

1.

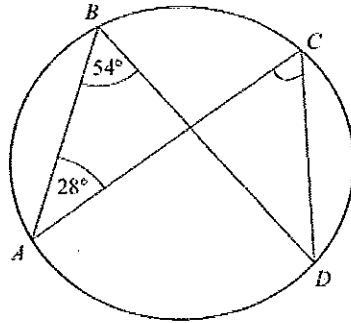


Diagram NOT accurately drawn

A, B, C and D are points on the circumference of a circle.
 Angle $ABD = 54^\circ$.
 Angle $BAC = 28^\circ$.

(i) Find the size of angle ACD .

.....54..... $^\circ$

(ii) Give a reason for your answer.

.....angles from the same points (in the
same segment) are equal.....

(3 marks)

2.

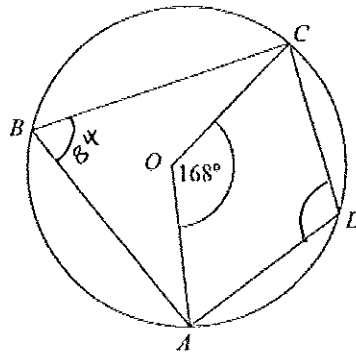


Diagram NOT accurately drawn

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

Angle $AOC = 168^\circ$

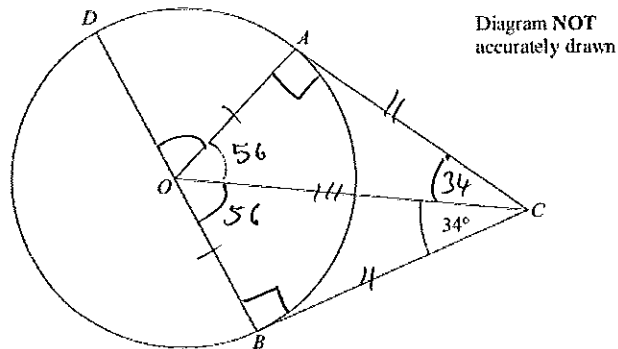
Work out the size of angle ADC .

You must give reasons for your working.

$\hat{A}BC = 84^\circ$ (Angle at centre is double angle at circumference)
 $\hat{A}DC = 180 - 84 = 96^\circ$ (Opp. angles in cyclic quadrilateral add to 180°)
96..... $^\circ$

(4 marks)

3.



A, B and D are points on the circumference of a circle, centre O .
 BOD is a diameter of the circle.
 BC and AC are tangents to the circle.
 Angle $OCB = 34^\circ$.

$$\hat{OAC} + \hat{OBC} = 90^\circ \text{ (tangent meets radius)}$$

Work out the size of angle DOA .

$$\hat{BOC} = 56^\circ \text{ (Angles in triangle add to } 180^\circ)$$

$$\hat{AOC} = \hat{BOC} \text{ (congruent triangles)}$$

$$180 - 56 - 56 = 68^\circ \text{ (Angles on a straight line = } 180^\circ)$$

$$\dots\dots\dots 68^\circ \dots\dots\dots$$

(4 marks)

4.

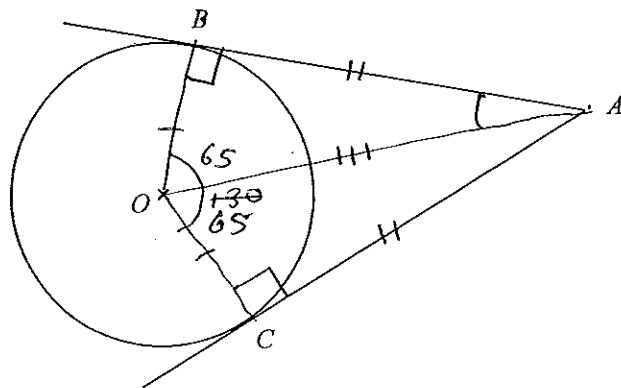


Diagram NOT accurately drawn

B and C are points on a circle, centre O .
 AB and AC are tangents to the circle.
 Angle $BOC = 130^\circ$.

