higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE

## MATHEMATICS N2

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**This marking guideline consists of 9 pages.**

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## QUESTION 1

1.1 1.1.1

$$\left[\sqrt{\frac{23x^9}{46x^{-2}}}\right]^0$$

$$=1 \checkmark \quad (1)$$

1.1.2

$$\log_{\sqrt{x}}\sqrt{x}$$

$$=1 \checkmark \quad (1)$$

1.1.3

$$\frac{\sqrt{\sqrt[3]{64p^{30}q^{36}}}}{2p^{-2}q^{-5}}$$

$$=\frac{\left(2^6 p^{30}q^{36}\right)^{\frac{1}{6}}}{2p^{-2}q^{-5}} \checkmark$$

$$=\frac{2^1 p^5 q^6}{2p^{-2}q^{-5}} \checkmark$$

$$= p^7 q^{11} \checkmark \quad (3)$$

1.1.4

$$\frac{\log 9 - \log 4}{\log 81 - \log 16}$$

$$=\frac{\log 3^2 - \log 2^2}{\log 3^4 - \log 2^4} \checkmark$$

$$=\frac{2\log 3 - 2\log 2}{4\log 3 - 4\log 2} \checkmark$$

$$=\frac{2(\log 3 - \log 2)}{4(\log 3 - \log 2)}$$

$$=\frac{1}{2} \checkmark \quad (3)$$

1.2 1.2.1

$$\frac{16^{x+2}}{64^{2x+1}} = 256$$

$$\checkmark$$

$$\frac{2^{4(x+2)}}{2^{6(2x+1)}} = 2^8 \checkmark$$

$$2^{4x+8-12x-6} = 2^8 \checkmark$$

$$-8x + 2 = 8$$

$$-8x = 6$$

$$x = -\frac{3}{4} \checkmark \quad (4)$$

1.2.2 $\frac{1}{2}\log_7 \frac{1}{49} = x$

$\log_7 7^{-2} = 2x$ ✓

$7^{2x} = 7^{-2}$

$2x = -2$ ✓

$x = -1$ ✓ (3)

**[15]**

## QUESTION 2

2.1 2.1.1 $a^2 - 6ab + 9b^2 = (a-3b)^2$ ✓✓

$a^2 - 9b^2 = (a-3b)(a+3b)$ ✓ ✓

$a^2 - 3ab = a(a-3b)$ ✓✓

$3a^2 - 6ab - 9b^2 = 3(a-3b)(a+b)$ ✓ (8)

2.1.2 $LCM = (a-3b)^2(a+3b)(a)(3)(a+b)$ ✓ ✓ ✓ ✓ (4)

2.2 2.2.1 $\frac{5x^2+6x-8}{3x+6} \div \frac{50x^2-32}{3x^2-12} \times \frac{2}{x-2}$ ✓ ✓ ✓

$= \frac{(5x-4)(x+2)}{3(x+2)} \times \frac{3(x-2)(x+2)}{2(5x-4)(5x+4)} \times \frac{2}{x-2}$

$= \frac{(x+2)}{(5x+4)}$ ✓ (4)

2.2.2 $\frac{3}{3-x} - \frac{x}{6+x-x^2}$

$= \frac{3}{3-x} - \frac{x}{(3-x)(2+x)}$ ✓

$= \frac{3(2+x)-x}{(3-x)(2+x)}$ ✓ (numerator) ✓(denominator)

$= \frac{6+2x}{(3-x)(2+x)}$ ✓ (4)

**[20]**

## QUESTION 3

3.1
$$-2=\sqrt{3-4q}$$
$$4=3-4q \checkmark$$
$$1=-4q$$
$$q=-\frac{1}{4} \checkmark$$
(2)

3.2
$$x^2-4x=2$$
$$x^2-4x-2=0 \checkmark$$
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$
$$x=\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(-2)}}{2(1)} \checkmark$$
$$x=4{,}449 \text{ or } x=-0{,}449 \checkmark$$
(3)

