higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

1 April 2021

This marking guideline consists of 9 pages.

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QUESTION 1

1.1 TRUE (1)

1.2 1.2.1

$$\frac{\log_e 1 - \log_4 16}{\log_4 2 - \log_4 32}$$
$$= \frac{\log_e e^0 - \log_4 16}{\log_4 \frac{2}{32}} \checkmark$$
$$= \frac{-\log_4 16}{\log_4 \frac{1}{16}} \checkmark$$
$$= \frac{-\log_4 4^2}{\log_4 4^{-2}} \checkmark$$
$$= 1 \quad \checkmark$$

(4)

1.2.2

$$\frac{\sqrt[3]{\sqrt[4]{x^{24}y^{12}}}}{\sqrt[3]{x^3y^6} \times \sqrt{x^4y^4}}$$
$$= \frac{(x^{24}y^{12})^{\frac{1}{3}\times\frac{1}{4}}}{xy^2 \times x^2y^2} \checkmark$$
$$= \frac{x^2y}{x^3y^4} \checkmark$$
$$= x^{2-3}y^{1-4}$$
$$= \frac{1}{xy^3} \checkmark$$

(3)

1.3

$$x = \frac{\sqrt[4]{265} \times (0,32)^2}{14,3}$$
$$\log x = \log\left[\frac{\sqrt[4]{265} \times (0.32)^2}{14.3}\right] \checkmark$$
$$\log x = \frac{1}{4}\log 265 + 2\log 0.32 - \log 14.3 \checkmark$$
$$\log x = -1.5392 \quad \checkmark$$
$$x = 10^{-1.5392}$$
$$x = 0.0289 \quad \checkmark$$

(4)

1.4

$$1 = \frac{128}{32^{2x+1}}$$
$$2^{5(2x+1)} = 2^7 \checkmark$$
$$10x + 5 = 7 \quad \checkmark$$
$$x = \frac{1}{5} \checkmark$$

(3)

[15]

QUESTION 2

2.1 2.1.1 $$\frac{7}{x^2-2xy+y^2}\times\frac{2x^2-2y^2}{x^2+2xy+y^2}\div\frac{2x+2y}{x-y}$$

$$=\frac{7}{(x-y)^2}\checkmark\times\frac{2(x-y)(x+y)\checkmark}{(x+y)^2\checkmark}\times\frac{x-y}{2(x+y)}\checkmark$$

$$=\frac{7}{(x+y)^2}\checkmark$$ (5)

2.1.2 $$\frac{3}{4x^2-9}-\frac{5}{4x^2-12x+9}$$

$$=\frac{3}{(2x-3)(2x+3)\checkmark}-\frac{5}{(2x-3)^2\checkmark}$$

$$=\frac{3(2x-3)-5(2x+3)}{(2x+3)(2x-3)^2}\checkmark$$

$$=\frac{6x-9-10x-15}{(2x+3)(2x-3)^2}\checkmark$$

$$=\frac{-4(x+6)}{(2x+3)(2x-3)^2}\checkmark$$ (5)

2.2 2.2.1 $m^2-m-12=(m+3)(m-4)$ ✓✓
$m^2-7m+12=(m-4)(m-3)$✓✓
$48-3m^2=-3(m^2-16)$ ✓
$=-3(m-4)(m+4)$✓ (6)

2.2.2 $HCF=m-4$ ✓
$LCM=$ $(m+3)$ ✓ $(m-4)$ ✓ $(m+4)(m-3)(-3)$ ✓ (4)
[20]

QUESTION 3

3.1 $7x^2 + 4x - 5 = 0$

$x = \dfrac{-4 \pm \sqrt{16 - 4(7)(-5)}}{2(7)}$ ✓

$x = \dfrac{-4 \pm \sqrt{156}}{14}$ ✓

$x = 0.606$ ✓ or $x = -1.178$ ✓ (4)

3.2 3.2.1

$n = \dfrac{Tpr}{u^2}$

$nu^2 = Tpr$ ✓

$u^2 = \dfrac{Tpr}{n}$ ✓

$u = \pm\sqrt{\dfrac{Tpr}{n}}$ ✓ (3)

3.2.2

$u = \pm\sqrt{\dfrac{55.5 \times 17.5 \times 3.55}{9.25}}$

$u = \pm 19.307$ ✓ (1)

3.3 $3b + 4a + 2 = 0 - - - - -$ (1)

$2a + 3b = 11 - - - - \ - -$ (2)

$a = \dfrac{11 - 3b}{2} - - \ - -(3)$ ✓

(3) $into$ (1)

$3b + 4\left(\dfrac{11 - 3b}{2}\right) + 2 = 0$ ✓

$b = 8$ ✓

$a = -\dfrac{13}{2}$ ✓

ALTERNATIVE 1

$\Rightarrow a = \dfrac{-2 - 3b}{4} - -(3)$ ✓

(3) $into$ (2) $\Rightarrow 2\left(\dfrac{-2 - 3b}{4}\right) + 3b = 11$ ✓

$b = 8$ ✓

$a = -\dfrac{13}{2}$ ✓ (4)

