



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

MATHEMATICS N2

8 APRIL 2013

This marking guideline consists of 9 pages.

✓ = 1 mark

✓ = ½ mark

QUESTION 1

1.1	1.1.1	$16 - x^2$ $(4 - x^2)(4 + x^2)$ ✓ ✓ $(2 - x)(2 + x)(4 + x^2)$ ✓		(3)
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	1.1.2	$16b^2 + 56b + 49$ $(4b + 7)(4b + 7)$ ✓ ✓		(2)
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	1.1.3	$1 - x - x^2 + x^3$ $(1 - x) - x^2(1 - x)$ ✓ ✓ $(1 - x)(1 - x^2)$ ✓ $(1 - x)(1 - x)(1 + x)$ ✓		(4)
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	1.1.4	$p(b^2 - a^2) - p^2(b^2 - a^2) + p^3(b^2 - a^2)$ $(b^2 - a^2)(p - p^2 + p^3)$ $p(b - a)(b + a)(1 - p + p^2)$ ✓ ✓ ✓ ✓		(4)
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1.2	1.2.1	$\frac{2}{x} + \frac{x}{2} - \frac{2x}{3}$ $\frac{6 \times 2 + 3x(x) - 2x(2x)}{6x}$ $\frac{12 + 3x^2 - 4x^2}{6x}$ ✓ ✓ ✓ $\frac{12 - x^2}{6x}$ ✓		(4)
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	1.2.2	$\frac{x+2}{2x^3} + 16$ $\frac{(x+2)+16(2x^3)}{2x^3}$ ✓ ✓ $\frac{x+2+32x^3}{2x^3}$ ✓		(3)
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1.2.3	$\frac{x^2 + 2x}{x^2 + x - 6} \times \frac{x^2 + 2x + 1}{x^2 + 3x + 2}$ $\frac{x(x+2)}{(x+3)(x-2)} \times \frac{(x+1)(x+1)}{(x+2)(x+1)} \quad \checkmark \checkmark \checkmark \text{ Top } \checkmark \checkmark \checkmark \checkmark \text{ Bottom}$ $\frac{x(x+1)}{(x+3)(x-2)} \quad \checkmark$			(4)
				[24]

QUESTION 2

2.1	$3y = -2x + 12$ $4y = 2x + 2$ $7y = 14$ $y = \frac{14}{7} \checkmark$ $= 2 \checkmark$ y in 1 $3(2) = -2x + 12 \checkmark$ $6 - 12 = -2x$ $\frac{-6}{-2} = x$ $3 = x \checkmark$			(4)
2.2	$2x^2 + 8x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-8) \pm \sqrt{(-8)^2 - 4(2)(-3)}}{2 \times (2)} \quad \checkmark \quad \checkmark$ $= \frac{-(-8) \pm \sqrt{64 + 24}}{4} \quad \checkmark$ $= \frac{-8 \pm 9,381}{4}$ $= \frac{-8 + 9,381}{4} \quad \text{or} \quad \frac{-8 - 9,381}{4}$ $x = 0,345 \quad \checkmark \quad -4,345 \quad \checkmark$			(4)

2.3	<p>Let x be the one number</p> <p>Then $x+4$ will be the greater number</p> $3(x+4) - 2x = 26 \quad \checkmark$ $3x + 12 - 2x = 26 \quad \checkmark$ $x = 14 \quad \checkmark$ <p>The numbers are 18 and 14 \checkmark</p>		(4)
2.4	$(7x - 2)(2x + 7) = 0$ $7x - 2 = 0$ $x = \frac{2}{7} \quad \checkmark$ $2x + 7 = 0$ $2x = -7$ $x = \frac{-7}{2} \quad \checkmark$		(2)
			[14]

