EXAM PAPERS PRACTICE

GCSE OCR Math J560

Circle Theorem

Answers

"We will help you to achieve A Star "

Answer 1

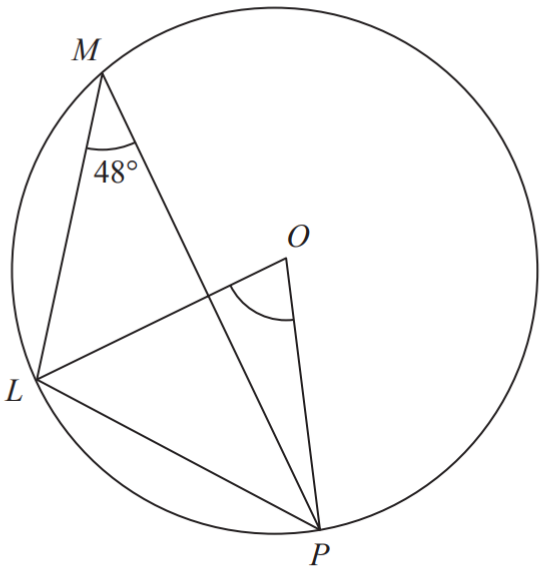


Diagram **NOT** accurately drawn

L, M and P are points on a circle, centre O
Angle $LMP = 48°$

(i) Write down the size of angle LOP

96 °

(ii) Give a reason for your answer.

Angle at the centre is twice the angle at the circumference

Answer 2

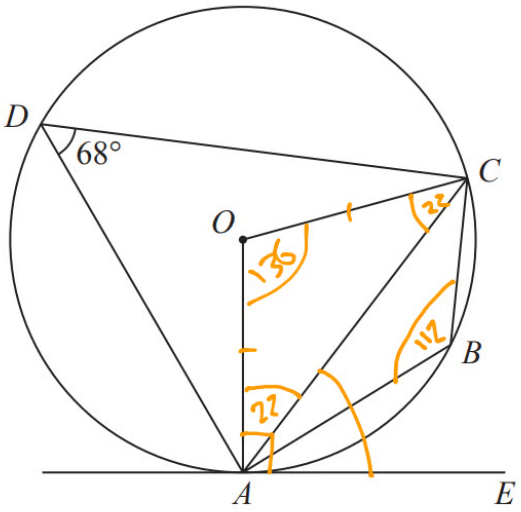


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle, centre O.
AE is a tangent to the circle.
Angle $ADC = 68°$

(a) (i) Find the size of angle ABC.

$180 - 68 = 112°$

112 °

(ii) Give a reason for your answer.

Opposite angles in a cyclic quadrilateral sum to 180 degrees

Answer 3

(c) Find the size of angle CAE.

$90 - 22 = 68$

68 °

Answer 4

(b) (i) Find the size of angle EDH. (4)

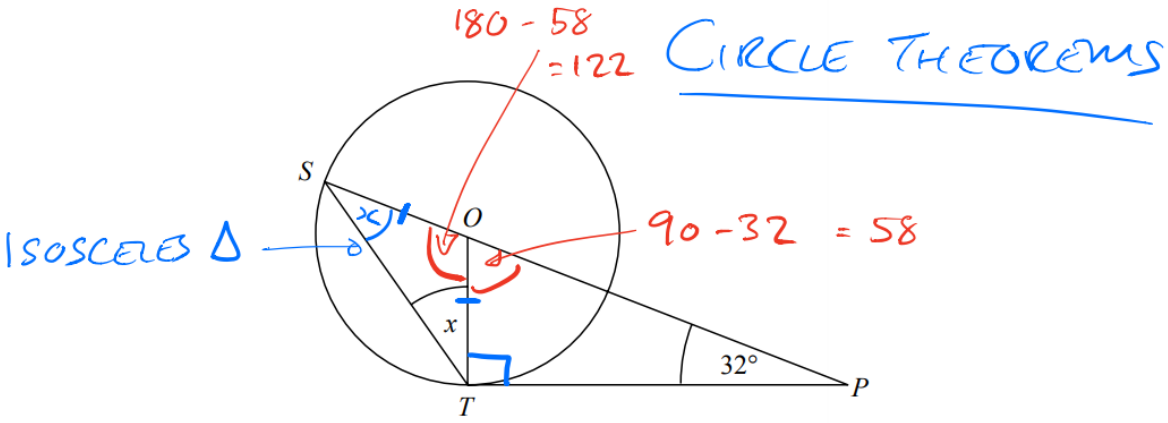
Cycliclic quadrialteral GHDE

113 °

(ii) Give a reason for your answer.