ALTERNATIVE 2

$4a + 3b = -2$.....(1)

$-[2a + 3b = 11]$.....(2)

$2a = -13$

$a = -\dfrac{13}{2}$

Substitute a in (2)

$2\left(-\dfrac{13}{2}\right) + 3b = 11$

$-13 + 3b = 11$

$\therefore\ b = 8$

3.4 $Let\ w = price\ of\ one\ water\ melon$

$\Rightarrow 400 - 4w = R16{,}60$ ✓

$\Rightarrow w = R95{,}85$ ✓ ANSWER ONLY: Full marks (2)

[14]

QUESTION 4

4.1 4.1.1

$$\frac{4}{3}\pi r^3 = \pi r^2 h$$
$$\frac{4}{3}\pi r^3 = 9\pi r^2 \checkmark$$
$$\pi r^2\left(\frac{4}{3}r - 9\right) = 0 \checkmark$$
$$r = \frac{27}{4} \checkmark \qquad r = 6.75cm$$

(3)

4.1.2

$$SA_{sphere} = 4\pi r^2$$
$$= 4\pi(6.75)^2 \checkmark$$
$$= \frac{729\pi}{4} cm^2 \checkmark \qquad SA_{sphere} = 572{,}555\ cm^2$$

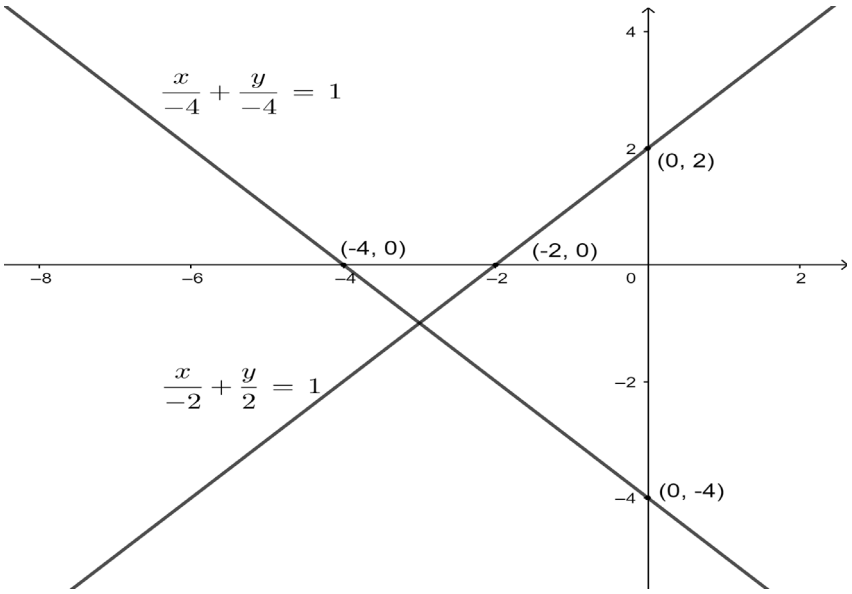
(2)

4.1.3

$$SA_{cylinder} = 2\pi r^2 + 2\pi rh$$
$$= 2\pi(6{,}75)^2 + 2\pi(6{,}75) \times 9 \checkmark$$
$$= \frac{1701\pi}{8} cm^2 \checkmark \qquad = 667{,}981\ cm^2$$

(2)

4.2 4.2.1



x – Intercepts i.e. (-2; 0) ✓ and (-4; 0) ✓
y – Intercepts i.e. (0; 2) ✓ and (0; -4) ✓ (4)

4.2.2 $(-3; -1)$ ✓✓ (2)

4.3 4.3.1 A (3; 0) ✓ and B (6; 0) ✓ (2)

