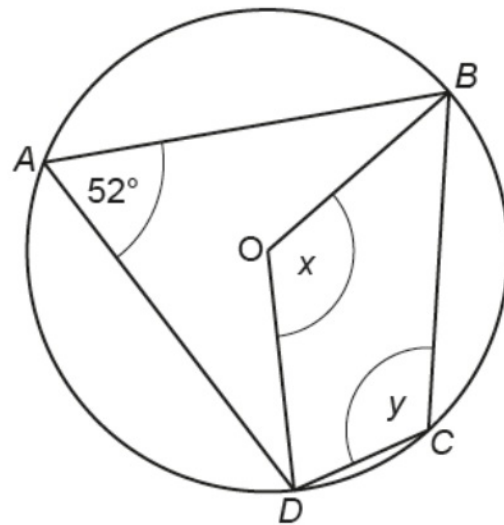


G63a Circle Theorems

OCR

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

Video created by W Neill



Not to scale

Angle BAD = 52° .

- (a) Work out angle x .
Give a reason for your answer.

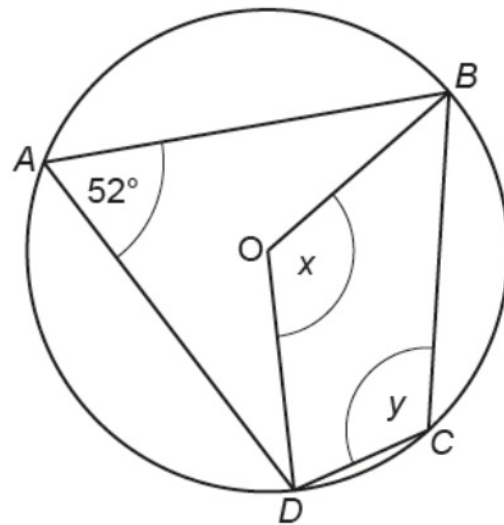
$x = \dots\dots\dots^\circ$ reason $\dots\dots\dots$

$\dots\dots\dots$ [2]

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

Video created by W Neill

G63a



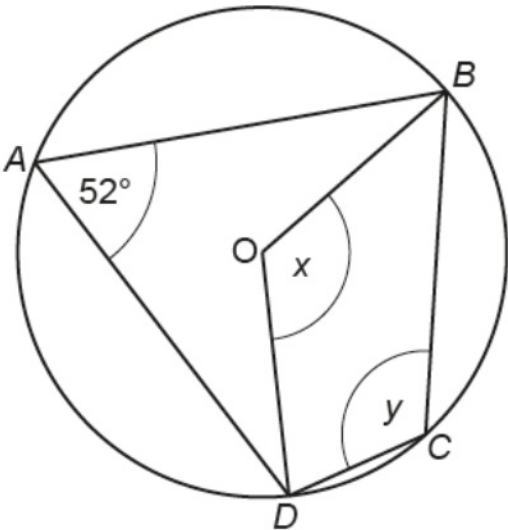
Not to scale

Angle BAD = 52° .

- (a) Work out angle x .
Give a reason for your answer.

$x = 104^\circ$ reason Angles at centre are double those at circumference. [2]

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

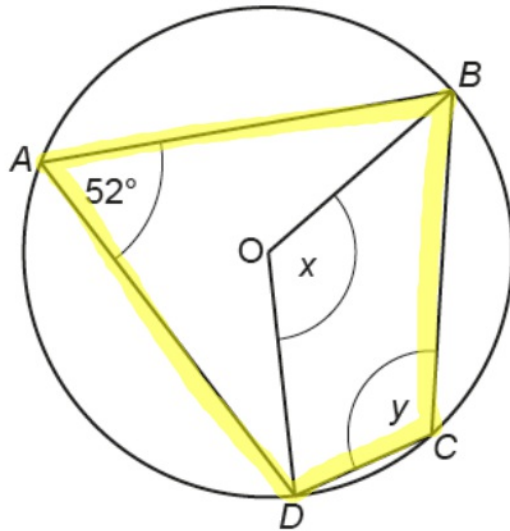


Not to scale

- (b) Work out angle y .
Give a reason for your answer.

$y = \dots\dots\dots^\circ$ reason $\dots\dots\dots$
 $\dots\dots\dots$ [2]

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



Not to scale

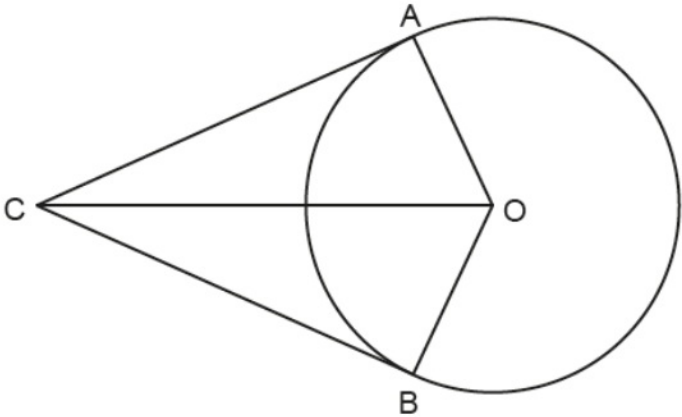
Opposites in a cyclic quadrilateral add to 180°
 $52 + y = 180^\circ$

- (b) Work out angle y .
Give a reason for your answer.

$y = 128$ $^\circ$ reason

..... [2]

13 A and B are points on the circumference of a circle, centre O.
CA and CB are tangents to the circle.



Not to scale

Prove that triangle OAC is congruent to triangle OBC.

.....

.....

.....

.....

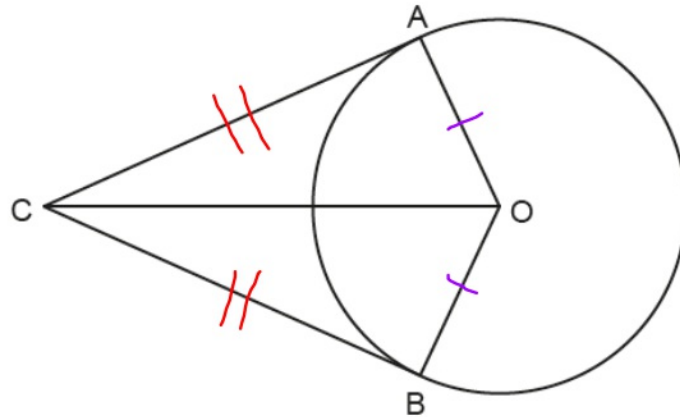
.....

..... [4]

13 A and B are points on the circumference of a circle, centre O.
CA and CB are tangents to the circle.

G51
G63a

SSS /
SAS
ASA
RHS



Not to scale

identical

Prove that triangle OAC is congruent to triangle OBC.

Prove SSS $AO = BO$... both radii

CO is common in both triangles

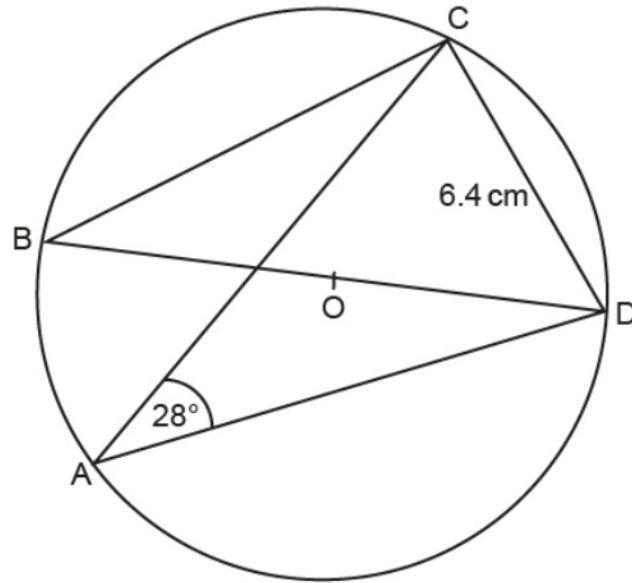
$CA = CB$ = Tangents to circle from same point

\therefore SSS, the two triangles are congruent.

[4]

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

Created by W Neill



Not to scale

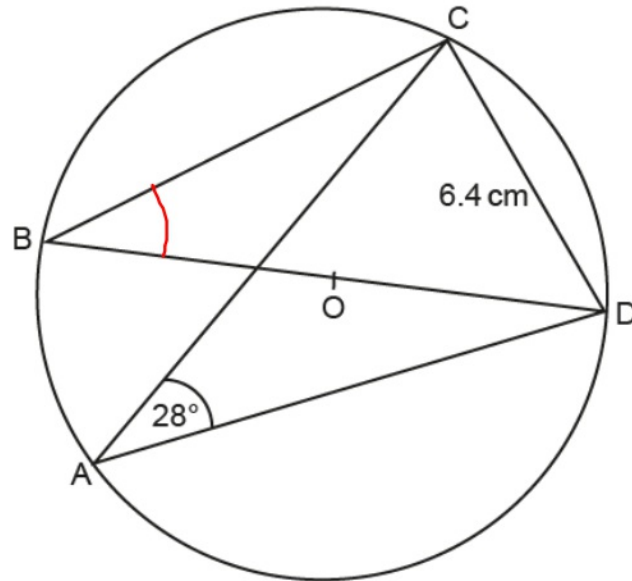
Angle CAD = 28° and CD = 6.4 cm.
BD is a diameter of the circle.

