higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

15 November 2022

This marking guideline consists of 9 pages.

Copyright reserved

QUESTION 1

1.1 1.1.1

$$\frac{\sqrt[4]{(a^2b^2)^6}}{a^5b^7 \times a^{-2}b^{-4}}$$
$$= \frac{(a^2b^2)^{\frac{3}{2}}}{a^{5-2}b^{7-4}} \checkmark\checkmark$$
$$= a^{3-3}b^{3-3}$$
$$= a^0b^0$$
$$= 1\checkmark$$ (3)

1.1.2

$$\left[(\log_3 27)^2 + \left(\log_8 \frac{1}{64}\right)^3\right]^{-1}$$
$$= [(3\log_3 3)^2 + (-2\log_8 8)^3]^{-1}\checkmark$$
$$= [(3)^2 + (-2)^3]^{-1}$$
$$= [9 - 8]^{-1}\checkmark$$
$$= 1\checkmark$$ (3)

1.2

$$\log_x 9 + \log_3 1 - \log_4 \frac{1}{16} = 3$$
$$\log_x 9 + 0 + 2\log_4 4 = 3\checkmark$$
$$\log_x 9 = 3 - 2\checkmark$$
$$\log_x 9 = 1\checkmark$$
$$x = 9\checkmark$$ (4)

1.3

$$\frac{64^{2x+1}}{16^{x-2}} = 256$$
$$\frac{4^{3(2x+1)}}{4^{2(x-2)}} = 4^4$$
$$4^{6x+3-2x+4} = 4^4\checkmark$$
$$4^{4x+7} = 4^4$$
$$\therefore 4x + 7 = 4\checkmark$$
$$\therefore 4x = -3$$
$$\therefore x = \frac{-3}{4}\checkmark$$ (3)

1.4 1.4.1

$$s = \pi r(4r + 2h)$$
$$\frac{s}{\pi r} = 4r + 2h\checkmark$$
$$\frac{s}{\pi r} - 4r = 2h\checkmark$$
$$\frac{s}{2\pi r} - 2r = h\checkmark$$ (3)

1.4.2

$$\frac{149,7}{2\pi(2,45)} - 2(2,25) = h\checkmark$$
$$h = 5,225\checkmark$$ (2)

1.5 $20x^2 + 9x = 18$
$20x^2 + 9x - 18 = 0$
$(5x + 6)(4x - 3) = 0$
$\boldsymbol{x = -\frac{6}{5}}$ **and** $\boldsymbol{x = \frac{3}{4}}$ (3)

[21]

QUESTION 2

2.1 2.1.1 $6b^2 - 27b - 15$
$= 3(2b^2 - 9b - 5)$✓
$= 3(2b + 1)(b - 5)$✓✓ (3)
If student divides by 3, penalise by 1 mark (max 2 marks)

2.1.2 $1 - 16x^{20}$
$= (1 + 4x^{10})(1 - 4x^{10})$✓
$= (1 + 4x^{10})(1 + 2x^5)(1 - 2x^5)$✓✓ (3)

2.1.3 $5x - 3a^2 - 5a + 3ax$
$= 5x + 3ax - 5a - 3a^2$
$= x(5 + 3a) - a(5 + 3a)$✓
$= (5 + 3a)(x - a)$✓✓ (3)

2.2 2.2.1 ✓ ✓ ✓ ✓
$LCM = (a + 1)(a + 1)(a + 2)(a - 7)$ (4)

2.2.2 $LCM = (a + 1)$✓ (1)

2.3 2.3.1 $\frac{6}{a+3} + \frac{a-2}{6-a-a^2}$
$= \frac{6}{a+3} + \frac{a-2}{(3+a)(2-a)}$
$= \frac{6}{a+3} - \frac{a-2}{(3+a)(a-2)}$✓
$= \frac{6}{a+3} - \frac{1}{(a+3)}$✓
$= \frac{5}{a+3}$✓ (3)

2.3.2 $\frac{a^2-4a+4}{a^2-1} \div \frac{a^2-2a}{a^2-a}$
✓ ✓ ✓
$= \frac{(a-2)(a-2)}{(a-1)(a+1)} \times \frac{a(a-1)}{a(a-2)}$
$= \frac{(a-2)}{(a+1)}$✓ (4)

[21]

QUESTION 3

3.1 $3y + 6 = 6x$ and $x = 2y - 2$
$3y + 6 = 6(2y - 2)$✓
$3y + 6 = 12y - 12$
$18 = 9y$
$y = 2$✓
$x = 2(2) - 2$✓
$x = 2$✓ (4)