3.3

$p=$ price of a pear
$a=$ price of an apples

$$5p+2a=16{,}50 \quad \text{.....Eq. 1}$$
$$3p+4a=18{,}50 \quad \text{.....Eq. 2} \checkmark$$

$$a=\frac{16{,}50-5p}{2} \quad \text{.....Eq. 3}$$

Substitute Eq. 3 into Eq. 2:

$$3p+4\left(\frac{16{,}50-5p}{2}\right)=18{,}50 \checkmark$$
$$3p+33-10p=18{,}50$$
$$p=2{,}07$$

$$a=\frac{16{,}50-5(2{,}07)}{2}$$
$$a=3{,}08 \checkmark$$

$p=$ price of a pear
$a=$ price of an apples

$$5p+2a=16{,}50 \quad \text{.....Eq. 1}$$
$$3p+4a=18{,}50 \quad \text{.....Eq. 2} \checkmark$$

Eq. 1 $\times 2$: $10p+4a=33$ .....Eq. 3

Subtract Eq. 2 from Eq. 2:

$$\begin{array}{ll} & 10p+4a=33 \\ (-) & 3p+4a=18{,}50 \\ & 7p\quad\quad=14{,}5 \checkmark \end{array}$$

$$p=2{,}07 \checkmark$$

$$a=\frac{16{,}50-5(2{,}07)}{2}$$
$$a=3{,}08 \checkmark$$
(4)

3.4
$$A=\pi\left(R^2-r^2\right)$$
$$\frac{A}{\pi}=R^2-r^2 \checkmark$$
$$r^2=R^2-\frac{A}{\pi} \checkmark$$
$$r=\sqrt{R^2-\frac{A}{\pi}} \checkmark$$

Alternatively
$$A=\pi\left(R^2-r^2\right)$$
$$A=\pi R^2-\pi r^2$$
$$\pi r^2=\pi R^2-A \checkmark$$
$$r^2=\frac{\pi R^2-A}{\pi} \checkmark$$
$$r=\sqrt{\frac{\pi R^2-A}{\pi}} \checkmark$$
(3)

3.5
$$D = h + \frac{x^2}{4h}$$
$$D - h = \frac{x^2}{4h} \checkmark$$
$$4h(D-h) = x^2 \checkmark$$
$$x = \sqrt{4h(D-h)} \checkmark$$
(3)
**[15]**

## QUESTION 4

4.1 4.1.1
$$SA = \pi r l + \pi r^2$$
$$315 = \pi r(15) + \pi r^2$$
$$0 = \pi r^2 + 15\pi r - 315 \checkmark \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$r = \frac{-(-15\pi) \pm \sqrt{(-15\pi)^2 - 4(\pi)(-315)}}{2(\pi)} \checkmark$$
$$r = 5{,}011 \text{ or } r \neq -20{,}011$$
$$\therefore\ r = 5{,}011 \checkmark$$
(3)

4.1.2
$$l^2 = h^2 + r^2$$
$$h^2 = l^2 - r^2$$
$$h = \sqrt{(15)^2 - (5{,}011)^2} \checkmark$$
$$h = 14{,}138 \checkmark \text{ cm}$$
(2)

4.1.3
$$V = \frac{1}{3}\pi r^2 h$$
$$V = \frac{1}{3}\pi(5{,}011)^2(14{,}138) \checkmark$$
$$V = 371{,}762 \checkmark \text{ cm}^3$$
(2)