Work out the size of angle BAO .

$$\dots\dots\dots 25^\circ \dots\dots\dots$$

(4 marks)

5.

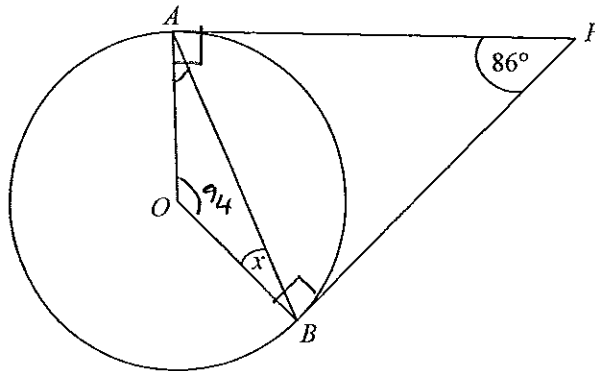


Diagram NOT accurately drawn

A and B are points on the circumference of a circle, centre O .
 PA and PB are tangents to the circle.
 Angle APB is 86° .

Work out the size of the angle marked x .

$$360 - 90 - 90 - 86 = 94^\circ$$

$$\frac{180 - 94}{2}$$

$$\dots\dots\dots 43^\circ$$

(3 marks)

6.

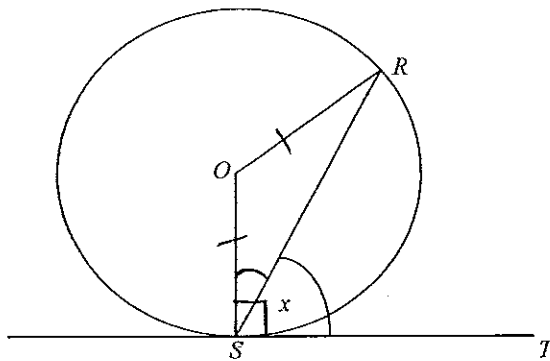


Diagram NOT accurately drawn

R and S are two points on a circle, centre O .
 TS is a tangent to the circle.
 Angle $RST = x$.

Prove that angle $ROS = 2x$.

You must give reasons for each stage of your working.

$$\begin{aligned}
 \hat{OST} &= 90^\circ \text{ (tangent meets radius)} \\
 \hat{OSR} &= 90 - x \\
 \hat{ORS} &= 90 - x \text{ (isosceles triangle)} \\
 ROS &= 180 - (90 - x) - (90 - x) \\
 &= 180 - 90 + x - 90 + x \\
 &= \underline{2x} \quad \text{(Angles in a triangle add up to } 180^\circ)
 \end{aligned}$$

(4 marks)

7.

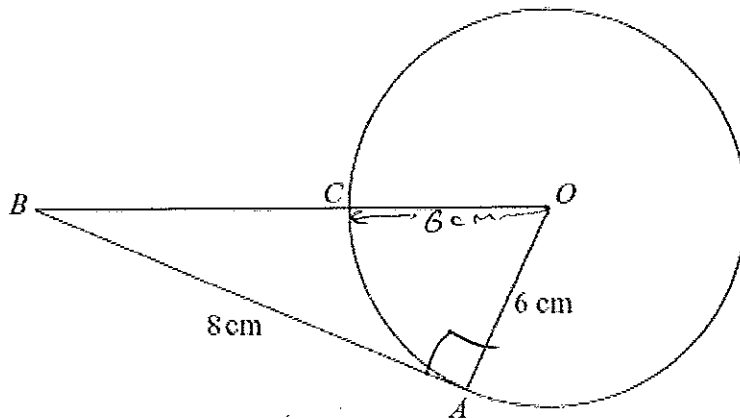


Diagram NOT
accurately drawn

In the diagram, O is the centre of the circle.
 A and C are points on the circumference of the circle.
 BCO is a straight line.
 BA is a tangent to the circle.

