higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

24 JULY 2018

This marking guideline consists of 9 pages.

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QUESTION 1

1.1 1.1.1

$$\frac{3^2\ e^{-2}\ fg^{-5}}{81e^{-4}\ f^3\ g^3}$$
$$= \frac{e^{-2+4}}{3^{4-2}\ f^{3-1}\ g^{3+5}} \checkmark$$
$$= \frac{e^{+2}}{3^2\ f^2\ g^8} \checkmark$$

(2)

1.1.2

$$\frac{3\log_8 64 - \log_2 64\ - \log_7 2\ 401}{\log 1000 + \ 2\log_2 8}$$
$$= \frac{3\log_8 8^2 - \log_2 2^6\ - \log_7 7^4}{\log 10^3 + \ 2\log_2 2^3} \checkmark$$
$$= \frac{6-6-4}{3+6} \checkmark$$
$$= \frac{-4}{9} \checkmark$$

(3)

1.1.3

$$\log_3 189 - (\log_7 3)^{-1}$$
$$= \log_3 189 - \frac{1}{\log_7 3}$$
$$= \log_3 189 - \log_3 7 \checkmark$$
$$= \log_3\left(\frac{189}{7}\right) \checkmark$$
$$= \log_3 27$$
$$= 3\log_3 3$$
$$= 3 \checkmark$$

(3)

1.2 1.2.1

$$3x^{\frac{3}{2}} = 24$$
$$x^{\frac{3}{2}} = 8 \checkmark$$
$$\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = \left(2^3\right)^{\frac{2}{3}} \checkmark$$
$$x = 2^2 \checkmark$$

(3)

1.2.1

$$\log_3 x + \log_3(x-2) = 1$$
$$\log_3 x(x-2) = 1 \checkmark$$
$$x^2 - 2x = 3^1 \checkmark$$
$$x^2 - 2x - 3 = 0$$
$$(x-3)(x+1) = 0 \checkmark$$
$$x = 3;\ \ x \neq -1 \checkmark$$

(4)

1.3
$$f = \frac{1}{2\pi\sqrt{LC}}$$
$$f\sqrt{LC} = \frac{1}{2\pi} \checkmark$$
$$\sqrt{LC} = \frac{1}{2\pi f}$$
$$\left(\sqrt{LC}\right)^2 = \left(\frac{1}{2\pi f}\right)^2 \checkmark$$
$$LC = \frac{1}{4\pi^2 f^2}$$
$$C = \frac{1}{4\pi^2 f^2 L} \checkmark$$
(3)
[18]

QUESTION 2

2.1 2.1.1
$$a^2 + 7a - 18 = (a+9)(a-2) \checkmark$$
$$4m^2 - 9y^2 = (2m-3y)(2m+3y) \checkmark$$
$$2m^2 - 3ym = m(2m-3y) \checkmark$$
(3)

2.1.2
$$\text{LCM} = m(a+9)(a-2)(2m-3y)(2m+3y) \quad (\checkmark \checkmark \checkmark)$$
(3)

2.1.3 $\text{HCF} = 1 \checkmark$ (1)

2.2 2.2.1
$$\frac{x^2 - x - 12}{x^2 - 3x - 10} \div \frac{x^2 - 9x + 20}{x^2 - 2x - 8} \times \frac{x-5}{x+3}$$
$$= \frac{(x-4)(x+3)}{(x-5)(x+2)} \times \frac{(x-4)(x+2)}{(x-4)(x-5)} \times \frac{x-5}{x+3} \quad (\checkmark \checkmark \checkmark)$$
$$= \frac{x-4}{x-5} \checkmark\checkmark$$
(5)

2.2.2
$$\frac{2}{x^2+3x-4}+\frac{4}{x^2-4x+3}$$
$$=\frac{2}{(x+4)(x+1)}+\frac{4}{(x-3)(x-1)}$$
$$=\frac{2(x-3)+4(x+4)}{(x+4)(x+1)(x-3)}$$
$$=\frac{2x-6+4x+16}{(x+4)(x+1)(x-3)}\checkmark$$
$$=\frac{6x+10}{(x+4)(x+1)(x-3)}\checkmark$$
(4)

2.3 2.3.1
$$20x^2-x-1$$
$$=(5x+1)(4x-1)$$
(2)

2.3.2
$$\frac{3}{64}-27y^2$$
$$=3\left(\frac{1}{64}-9y^2\right)\checkmark$$
$$=3\left(\frac{1}{8}-3y\right)\left(\frac{1}{8}+3y\right)$$
(3)
[21]

QUESTION 3

3.1 Peter had Rx

Morris had $R\frac{1}{4}x\checkmark$

Ayanda had $R\frac{1}{2}x\checkmark$

$\frac{1}{4}x=\frac{1}{2}x-35\checkmark$

$x=2x-140\checkmark$

$x=140\checkmark$
(5)

