Circle Theorems (H)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	C. Beale
Total Marks:	

1. (a) Calculate the size of the angle marked x.

You must give a reason for your answer.

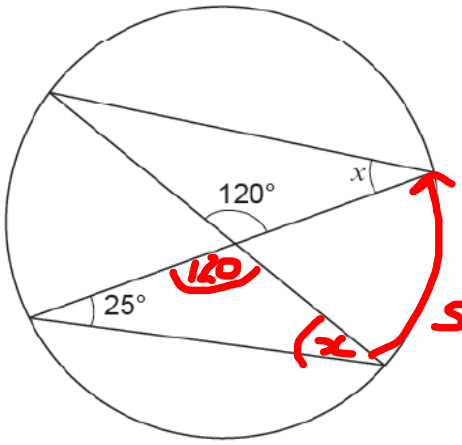


Diagram not drawn to scale

$120 + 25 = 145$

$x = 180 - 145 = 35°$ [2]

(b) The diagram shows a circle with centre O.

The tangent PT touches the circle at C.

The reflex angle at the centre of the circle is 280°.

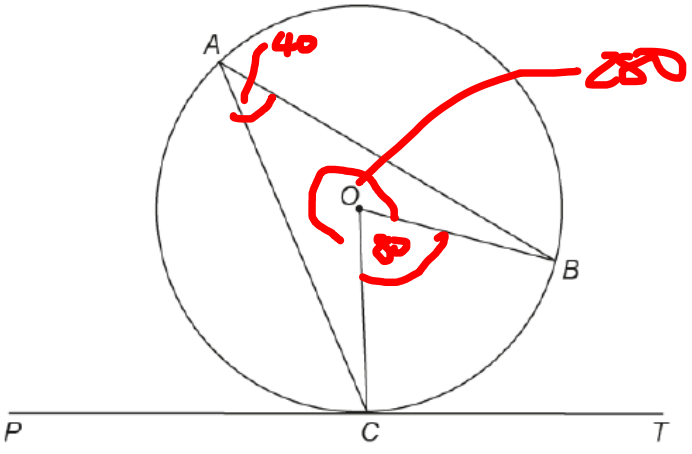


Diagram not drawn to scale

Diagram not drawn to scale

Find the size of $B\hat{A}C$.

You must give a reason for your answer.

40° - Angle at the centre is double the angle at circumference.

[2]

(c) The points A, B and C lie on the circumference of a circle.

The straight line PBT is a tangent to the circle.

CBP = x, where x is measured in degrees.

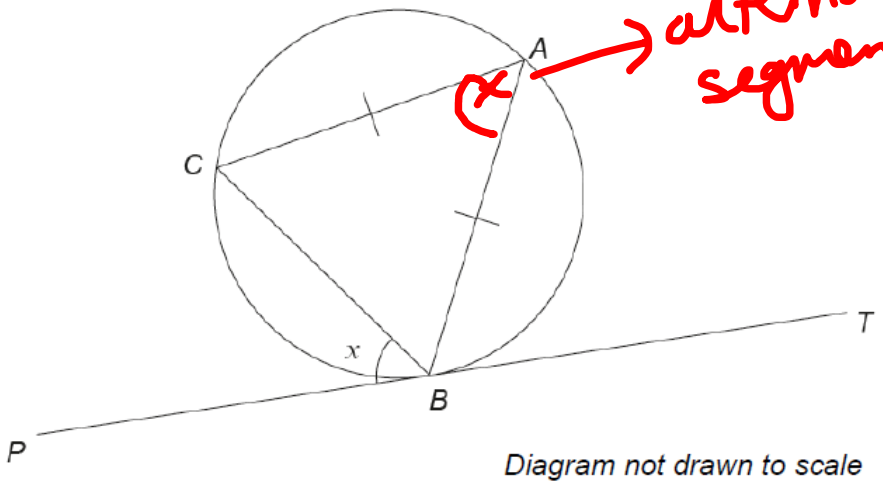


Diagram not drawn to scale

Show that the size of ABC in degrees is $90 - \frac{1}{2}x$

You must give reasons for each step of your answer.

