NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2009

MATHEMATICS: PAPER III

MARKING GUIDELINES

Time: 2 hours 100 marks

These marking guidelines were used as the basis for the official IEB marking session. They were prepared for use by examiners and sub-examiners, all of whom were required to attend a rigorous standardisation meeting to ensure that the guidelines were consistently and fairly interpreted and applied in the marking of candidates' scripts.

At standardisation meetings, decisions are taken regarding the allocation of marks in the interests of fairness to all candidates in the context of an entirely summative assessment.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines, and different interpretations of the application thereof. Hence, the specific mark allocations have been omitted.

Please note that learners who provided alternate correct responses to those given in the marking guidelines will have been given full credit.

SECTION A

QUESTION 1 [LO 1: AS 12.1.3]

(a) $T_{k+1} = T_k + 6; \quad T_1 = 8$ (2)

(b) $T_3 = aT_2 + bT_1 = a(2) + b(1) = 5$
$T_4 = aT_3 + bT_2 = a(5) + b(2) = 12$

$\therefore 2a + b = 5$
$b = 5 - 2a$
and $5 + 2(5 - 2a) = 12$
$5a - 4a = 12 - 10$
$a = 2$
$\therefore b = 5 - 2(2)$
$b = 1$ (6)

8 marks

QUESTION 2 [LO 4: AS 11.4.2; 12.4.2]

(a) $P(R, R, R) = \frac{26}{52} \times \frac{25}{51} \times \frac{24}{50} = \frac{2}{17}$

$P(B, B, B) = \frac{2}{17}$

$\therefore P$ (all are same colour) $= \frac{4}{17}$ or 0,24 (5)

(b) (1) If mutually exclusive $P(A \cap B) = 0 \therefore$
$P(A \cap B) = \frac{3}{8} + \frac{1}{4} = \frac{5}{8}$ (2)

(2) If independent $P(A \cap B) = P(A)\,P(B) = \frac{3}{8} \times \frac{1}{4} = \frac{3}{32}$
$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= \frac{3}{8} + \frac{1}{4} - \frac{3}{32}$
$= \frac{17}{32}$ (5)

(c) (1) $6! = 720$ (2)

(2) $(--)----\ 5!\ 2! = 240$
$\therefore P$ (sitting together) $= \frac{240}{720} = \frac{1}{3}$ (4)

18 marks

QUESTION 3 [LO 4: AS 12.4.1]

(a) $A = 169,83$ $\therefore y = -0,93x + 169,83$
$B = -0,93$ (4)

(b) $\hat{y} = -0,93(33) + 169,83$
$\hat{y} = 139,14 = 139$ m (2)

(c) $r = -0,95$ $[r = -0,9496957731]$ (2)

(d) 5 (1)

(e) $-0,93 \times 15 = -13,95$ or $y_{33} - y_{18}$
$= 139,14 - 153,09$
$= \underline{-13,95 \text{ m}}$ (3)

12 marks

QUESTION 4 [LO 4: AS 12.4.3]

(a) $\bar{x} = 59,66$
$\therefore$ they are incorrect

Median = 48th score = in category 55 – 59
$\therefore$ they are incorrect (5)

(b) 8,2 (3)

(c) (1) Q_3 read at $\frac{3}{4} \times 96 = 72$ $\therefore (64;72)$
Q1 read at $\frac{1}{4} \times 96 = 24$ $\therefore (54;24)$
$\therefore$ interquartile range = 10 (4)

(2) Range = 84 – 40 = 44
Middle 50% occurs in interquartile range of 10. Data clustered in middle categories, spread at extremes. (2)

14 marks

QUESTION 5 [LO 4: AS 12.4.4]

(a) B

(b) A

(c) C

3 marks

QUESTION 6 [LO 1: AS 12.4.1 and 11.4.3]

(a) We have no idea how many people were in the trial – might be only 1%/10%, etc. as a success rate. (1)

(b) Can't conclude this – have no idea of age of people tested. Big feet could mean older people which could mean higher numeracy. (2)

3 marks

SECTION B

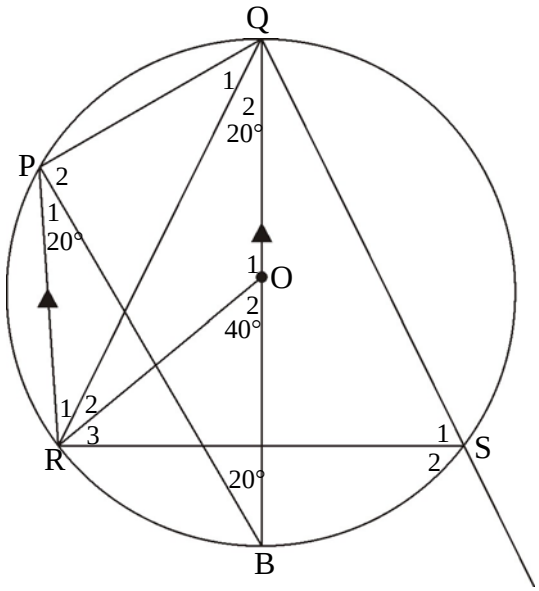
QUESTION 7 [LO 3: AS 11.3.2]

(a)
$$\frac{AR}{AB} = \frac{5}{7}$$
$$\therefore \frac{AR}{RB} = \frac{5}{2}$$
$$\therefore \frac{AS}{SP} = \frac{5}{2}$$
$$\therefore \frac{AS}{SC} = \frac{5}{9}$$ (3)