Calculate the area of the circle.

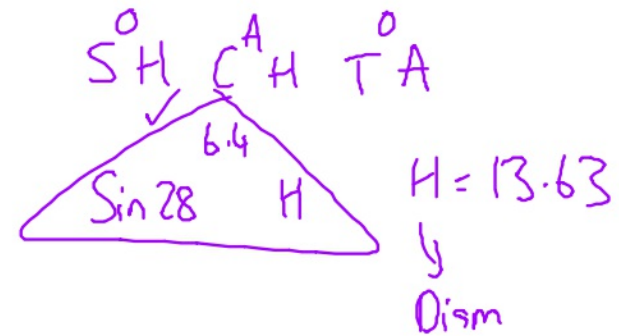
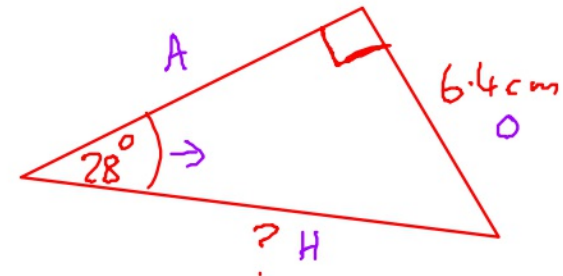
..... cm² [5]

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

Created by W Neill



Not to scale



Angle CAD = 28° and CD = 6.4 cm.
BD is a diameter of the circle.

Calculate the area of the circle.

$$R^2 \times \pi$$

$$\begin{aligned} \text{Area} &= R^2 \times \pi \\ &= 6.186^2 \times \pi \\ &= 146.0 \text{ cm}^2 \end{aligned}$$

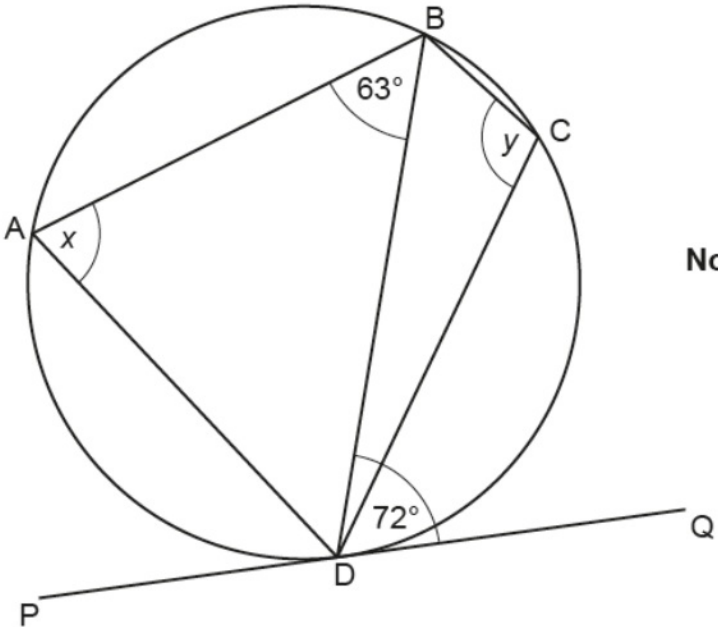
..... cm² [5]

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

G63A

PQ is a tangent to the circle at D.
Angle BDQ = 72° and angle ABD = 63° .

- (a) Work out angle x .
Give a reason for your answer.



Not to scale

Angle $x = \dots\dots\dots^\circ$ because $\dots\dots\dots$

$\dots\dots\dots$ [2]

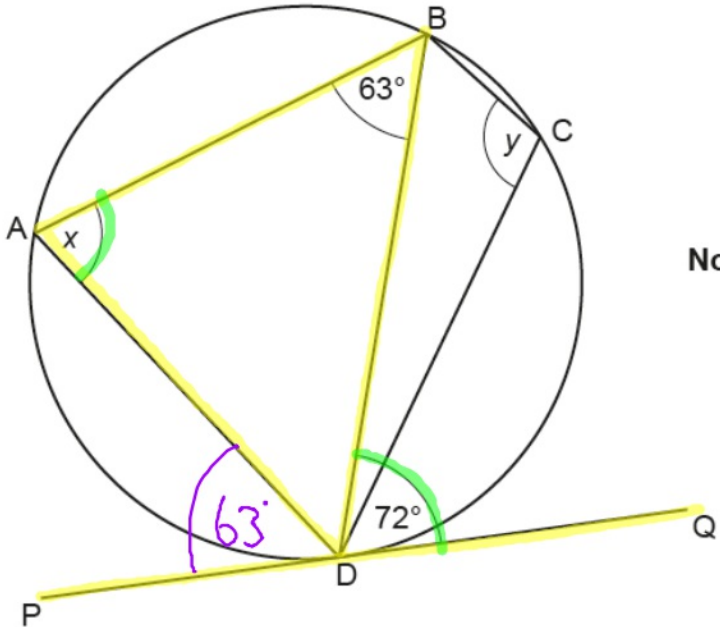
Created by W Neill

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

G63A

PQ is a tangent to the circle at D.
Angle $BDQ = 72^\circ$ and angle $ABD = 63^\circ$.

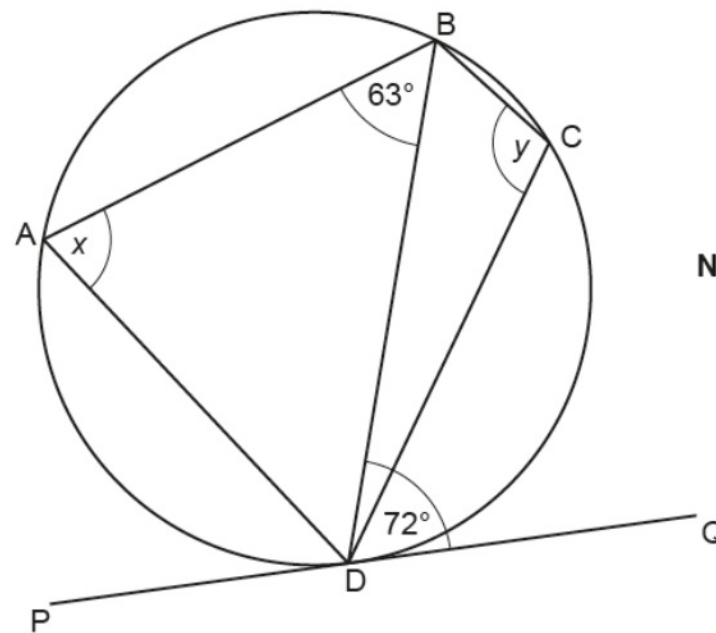
- (a) Work out angle x .
Give a reason for your answer.



Not to scale

Angle $x = 72^\circ$ because Alternate segment rule
..... [2]

Created by W Neill

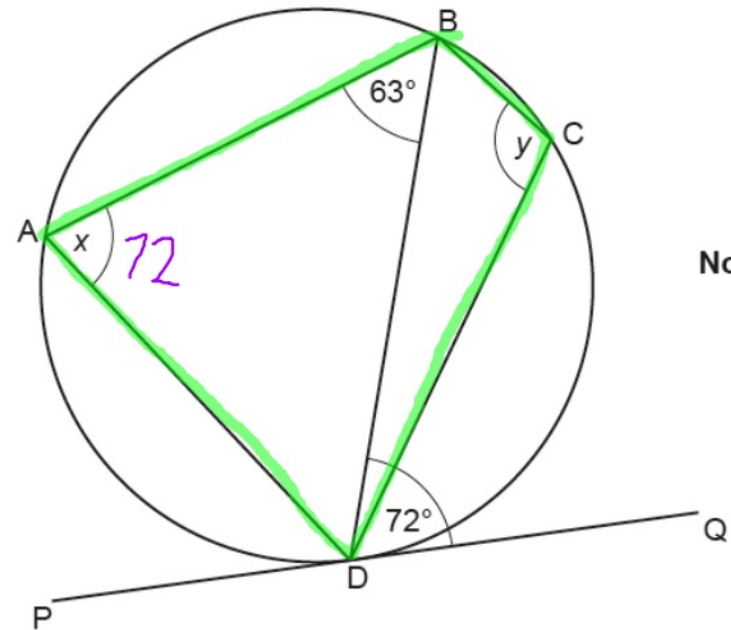


Not to scale

- (b) Work out angle y .
Give a reason for your answer.