Opposite angles in a cyclic quadrilateral sum to 180 degrees

Answer 5



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 $OPT = 32°$

→ RADIUS AND TANGENT MEET AT 90°

Work out the size of the angle marked x.
You must give a reason for each stage of your working.

$\hat{TOP} = 90 - 32$ (RADIUS AND TANGENT MEET AT 90°)
$= 58°$

$\hat{SOT} = 180 - 58$ (ANGLES ON A STRAIGHT LINE ADD TO 180°)
$= 122°$

$2x + 122 = 180$ (ISOSCELES TRIANGLE)
$-122 \quad -122$

$\frac{2x}{2} = \frac{58}{2}$

$x = 29°$

Answer 6

CIRCLE THEOREMS

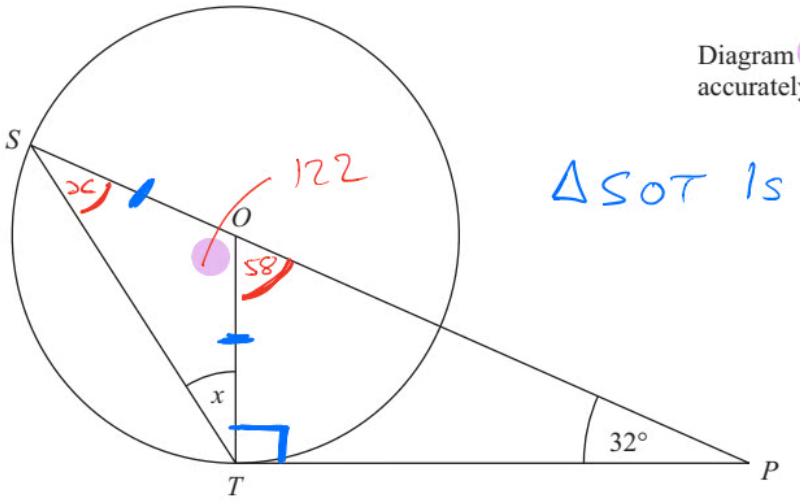


Diagram **NOT** accurately drawn

ΔSOT IS ISOSCELES

S and T are points on the circumference of a circle, centre O.
PT is a tangent to the circle. — TANGENT AND RADIUS MEET AT 90°
SOP is a straight line.

Angle $OPT = 32°$

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

$\hat{TOP} = 90 - 32 = 58°$

$\hat{SOT} = 180 - 58 = 122°$ (STRAIGHT LINE)

$x = \frac{1}{2}(180 - 122)$ (ISOSCELES Δ)

$= 29°$

Answer 7

CIRCLE THEOREMS

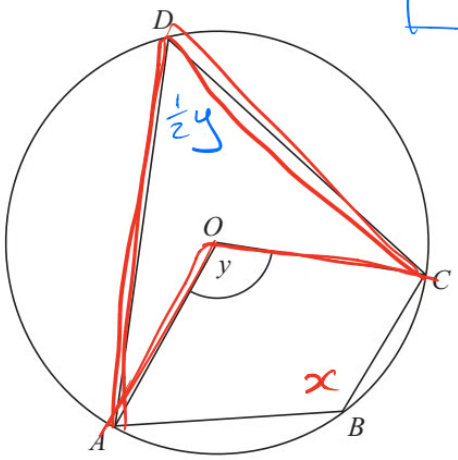


Diagram **NOT** accurately drawn

ANGLE AT CENTRE IS TWICE ANGLE AT CIRCUMFERENCE

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

Angle $AOC = y$.

Find the size of angle ABC in terms of y.
Give a reason for each stage of your working.