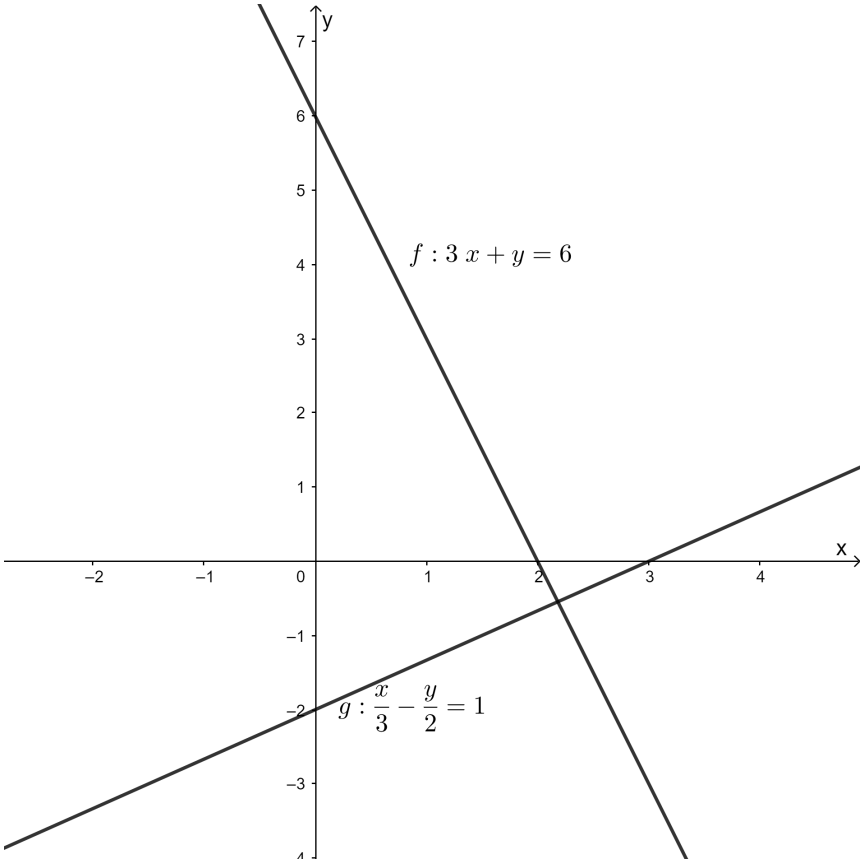
4.2
$$\text{Area} = \left[\frac{(1\text{st} + \text{Last ordinate})}{2} + \sum \text{all other ordinates}\right] \times \text{distance between ordinates}$$
$$\checkmark \qquad\qquad \checkmark$$
$$A = \left[\frac{6+5}{2} + 10 + 60 + 70 + 40 + 20 + 12\right] \times 3$$
$$A = 652{,}5 \checkmark \text{ units}^2$$
(3)

4.3 4.3.1

$f: 3x + y = 6$ $\qquad$ $g: \frac{x}{3} - \frac{y}{2} = 1$

$x$ – intercept✓ $\qquad$ $x$ – intercept✓

$y$ – intercept✓ $\qquad$ $y$ – intercept✓




(4)

4.3.2 $(2{,}2; -0{,}5)$✓ (Accept variation of ±0,1) (1)

4.4 4.4.1 $A(-1;0)$✓ and $B(3;0)$✓ (2)

4.4.2 $C(0;-9)$✓ (1)

4.4.3 $x = \frac{-b}{2a}$ $\qquad$ $y = 3x^2 - 6x - 9$

$x = \frac{-(-6)}{2(3)}$ $\qquad$ $y = 3(1)^2 - 6(1) - 9$

$x = 1$✓ $\qquad$ $y = -12$✓ (2)

4.4.4 $E(-3;0)$✓ (1)

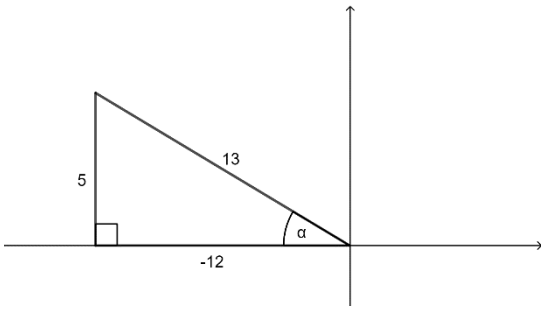
4.4.5 $F(0;-6)$✓ (1)

**[22]**

## QUESTION 5

5.1 $78{,}3° = 78° + (0{,}3 \times 60)$
$78{,}3° = 78°18'$ ✓ (1)

5.2.1




$\sec\alpha = -\frac{13}{12}$
$r^2 = x^2 + y^2$
$y = \sqrt{(13)^2 - (-12)^2}$
$y = 5$ ✓

$1 - \cot\alpha$
$= 1 - \left(\frac{-12}{5}\right)$ ✓
$= \frac{17}{5}$ ✓ (3)

5.2.2 $\sin^2\alpha + \cos^2\alpha$
$= \left(\frac{5}{13}\right)^2 + \left(\frac{-12}{13}\right)^2$ ✓
$= \frac{25}{169} + \frac{144}{169}$
$= 1$ ✓ (2)