$AB = 8$ cm.
 $OA = 6$ cm.

(a) Explain why angle OAB is a right angle.

..... Where a tangent meets a radius is 90°

(1)

(b) Work out the length of BC .

$$OB^2 = 6^2 + 8^2$$

$$OB^2 = 100$$

$$OB = \sqrt{100} = 10 \text{ cm}$$

$$10 - 6 = 4$$

..... 4 cm
 (3)

(4 marks)

8.

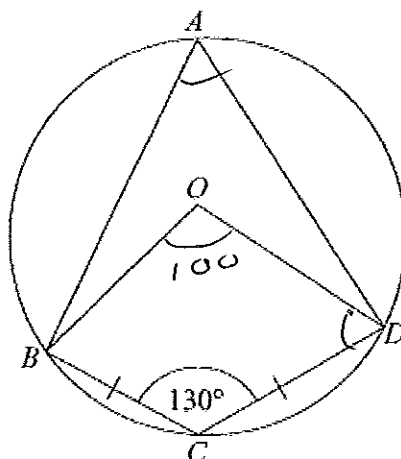


Diagram NOT accurately drawn

A, B, C and D are points on a circle, centre O .
 $BC = CD$.
 Angle $BCD = 130^\circ$.

- (a) Write down the size of angle BAD .
 Give a reason for your answer.

opposite angles in a cyclic quadrilateral
 add up to 180°

.....50..... $^\circ$
 (2)

- (b) Work out the size of angle ODC .
 Give reasons for your answer.

$\hat{BOD} = 100^\circ$ (angle at centre is double angle
 at circumference)

$$\frac{360 - 100 - 130}{2} = 65 \quad (\text{angles in a quadrilateral add to } 360^\circ)$$

$\angle OBO = \angle ODO$ (OBCD is a kite)

.....65..... $^\circ$
 (4)

(6 marks)

9.

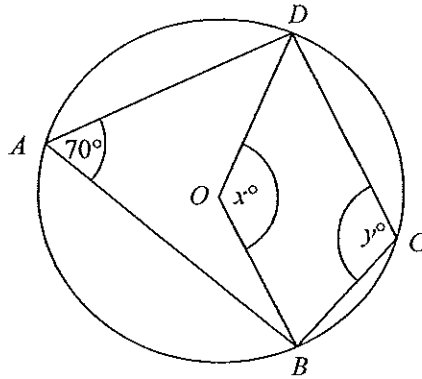


Diagram NOT accurately drawn

In the diagram, A, B, C and D are points on the circumference of a circle, centre O .
 Angle $BAD = 70^\circ$.
 Angle $BOD = x^\circ$.
 Angle $BCD = y^\circ$.

(a) (i) Work out the value of x .

$x = \dots\dots\dots 140 \dots\dots\dots$

(ii) Give a reason for your answer.

angle at centre is double the angle at the circumference

(2)

(b) (i) Work out the value of y .

$y = \dots\dots\dots 110 \dots\dots\dots$

(ii) Give a reason for your answer.

opposite angles in a cyclic quadrilateral add up to 180°

(2)

(4 marks)

10.

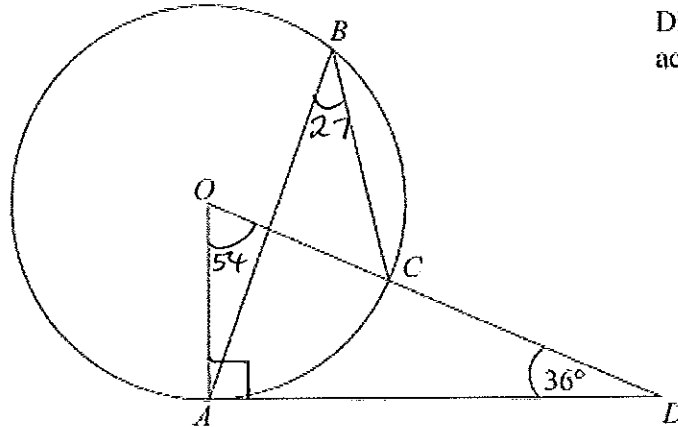


Diagram NOT accurately drawn

The diagram shows a circle centre O .
 A , B and C are points on the circumference.