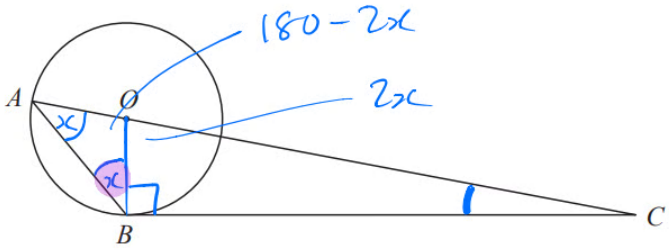
CYCLIC QUAD

OPPOSITE ANGLES ADD TO 180°

$A\hat{D}C = \frac{1}{2}y$ (ANGLE AT CENTRE)

$A\hat{B}C = 180 - \frac{1}{2}y$ (CYCLIC QUADRILATERAL)

Answer 8



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

BC is a tangent to the circle. — RADIUS & TANGENT MEET AT 90°
AOC is a straight line.
Angle $ABO = x°$.

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.

$\hat{OAB} = x$ (ISOSCELES △)

$\hat{AOB} = 180 - 2x$ (ANGLES IN A △)

$\hat{BOC} = 2x$ (ANGLES ON A STRAIGHT LINE)

$\hat{ACB} = 90 - 2x$ (OBC = 90 AS RADIUS AND TANGENT MEET AT 90°)

Answer 9

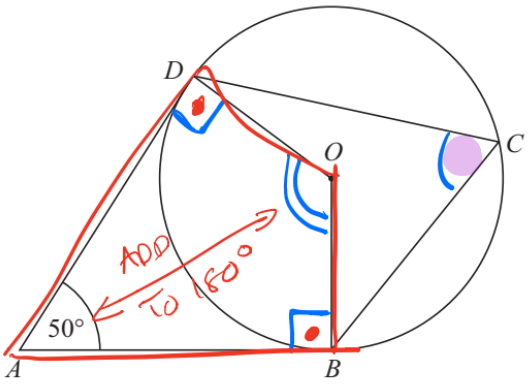


Diagram **NOT** accurately drawn

ANGLE AT CENTRE = 2x ANGLE AT CIRCUMFERENCE

B, *C* and *D* are points on the circumference of a circle, centre *O*.
AB and *AD* are tangents to the circle.

RADIUS + TANGENT MEET AT 90°

Angle *DAB* = 50°

Work out the size of angle *BCD*.
Give a reason for each stage in your working.

$D\hat{O}B = 180 - 50$

$= 130°$

ANGLES IN QUAD ADD TO 360°

$B\hat{C}D = \frac{1}{2} \times D\hat{O}B$

$= \frac{1}{2} \times 130$

$= 65°$

Answer 10

CIRCLE THEOREMS

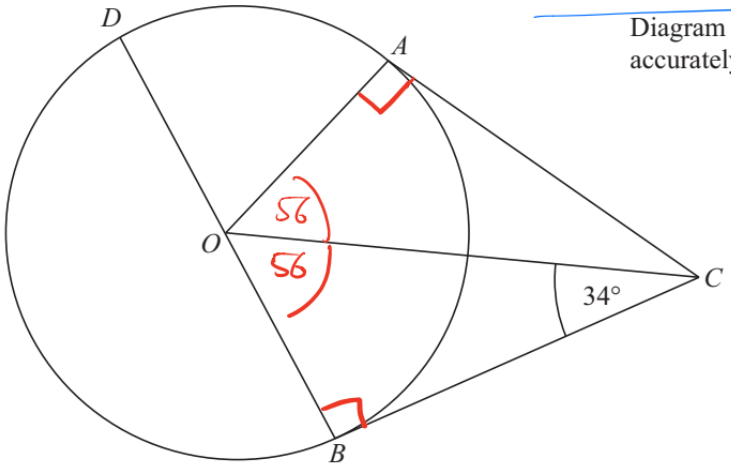


Diagram **NOT** accurately drawn

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 $OCB = 34°$.

TANGENT AND RADIUS MEET AT 90°

Work out the size of angle DOA.

$B\hat{O}C = 90 - 34$

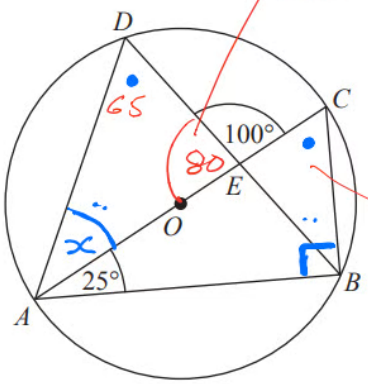
$= 56°$

So $A\hat{O}C = 56°$ (KITE SO SYMMETRICAL)

$D\hat{O}A = 180 - 56 - 56$

$= 68°$

Answer 11



STRAIGHT LINE

CIRCLE THEOREMS

Diagram **NOT** accurately drawn

∴ ANGLES IN SAME SEGMENT ARE EQUAL.

