

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

MATHEMATICS N2

18 NOVEMBER 2013

This marking guideline consists of 12 pages.

$$\frac{\log_x 32}{\log_x 1024}$$

$$\frac{5 \log_x 2}{10 \log_x 2}$$

$$\frac{5}{10}$$

$$\frac{1}{2} = RHS$$

(4)

1.2

$$\sqrt{\sqrt{4.83} \bullet (16,2)^2}$$

$$let\ x = \left((4,83)^{\frac{1}{2}} \bullet (16,2)^2 \right)^{\frac{1}{2}}$$

$$\log x = \log \left(4,83^{\frac{1}{2}} \bullet 16,2^2 \right)^{\frac{1}{2}}$$

$$\log x = \frac{1}{2} \left[\log 4,83^{\frac{1}{2}} + \log 16,2^2 \right]$$

$$\log x = \frac{1}{2} \left[\frac{1}{2} \log 4,83 + 2 \log 16,2 \right]$$

$$\log x = \frac{1}{2} \left[\frac{1}{2} (0,684) + 2(1,21) \right]$$

$$1.3 \quad \log x + \log 250 = 3$$

$$\log x + \log 250 = \log 1000 \quad \checkmark$$

$$\log x = \log 1000 - \log 250 \quad \checkmark$$

$$\log x = \frac{\log(1000)}{(250)} \quad \checkmark$$

$$\log x = \log 4 \quad \checkmark$$

$$x = 4 \quad \checkmark$$

(4)

$$1.4$$

$$\frac{(a^4)^{n+1} \bullet (a^2b)^{-3n}}{(ab)^{3n} \bullet b^n}$$

$$\frac{a^{4n+4} \bullet a^{-6n} b^{-3n}}{a^{3n} b^{3n} \bullet b^n} \quad \checkmark \quad \checkmark \quad \checkmark$$

$$= a^{4n+4-6n-3n} b^{-3n-n}$$

$\checkmark$

$$= a^{-5n+4} b^{-4n}$$

(4)

$$1.5$$

$$\frac{x}{2} - \frac{x}{3} - 2 = 2$$

$$\frac{3x-2x}{6} = 2+2 \quad \checkmark$$

$$\frac{x}{6} = 4 \quad \checkmark$$

$$x = 4 \times 6$$

$$x = 24 \quad \checkmark$$

(3)
[20]

2.1.2 $V = \ell^2 \times h$ where ℓ is the inside length

$$10053,096 = \ell^2 \times 2 \quad \checkmark$$

$$\frac{10053,096}{2} = \ell^2$$

$$5026,548 = \ell^2 \quad \checkmark$$

$$\sqrt{5026,548} = \ell$$

$$70,898 = \ell \quad \checkmark$$

$$\text{outside } 70,898 + 20 = 90,898 \text{ mm} = \ell \quad \checkmark \quad (3)$$

2.2 $r = 200 \text{ mm}$ $\theta = 20^\circ$

2.2.1 $\ell = \theta r$

$$= \frac{20}{57,3} \times 200 \quad \text{or} \quad 0,349 \times 200 \quad \checkmark$$

$$= 69,808 \text{ mm} \quad \checkmark \quad (2)$$

2.2.2 $A = \frac{1}{2} \theta r^2$

$$= \frac{1}{2} \times \frac{20}{57,3} \times 200 \quad \text{or} \quad 0,5 \times 0,349 \times 200 \quad \checkmark$$

$$= 34,904 \text{ mm}^2 \quad \checkmark \quad (2)$$

$$= 27,531 \text{ mm} \checkmark$$

$$r = \frac{D}{2} = \frac{27,531}{2} = 13,766 \text{ mm} \checkmark$$

(3)

2.4

$$N = 560 \text{ r/min} \quad D = 150 \text{ mm}$$

2.4.1

$$V = \frac{\pi DN}{60}$$

$$V = \frac{\pi \cdot 0,15 \times 560}{60} \checkmark$$

$$= 4,398 \text{ m/s} \checkmark$$

(2)

2.4.2

$$W = \frac{2\pi N}{60}$$

$$W = \frac{2\pi \cdot 560}{60} \checkmark$$

$$= 58,643 \text{ rad/s} \checkmark$$

(2)

