

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

AUGUST EXAMINATION

MATHEMATICS N4

24 July 2014

This marking guideline consists of ⁸ pages.

L DHET
C.M. *7/08/14*
N.F. *07/08/14*
I.M. *7/8/14*

QUESTION 1

$$\begin{aligned}
 1.1 \quad (2x-1)\log 5 &= (3x+4)\log 7 \quad \checkmark \\
 3,219x - 1,609 &= 5,838x + 7,784 \quad \checkmark \\
 -2,619x &= 9,393 \\
 x &= -3,586 \quad \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 1.2 \quad \log\left(\frac{D-R}{R}\right) &= \frac{P}{A} \quad \checkmark \\
 \frac{D-R}{R} &= 10^{\frac{P}{A}} \quad \checkmark \\
 D-R &= R10^{\frac{P}{A}} \\
 D &= R10^{\frac{P}{A}} + R \quad \checkmark
 \end{aligned} \tag{3}$$

1.3 1.3.1

$$|D| = \begin{vmatrix} -1 & -1 & 1 \\ -1 & 2 & -1 \\ \frac{1}{2} & 0 & \frac{-1}{3} \end{vmatrix} \quad \text{or} \quad |D| = \begin{vmatrix} 1 & -1 & 1 \\ -1 & 2 & -1 \\ -3 & 0 & 2 \end{vmatrix} \checkmark$$

$$|D| = 1 \begin{vmatrix} 2 & -1 \\ 0 & \frac{-1}{3} \end{vmatrix} + 1 \begin{vmatrix} -1 & -1 \\ \frac{1}{2} & \frac{-1}{3} \end{vmatrix} + 1 \begin{vmatrix} -1 & 2 \\ \frac{1}{2} & 0 \end{vmatrix} \checkmark$$

$$\text{or} \quad -3 \begin{vmatrix} -1 & 1 \\ 2 & -1 \end{vmatrix} + 2 \begin{vmatrix} 1 & -1 \\ -1 & 2 \end{vmatrix}$$

$$|D| = \frac{-5}{6} \quad \text{or} \quad 5 \quad \checkmark$$

$$|D_m| = \begin{vmatrix} -3 & -1 & 1 \\ -4 & 2 & -1 \\ 1 & 0 & \frac{-1}{3} \end{vmatrix} \quad \text{or} \quad |D_m| = \begin{vmatrix} -3 & -1 & 1 \\ -4 & 2 & -1 \\ -6 & 0 & 2 \end{vmatrix} \checkmark$$

$$|D_m| = -3 \begin{vmatrix} 2 & -1 \\ 0 & \frac{-1}{3} \end{vmatrix} + 1 \begin{vmatrix} -4 & -1 \\ 1 & \frac{-1}{3} \end{vmatrix} + 1 \begin{vmatrix} -4 & 2 \\ 1 & 0 \end{vmatrix}$$

$$\text{or} \quad -6 \begin{vmatrix} -1 & 1 \\ 2 & -1 \end{vmatrix} + 2 \begin{vmatrix} -3 & -1 \\ -4 & 2 \end{vmatrix} \checkmark$$

$$|D_m| = \frac{7}{3} \quad \text{or} \quad -14 \quad \checkmark$$

$$m = \frac{-14}{5} = -2,8 \tag{8}$$

1.3.2

$$M_{31} = \begin{vmatrix} -1 & 1 \\ 2 & -1 \end{vmatrix} \checkmark$$

$$= -1 \checkmark \tag{2}$$

1.4

$$\left. \begin{aligned} 2l + 2b &= 28 \dots\dots\dots(1) \\ lb &= 46 \dots\dots\dots(2) \end{aligned} \right\} \checkmark$$

from (1) $l = 14 - b$

substituting in (2) $(14 - b)b = 46$

$$14b - b^2 = 46$$

$$b^2 - 14b + 46 = 0 \checkmark$$

$$b = \frac{+14 \pm \sqrt{12}}{2}$$

$$b_1 = 8,732 \text{ or } b_2 = 5,268 \checkmark$$

$$l_1 = 5,268 \text{ or } l_2 = 8,732 \checkmark$$

(4)
[20]

QUESTION 2

2.1

$$a = \frac{-2 \pm \sqrt{(2)^2 - 4(2)(1)}}{4} \checkmark$$

$$a = \frac{-2 \pm \sqrt{-4}}{4} \checkmark$$

$$a = \frac{-2 \pm j2}{4} \checkmark$$

$$a = \frac{-1}{2} + \frac{j}{2} \checkmark \text{ or } \frac{-1}{2} - \frac{j}{2} \checkmark \quad a = \frac{-1 \pm j}{2}$$

