



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2008

MATHEMATICS: PAPER III
MARKING GUIDELINES

Time: 2 hours

100 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

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. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

SECTION A

QUESTION 1

(a) $a = 1$
 $T_6 = a + (n-1)d = 21$ ✓ m
 $1 + 5d = 21$ ✓ a
 $\therefore d = 4$
 $\therefore 1; 5; 9; 13$ ✓ ca (3)

(b) $T_k = 1 + (k-1)4$
 $= 1 + 4k - 4$
 $= 4k - 3$ ✓ ca (1)

(c) $T_1 = 1$
 $T_2 = T_1 + 1.4$ ✓ m
 $T_3 = T_2 + 1.4$ ✓ ca
 $T_{k+1} = T_k + 4$ if $T_1 = 1$ for $k \geq 1$ ✓ ca (3)
[7]

QUESTION 2

(a) $\frac{9!}{2!2!2!}$ ✓ a ✓ a ✓ a
 $= 45360$ ✓ ca (5)

(2) $\frac{7!}{2!2!}$ ✓ a ✓ a ✓ a
 $\frac{5040}{4}$ ✓ ca
 $= \frac{1260}{45360}$ ✓ ca
 $= 0,03$ (5)

(b) $\frac{3}{10} \cdot \frac{6}{10} + \frac{7}{10} \cdot \frac{4}{10}$ ✓ a ✓ a ✓ a
 $= 0,46$ ✓ ca (4)

(c) $5!4!2!$ ✓ a ✓ a ✓ a
 $= 5760$ ✓ ca (4)
[18]

QUESTION 3

- (a) 0 ✓ a
- (b) values above 0,5 ✓ a
- (c) values below -0,5 ✓ a
- (d) values between 0 and 0,5 ✓ a

(4)
[4]

QUESTION 4

- (a) $A = 5,87$ ✓ a
 $B = 2,21$ ✓ a
 $y = 5,87 + 2,21x$ ✓ ca ✓ ca

(4)

- (b) $y = 5,87 + 2,21x$ ✓ m
 $y = 5873,7 + 2,2125(9000)$
 $= 25786,20$
 $R25786,20$ per month ✓ ca
 OR $y = 5,87 + 2,21(9)$
 $= 25,76$
 $\therefore R25\ 760$ per month

(2)

- (c) $r = 0,95$ ✓ a ✓ a

(2)

- (d) Very strong correlation as r close to 1 ✓ c ✓ a

(2)

[10]

QUESTION 5

- (a)

Class	Frequency	Midpoint
$x < 5$	25	2,5
$5 \leq x < 10$	20	7,5
$10 \leq x < 15$	35	12,5
$15 \leq x < 20$	60	17,5
$20 \leq x < 25$	90	22,5
$25 \leq x < 30$	70	27,5
$30 \leq x < 35$	25	32,5
$35 \leq x < 40$	20	37,5
$40 \leq x < 45$	5	42,5
Total	350	

✓ m
 ✓ m
 ✓ a
 ✓ a

(4)

- (b) $\mu = 21,08$ ✓ ca ✓ ca ✓ ca

(4)

- (c) $\sigma = 9,21$ ✓ ca ✓ ca ✓ ca ✓ ca

(4)

- (d) $20 \leq x < 25$ ✓✓^{ca-ca} (2)
- (e) From the histogram it is roughly normally distributed
 Percentage wise $\pm \frac{70+90+60+0,4 \times 35}{350}$ ✓ m
 = 66,9% ✓
 in first std deviation – yes. ✓ m (2)

[16]

SECTION B

QUESTION 6

- (a) $\hat{R}_1 = 90^\circ$ ✓^a
 $\hat{Q}_1 = 50^\circ$ ✓^a
 $\hat{B} = 140^\circ$ ✓^a
 $\hat{A} = 130^\circ$ ✓^a (4)
- (b) $\hat{A} + \hat{B} = 270^\circ$ ✓^a (1)

[5]

QUESTION 7

- (a) $\triangle MTN$ and $\triangle MET$
 \hat{M} ...common ✓^a
 $\hat{N} = \hat{T}_1$ ✓^a ...tan chrd ✓^m
 $\hat{T} = \hat{E}$...3rd \angle of \triangle ✓^a
 $\therefore \triangle MTN \equiv \triangle MET$...AAA (4)

- (b) $NE = 12800km$
 $\therefore NM = 12801km$ ✓^a
 $\therefore \frac{MN}{MT} = \frac{MT}{ME}$
 $\therefore MN \cdot ME = MT^2$ ✓^m
 $12801 \cdot 1 = MT^2$ ✓^a
 $\therefore MT = 113,14km$ ✓^a (4)

[8]

QUESTION 8

- (a) $CP = PD$...line \perp chrd ✓
- (b) $\triangle CPB \equiv \triangle DPB$ ✓^a ...SAS ✓^m
 $\therefore \hat{B}_1 = \hat{B}_2$ ✓^a ... \triangle 's \equiv ✓^m
- (c) $\hat{E} = \hat{B}_1 + \hat{B}_2$ ✓ ...line \perp chrd ✓
 $\therefore \hat{E} = 2\hat{B}_1$...($\hat{B}_1 = \hat{B}_2$) ✓^m (3)

1 wj (1)
 1 wj 2wj
 (4)

2 wj
 1 wj
 (3)

- (d) $\hat{O}_1 = 2\hat{B}_1$ ✓
 $\therefore \hat{O}_1 = \hat{E}$ ✓
 $\therefore CEFO$ cyclic ...ext $\angle =$ opp int \angle ✓

2 wj
 1 wj
 (4)
 [12]

QUESTION 9

- (a) $\hat{B}_4 = \hat{A}_2$... tan chrd ✓
 $\hat{A}_2 = \hat{E}_{12}$... \angle 's same seg ✓
 $\therefore AB \parallel EC$ ✓ ... alt \angle 's equal ✓

wj
 wj
 (4)

- (b) Similar to above ✓✓

(2)

- (c) (1) $\hat{D}_6 = \hat{E}_{11} + \hat{E}_{12}$ ✓ ...ext \angle cycl quad ✓
 and
 $\hat{A}_1 + \hat{A}_2 = \hat{E}_{11} + \hat{E}_{12}$...alt \angle 's ✓
 $\therefore \hat{D}_6 = \hat{A}_1 + \hat{A}_2$

1 wj
 2 wj

- (2) $\hat{D}_7 = \hat{C}_{10}$ ✓ ... \angle 's in same segm ✓
 and
 $\hat{C}_{10} = \hat{A}_1 + \hat{A}_2$...alt \angle 's ✓
 $\therefore \hat{D}_7 = \hat{D}_6$

2 wj 1 wj
 (4)

(3)
 [13]

QUESTION 10

- (a) let $\hat{E}_1 = p$
 $\therefore \hat{E}_2 = 90^\circ - p$ ✓
 $\therefore \hat{B} = 90^\circ - p$ ✓
 and $\hat{F}_1 = p$ ✓
 $\therefore \triangle BAE \parallel \triangle EDF$...AAA

(3)

- (b) $AE = x \therefore ED = 9 - x$ ✓
 $\therefore \frac{DF}{AE} = \frac{ED}{AB}$ ✓
 $= \frac{x(9-x)}{9}$ ✓
 $\therefore \text{Area } \triangle EDF = \frac{1}{2}bh$
 $= \frac{1}{2} \cdot \frac{x(9-x)}{9} \cdot (9-x)$ ✓
 $= \frac{x(9-x)^2}{18}$

(4)
 [7]