

1.

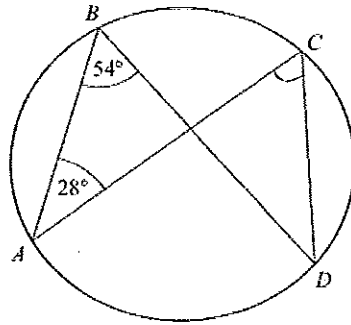


Diagram NOT accurately drawn

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

(ii) Give a reason for your answer.

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

(3 marks)

2.

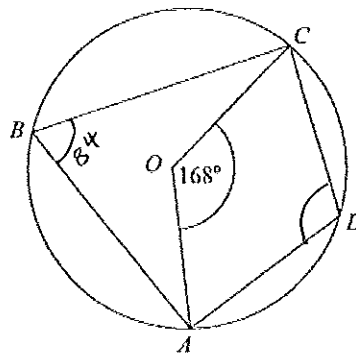


Diagram NOT accurately drawn

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

Angle $AOC = 168^\circ$

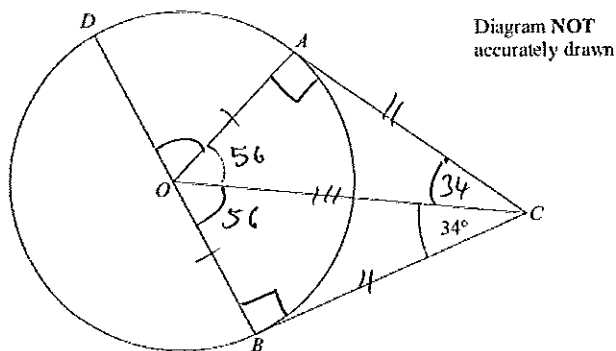
Work out the size of angle ADC .

You must give reasons for your working.

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

(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 .

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

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

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

..... 68° $^\circ$

(4 marks)

4.

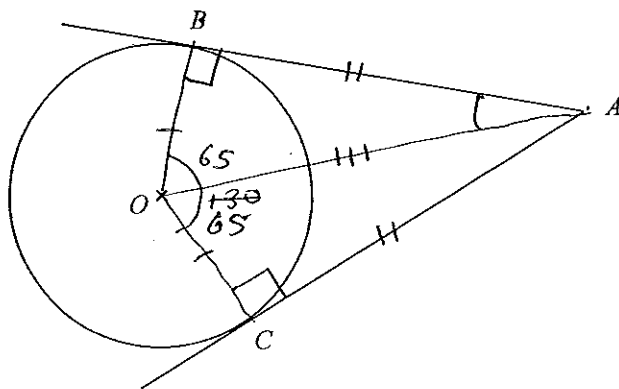


Diagram NOT accurately drawn

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 .

..... 25 $^\circ$

(4 marks)

5.

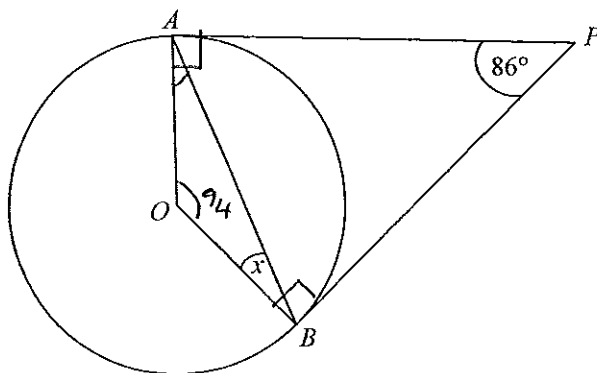


Diagram NOT accurately drawn

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 .

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

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

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

(3 marks)

6.