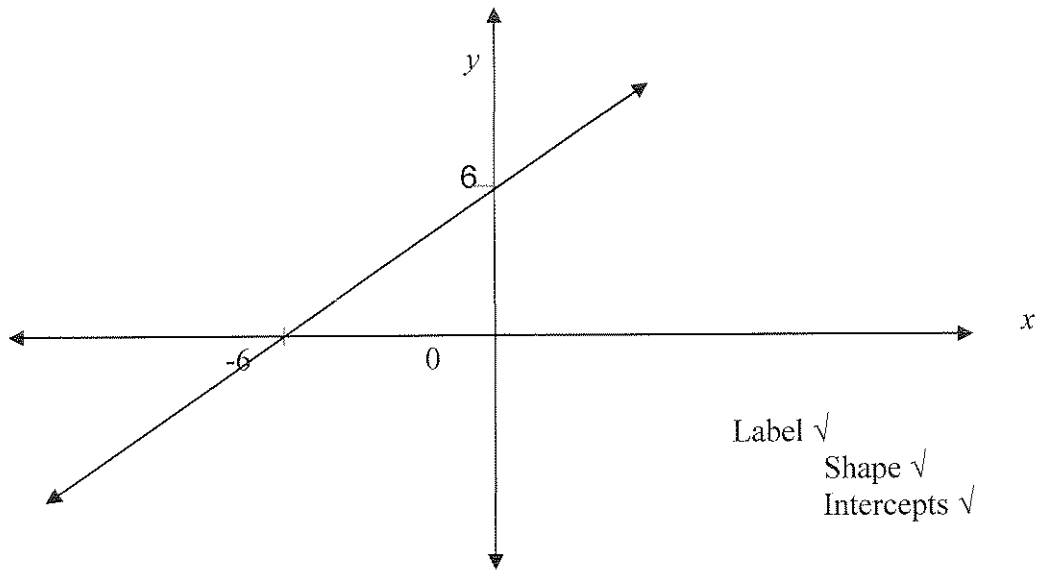
(5)

2.2

$$\begin{aligned} \frac{(4 - 2j)(5 + j)}{3 - 2j} &= \frac{20 + 4j - 10j - 2j^2}{3 - 2j} \times \frac{3 + 2j}{3 + 2j} \quad \checkmark \\ &= \frac{22 - 6j}{3 - 2j} \times \frac{3 + 2j}{3 + 2j} \quad \checkmark \\ &= \frac{66 - j18 + j44 - 12j^2}{9 - 4j^2} \quad \checkmark \\ &= \frac{78 + j26}{13} \quad \checkmark \\ &= 6 + j2 \quad \checkmark \end{aligned}$$

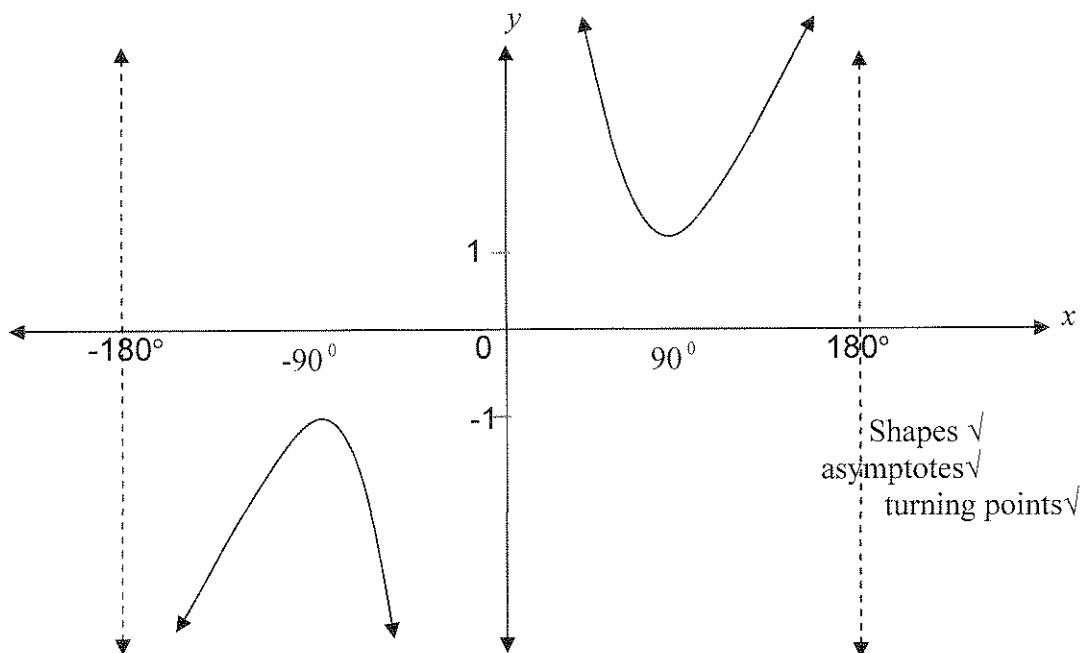
(5)