Angle $y = \dots\dots\dots^\circ$ because $\dots\dots\dots$

Created by W Neill



Not to scale

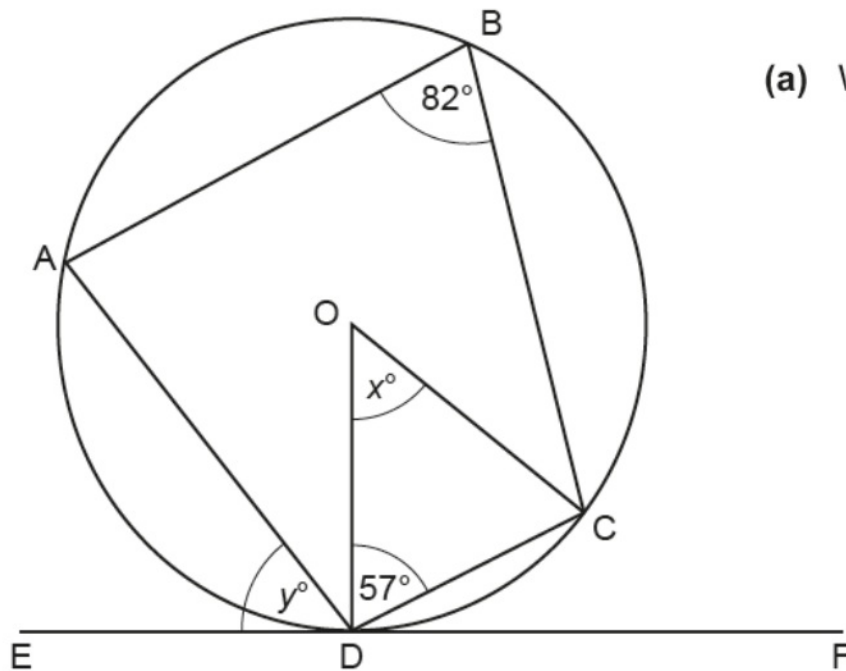
- (b) Work out angle y .
Give a reason for your answer.

opposite sides of a cyclic quadrilateral
add to 180° ... $72 + 108 = 180^\circ$ ✓

Angle $y = 108$ ° because

19 The diagram shows a circle, centre O.

G63a Points A, B, C and D lie on the circumference of the circle.
EDF is a tangent to the circle.
Angle ABC = 82° and angle ODC = 57° .



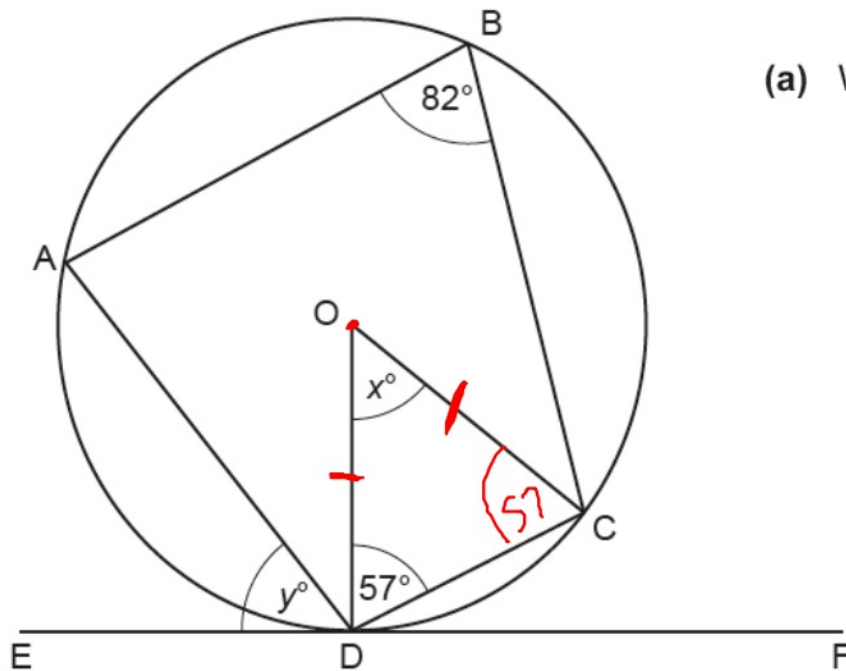
(a) Work out the value of x .

Not to scale

(a) $x = \dots\dots\dots$ [2]

19 The diagram shows a circle, centre O.

G63a Points A, B, C and D lie on the circumference of the circle.
 EDF is a tangent to the circle.
 Angle ABC = 82° and angle ODC = 57° .



(a) Work out the value of x .

Not to scale

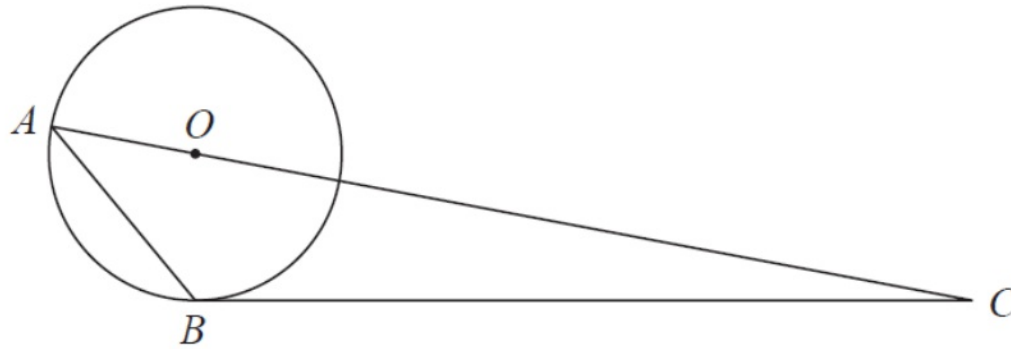
$$x = \frac{57 + 57}{114} \\ 180 - 114$$

(a) $x = \dots\dots\dots 66^\circ \checkmark$ [2]

11

G63a/b

Video created by W Neill



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

BC is a tangent to the circle.

AOC is a straight line.

Angle $ABO = x^\circ$.

Find the size of angle ACB , in terms of x .

Give your answer in its simplest form.

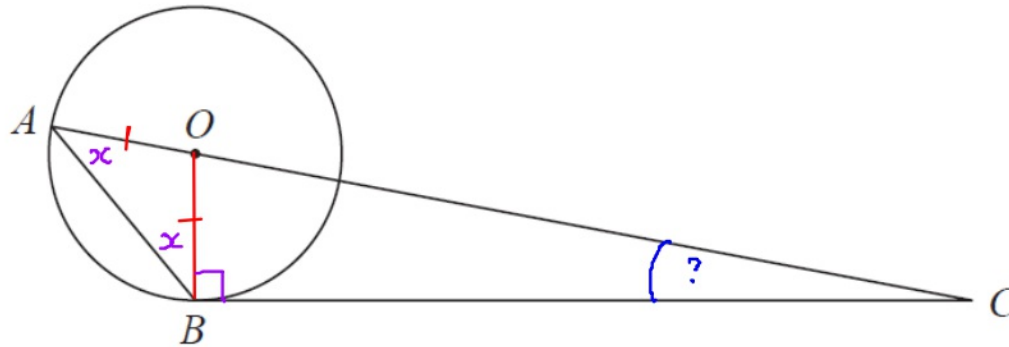
Give reasons for each stage of your working.

(Total for Question 11 is 5 marks)

11

G63a/b

Video created by W Neill



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

BC is a tangent to the circle.

AOC is a straight line.

Angle $ABO = x^\circ$.

Find the size of angle ACB , in terms of x .

Give your answer in its simplest form.

Give reasons for each stage of your working.

