NAME :

Centre of Excellence in Mathematics
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YEAR 12 – MATHS EXT.1

REVIEW TOPIC (PAPER 2): CIRCLE GEOMETRY

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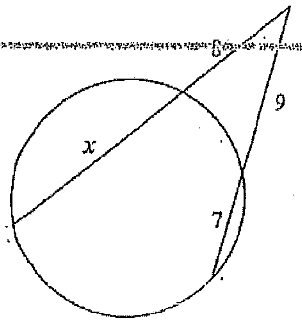
CARINGBAH 2004 Q1

f)



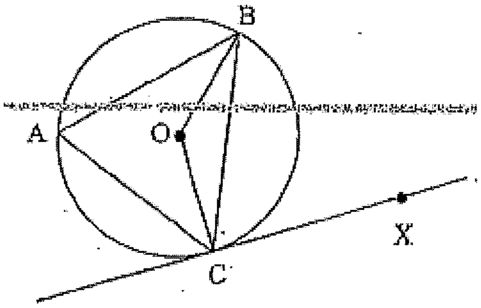
Not to scale

Calculate the value of x, giving a reason for your answer. 2

CARINGBAH 2004 Q3

d)

CX is tangent to the circle centre O. Let $\angle CAB = \alpha$.



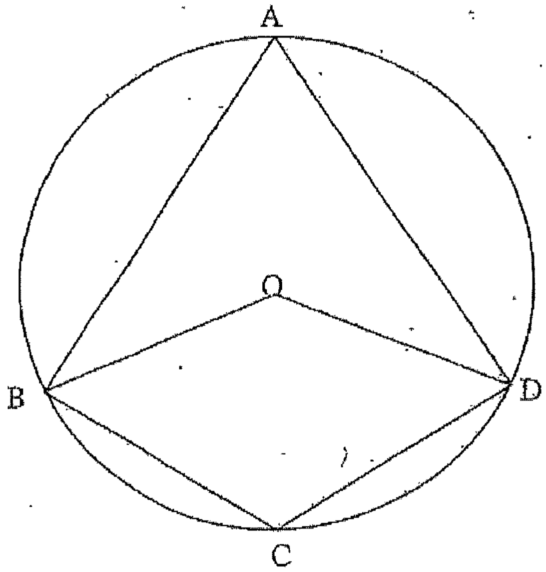
ii) Find with reasons $\angle COB$ in terms of α. 1

iii) Find with reasons $\angle OCB$ in terms of α. 1

iv) Hence show that $\angle BCX = \angle BAC$. 1

CRANBROOK 2004 Q4

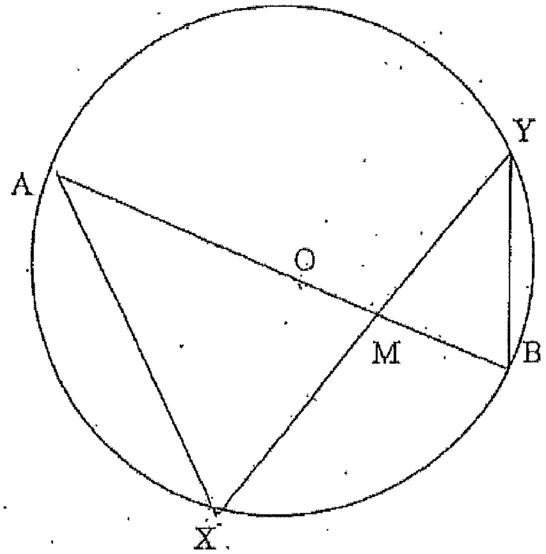
(a)



In the diagram A, B, C and D are points on a circle with centre O. $\angle BAD = x^o$ and $\angle BOD = \angle BCD$.

(ii) Find the value of x giving reasons. 3

(b) In the diagram below, AB is a diameter of a circle, whose centre is the point O. The chord XY passes through M, the mid-point of OB. AX and BY are joined.