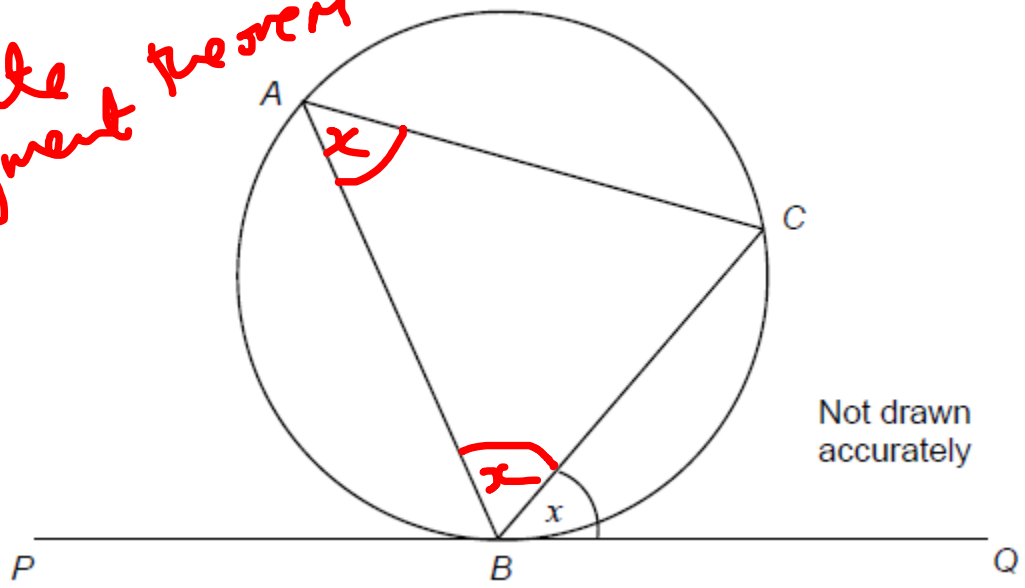
since ABC is isosceles,

$\hat{ABC} = \frac{180 - x}{2} = 90 - \frac{1}{2}x$

[2]

2. A, B and C are points on a circle.

- BC bisects angle ABQ.
- PBQ is a tangent to the circle.



alternate segment theorem

Angle $CBQ = x$

Prove that $AC = BC$

since $\hat{CAB} = \hat{CBA}$ the triangle is isosceles and AC = BC

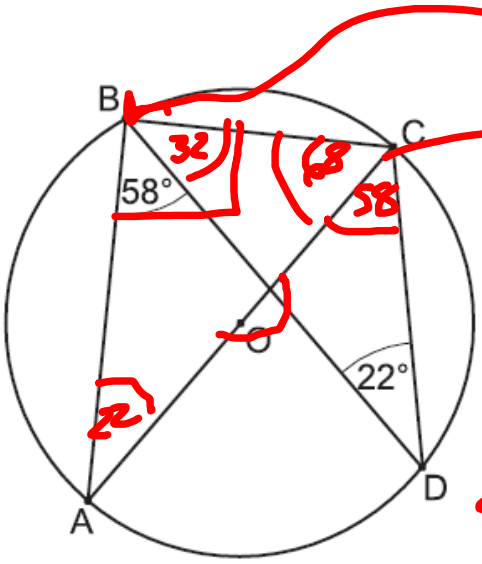
[3]

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

AC is a diameter of the circle.

Angle ABD = 58°.

Angle CDB = 22°.



Same segment theorem

180 - 90 - 22 = 68

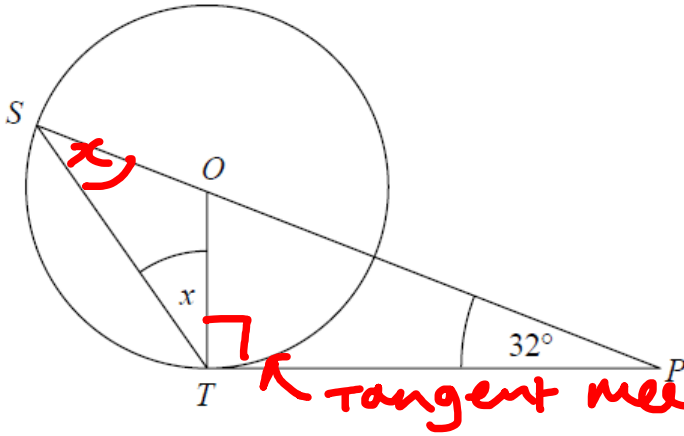
$\hat{ABC} = 90°$ as angle at centre is 2x angle at circumference

Work out the sizes of angle ACD and ACB, giving reasons for your answers.

(a) Angle ACD = ... 58 .....° [2]

(b) Angle ACB = ... 68 .....° [3]

4.