QUESTION 3

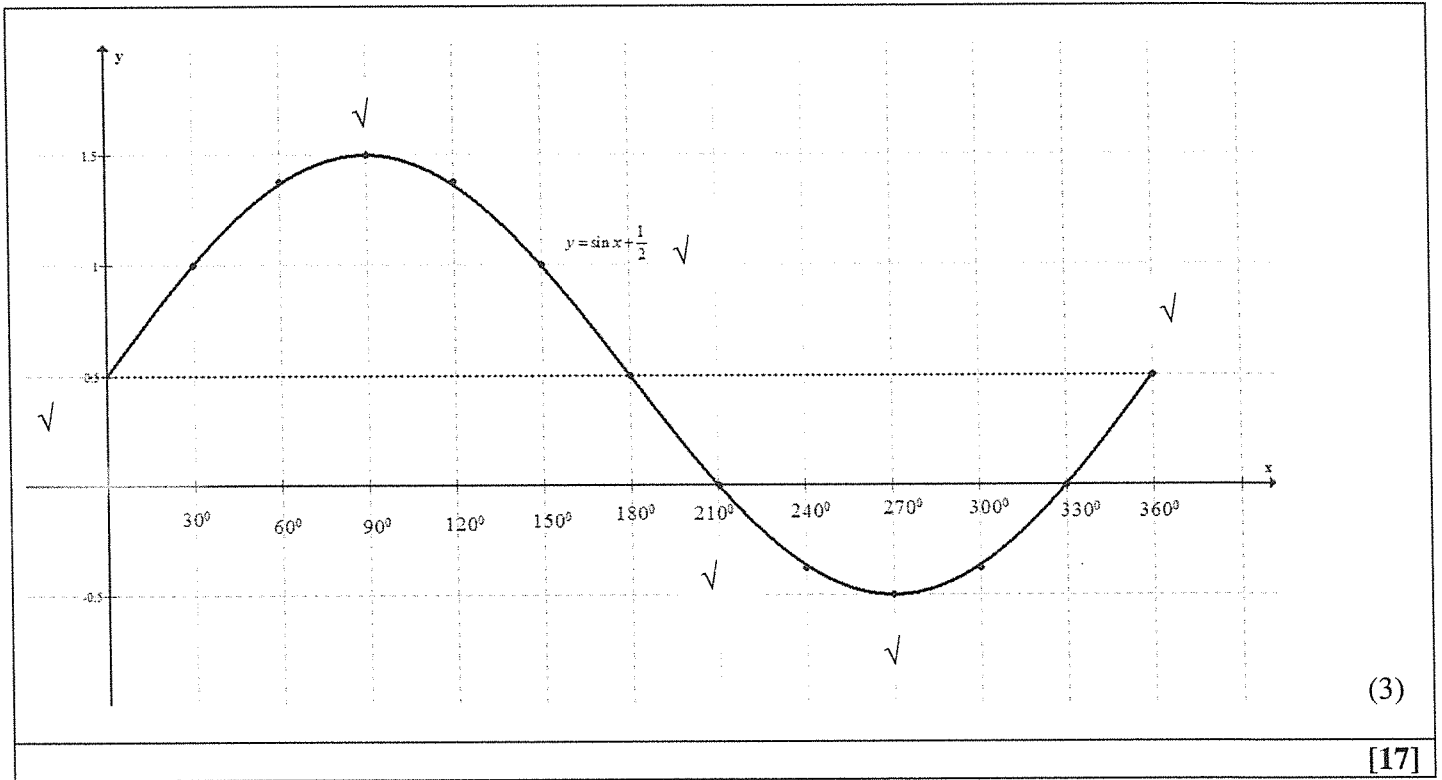
3.1	$y - x^2 + x + 6 = 0$ $y = x^2 - x - 6$		
3.1.1	<p>Zero point ($y = 0$)</p> $x^2 - x - 6 = 0 \quad \checkmark$ $(x - 3)(x + 2) = 0 \quad \checkmark$ $\therefore x - 3 = 0$ $x = 3 \checkmark$ <p>Zero points (0;-6)(3;0) \checkmark</p>	$x + 2 = 0$ $x = -2 \quad \checkmark$	(3)
3.1.2	-6 or (0 ; -6)		(1)
3.1.3	<p>Axis of symmetry ($x = \frac{-b}{2a}$)</p> $x = \frac{1(-1)}{2 \cdot 1} = \frac{1}{2} \quad \checkmark$		(1)

3.1.4	Turning point ($x = \frac{1}{2}$) $y = \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right) - 6$ $= -6\frac{1}{4}$ Turning point ($\frac{1}{2}; -6\frac{1}{4}$) min ✓ ✓	(2)
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Graph 3 marks – see mark allocation on graph ✓ ✓ ✓	(3)
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3.2	$2y - 4x = -12$ $2y = 4x - 12$ $y = \frac{4x}{2} - \frac{12}{2}$ $y = 2x - 6$ $m = 2$ $y \text{ intercept} = -6$ Graph 2 marks – see mark allocation on graph ✓ ✓ $(-2;0)$ and $(3;0)$ ✓ ✓	(4)
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3.3	x	0	30	60	90	120	150	180	210	240	270	300	330	360
	$\sin x$	0	0,5	0,866	1	0,866	0,5	0	-0,5	-0,866	-1	-0,866	-0,5	0
	$\sin x + \frac{1}{2}$	0,5	1	1,366	1,5	1,366	1	0,5	0	-0,366	-0,5	-0,366	0	0,5



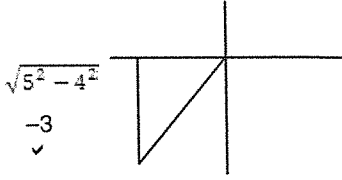
QUESTION 4

4.1	4.1.1	$\theta = 8,62 \text{ radians at } 1,5 \text{ sec}$ $w = \frac{\theta}{t} = \frac{\text{radians}}{1,5}$ $w = 5,747 \text{ rad/sec} \quad \checkmark$ $t = \frac{\theta}{w} = \frac{4 \text{ rev} \times \frac{360^\circ}{57,3^\circ}}{5,747 \text{ rad/sec}} \quad \checkmark$ $t = \frac{25,131 \text{ rad}}{5,747}$ $4,373 \text{ sec} \quad \checkmark$		(3)
	4.1.2	$V = wr \quad \checkmark$ $= 5,747 \times 0,4 \quad \checkmark$ $= 2,299 \text{ m/s} \quad \checkmark$		(2)