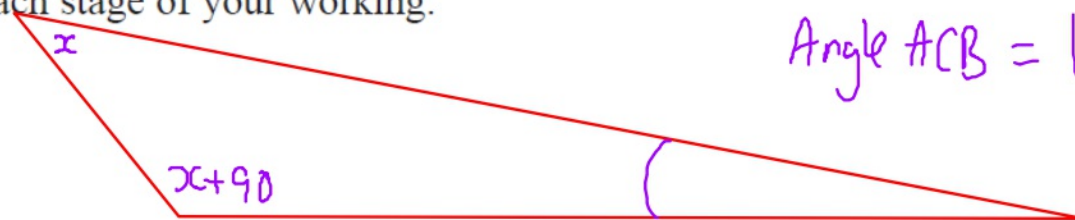
Triangle AOB is isosceles as OB and AO are both radii

angle $OBC = 90^\circ$ as a tangent meets a Radius at 90°

$180 - 90$

$$\text{Angle } ACB = 180 - (x + x + 90)$$

$$90 - 2x \checkmark$$

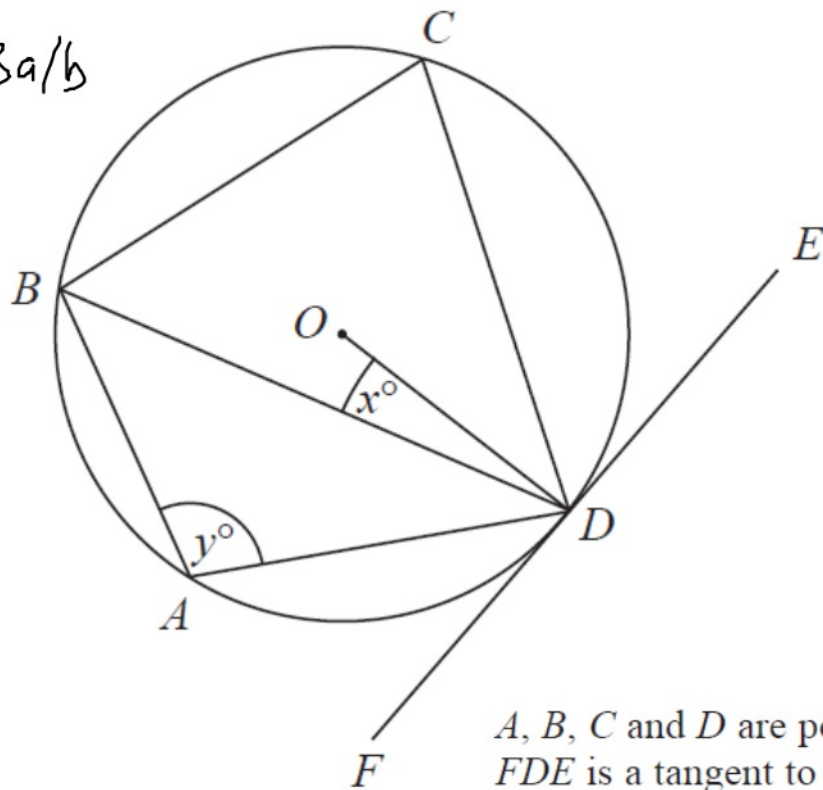


(Total for Question 11 is 5 marks)

Edexcel

13

G63a/b



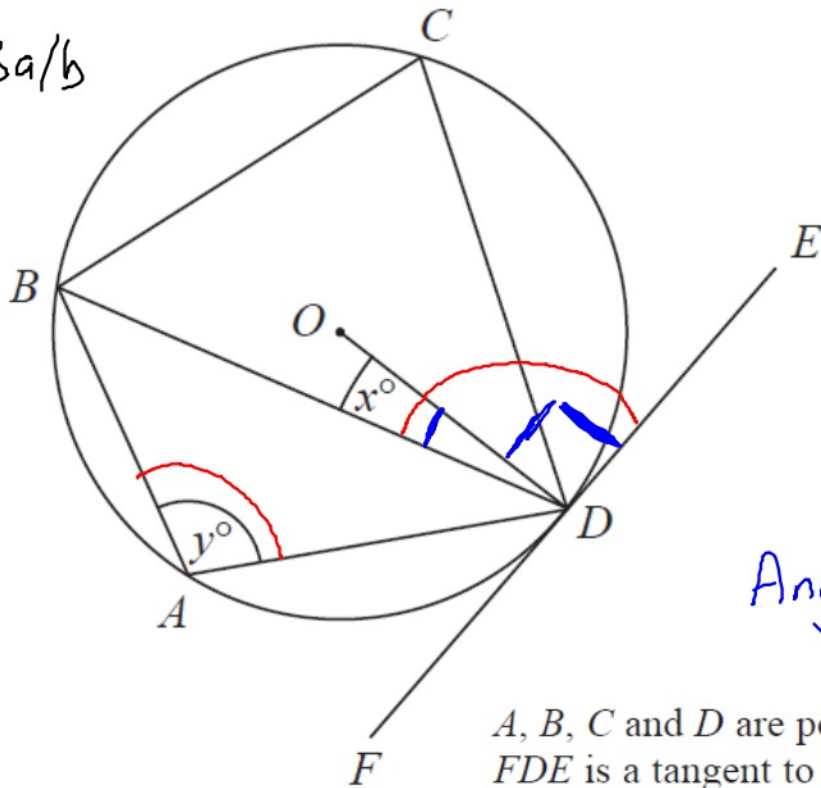
A, B, C and D are points on the circumference of a circle, centre O .
 FDE is a tangent to the circle.

(a) Show that $y - x = 90$

You must give a reason for each stage of your working.

13

G63a/b



$$\text{Angle BDE} = y^\circ$$

because of Alternate Segment rule

$$\text{Angle ODE} = 90^\circ$$

tangents meet radii at 90°

$$\text{Angle BDE} - x = 90^\circ$$

$$y - x = 90^\circ$$

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

(a) Show that $y - x = 90$

You must give a reason for each stage of your working.

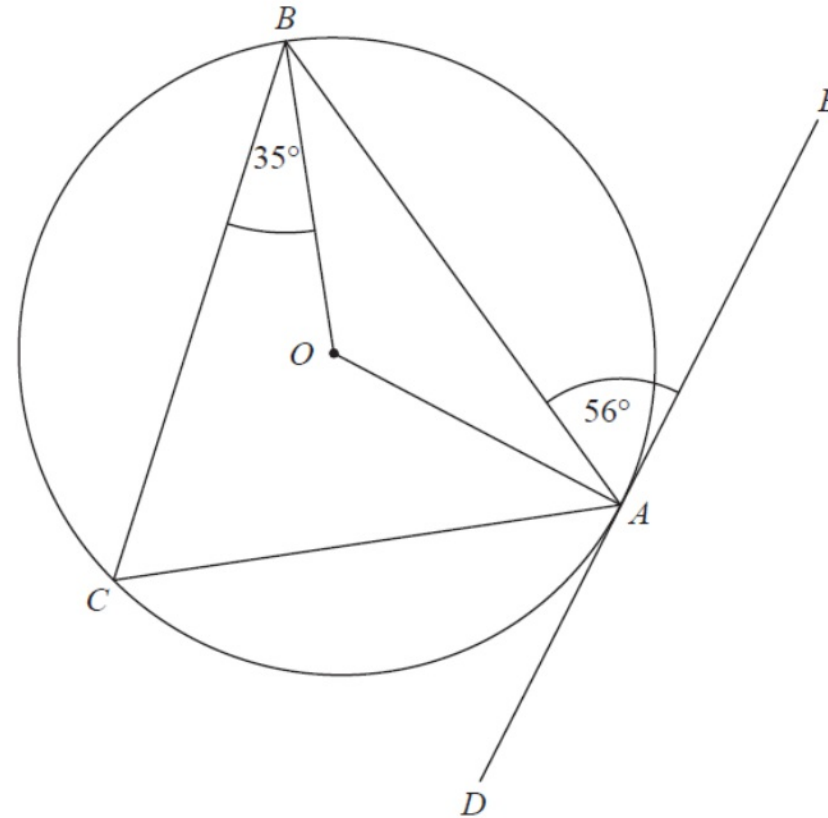
- 12 A , B and C are points on the circumference of a circle, centre O .
 DAE is the tangent to the circle at A .

G63a

Angle $BAE = 56^\circ$

Angle $CBO = 35^\circ$

Work out the size of angle CAO .
You must show all your working.