90 - 25 = 65

A, B, C and D are points on the circumference of a circle, centre O.
AC is a diameter of the circle.
AC and BD intersect at E.

→ ANGLE IN A SEMICIRCLE IS 90°

Angle $CAB = 25°$
Angle $DEC = 100°$

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

$A\hat{B}C = 90°$ (ANGLE IN A SEMICIRCLE)

SO $A\hat{C}B = 90 - 25$
$= 65°$

SO $A\hat{D}B = 65°$ (ANGLES IN SAME SEGMENT)

$A\hat{E}D = 180 - 100$ (STRAIGHT LINE)
$= 80°$

SO $x = 180 - 80 - 65$ (ANGLES IN A TRIANGLE)
$= 35°$

Answer 12

CIRCLE THEOREMS

ISOSCELES TRIANGLE

$2x = 180 - 42$

$x = \frac{1}{2}(180 - 42)$

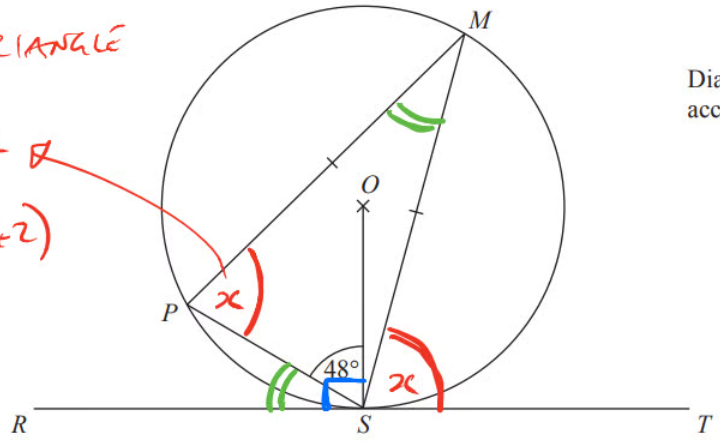


Diagram **NOT** accurately drawn

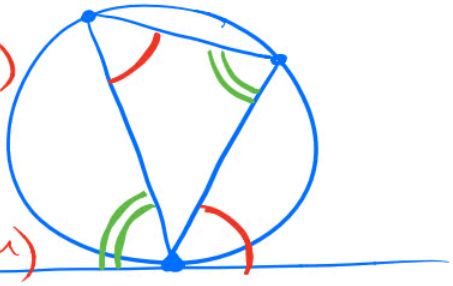
P, M and S are points on a circle, centre O.
RST is a tangent to the circle.

Angle $PSO = 48°$
$MP = MS$

Work out the size of angle MST.
Give reasons for each stage of your working.

→ RADIUS AND TANGENT MEET AT 90°

→ ALTERNATE SEGMENT THEOREM:



$P\hat{S}R = 90 - 48$ (RADIUS AND TANGENT)

$= 42°$

$P\hat{M}S = 42$ (ALTERNATE SEGMENT THEOREM)

$M\hat{P}S = \frac{1}{2}(180 - 42)$ (ISOSCELES Δ)

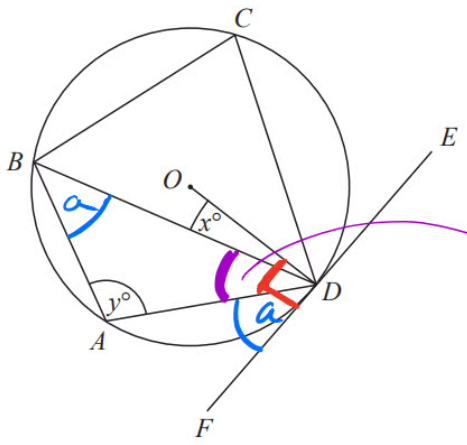
$= 90 - 21$

$= 69°$

$M\hat{S}T = 69°$ (ALTERNATE SEGMENT THEOREM)

Answer 13

CIRCLE THEOREMS



180 - y - a

A, B, C and D are points on the circumference of a circle, centre O. — "CYCLIC QUAD"
FDE is a tangent to the circle. — "RADIUS AND TANGENT"

(a) Show that $y - x = 90$ — "ALTERNATE SEGMENT"
You must give a reason for each stage of your working.