2.3



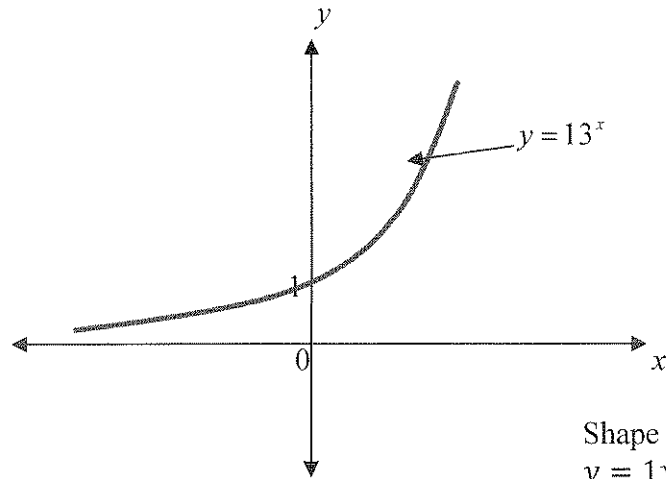
(3)

2.4



(3)

2.5 2.5.1



Shape ✓
 $y = 13^x$ ✓
 Labels ✓

(3)

2.5.2 Function ✓

(1)

[20]

QUESTION 3

3.1

$$\tan 75^\circ = \tan(45^\circ + 30^\circ)$$

$$= \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ} \quad \checkmark$$

$$= \frac{\frac{\sqrt{2}}{\sqrt{2}} + \frac{1}{\sqrt{3}}}{1 - \frac{\sqrt{2}}{\sqrt{2}} \cdot \frac{1}{\sqrt{3}}} \quad \checkmark$$

$$= \frac{1 + \frac{1}{\sqrt{3}}}{1 - \frac{1}{\sqrt{3}}} \quad \checkmark$$

$$= \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \text{ or } \frac{3 + \sqrt{3}}{3 - \sqrt{3}} \quad \checkmark$$

(4)

3.2

$$= \frac{1 - \cos^2 \theta}{1 + \cos \theta} - 1 \quad \checkmark$$

$$= \frac{(1 + \cos \theta)(1 - \cos \theta) - 1}{1 + \cos \theta} \quad \checkmark$$

$$= 1 - \cos \theta - 1 \quad \checkmark$$

$$= -\cos \theta \quad \checkmark$$

(4)

3.3 The question has a mistake and been removed.

(-4)

3.4 $\sin(3A + 20^\circ) = \sin[90^\circ - (A + 10^\circ)] \quad \checkmark$

$\sin(3A + 20^\circ) = \sin(80^\circ - A) \quad \checkmark$

$3A + 20^\circ = 80^\circ - A$

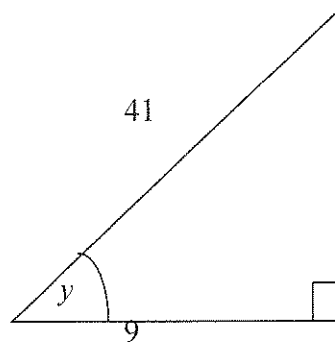
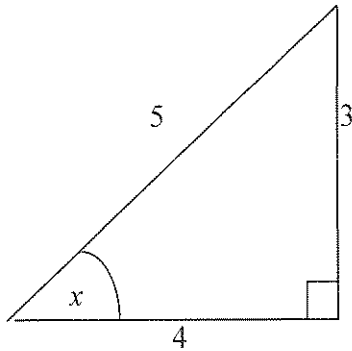
$4A = 60^\circ$

$A = 60^\circ \quad \checkmark$

$A = 15^\circ \quad \checkmark$

(4)

3.5



or mark for given values of $\cos x$ and $\sin y$

40 \checkmark

$\sin(x - y) = \frac{3}{5} \cdot \frac{9}{41} - \frac{40}{41} \cdot \frac{4}{5} \quad \checkmark$