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°

Work out the size of the angle marked *x*.

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

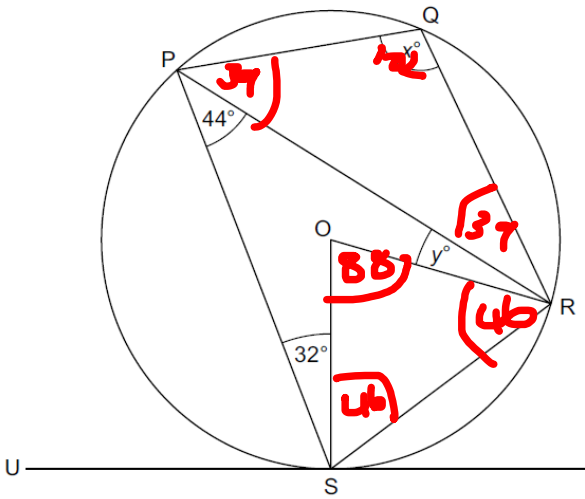
[4]

5. The diagram shows a circle, centre O.

Points P, Q, R and S lie on the circumference of the circle.

UST is a tangent to the circle.

Angle RPS = 44° and angle PSO = 32°.



Not to scale

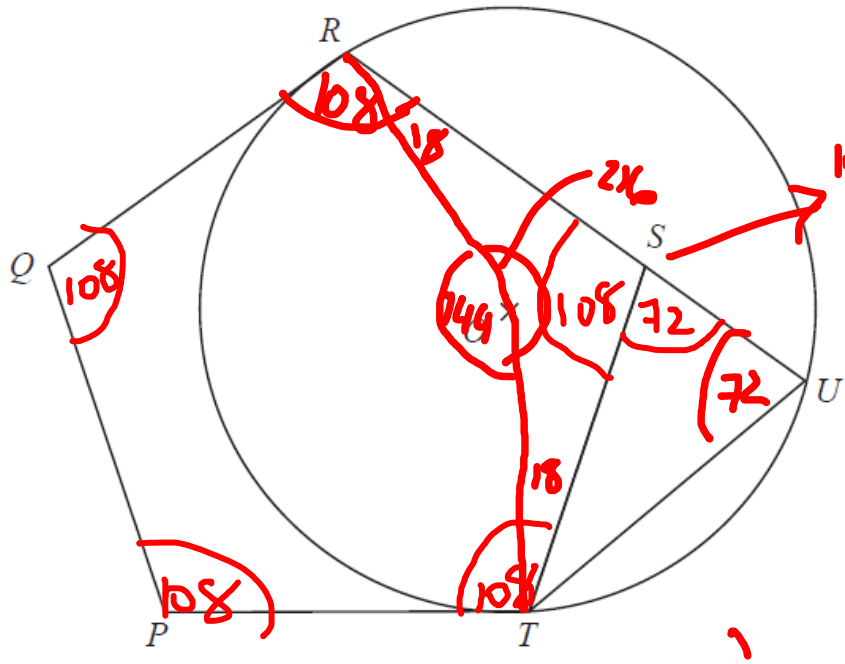
a) Work out the value of x .

a) x = 102° ..... [4]

b) Work out the value of y .

b) y = 12° ..... [3]

6.



interior + exterior = 180°

$PQRST$ is a regular pentagon.

R, U and T are points on a circle, centre O.

QR and PT are tangents to the circle.

RSU is a straight line.

Prove that $ST = UT$.

$S\hat{U}T = \frac{1}{2} \times R\hat{O}T$

$= \frac{1}{2} \times 144 = 72°$

exterior: $\frac{360}{5} = 72$

interior: $180 - 72 = 108$.

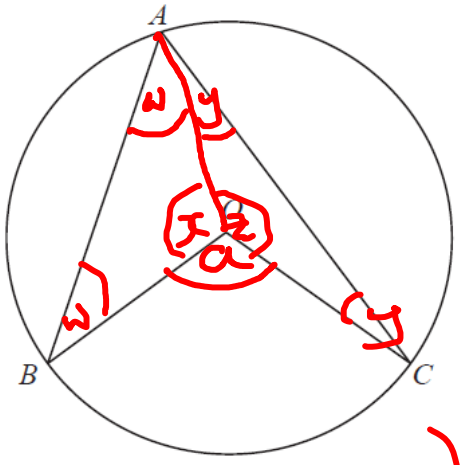
$144 \div 2 = 72$

$T\hat{V}S = T\hat{S}U = 72°$

Angles round a point = 360°

∴ triangle is isosceles and $ST = UT$. [5]

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



Prove that angle BOC is twice the size of angle BAC.