DCO is a straight line.
 DA is a tangent to the circle.

Angle $ADO = 36^\circ$

(a) Work out the size of angle AOD .

.....54.....^o
 (2)

(b) (i) Work out the size of angle ABC .

.....27.....^o

(ii) Give a reason for your answer.

.....the angle at the circumference is half.....
the angle at the centre.....

(3)
 (4 marks)

11.

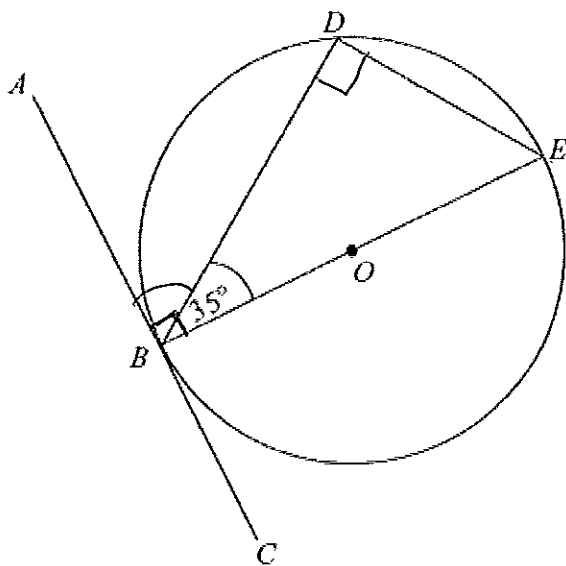


Diagram NOT
accurately drawn

B, D and E are points on a circle centre O .
 ABC is a tangent to the circle.
 BE is a diameter of the circle.
 Angle $DBE = 35^\circ$.

(a) Find the size of angle ABD .

Give a reason for your answer.

where a tangent meets a radius it is
a 90° angle

.....55.....^o
(2)

(b) Find the size of angle DEB .

Give a reason for your answer.

Alternate segment theorem.

.....55.....^o
(2)

(4 marks)

12.

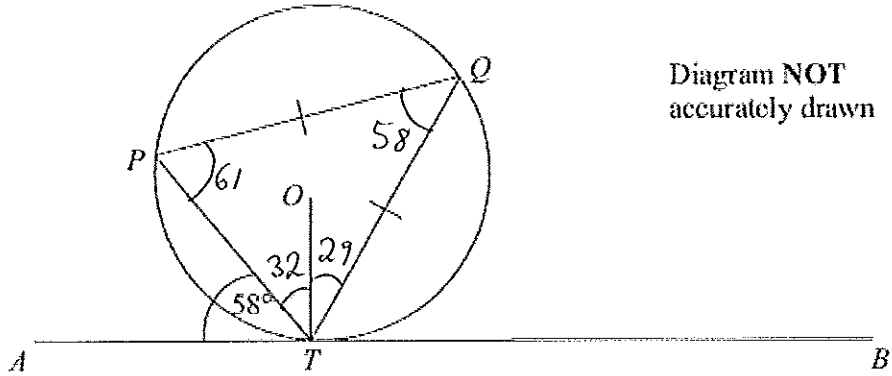


Diagram NOT accurately drawn

P , Q and T are points on the circumference of a circle, centre O .
The line ATB is the tangent at T to the circle.

$PQ = TQ$.
Angle $ATP = 58^\circ$.