4.3.2 C (0; -18) ✓ and D (9; -18) ✓ (2)

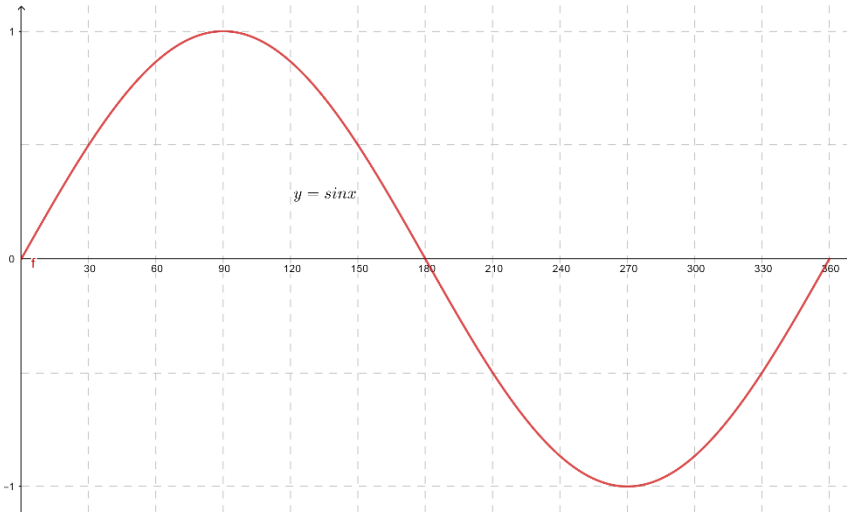
✓ ✓

4.3.3 **E**$(4.5; 2.25)$ (2)

[19]

QUESTION 5

5.1.1



Turning points
$(90°;1)$ ✓ and
$(270°;-1)$ ✓
Shape✓
x-intercepts at
$0°;\ 180°;\ 360°$ ✓

(4)

5.1.2 $x = 330°$ ✓ *and* $x = 210°$ ✓ (2)

5.2
$$\cot 26°48' = \frac{1}{\tan\left(26° + \frac{48}{60}\right)}$$
$$= \frac{1}{tan26.8°}\checkmark$$
$$= 1{,}980 \quad \checkmark$$

(2)

5.3 5.3.1
$$\tan 67° = \frac{91}{BD}$$
$$BD = \frac{91}{\tan 67°}\checkmark$$
$$BD = 38{,}627\ m\ \checkmark$$

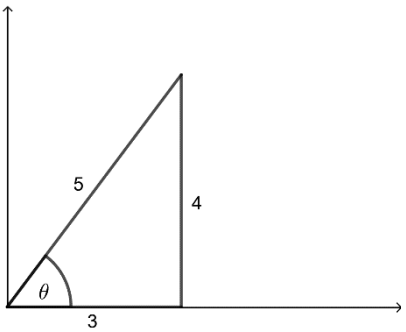
(2)

5.3.2
$$\tan 53° = \frac{AB}{38{,}627}\checkmark$$
$$AB = 38{,}627 \tan 53°$$
$$AB = 51{,}26\ m\checkmark$$

$$AC = 51{,}26\ m + 91m$$
$$AC = 142{,}26\ m\checkmark$$

(3)

5.4
$$x = \sqrt{5^2 - 4^2}$$
$$x = 3\ \checkmark$$
$$cos^2\theta + tan^2\theta$$
$$= \left(\frac{3}{5}\right)^2 + \left(\frac{4}{3}\right)^2\ \checkmark$$
$$= \frac{481}{225}\checkmark$$



(3)
[16]

QUESTION 6

6.1 $5.6\,rads$
$= 5{,}6 \times 57.3$ ✓
$= 320° + 0{,}.88 \times 60'$
$= 320°53'$✓

ALTERNATIVELY
$5.6\,rads = \frac{5{,}6 \times 180°}{\pi}$ ✓
$= 320° + 0{,}86 \times 60'$
$= 320°52'$✓ (2)

6.2 6.2.1
$l = \frac{45.5}{5}$
$l = 9{,}1$ ✓ *cm* (1)

6.2.2
$\theta = \frac{2\pi}{5}$
$\theta = 1{,}257$ ✓ *rads* (1)

6.2.3
$A = \frac{1}{2}r^2\theta$
$A = \frac{1}{2}(7{,}242)^2 \times 1{,}257$ ✓
$A = 32{,}963$ ✓ cm^2

$C = 2\pi r$
$r = \frac{45{,}5}{2\pi}$
$r = 7{,}242$ ✓ *cm* (3)

6.3 6.3.1
$n = \frac{1}{10} revs.per\ second$
$v = \pi Dn$
$v = \pi \times 7250 \times 2 \times \frac{1}{10}$✓
$v = 4555{,}309$✓ *m/s* (2)

6.3.2
$\omega = \frac{v}{r}$
$\omega = \frac{4555{,}309}{7250}$ ✓
$\omega = 0{,}628$ ✓ *rad/s*

$\omega = 2\pi n$
$\omega = 2\pi\left(\frac{1}{10}\right)$✓
$\omega = 0{,}628$ ✓*rad/s* (2)

6.4 If $D = x$
$\therefore h = \frac{D}{2}$✓✓ (2)

6.5 $\text{Area} = \left[\frac{(1\text{st} + \text{Last ordinate})}{2} + \Sigma\text{ of other ordinates}\right] \times \text{ common distance}$
✓ ✓
$Area = \left[\frac{3 + 0.52}{2} + 6{,}1 + 8.2 + 7{,}2 + 9{,}2 + 7{,}3 + 1.3 + 3.1\right] \times \frac{350}{1000}$
$Area = 15{,}456$✓ km^2 (3)
[16]

TOTAL: 100

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