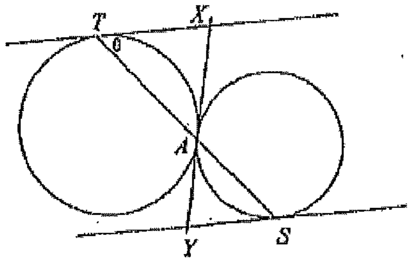


(ii) Prove the two triangles formed (triangles AXM and MYB) are similar. 4

(iii) If $XM = 8cm$ and $YM = 6cm$, find the length of the radius of the circle. 3

GRAMMAR 2004 Q2

(b)



In the diagram above, two circles touch one another externally at the point A. A straight line through A meets one of the circles at T and the other at S. The tangents at T and S meet the common tangent at A at X and Y respectively.

Let $\theta = \angle XTA$.

(i) Explain why $\angle XAT$ is θ. **1**

(ii) Prove that $TX \parallel YS$. **2**

JAMES RUSE 2002 Q2

(a)

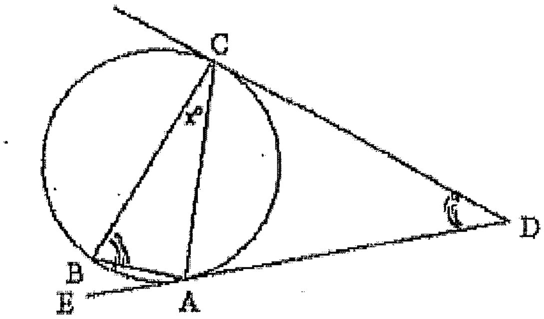


Diagram not to scale 4

AD and CD are tangents to a circle. B is a point on the circle such that $\angle CBA$ and $\angle CDA$ are equal and are each both double $\angle BCA$. Prove that BC is a diameter of the circle.

SOLUTIONS

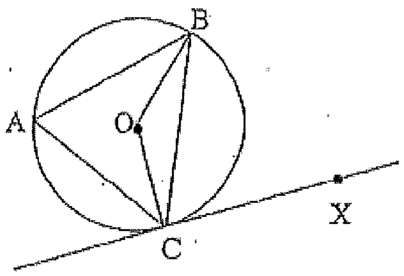
CARINGBAH 2004 Q1

f) $8\times(x+8)=9\times16$ [Product of intersecting secants]

$8x+64=144 \Rightarrow x=10.$

CARINGBAH 2004 Q3

d)



i) $\angle COB = 2\alpha$ ($\angle$ at centre = twice $\angle$ at circumference)

ii) $\angle OCB = 90-\alpha$ (base $\angle$'s of isos Δ = and $\angle$ sum of Δ)

iii) $\angle BCX = \angle OCX - \angle OCB$

$= 90-(90-\alpha)$ (rt. $\angle$, tangent $\perp$ to radius)

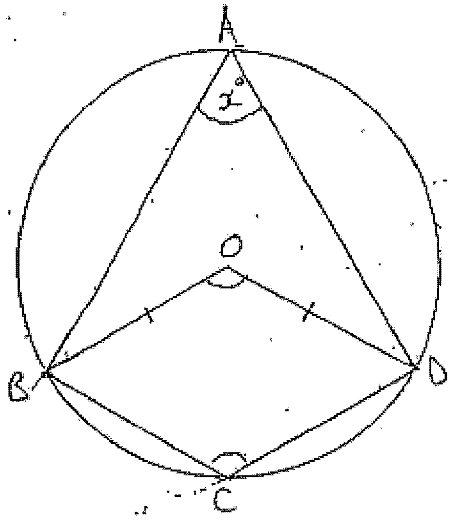
$= \alpha$

$= \angle BAC.$

CRANBROOK 2004 Q4

(a)

1 MARK



(1 MARK) $\angle BOD = 2x$ (Angle at centre is eq. to twice angle at circumference

$\angle BOD = \angle BCD$ (given)