Calculate the size of angle OTQ .
Give a reason for each stage in your working.

$$\hat{PQT} = 58^\circ \quad (\text{Alternate segment theorem})$$

$$OTP = 32^\circ \quad \text{tangent meets radius at } 90^\circ \text{ angle}$$

$$90 - 58 = 32$$

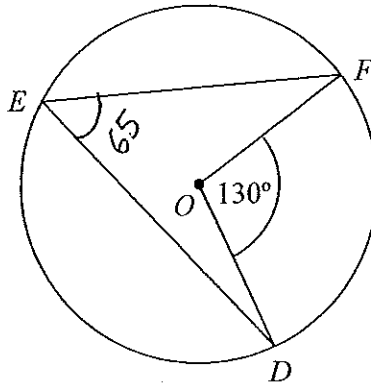
$$\hat{QPT} \text{ and } \hat{QTP} = 61^\circ \quad (\text{angles in triangle add to } 180, \text{ angles at base of isosceles triangle are equal})$$

$$OTQ = 29^\circ \quad (61 - 32)$$

.....29.....°

(4 marks)

13. (a)



D, E and F are points on the circumference of a circle, centre O .
Angle $DOF = 130^\circ$.

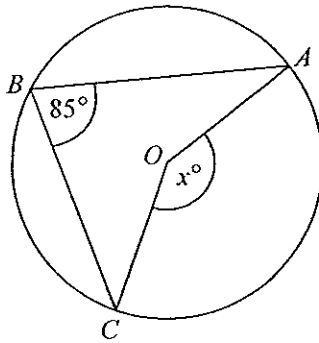
(i) Work out the size of angle DEF .

..... 65

(ii) Give a reason for your answer.

..... angle at circumference is half
..... angle at centre

(2)



(b)

In the diagram, A, B and C are points on the circumference of a circle, centre O .
Angle $ABC = 85^\circ$.

(i) Work out the size of the angle marked x° .

..... 170

(ii) Give a reason for your answer.

..... angle at centre is double angle at
..... circumference

(2)

(4 marks)

*14.

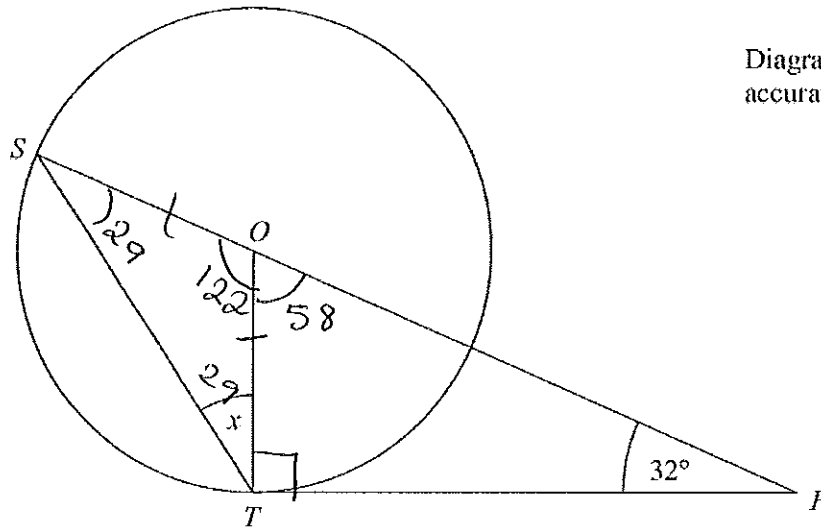


Diagram NOT accurately drawn

S and T are points on the circumference of a circle, centre O .
 PT is a tangent to the circle.
 SOP is a straight line.

Angle $OPT = 32^\circ$.

Work out the size of the angle marked x .
 Give reasons for your answer.

$\hat{T}OP = 58^\circ$ (Angles in a triangle add up to 180°)
 $\hat{O}TP = 90^\circ$ (tangent meets radius)
 $\hat{S}OT = 122^\circ$ (angles on a straight line add up to 180°)
 $\hat{O}TS = 29^\circ$ (angles at base of isosceles triangle are equal)

.....^o

(Total 5 marks)