$A\hat{B}D = A\hat{D}F = a$ (ALTERNATE SEGMENT)

$B\hat{D}A + O\hat{D}B + A\hat{D}F = 90$ (RADIUS AND TANGENT)

$180 - y - a + x + a = 90$
-180 -180

$-y + x = -90$

$\times -1$

$y - x = 90$

Answer 14

CIRCLE THEOREMS

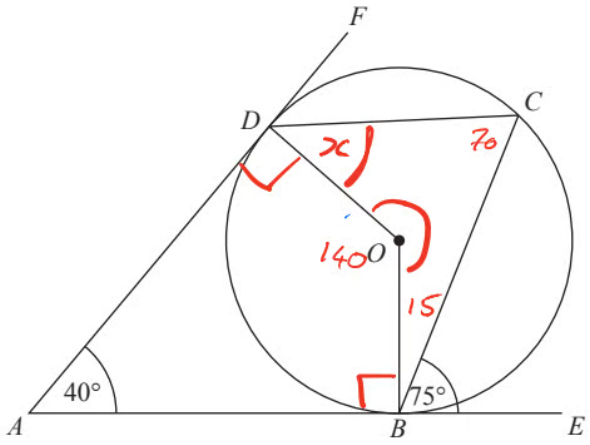


Diagram **NOT** accurately drawn

B, C and D are points on the circumference of a circle, centre O.
ABE and ADF are tangents to the circle.

Angle $DAB = 40°$
Angle $CBE = 75°$

Work out the size of angle ODC. $= x$

ANGLE AT CENTRE IS TWICE ANGLE AT CIRCUMFERENCE

TANGENT AND RADIUS MEET AT 90°

$A\hat{D}O = A\hat{B}O = 90°$

$D\hat{A}B = 360 - 90 - 90 - 40$

$= 180 - 40$

$= 140°$ (ANGLES IN A QUAD)

$D\hat{C}B = \frac{140}{2} = 70°$ (ANGLE AT CENTRE)

$O\hat{B}C = 90 - 75 = 15°$

REFLEX $B\hat{O}D = 360 - 140 = 220°$

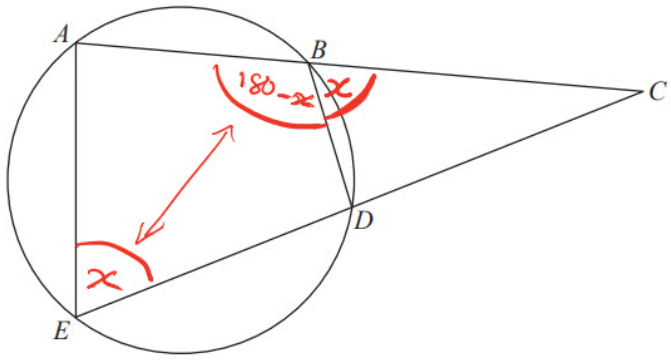
$x = 360 - 15 - 70 - 220$

$= 55°$

Answer 15

CIRCLE THEOREMS

Diagram **NOT** accurately drawn



A, *B*, *D* and *E* are points on a circle. *ABC* and *EDC* are straight lines.

Prove that triangle *BCD* is similar to triangle *ECA*.
You must give reasons for your working.

– OPP ANGLES IN A CYCLIC QUADRILATERAL ADD UP TO 180°

ALL THE ANGLES ARE

$A\hat{C}E = B\hat{C}D$ (SAME ANGLE) THE SAME.

LET $D\hat{B}C = x$

THEN $A\hat{B}D = 180 - x$ (STRAIGHT LINE)

THEN $A\hat{E}C = x$ (OPP. ANGLES IN A CQ)

SO $D\hat{B}C = A\hat{E}C$

[SO $E\hat{A}C = B\hat{D}C$ (3RD ANGLE IN Δ)]

SO THE Δs ARE SIMILAR.