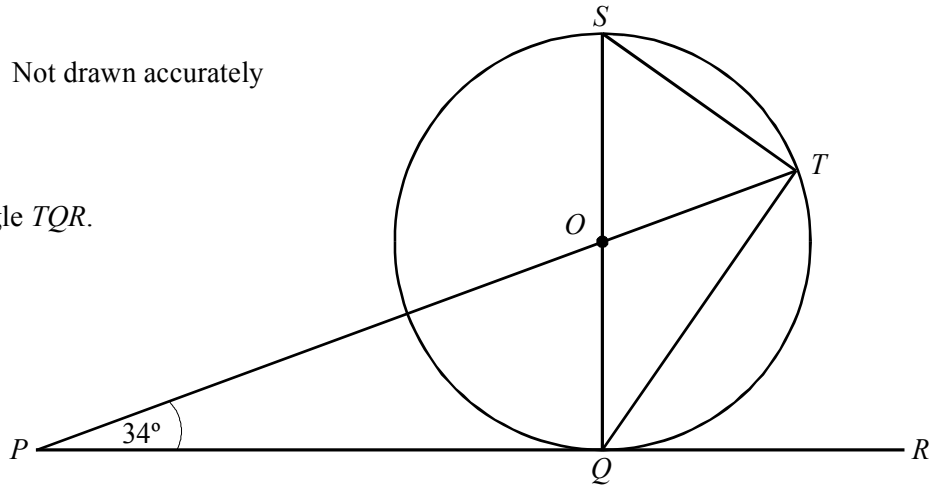
- (a) Angle OCA (b) Angle AOC
(c) Angle ACB (d) Angle ABC



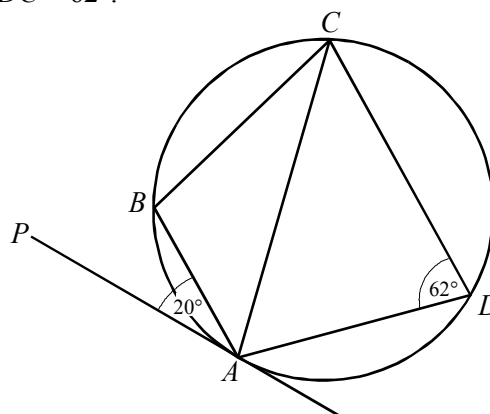
2. The line PQR is a tangent to a circle with centre O .
 QS is a diameter of the circle.
 T is a point on the circumference of the circle such that POT is a straight line.
The angle OPQ is 34° .

Not drawn accurately

Calculate the size of angle TQR .



3. $ABCD$ is a cyclic quadrilateral and PA is a tangent to the circle at A .
Angle $BAP = 20^\circ$ and angle $ADC = 62^\circ$.



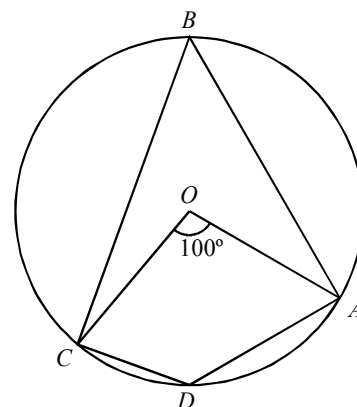
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Find angles ABC and BAC .

4. In the diagram, O is the centre of the circle.
Angle $COA = 100^\circ$

Calculate

- (a) angle CBA ,
(b) angle CDA

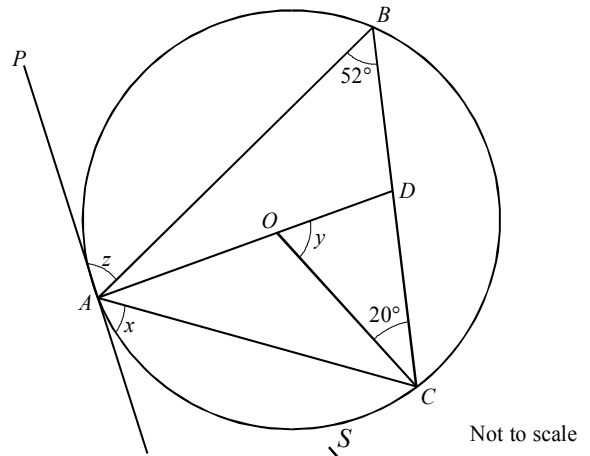


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5. A, B and C are points on the circumference of a circle centre O .