3.2 3.2.1
$$\frac{2x-1}{3}=x-1$$
$$2x-1=3(x-1)\checkmark$$
$$2x-1=3x-3$$
$$-1+3=3x-2x$$
$$x=2\checkmark$$
(2)

3.2.2 $13x^2 - 8 = 7x$

$13x^2 - 7x - 8 = 0$

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

$x = \dfrac{-(-7) \pm \sqrt{(-7)^2 - 4(13)(-8)}}{2(13)}$ ✓

$x = \dfrac{7 \pm \sqrt{465}}{26}$

✓ ✓

$x = 1{,}099$ or $x = -0{,}560$ (3)

3.3 3.3.1 $\omega = 2\pi n$

$n = \dfrac{\omega}{2\pi}$

$n = \dfrac{272}{2\pi}$ ✓

$n = 43{,}290$ r/s✓ (2)

3.3.2 $v = \pi D n$

✓ (mark for converting cm to m)

$v = \pi\left(\dfrac{2 \times 3}{100}\right)(43{,}290)$✓

$v = 8{,}160$ m/s✓ (3)

3.3.3 $\omega = 272$ rad/s

$5\,\text{min} = 5 \times 60$

$= 300\,\text{sec}$ ✓

$\theta = 272$ rad in 1 second

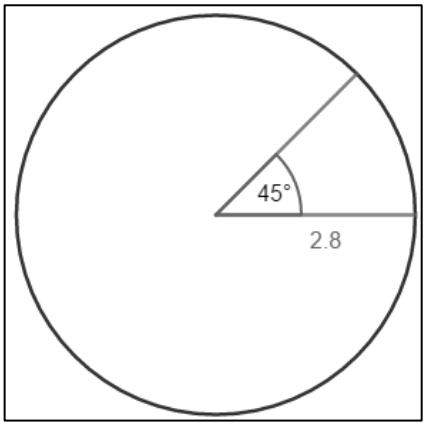
$\therefore \theta = 272 \times 300$ ✓

$\therefore \theta = 81600$ radians in 5 minutes (300 seconds) ✓ (3)

3.4 $A = \dfrac{1}{2} r^2 \theta$ $\theta = 45° \times \dfrac{\pi}{180°}$

$A = \dfrac{1}{2}(2{,}8)^2(0{,}785)$✓ $\theta = 0{,}785$ rad✓

$A = 3{,}077$ ✓ cm^2



(3)

3.5 $64°45'54'' = 64,765°$ ✓

$\theta = 64,765° \times \frac{\pi}{180°}$

$\theta = 1,200$ radians✓

(2)
[23]

QUESTION 4

4.1 $\text{Area} = \left[\frac{(\text{First ordinate} + \text{Last ordinate})}{2} + \text{Sum of all other ordinates}\right]$

$\times$The distance between ✓ the ordinates ✓

$\text{Area} = \left[\frac{(4+7)}{2} + 6 + 8 + 10 + 8\right] \times 3$

$\text{Area} = (37,5) \times 3$

$\text{Area} = 112,5$ ✓ units^2

(3)

4.2 $\text{Volume} = \frac{4}{3}\pi r^3$ $\qquad r = \frac{280}{2}$

$\text{Volume} = \frac{4}{3}\pi (140)^3$ ✓ $\qquad r = 140$ mm ✓

$\text{Volume} = 11494040,32$ mm^3✓

(3)

4.3 $\cos\beta = 0,65$

$\beta = \cos^{-1}(0,65)$✓

$\beta = 49,458°$ ✓

$\beta = 360° - 49,458°$ ✓

$= 310,542°$

(3)

4.4 $V_{rect} = V_{sphere}$ ✓

$l.b.h = \frac{4}{3}\pi r^3$

✓

$(5 \times 3 \times 4) = \frac{4}{3}\pi r^3$

$60 \times \frac{3}{4\pi} = r^3$ ✓

$r = \sqrt[3]{60 \times \frac{3}{4\pi}}$

$r = 2,429$ ✓

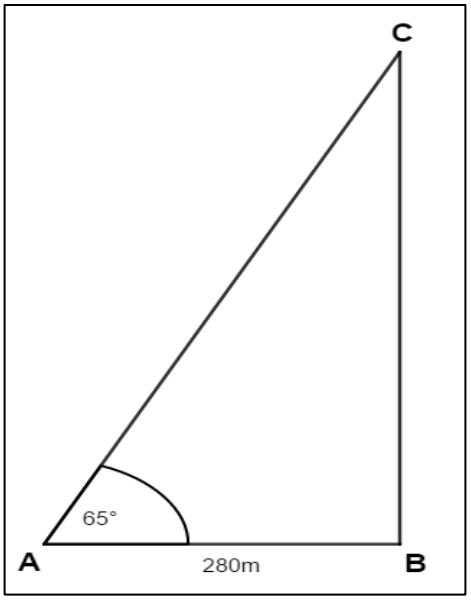
$D = 2,429 \times 2$

$D = 4,858$ ✓ mm

(5)