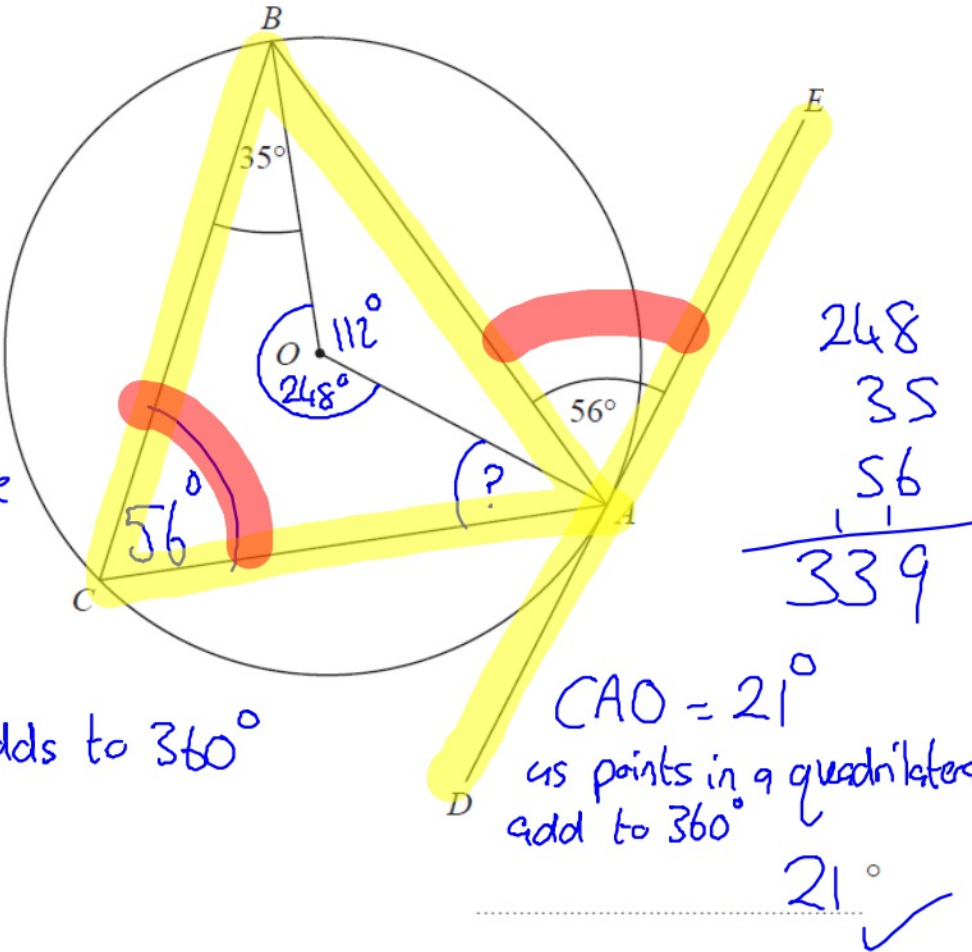
.....
(Total for Question 12 is 3 marks)

12 A, B and C are points on the circumference of a circle, centre O.
DAE is the tangent to the circle at A.

G63a

Angle BAE = 56°
Angle CBO = 35°

Work out the size of angle CAO.
You must show all your working.



Angle ACB = 56° ... alternate segment rule

Angle AOB = 112° ... as angle at centre is double angle at circumference

Other angle AOB = 248° as a point adds to 360°

248
35
56

339

CAO = 21°
as points in a quadrilateral add to 360°
21° ✓

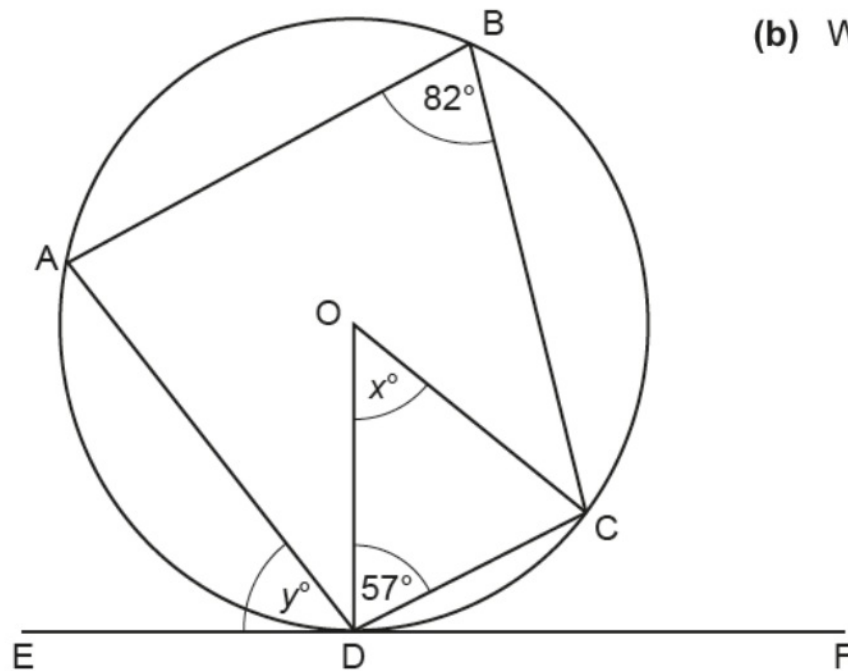
(Total for Question 12 is 3 marks)

19 The diagram shows a circle, centre O.

G63a

Points A, B, C and D lie on the circumference of the circle.
EDF is a tangent to the circle.

Angle ABC = 82° and angle ODC = 57° .



(b) Work out the value of y .

Not to scale

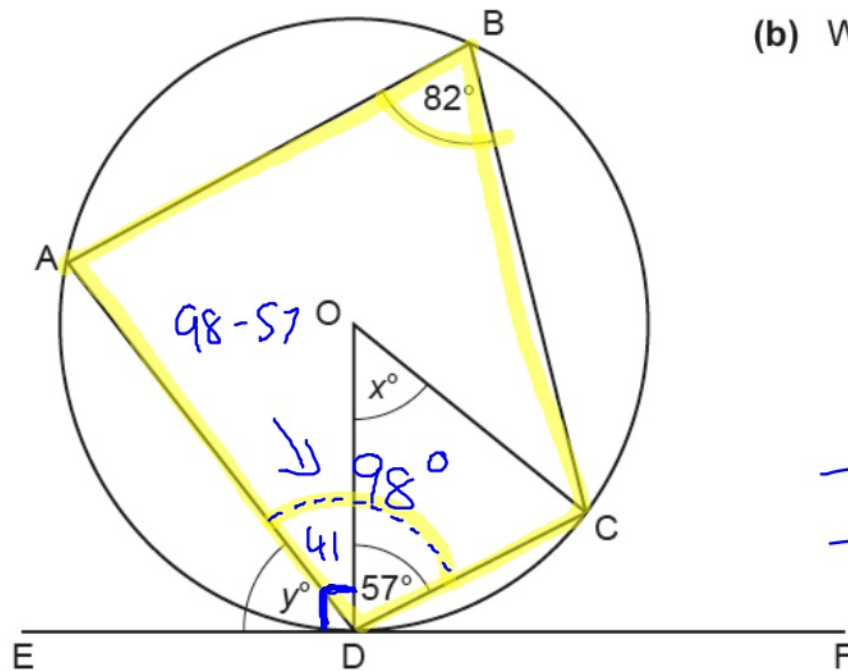
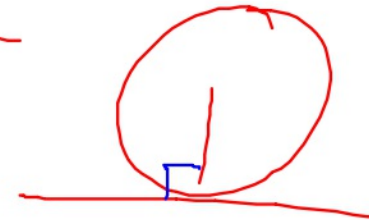
(b) $y = \dots\dots\dots$ [3]

19 The diagram shows a circle, centre O.

G63a

Points A, B, C and D lie on the circumference of the circle.
EDF is a tangent to the circle.

Angle ABC = 82° and angle ODC = 57° .



(b) Work out the value of y .

Not to scale

$$\begin{array}{r} 98 \\ - 57 \\ \hline 41 \end{array}$$

$$\begin{aligned} 180 - 82^\circ \\ = 98^\circ \end{aligned}$$

$$\begin{aligned} y + 41 &= 90^\circ \\ y &= 49 \end{aligned}$$

(b) $y = \dots\dots\dots y = 49 \checkmark$ [3]

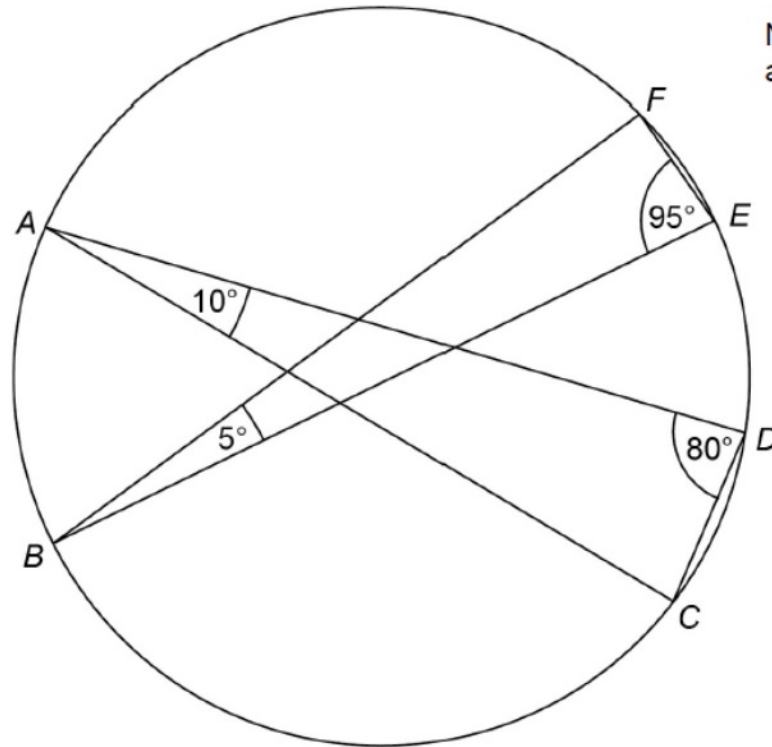
AQA

12

A, B, C, D, E and F are points on a circle.