$= \frac{27}{205} - \frac{160}{205} \quad \checkmark$

$= \frac{-133}{205} \quad \checkmark$

(4)

[16]

QUESTION 4

4.1 $(2x^2)^5 + 5(2x^2)^4(-3) + \frac{43 \cdot 5(2x^2)^3(9)}{2} + \frac{33 \cdot 43 \cdot 5(2x^2)^2(-27)}{6}$

$= 32x^{10} - 240x^8 + 720x^6 - 1080x^4 + \dots$

$\checkmark \quad \checkmark \quad \checkmark \quad \checkmark$

(4)

4.2 $\frac{dy}{dx} = \frac{1}{3x} + 3x^{-2} - 2 \sin x - \frac{7}{5} \operatorname{cosec} x \cot x$

$\checkmark \quad \checkmark \quad \checkmark \quad \checkmark$

(4)

$$4.3 \quad U = \sec x \quad U' = \sec x \tan x \quad \checkmark$$

$$V = \log x \quad V' = \frac{1}{x \ln 10} \quad \checkmark$$

$$\frac{dy}{dx} = \frac{\log x \sec x \tan x - \sec x \frac{1}{x \ln 10}}{(\log x)^2} / \frac{\sec x (\tan x \log x - \frac{1}{x \ln 10})}{(\log x)^2} \quad \checkmark \checkmark \quad (4)$$

$$4.4 \quad \frac{dy}{dx} = -6x^2 + 6x + 12 \quad \checkmark$$

$$-6x^2 + 6x + 12 = 0$$

$$(x-2)(x+1) = 0 \quad \checkmark$$

$$x_1 = 2 \quad \checkmark \quad \text{and/en} \quad x_2 = -1 \quad \checkmark$$

$$y_1 = -2(2)^3 + 3(2)^2 + 12(2) - 7$$

$$y_1 = 13 \quad \checkmark$$

$$y_2 = -2(-1)^3 + 3(-1)^2 + 12(-1) - 7$$

$$y_2 = -14 \quad \checkmark$$

(2; 13) maximum turning point and (-1; -14) minimum turning point $\checkmark \checkmark$

(8)

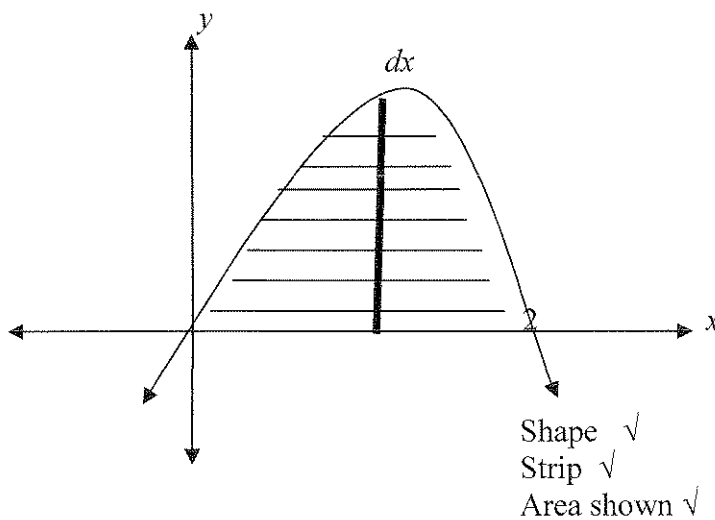
[20]

QUESTION 5

5.1 $\int \sin x dx \quad \checkmark$
 $= -\cos x + c \quad \checkmark$ (3)

5.2 $= [\sin 4x]_0^{\frac{\pi}{3}} \quad \checkmark$
 $= \left\{ \sin 4\left(\frac{\pi}{3}\right) - \sin 4(0) \right\} \quad \checkmark$
 $= -0,8667 \quad \checkmark$ (3)

5.3 5.3.1



(3)

5.3.2 $\int_0^2 (-x^2 + 2x) dx \quad \checkmark$
 $= \left[\frac{-x^3}{3} + x^2 \right]_0^2 \quad \checkmark$
 $= \left(\frac{-2^3}{3} + (2)^2 \right) - (0) \quad \checkmark$
 $= 1,34.u^2 \quad \checkmark$ (4)

5.4 $\frac{\sec x}{3} + \frac{e^{-2x}}{6} + \frac{2}{3}x^{\frac{2}{3}} - x^{-4} - \frac{2 \cdot 4^{3x}}{3 \ln 4} + px + c$
 $\checkmark \quad \checkmark \quad \checkmark \quad \checkmark \quad \checkmark \quad \checkmark \quad \checkmark$ (7)
[20]
[96]