(1 MARK) $\angle BCD = 180° - x$ (Opposite ∠s in a quad. are sup

(1 MARK) ∴ $2x = 180° - x$

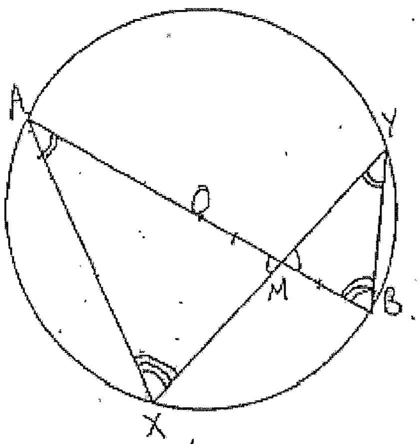
$3x = 180°$

∴ $x = 60°$

(b)

(i)

(1 MARK)



(ii) In Δs AXM and ΔYBM

∠AMX = ∠YMB (Vert. opp. angles)

∠XAM = ∠BYM (Angles subtended by same arc (XB) are equal)

∠AXM = ∠YBM (Angles subtended by same arc (AY) are equal)

ONLY NEED 2!

- (1 MARK FOR EACH REASON)
- (1 MARK FOR LAYOUT)

(1 MARK) ∴ Δ AXM ||| Δ YBM (Equiangular)

(iii) (1 MARK) $\frac{XM}{BM} = \frac{AM}{YM}$ (corresponding sides in similar triangles)

(1 MARK) AM = 3 × BM (M is midpoint of OB and AB is diameter)

8 3 AM

$48 = 3 . BM^2$

$16 = BM^2$

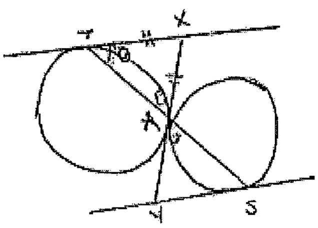
$\therefore BM = 4$

radius $= 2 \times MB$

$= 2 \times 4$

(1 MARK) $= 8cm$

GRAMMAR 2004 Q2

(a)(i) 

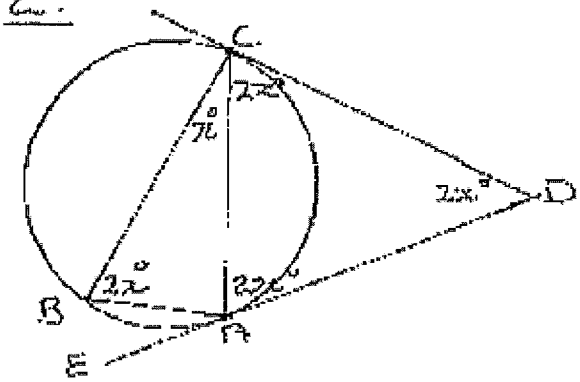
(i) Tangents from an external point are equal to points on the circle (i.e. X & T)
∴ $X\hat{A}T = \theta$ (since AX = XT)

(ii) $Y\hat{A}S = \theta$ (vert. opposite)
AY = YS (tangents from external point)
∴ $A\hat{S}Y = \theta$
∴ XT ∥ YS (since alternate angles are equal).

JAMES RUSE 2004 Q2

Qn 2:

(a)



$\angle CBA = \angle CDA = 2x^\circ$ (given)

$\angle DAC = \angle CBA$ (Angle between a tangent & a chord equals angle in the alternate segment)

Similarly ①

$\angle DCA = \angle CBA = 2x^\circ$

$\therefore$ In $\triangle CDA$ $2x + 2x + 2x = 180^\circ$ (angle sum $\triangle$)

$\therefore x = 30^\circ$ ①

In $\triangle BAC$

$x^\circ + 2x^\circ + \angle BAC = 180^\circ$

$30^\circ + 60^\circ + \angle BAC = 180^\circ$ ①

$\therefore \angle BAC = 90^\circ$

$\therefore BC$ is a diameter (angle in semi-circle is 90°) ①