Video created by W Neill

G63a



Circle the line that is a diameter of the circle.

[1 mark]

BE

AD

AC

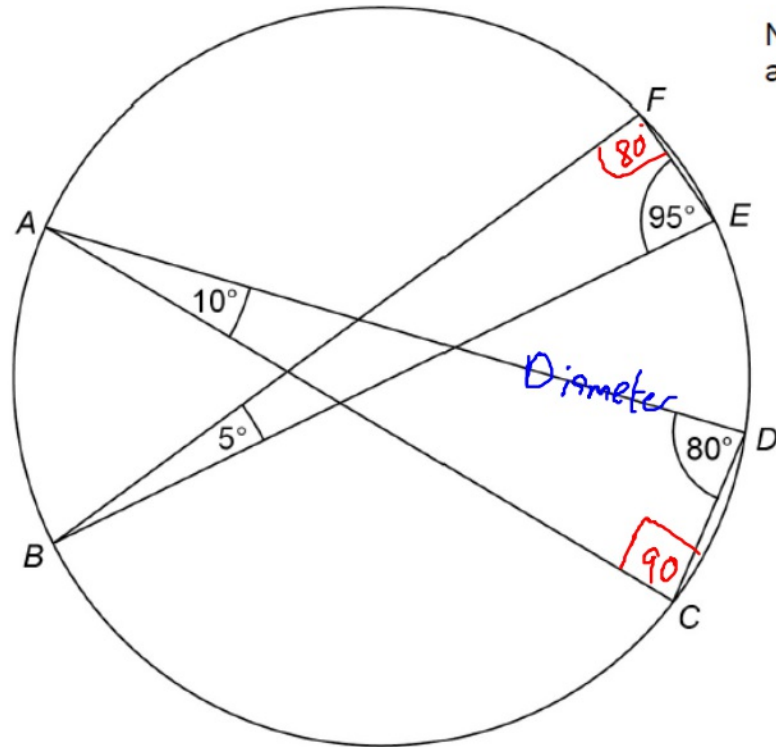
BF

12

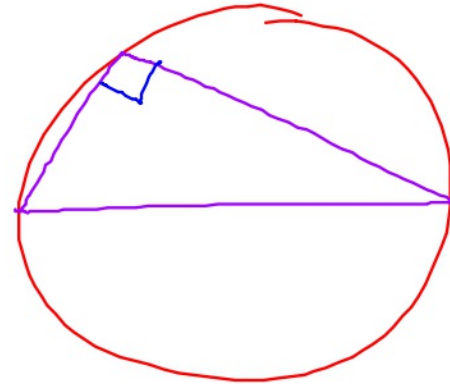
A, B, C, D, E and F are points on a circle.

Video created by W Neill

G63a



Not drawn accurately



Circle the line that is a diameter of the circle.

BE

AD

AC

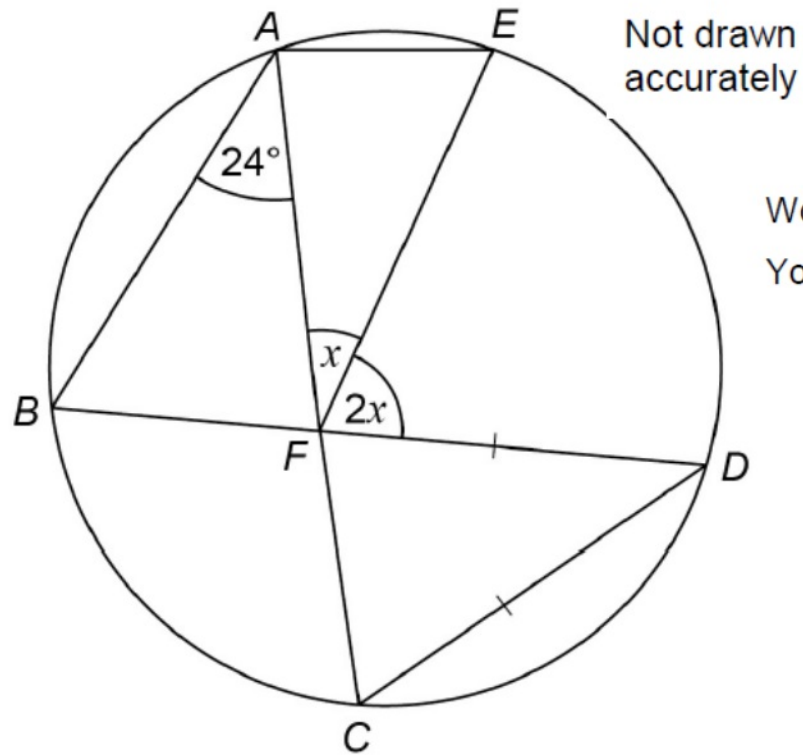
BF

[1 mark]

19 A, B, C, D and E are points on a circle.

G63a BFD and AFC are straight lines.

A16 DC = DF



Work out the size of angle x .

You **must** show your working which may be on the diagram.

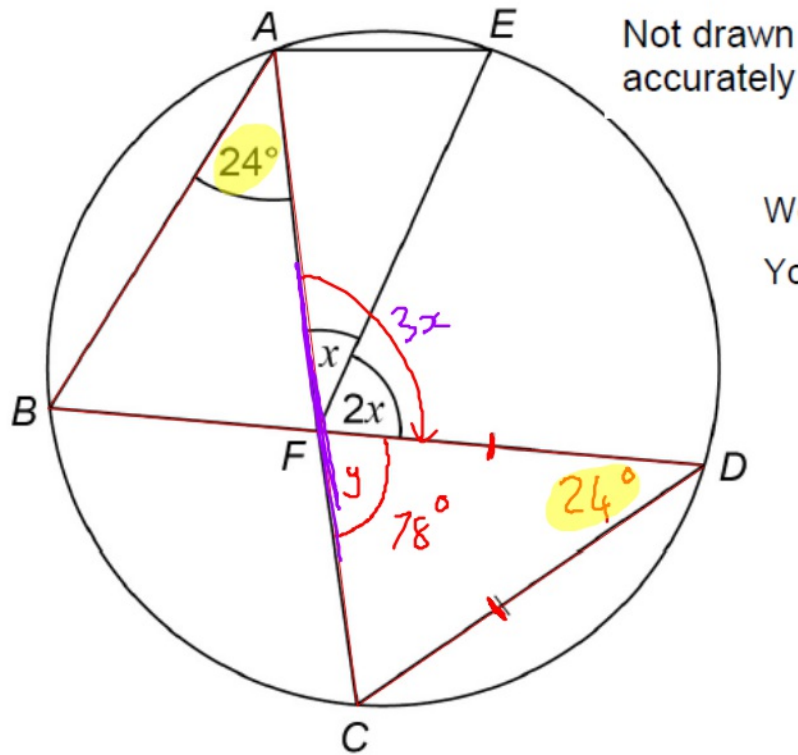
[4 marks]

Answer _____ degrees

19 A, B, C, D and E are points on a circle.

G63a BFD and AFC are straight lines.

A16 DC = DF



Work out the size of angle x .

You **must** show your working which may be on the diagram.

[4 marks]

$$y^\circ = (180^\circ - 24^\circ) \div 2$$

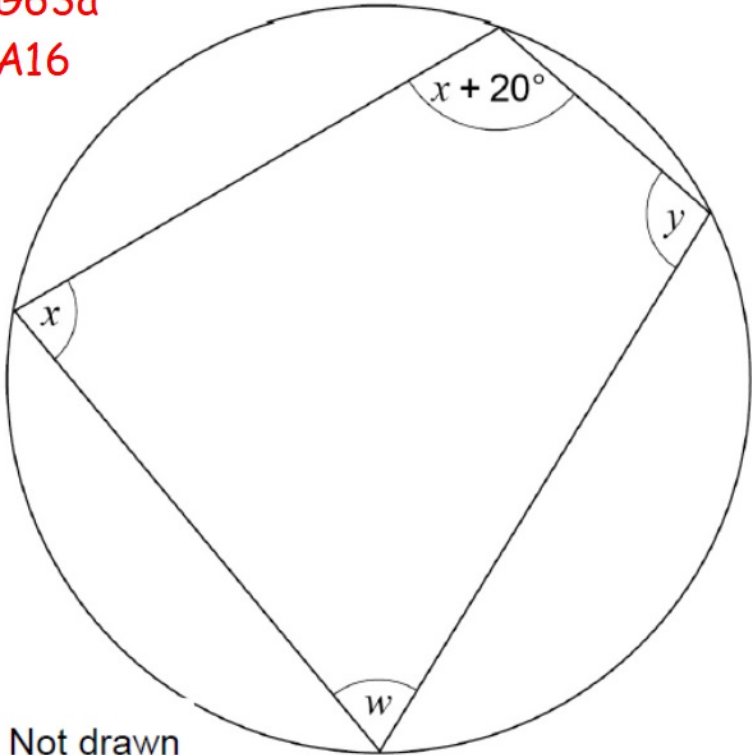
$$3x + 78^\circ = 180^\circ$$

$$\div 3 \left(\begin{array}{l} 3x = 102^\circ \\ x = 34^\circ \end{array} \right) \div 3$$