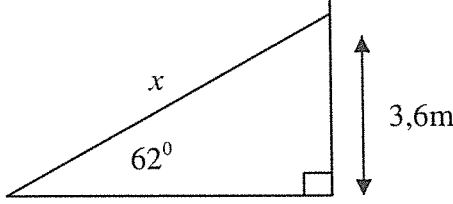
4.2	<p>Diameter 40 mm Height 9 mm</p> $D = \frac{x^2}{4h} + h$ $40 = \frac{x^2}{4 \times 9} + 9 \quad \checkmark$ $(40 - 9) = \frac{x^2}{36}$ $\sqrt{31 \times 36} = x \quad \checkmark$ $33,407 \text{ mm} = x \quad \checkmark$		(3)
4.3	$H = \sqrt{\frac{a^2}{4} + h^2}$ $H^2 = \frac{a^2}{4} + h^2 \quad \checkmark$ $H^2 - h^2 = \frac{a^2}{4} \quad \checkmark$ $\pm \sqrt{4(H^2 - h^2)} = a \quad \checkmark$		(3)
4.4	$A = d \left[\frac{O_1 + O_L}{2} = O_2 + \dots \right]$ $= 20 \left[\frac{120 + 118}{2} + 137 + 148 + 147 + 154 + 142 + 136 + 127 \right] \quad \checkmark \quad \checkmark$ $= 20 \times 1110 \quad \checkmark$ $= 22\,200 \text{ mm}^2 \quad \checkmark$		(4)
4.5	<p>Volume of cylinder = volume of cone</p> <p>Volume of cylinder:</p> $V = \pi r^2 h$ $= \pi (35)^2 (40) \quad \checkmark$ $= 153938,04 \text{ mm}^2 \quad \checkmark$ <p>Volume of cone:</p> $V = \frac{1}{3} \pi r^2 h$ $153938,04 = \frac{1}{3} \pi (70)^2 h \quad \checkmark$ $\frac{3(153938,04)}{\pi (70)^2} = h$ $30 = h \quad \checkmark$		(4)
			[19]

QUESTION 5

5.1	5.1.1	$\left(\sqrt[3]{x^{24}y^{12}}\right)^{\frac{2}{3}}$ $\left((x^{24}y^{12})^{\frac{1}{3}}\right)^{\frac{2}{3}}$ $\left(x^{\frac{24}{3}}y^{\frac{12}{3}}\right)^{\frac{2}{3}} \checkmark$ $(x^8y^4)^{\frac{2}{3}} \checkmark$ $x^{\frac{8}{3}}y^{\frac{4}{3}}$ $x^2y \checkmark$		(3)
	5.1.2	$\frac{5^2 \times \sqrt[3]{625}}{125 \times 5^0} + \frac{1}{\sqrt[3]{8}}$ $\frac{5^2 \times 5}{5^3 \times 1} + \frac{1}{2} \quad \checkmark \quad \checkmark$ $1 + \frac{1}{2} = 1,5 \quad \text{or} \quad \frac{3}{2} \quad \checkmark$		(3)
5.2		$81^{2x+3} \times \left(\frac{1}{9}\right)^{2x+4} = \frac{1}{9^{-2}}$ $(9^2)^{2x+3} \times (9^{-1})^{2x+4} = 9^2$ $9^{4x+6-2x-4} = 9^2 \quad \checkmark$ $9^{2x+2} = 9^2 \quad \checkmark$ $\therefore 2x+2 = 2 \quad \checkmark$ $2x = 2 - 2$ $x = 0 \quad \checkmark$		(4)
5.3		$\text{Let } x = \frac{(13,4)^3 \times \sqrt[4]{298}}{100}$ $\ln x = \ln 13,4^3 + \ln 298^{\frac{1}{4}} - \ln 100 \quad \checkmark$ $= 3(2,595) + \frac{1}{4}(5,697) - 4,605 \quad \checkmark$ $= 7,785 + 1,424 - 4,605$ $\ln x = 4,604 \quad \checkmark$ $x = e^{4,604}$ $x = 99,883 \quad \checkmark$		(4)

5.4	5.4.1	$\sec \theta = \frac{-5}{4}$ $\tan \theta \cos \theta$ $\frac{-3}{-4} \times \frac{-4}{5} \checkmark$ $-\frac{3}{5} \checkmark$		(3)
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	5.4.2	$\frac{1}{\operatorname{Cosec} \theta}$ $\frac{1}{\frac{5}{-3}} \checkmark$ $-\frac{3}{5} \checkmark$		(2)
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5.5				
		$\operatorname{cosec} 62 = \frac{x}{3,6} \checkmark$ $3,6 \times \operatorname{cosec} 62 = x \checkmark$ $3,6 \times 1,209 = x \checkmark$ $4,353 = x \checkmark$		(4)

5.6	$125,25^\circ$ $125^\circ 15' \checkmark$		(1)
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5.7	$80^\circ 41'$ $80,683^\circ \checkmark$ $1,408 \text{ rad} \checkmark$		(2) [26]
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TOTAL:			100
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