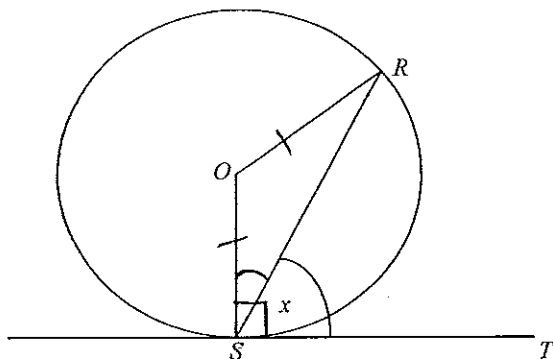


Diagram NOT accurately drawn

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

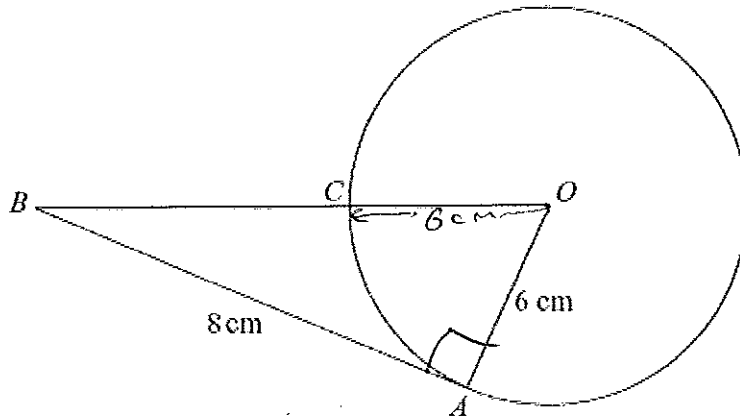
Prove that angle $ROS = 2x$.
 You must give reasons for each stage of your working.

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

(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.

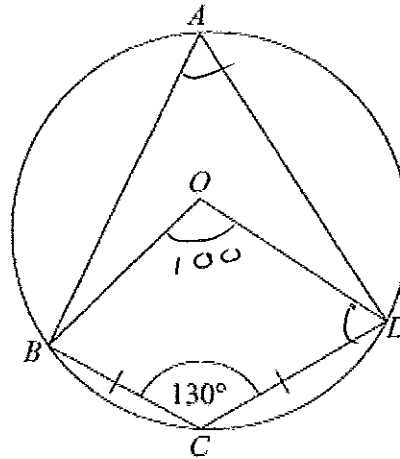


Diagram NOT accurately drawn

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.....
 (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)

$$\frac{360 - 100 - 130}{2} = 65$$

angles in quadrilateral
 add up to 180°

$$\angle BO = \angle DO$$

.....65.....
 (4)

(6 marks)

9.

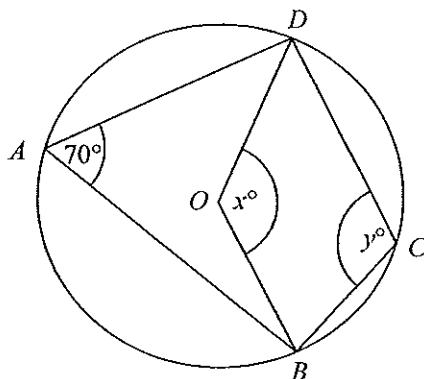


Diagram NOT accurately drawn

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 .

$$x = \underline{140}$$

(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 .

$$y = \underline{110}$$

(ii) Give a reason for your answer.

opposite angles in a cyclic quadrilateral add up to 180°

(2)

(4 marks)

10.

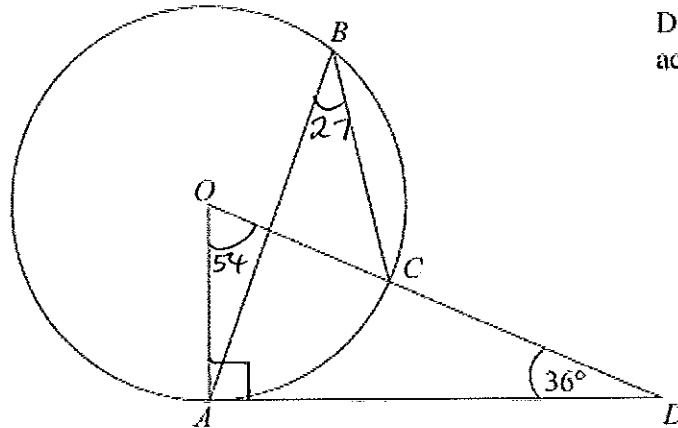


Diagram NOT accurately drawn

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.

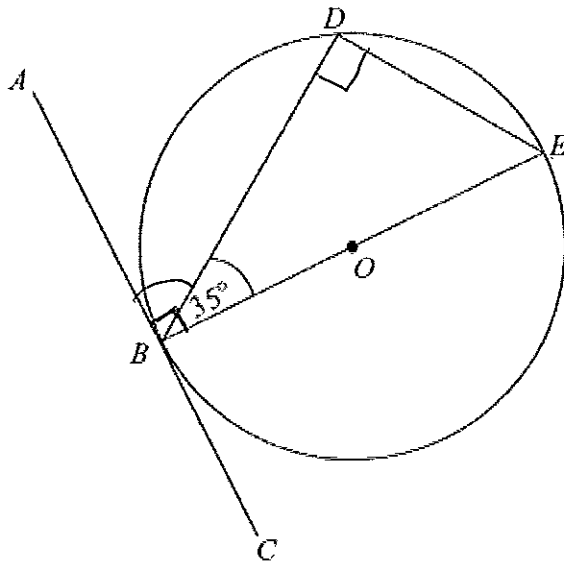


Diagram NOT
accurately drawn

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

(b) Find the size of angle DEB .