Answer 34 degrees ✓

24 Here is a cyclic quadrilateral.

G63a
A16



Not drawn accurately

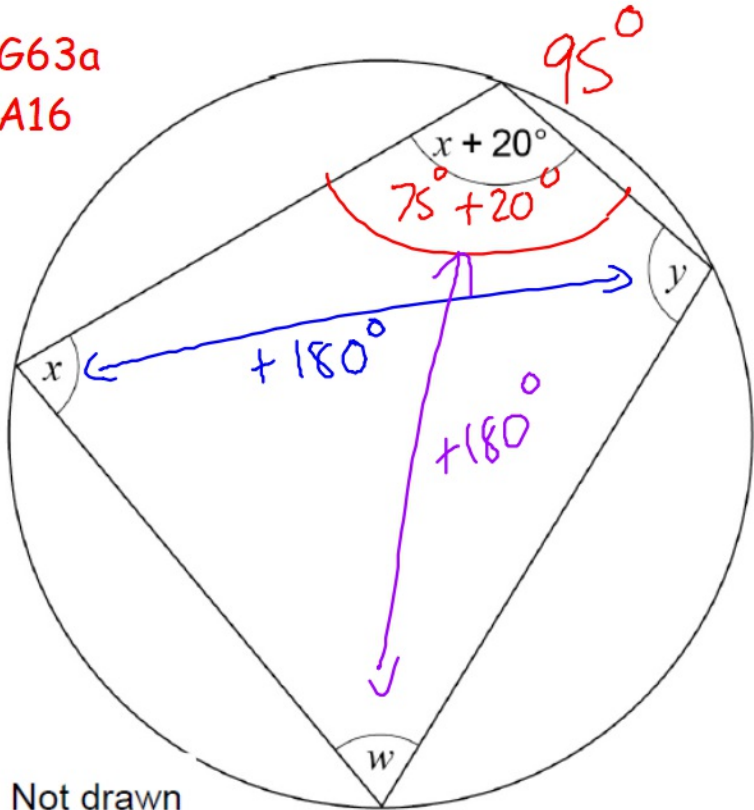
$$x : y = 5 : 7$$

Work out the size of angle w . [4 marks]

Answer _____ degrees

24 Here is a cyclic quadrilateral.

G63a
A16



Not drawn accurately

$x : y = 5 : 7$

Work out the size of angle w . [4 marks]

$180^\circ = 12 \text{ parts}$
 $15^\circ = 1 \text{ part}$

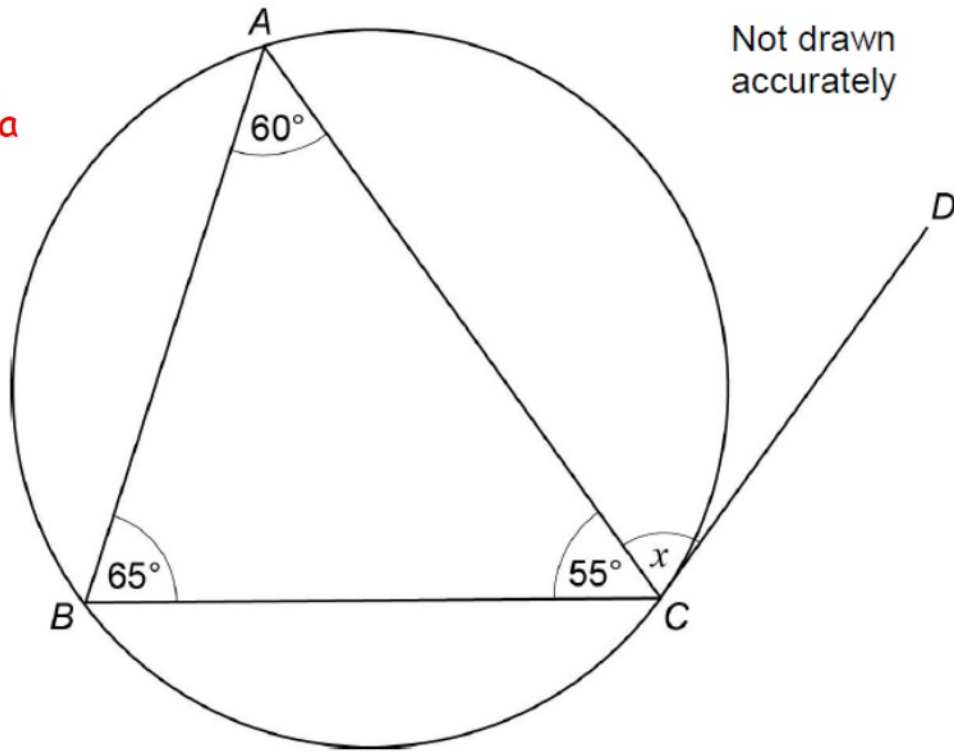
$x : y$
 $5 : 7$
 $\swarrow \quad \searrow$
 $75 \quad 105$
 $x = 75^\circ$

$95 + \square = 180^\circ$

Answer 85 degrees ✓

19

G63a



A , B and C are points on a circle.
 CD is a tangent to the circle.

Write down the size of angle x .
Give a reason for your answer.

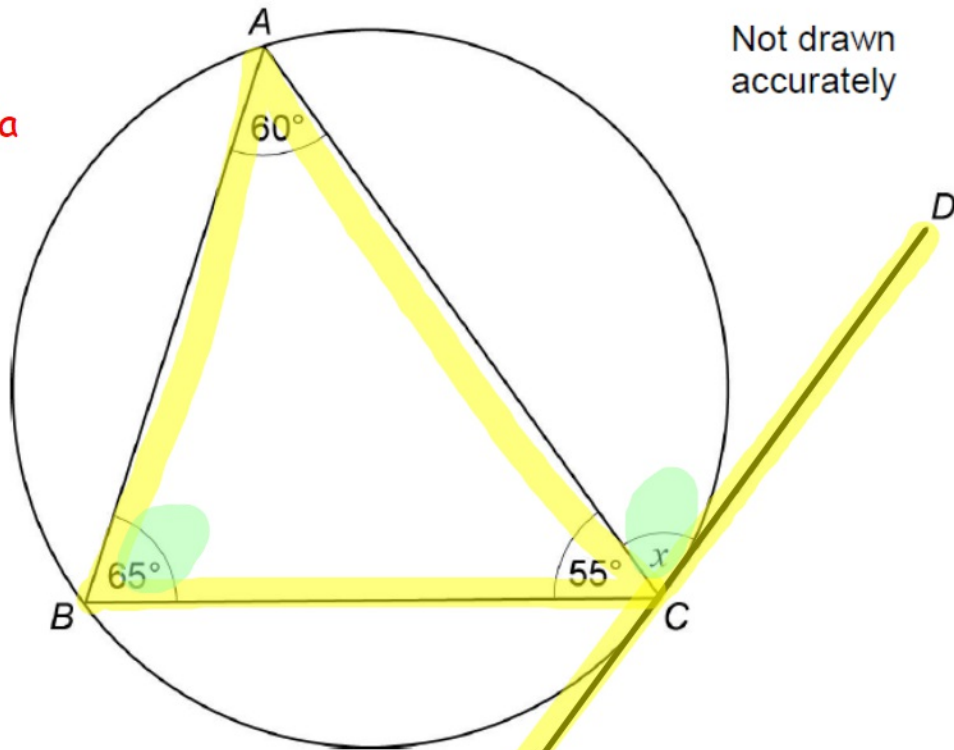
[2 marks]

Answer _____ degrees

Reason _____

19

G63a



A , B and C are points on a circle.
 CD is a tangent to the circle.

Write down the size of angle x .
Give a reason for your answer.