3.2 3.2.1 $\omega = 2\pi n$
$\omega = 2\pi(15)$
$\omega = 94{,}248$rad/s✓
$n = 0{,}25 \times 60$
$n = 15$revs/s✓ (2)

3.2.2 $v = \pi Dn$
$v = \pi(0{,}08)(15)$✓
$v = 3{,}77\ m/s$✓
$D = \frac{80}{1000}$
$D = 0{,}08m$✓ (3)

3.3 $c = 2\pi r$
$\frac{25}{2\pi} = r$
$r = 3{,}979$✓
$A = \frac{1}{2}r^2\theta$
$A = \frac{1}{2}(3{,}979)^2(0{,}960)$✓✓
$A = 7{,}600\ cm^2$✓
$\theta = 55 \times \frac{\pi}{180}$
$\theta = 0{,}960 radians$✓ (5)

3.4 $Surface\ area = \pi rl$
$0{,}6 = \pi(1{,}3)l$✓
$l = 0{,}147$✓

$l^2 = r^2 + h^2$
$h = \sqrt{(1{,}3)^2 - (0{,}147)^2}$✓
$h = 1{,}292$cm✓ (4)

3.5 Volume $= \pi r^2 h$
$506{,}6 = \pi r^2(30)$✓
$r = \sqrt{\frac{506{,}6}{30\pi}}$
$r = 2{,}318\ cm$✓

Surface area $= 2\pi r^2 + 2\pi rh$
Surface area $= 2\pi(2{,}318)^2 + 2\pi(2{,}318)(30)$✓
Surface area $= 470{,}693$ cm^2✓ (4)

3.6 $A = \underset{\checkmark}{\left[\frac{(\text{First ordinate}+\text{Last ordinate})}{\underset{\checkmark}{2}} + \underset{\checkmark}{\text{Sum of all other ordinates}}\right]} \times \text{distance}$

$A = 0{,}5\left[\frac{0{,}25 + 0{,}3}{2} + 1{,}3 + 3{,}1 + 3{,}7 + 2{,}9 + 2{,}7 + 2{,}8 + 1{,}6\right]$

$A = 9{,}188\ km^2$ ✓ (4)

[26]