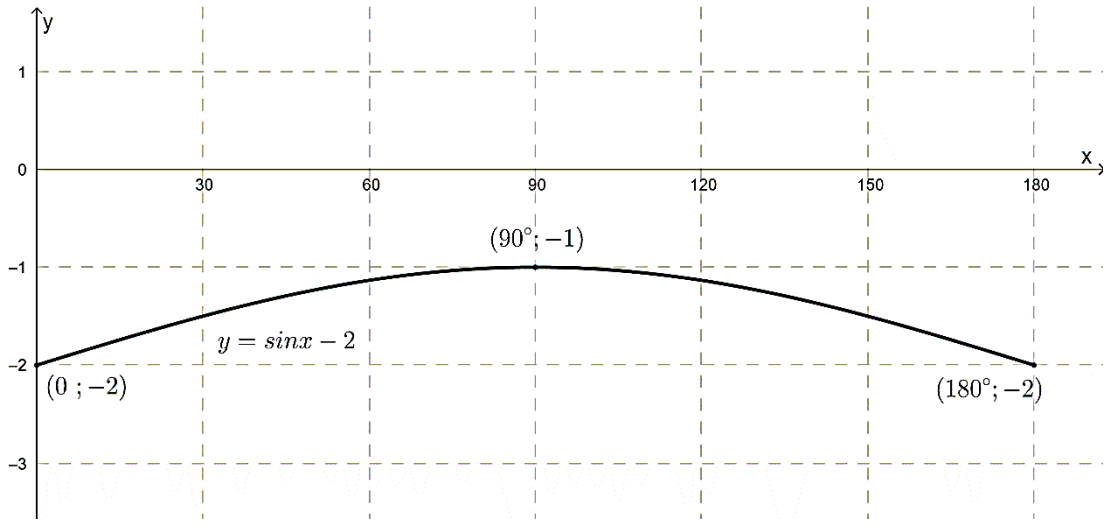
5.3 $XY = BY - BX$

For BY
$\tan Y\hat{P}B = \frac{BY}{BP}$
$\tan 39° = \frac{BY}{18}$ ✓
$BY = 18\tan 39°$
$BY = 14{,}576$ ✓ m

For BX
$\tan X\hat{P}B = \frac{BX}{BP}$
$\tan 21° = \frac{BX}{18}$ ✓
$BX = 18\tan 21°$
$BX = 6{,}910$ ✓ m

$XY = BY - BX$
$XY = 14{,}576 - 6{,}910$
$XY = 7{,}666$ m✓ (5)

5.4 5.4.1




Graph starting at $(0;-2)$ ✓
Graph turning at $(90°;-1)$ ✓
Graph ending at $(180;-2)$ ✓ (3)

5.4.2 $x = 30°$ ✓ and $x = 150°$ ✓ (2)

**[16]**

## QUESTION 6

6.1

$$7{,}555 = 7{,}555 \times \frac{180°}{\pi}$$
$$7{,}555 = 432{,}870° \checkmark$$

Alternative
$$7{,}555 = 7{,}555 \times 57{,}3°$$
$$7{,}555 = 432{,}902° \checkmark$$

(1)

6.2 6.2.1

$$v = \pi D n$$
$$n = \frac{v}{\pi D}$$
$$n = \frac{5}{\pi\left(\frac{3}{4}\right)} \checkmark$$
$$n = 2{,}122 \checkmark \text{ r/s}$$

(2)

6.2.2

$$n = 2{,}122 \times 60$$
$$n = 127{,}323 \checkmark \text{ r/m}$$

(1)

6.3

$$A = \frac{1}{2} r^2 \theta$$
$$A = \frac{1}{2}(7)^2(1{,}309) \checkmark$$
$$A = 32{,}071 \checkmark \text{ cm}^2$$

$$\theta = 75° \times \frac{\theta}{180°}$$
$$\theta = 1{,}309 \checkmark \text{radians}$$
$$r = \frac{14}{2}$$
$$r = 7 \checkmark \text{ cm}$$

(4)

6.4

$$D = h + \frac{x^2}{4h}$$

$$9 = h + \frac{(6)^2}{4h} \checkmark$$

$$9 = h + \frac{9}{h}$$

$$0 = h^2 - 9h + 9$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$h = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(1)(9)}}{2(1)} \checkmark$$

$h = 1{,}146$ or $h = 7{,}854$

Minor segment height: $h = 1{,}146$ ✓

Major segment height: $H = 7{,}854$ ✓

(4)

**[12]**

**TOTAL: 100**

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