[2 marks]

Answer 65° degrees

Reason

Alternate segment rule ✓

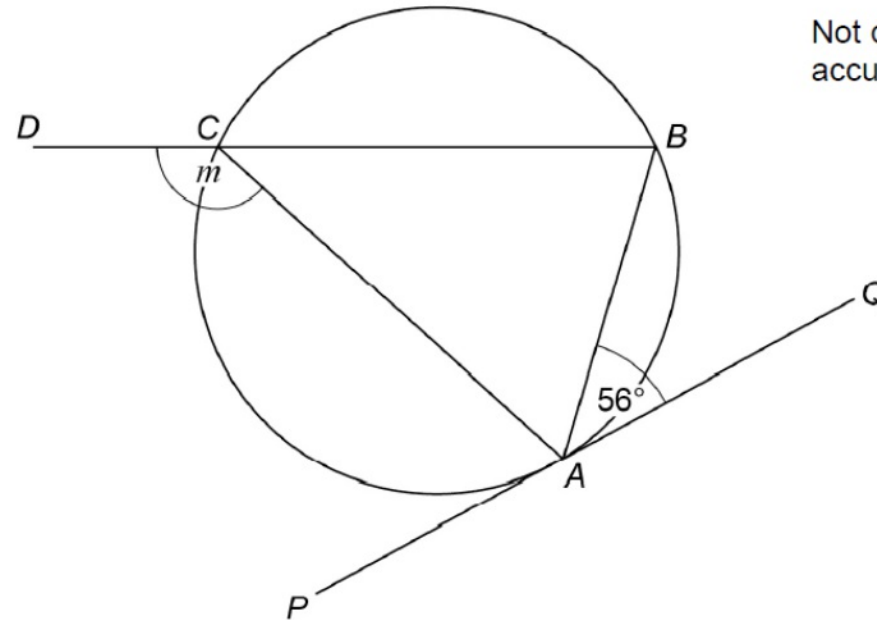
22

A , B and C are points on a circle.

DCB is a straight line.

G63a

PAQ is a tangent to the circle.



fill

Not drawn
accurately

Sam is trying to work out the size of angle m .

Here is his working.

$$\text{angle } ACB = 56^\circ$$

angles in the same segment are equal

$$m = 180^\circ - 56^\circ$$

angles at a point on a straight line add up to 180°

$$m = 124^\circ$$

Make a criticism of his working.

[1 mark]

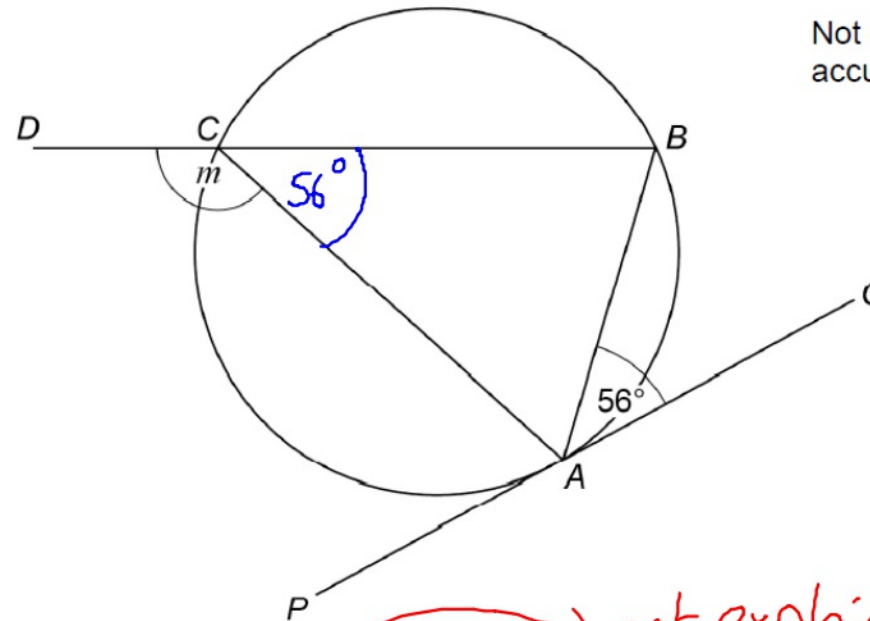
22

A , B and C are points on a circle.

DCB is a straight line.

G63a

PAQ is a tangent to the circle.



ell

Not drawn
accurately

Sam is trying to work out the size of angle m .

Here is his working.

$$\text{angle } ACB = 56^\circ$$

$$m = 180^\circ - 56^\circ$$

$$m = 124^\circ$$

angles in the same segment are equal \times

angles at a point on a straight line add up to 180°

not explained well
should have said...
alternate segment
rule.

Make a criticism of his working.

[1 mark]

20

P, Q, R and S are points on a circle.

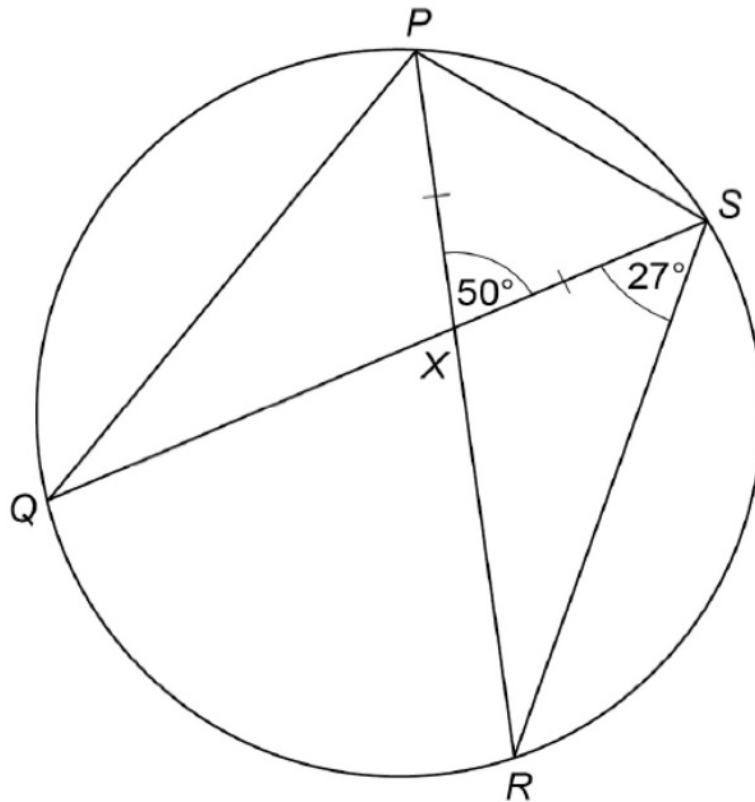
PXR and QXS are straight lines.

G63a $PX = SX$

Prove that QS is **not** a diameter of the circle.

[4 marks]

Not drawn
accurately



20

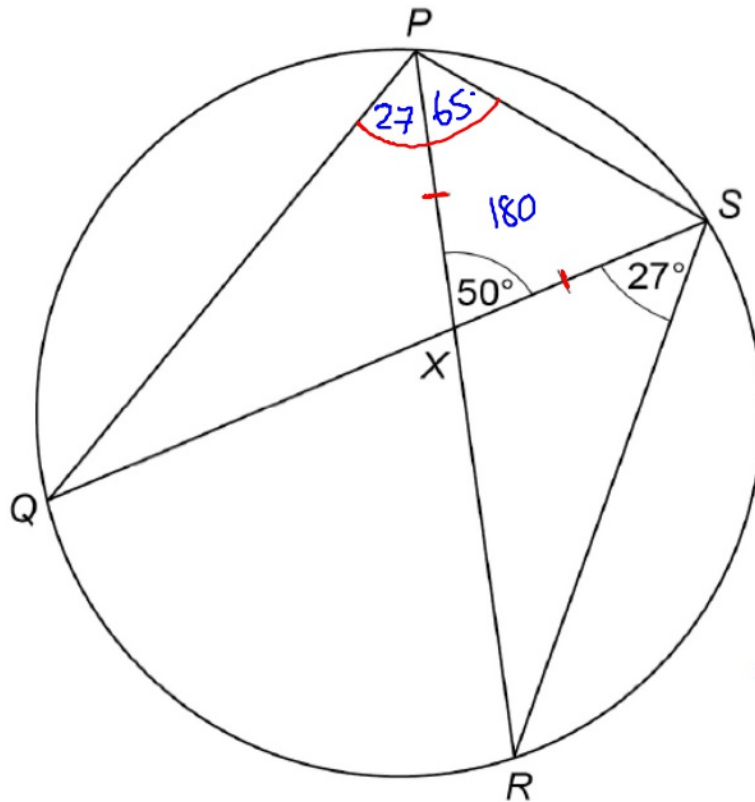
P, Q, R and S are points on a circle.

PXR and QXS are straight lines.

G63a

$PX = SX$

Not drawn accurately



Prove that QS is **not** a diameter of the circle.

[4 marks]

Angle $QPX = 27^\circ$
reason... angles that originate from the same points are equal

Angle $SPX = 65^\circ$ base angles in an Isosceles are equal

Angle $QPS = 65$
 $+ 27$

 92° \therefore this is not a right angle and QS can't be diameter.