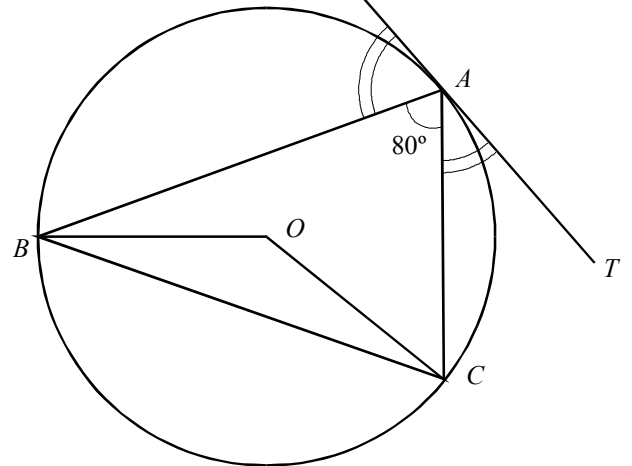
D is a point on BC such that AOD is a straight line.
 PA is a tangent to the circle at A .

Calculate angles x, y and z .



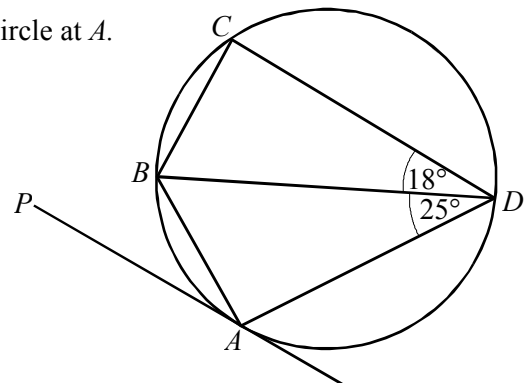
6. In the diagram, O is the centre of the circle.
 SAT is a tangent to the circle at A .
 Angle $BAC = 80^\circ$ and angle $SAB = \text{angle } TAC$.

- (a) Calculate
 (i) angle BOC (ii) angle OBC
 (iii) angle ABO (iv) angle ACO .
- (b) Explain why triangles OAB and OAC are congruent (identical).



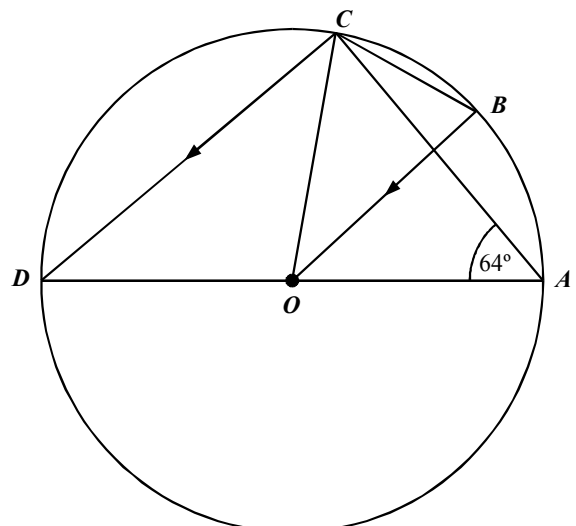
7. A, B, C and D are points on the circumference of a circle.
 BD is a diameter of the circle and PA is a tangent to the circle at A .
 Angle $ADB = 25^\circ$ and angle $CDB = 18^\circ$.

- (a) Write down the value of angle
 (i) BCD (ii) PAB .
- (b) Calculate angle ABC .



8. AD is a diameter of a circle centre O .
 B and C are points on the circumference such that DC is parallel to OB . The angle $OAC = 64^\circ$.

- (a) Calculate the size of angle ODC .
 (b) Calculate the size of angle AOB .
 (c) Calculate the size of angle ACB .
 (d) Calculate the size of angle OBC .



Answers.

1. (a) $OCA = OAC$ by isosceles triangles. 12° .
(b) Angles in a triangle add to 180° . 156° .
(c) $ACB = \frac{1}{2}AOB = \frac{1}{2}(156 - 80) = 38^\circ$.
(d) $\frac{1}{2}(360 - 156) = 102^\circ$.

2. 62° .

3. $ABC = 180 - 62^\circ = 118^\circ$.
{ $ACB = 20^\circ$ by the alternate segment theorem}
 $BAC = 180 - (118 + 20) = 42^\circ$.

4. (a) $100 \div 2 = 50^\circ$.
(b) $180 - 50 = 130^\circ$.

5. $x = 52^\circ$ by the alternate segment theorem.
 $AOC = 2 \times 52^\circ = 104^\circ$.
 $y = 180 - 104 = 76^\circ$.
 $z = 58^\circ$.

6. (a) (i) 160° (ii) 10° (iii) 40° (iv) 40° .
(b) Each triangle has 2 pairs of equal sides and all corresponding angles equal.

7. (a) (i) 90° (ii) 25° .
(b) 137° .

8. (a) 26° .
(b) 26° .
(c) 13° .
(d) 77° .