2008

PRLEIMINARY HIGHER SCHOOL CERTIFICATE

ASSESSMENT 2

Mathematics Extension 1

General Instructions

- Working Time - 45 mins.
- Write using a blue or black pen.
- Approved calculators and templates may be used.
- All necessary working should be shown for every question.
- Begin each question on a fresh sheet of paper.

Total marks (30)

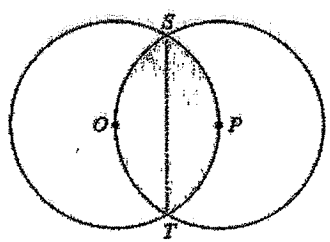
- Attempt Questions 1-2.
- All questions are of equal value

Question 1 (15 marks)

(a) Fill in the missing words (write the missing word on answer paper).

(i)	Equal arcs on circles of equal radii subtend equal _____ at the centre.	1
(ii)	Equal angles at the centre stand on equal _____.	1
(iii)	The perpendicular from the centre of a circle to a chord _____ the chord.	1
(iv)	The line joining the centre to the midpoint of a chord is _____ to the chord.	1
(v)	Equal chords in equal circles are _____ from their centres.	1
(vi)	The angle at the centre of a circle is _____ the angle at the circumference.	1
(vii)	Angles in the same segment standing on the same arc are ____.	1
(viii)	The angle in a semi-circle is ____.	1
(ix)	Opposite angles of a cyclic quadrilateral are ____.	1
(x)	The exterior angle of a cyclic quadrilateral is equal to ____.	1

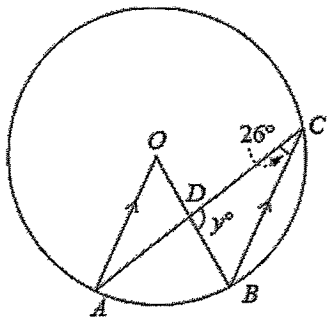
(b) The points O and P are centres of the two equal circles and are d cm apart. The two circles meet at S and T.



(i)	Show that ΔSOP is equilateral	3
(ii)	Show that angle SOT is 120^0.	2

Question 2 (15 marks)

(a)



The points A, B and C lie on a circle with centre O.

The lines AO and BC are parallel, and OB and AC intersect at D.

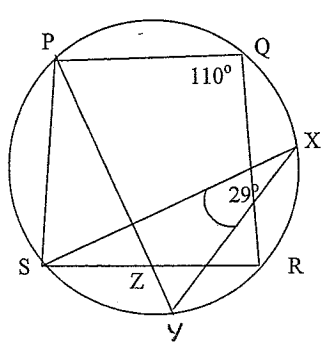
Also, $\angle ACB = 26^0$ and $\angle BDC = y^0$, as shown on the diagram.

Copy or trace the diagram into your Writing Booklet.

(i) State why $\angle AOB = 52^o$ **1**

(ii) Find y. Justify your answer. **2**

(b) PQRS is a cyclic quadrilateral. X and Y are two points on the circle. Point Z is the intersection of PY and SR. $\angle SXY = 29^\circ$ and $\angle PQR = 110^\circ$. Find the size of $\angle SZP$, giving reasons for your answer.



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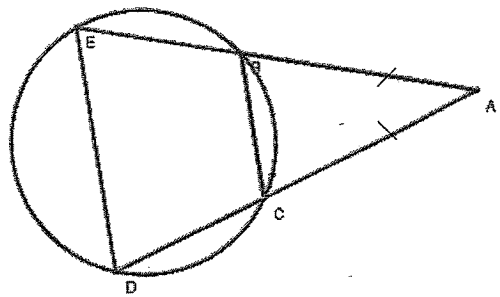
(c) State the reasons (i), (ii), (iii), (iv) in the steps of the following proof.



Prove: $BC \;||\; ED$

Proof: $\angle ABC = \angle ACB$ ..... **(i)**

$\angle ABC + \angle EBC = 180^0$ ..... **(ii)**

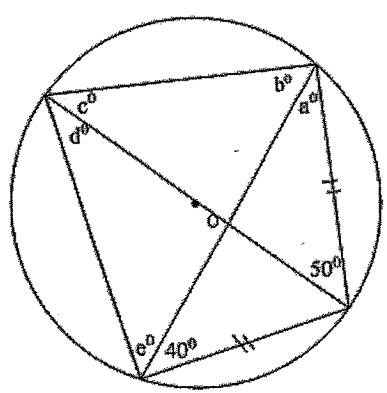
$\angle EBC + \angle EDC = 180^0$ ..... **(iii)**

$\therefore \angle ABC = \angle EDC$

$\therefore \angle ACB = \angle ADE$

$\therefore BC \;||\; ED$ ..... **(iv)** **4**

(d) Find the value of the pronumerals. Give reasons for your answers. **5**



END OF PAPER

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Ms Green

Question 1

a) i) angles

ii) arcs

iii) bisects

iv) perpendicular

v) equidistant

vi) twice

vii) equal

viii) 90°

ix) supplementary

x) the opposite interior angle

b) i) OP = OS = PS (radii of circles)

PS = OP (radii of circles)

ΔSOP is equilateral

∴ PS = OS = OP (radii of circles)

∴ ΔSOP is equilateral

ii) construct: PT and OT

PO = OT = PT (radii of circle)

∴ ΔPOT is equilateral

∴ all ∠'s = 60°

∴ ∠POT = 60°

If ΔSOP is equilateral

∴ ∠SOP = 60°

∴ ∠SOT = ∠SOP + ∠POT

= 60° + 60°

= 120°

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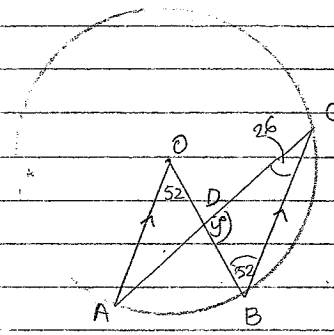
Question 2

a)



i) ∠AOB = 26 × 2 (∠ at centre is twice ∠ at circumference)

∴ ∠AOB = 52°

ii) ∠AOB = 52°

∴ ∠OBC = 52 (alt ∠'s)

∴ ∠y° = 180 − 52 − 26 (∠ sum of Δ)

= 102°

b) ∠SPZ = 29° (∠'s in same segment)

∠PSZ = 70° (opp. ∠s of cyc. quad)

∴ ∠SZP = 180 − 70 − 29° (∠ sum of Δ)

∠SZP = 81°

c) ∠ABC = ∠ACB (base ∠'s of isosceles Δ).

∠ABC + ∠EBC = 180° (∠ sum of straight line).

∠EBC + ∠EDC = 180° (opp ∠'s of cyclic quadrilateral are supplementary)

∴ ∠ABC = ∠EDC

∴ ∠ACB = ∠ADE

∴ BC ∥ ED (corresponding ∠'s. ∠ACB = ∠ADE)

d) ∠e° = 50° (∠s in same segment)

∠a° = 40° (∠s in same segment)

a° + b° = 180 − 90° (opp ∠'s of cyclic quad are equal)

40° + b° = 90°

b° = 50°

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Question 2 (d) cont >>...

let corners of cyclic quadrilateral be A, B, C, D

$\angle BOD = 180 - 50 - 40$ ($\angle$ sum of Δ)

$= 90°$

$\therefore \angle AOC = 90°$ (vert opp $\angle$s)

$\therefore d° = 180 - 90 - 50°$ ($\angle$ sum of Δ)

$= 40°$

$\angle C° = 40°$ ($\angle$s in the same segment are equal)