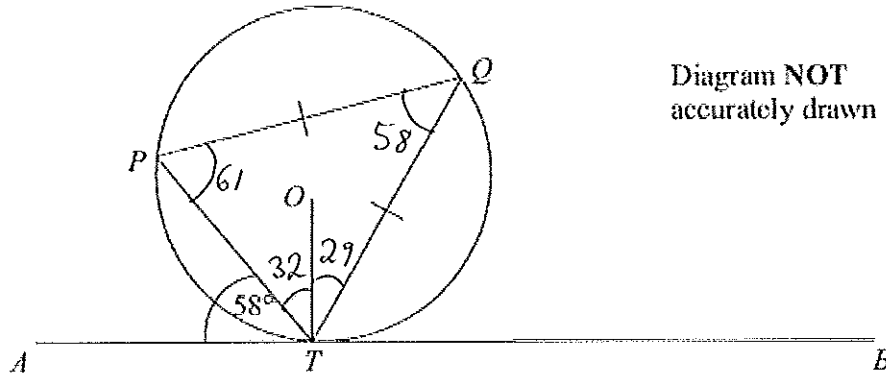
Give a reason for your answer.

Alternate segment theorem.

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

(4 marks)

12.



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.

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

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

$$90 - 58 = 32$$

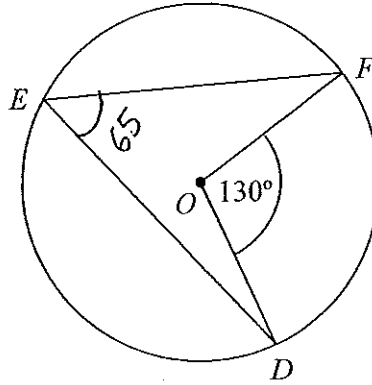
$$\hat{QPT} \text{ and } \hat{QTP} = 61^\circ \quad (\text{angles in triangle add to } 180, \text{ angles at base of isosceles triangle are equal})$$

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

.....29.....°

(4 marks)

13. (a)



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

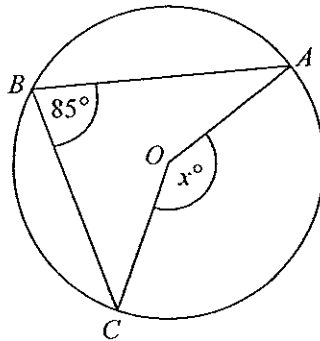
(i) Work out the size of angle DEF .

.....65..... $^\circ$

(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..... $^\circ$

(ii) Give a reason for your answer.

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

(2)

(4 marks)

*14.

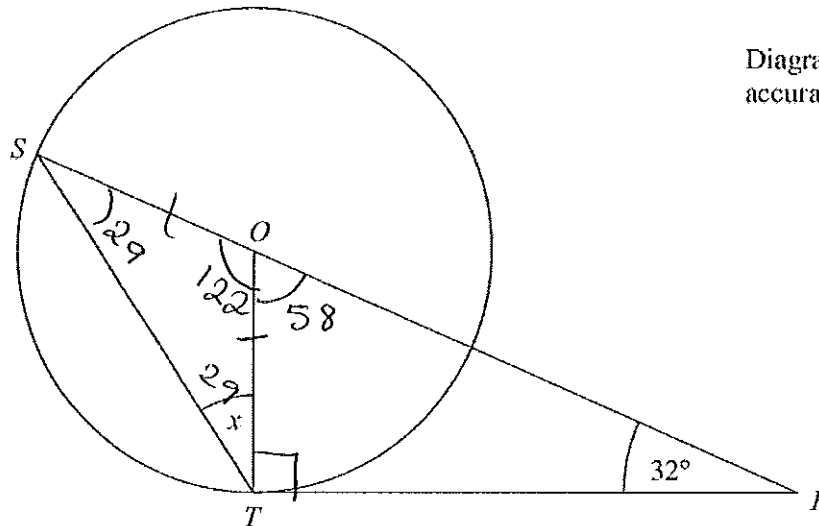


Diagram NOT
accurately drawn

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.

$$\begin{aligned} \hat{TOP} &= 58^\circ && \text{(Angles in a triangle add up to } 180^\circ) \\ \hat{OTP} &= 90^\circ && \text{(tangent meets radius)} \\ \hat{SOT} &= 122^\circ && \text{(angles on a straight line add up} \\ &&& \text{to } 180^\circ) \\ \hat{OTS} &= 29^\circ && \text{(angles at base of isosceles triangle are} \\ &&& \text{equal)} \end{aligned}$$

.....°

(Total 5 marks)