$2w + x = 180$

$x = 180 - 2w$

$2y + z = 180$

$z = 180 - 2y$

$\hat{BAC} = w + y$

$\hat{BOC} = 2w + 2y = 2(w + y)$

$a + x + z = 360$

$a + 180 - 2w + 180 - 2y = 360$

$a = 360 - 360 + 2w + 2y$

$a = 2w + 2y$

[4]

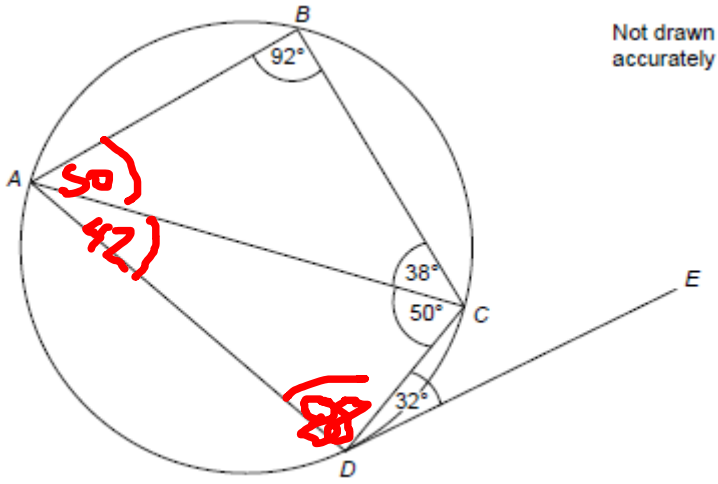
8. B, C and D are points on a circle.

Angle ABC = 92°

Angle ACB = 38°

Angle ACD = 50°

Angle CDE = 32°



Tick whether each statement is true or false.

Give a reason for each answer.

Statement	True	False
AC is a diameter	☐	☑

$A\hat{B}C \neq 90°$

Reason

Statement	True	False
Angle *ADC* = 88°	☑	☐

opposite angles in Cyclic quadrilateral = 180°

Reason

Statement	True	False
ABCD is a trapezium	☑	☐

AB and CD are parallel. (alternate angles)

Reason

Statement	True	False
DE is a tangent to the circle	☐	☑

Reason

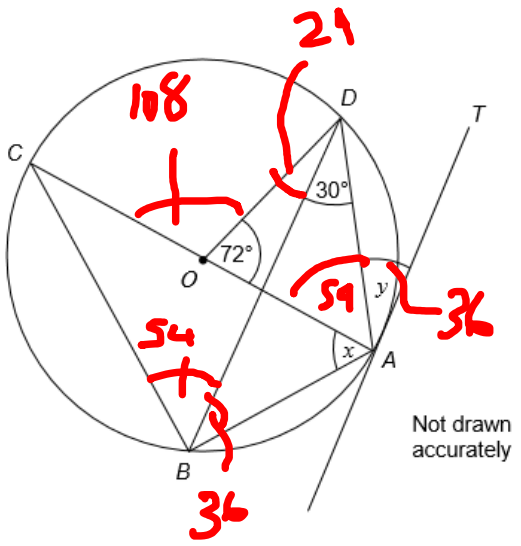
EDC ≠ DCA (alternate Segment theorem)

[4]

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

AC is a diameter of the circle.

AT is a tangent to the circle.



Work out the size of angle x and the size of angle y.

$180 - 72 = 108$

$108 \div 2 = 54$

$y = 90 - 54 = 36$

[4]

$108 \div 2 = 54$

$90 - 54 = 36$

$36 + 30 = 66$

$180 - 66 = 114$

$x = 114 - 54 = 60°$

CREDITS AND NOTES

Question	Awarding Body
1	WJEC Eduqas
2	AQA
3	OCR
4	Pearson Edexcel
5	OCR
6	Pearson Edexcel
7	Pearson Edexcel
8	AQA
9	AQA

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board s (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.

Links:

AQA http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300

OCR http://ocr.org.uk/gcsemaths

Pearson Edexcel http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html

WJEC Eduqas http://www.eduqas.co.uk/qualifications/mathematics/gcse/

Contents:

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material