(b)
$$\frac{RT}{RC} = \frac{2}{9}$$
$$\frac{RT}{20} = \frac{2}{9}$$
$$RT = \frac{40}{9}$$
$$RT = 4{,}4 \text{ cm}$$ (3)

6 marks

QUESTION 8 [LO 3: AS 12.3.2]

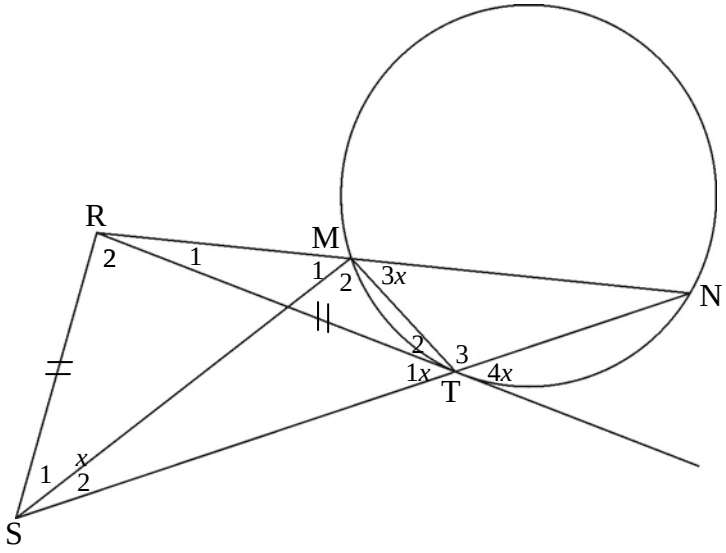


(a) $\hat{P}$ = 20°
$\hat{Q}$ = 20°
$\hat{Q}_2$ = 40° (3)

(b) $\hat{P}_2$ = 90° (L semi circle)
$\hat{S}_2$ = 110° (ext L cyclic quad) (4)

7 marks

QUESTION 9 [LO 3: AS 11.3.2]



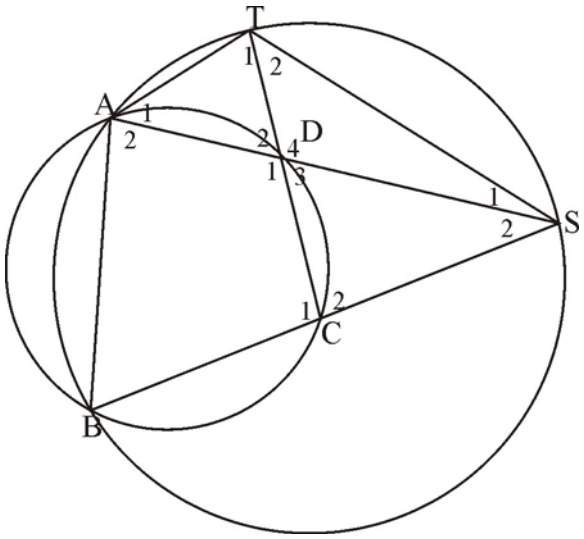
(a) $\hat{T}_1 = \hat{T}_4 = x$ vert opp
$\hat{S}_1 + \hat{S}_2 = \hat{T}_1 = x$ Isos Δ
$\hat{M}_3 = \hat{T}_4 = x$ tan chord (6)

(b) $R\hat{S}T = \hat{S}_1 + \hat{S}_2 = x$ proven
$\hat{M}_3 = x$
$R\hat{S}T = \hat{M}_3$ (1)

(c) $R\hat{S}T = \hat{M}_3$ proved
$\therefore$ *RSTM* is cyclic quad (ext $\angle$ = int opp $\angle$) (2)

9 marks

QUESTION 10 [LO 3: AS 12.3.2]



(a) $\hat{T}_1 + \hat{T}_2 = \hat{B} = 180°$ opp Ls cyclic quad $ATSB$

$\hat{B} + \hat{D}_1 = 180°$ opp Ls cyclic quad $ADCB$

$\therefore \hat{T}_1 + \hat{T}_2 = \hat{D}_1$

But $\hat{D}_1 = \hat{D}_4$ vert opp

$\therefore \hat{T}_1 + \hat{T}_2 = \hat{D}_4$ (4)

(b) In ΔSTD and ΔSAT

$\hat{S}_1$ common

$\hat{D}_4 = \hat{T}_1 + \hat{T}_2$ proved above

$\therefore \hat{T}_2 = \hat{A}_1$

$\therefore \Delta STD /// \Delta SAT$ (AAA) (3)

(c) $\frac{ST}{SA} = \frac{SD}{ST}$ (equiangular Δs)

$ST^2 = SD.SA$

But $\Delta SDC /// \Delta SBA$

$\therefore \frac{SD}{BS} = \frac{CS}{AS}$

$\therefore SD.SA = BS.CS$

$\therefore ST^2 = BS.CS$ (5)

12 marks

QUESTION 11 [LO 3: AS 11.3.2]

(a) $BC^2 = 8^2 - (4,8)^2$
$BC^2 = 40,95$
$BC = 6,4$ (2)

(b) $\Delta BED /// \Delta BAC$ (1)

(c) Area $\Delta ABC = \frac{1}{2}(4,8)(6,4) = 15,36$
For Area ΔBED need ED:
But $\frac{BO}{BC} = \frac{ED}{AC}$ (similar Δs)
$\therefore \frac{ED}{4,8} = \frac{4}{6,4}$
$\therefore ED = 3$

So Area $\Delta BED = \frac{1}{2}(3)(4) = 6$
$\therefore$ Area $ADEC = 15,36 - 6$
$= \underline{9,36\ cm^2}$ (5)

8 marks

Total: 100 marks