4.5 4.5.1

$$\tan 65° = \frac{BC}{AB}$$
$$BC = 280 \times \tan 65° \checkmark$$
$$BC = 600{,}462 \text{ m} \checkmark$$



(2)

4.5.2

$$\cos 65° = \frac{AB}{AC}$$
$$AC = \frac{280}{\cos 65°} \checkmark$$
$$AC = 662{,}536 \text{ m} \checkmark$$

OR

$$AC^2 = AB^2 + BC^2$$
$$AC = \sqrt{(280)^2 + (600{,}462)^2} \checkmark$$
$$AC = 662{,}536 \text{ m} \checkmark$$

(2)
[18]

QUESTION 5

5.1 5.1.1

$$x^2 + 6x - 7 = 0$$
$$(x+7)(x-1) = 0$$
$$\checkmark \quad \checkmark$$
$$x = -7 \text{ or } x = 1$$

(2)

5.1.2

$$x = \frac{-b}{2a}$$
$$x = \frac{-(6)}{2(1)}$$
$$x = -3 \checkmark$$

(1)

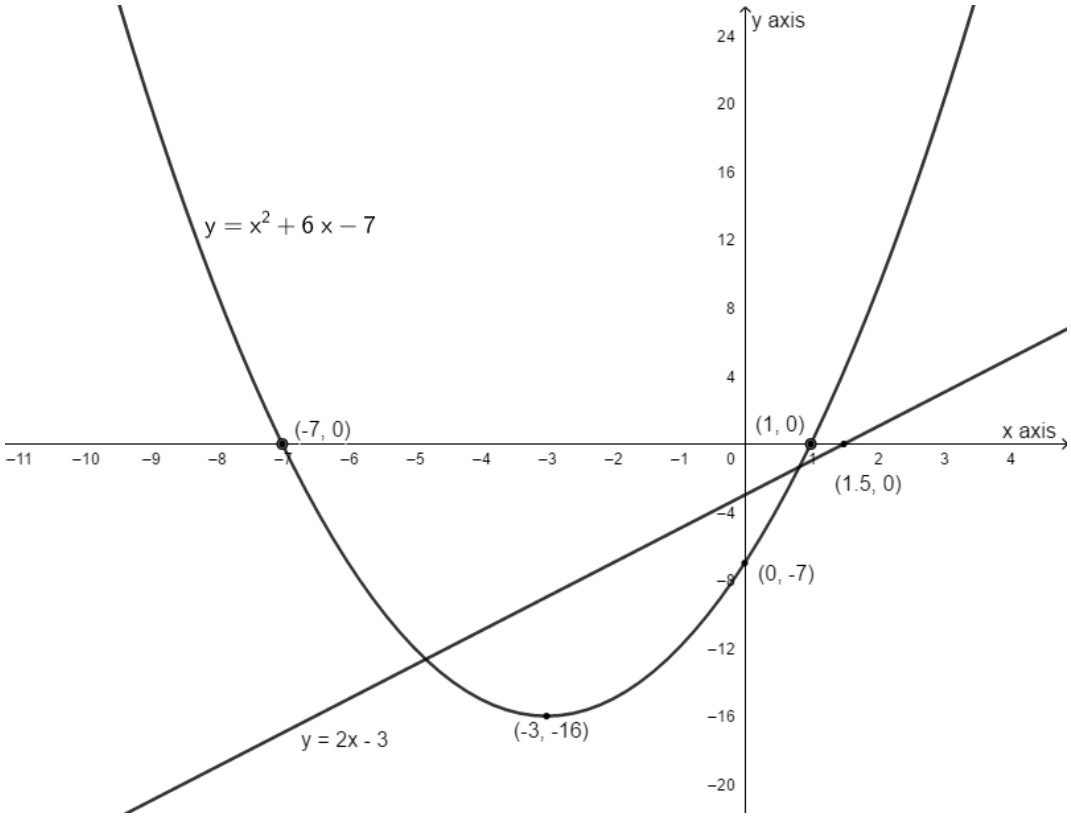
5.1.3

$$\text{Sub } x = -3 \text{ into } x^2 + 6x - 7 = 0$$
$$y = (-3)^2 + 6(-3) - 7 \checkmark$$
$$y = -16 \checkmark$$

(2)

5.1.4 $y = -7 \checkmark$ (1)

5.2.1 2 Marks for correct parabola drawn ✓✓ (2)
and
5.2.2 2 Marks for correct straight line drawn ✓✓ (2)



5.2.3 $(0{,}8\,;-1{,}3)$ and $(-4{,}8\,;-12{,}7)$ (2)

5.3.1 and 5.3.2 3 marks for $f(x) = \sin x$ ✓✓✓ (3)

3 marks for $g(x) = 2\cos x - 0{,}5$ ✓✓✓ (3)



5.3.3 $x = \pm 50°$ ✓and $x = \pm 256°$ ✓ (2)

[20]

TOTAL: 100

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