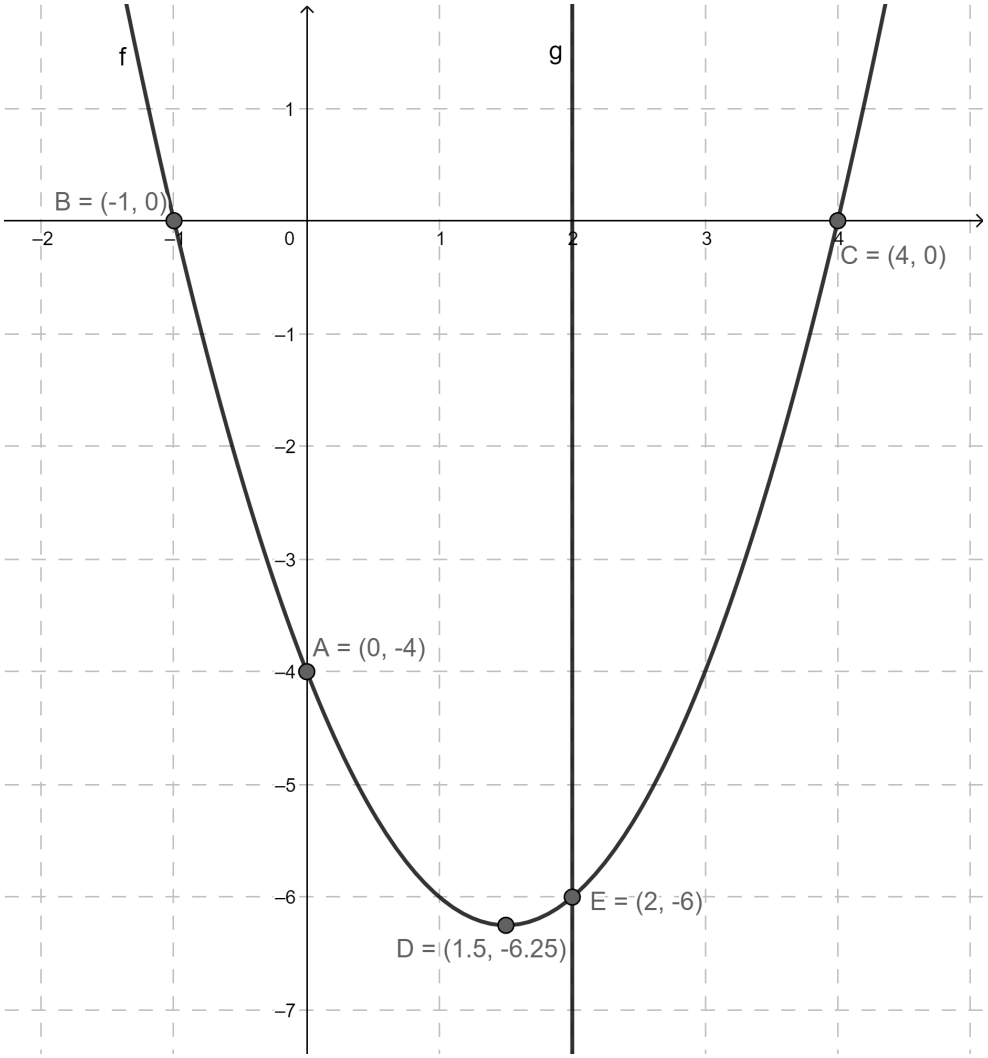
QUESTION 4

4.1 4.1.1 A$(-6; 0)$ ✓ and D$(0; 12)$ ✓ (2)

4.1.2 B$(-2; 0)$ ✓and C$(6; 0)$ ✓ (2)

4.1.3 E$(2; 16)$ ✓✓ (2)

4.2.1



$f: y = x^2 - 3x - 4$

$x - interept$ ✓

$y - intercept$ ✓

TP ✓

$Shape$ ✓

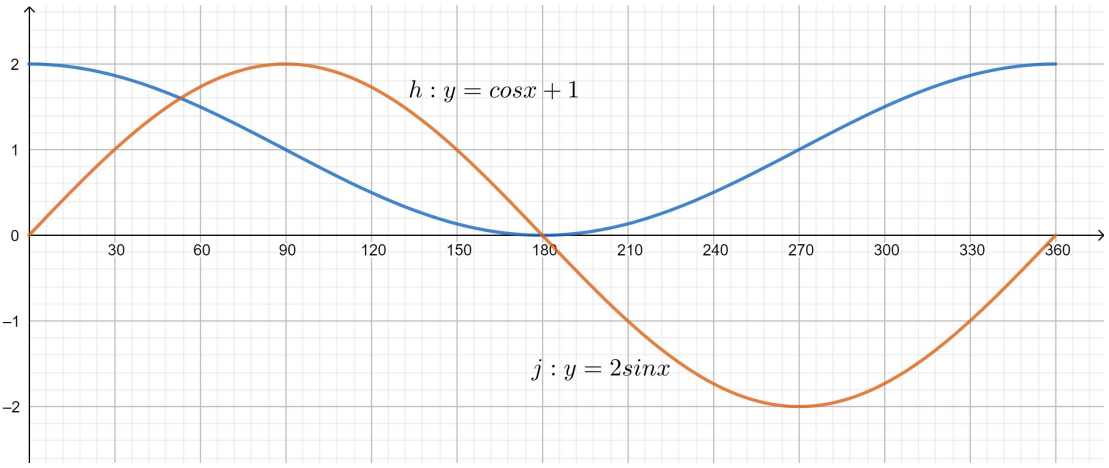
$g: x = 2$

$x - intercept$ ✓

(5)

4.2.2 $(2; -6)$ ✓✓ (2)

4.3.1



$h: y = \cos x + 1$
starting point ✓
correct shift✓
shape ✓

$j : y = \sin x$
starting point✓
correct amplitude✓
shape✓

4.3.2 $(53; 1{,}6)$ ✓ and $(180; 0)$ ✓ (2)
[21]

QUESTION 5

5.1 $\tan\theta = -1$
$\theta = \tan^{-1}(1)$
$\theta = 45°$
$\theta = 135° \; and \; 315°$ (3)

5.2 5.2.1 $33°15' = 33{,}25°$

$$\tan B = \frac{AC}{AB}$$

$$\tan 33{,}25° = \frac{AC}{96}$$

$$AC = 96 \tan 33{,}25°$$

$$AC = 62{,}940 \; m$$ (3)

5.2.2 $$BC^2 = AB^2 + AC^2$$

$$BC = \sqrt{96^2 + 62{,}940^2}$$

$$BC = 114{,}793$$ (2)

5.3 $$D = h + \frac{x^2}{4h}$$

$$42 = 10 + \frac{x^2}{4(10)}$$

$$x = \sqrt{1280}$$

$$x = 35{,}778 \; mm$$ (3)

[11]

TOTAL: 100

Copyright reserved