2.5

$$A = d \left[\frac{0_1 + 0_L}{2} + 0_2 + 0_3 + \dots \right]$$

$$A = 3 \left[\frac{0 + 0}{2} + 4 + 8 + 6 + 2 \right] \checkmark$$

$$= 3(20) \checkmark$$

$$60 \text{ mm}^2 \checkmark$$

(3)

$$C = \frac{\left(\frac{1}{2\pi F}\right)^2}{L} \quad \checkmark$$

$$C = \frac{1}{L} \left(\frac{1}{2\pi F}\right)^2$$

$$C = \frac{1}{4\pi F^2 L}$$

(4)
[24]

QUESTION 3

3.1 3.1.1 $\frac{1}{2} \text{Co sec } 150^\circ$

$$\frac{1}{2 \text{Sin } 150^\circ} \quad \checkmark$$

$$1 \quad \checkmark$$

(2)

3.1.2 $\text{Tan } 40^\circ 42' + \text{Sec } 30^\circ 40'$

$$0,8601 + 1,1626 \quad \checkmark$$

$$= 2,023 \quad \checkmark$$

(2)

Second quadrant

$$\theta + 30^\circ = 180^\circ - 30^\circ \quad (2^{\text{nd}} \text{ Q})$$

$$\theta = 150^\circ - 30^\circ = 120^\circ$$

$$\theta = 120^\circ \quad \checkmark$$

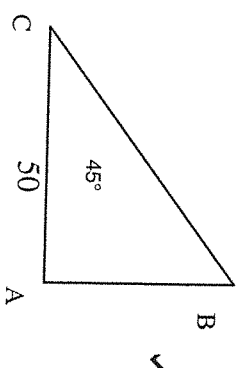
$$\therefore \theta \in (0; 120)$$

3.3

$$\therefore \tan 45^\circ = \frac{BA}{50} \quad \checkmark$$

$$AB = 50 \tan 45^\circ$$

$$= 50 \text{ m} \quad \checkmark$$



(3)

3.4

$$18x^2 - 4 = 0$$

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

$$x = \frac{-0 \pm \sqrt{0^2 - 4(18)(-4)}}{2 \times 18} \quad \checkmark \checkmark$$

$$x = \frac{\pm \sqrt{288}}{36} \quad \checkmark$$

$$= \frac{\pm 16,971}{36}$$

$$\pm 0,471 \quad \checkmark$$

(3)

$$\therefore -y = -35$$

$$\therefore y = 35 \text{ age of father}$$

(3)
[16]

QUESTION 4

4.1 See graph on p.11

$$y = -x^2 + 4$$

x	-3	-2	-1	0	1	2	3
$y = -x^2 + 4$	-5	0	3	4	3	0	5

Graph: half mark for each plotted point on graph paper & 1 mark for shape and 1 mark for labelling (5)

4.2 See graph on p.11

$$y = 2$$

$$x - 2 = y \quad (x\text{-intercept, } y\text{-intercept})$$

(3)

4.3 See graph on p.12

x	0	30	60	90	120	150	180
$\sin x$	0	0,5	0,866	1	0,866	0,5	0
$2\sin x$	0	1	1,732	2	1,732	1	0
$2\sin x + 1$	1	2	2,732	3	2,732	2	0
$2x$	0	60	120	180	240	300	360
$\cos x$	1	0,5	-0,5	-1	-0,5	0,5	1
$2\cos 2x$	2	1	-1	-2	-1	1	2

Graph: 3 marks for $\sin$ -graph; 3 marks for $\cos$ -graph

(6)

4.4 4.4.1 $2\sin x + 1 = 2\cos 2x$

$$\pm 19^\circ \text{ and } \pm 162^\circ$$

(1)

QUESTION 5

5.1 5.1.1

$$5 - \frac{45}{a^2}$$

$$5 \left(1 - \frac{9}{a^2} \right) \checkmark$$

$$5 \left(1 - \frac{3}{a} \right) \left(1 + \frac{3}{a} \right) \checkmark \checkmark$$

(3)

5.1.2

$$6x^2 - 19 + \frac{15}{x^2}$$

$$\left(3x - \frac{5}{x} \right) \left(2x - \frac{3}{x} \right) \checkmark \checkmark$$

(2)

5.1.3

$$a^2(m-n) - 2a(m-n) - n + m$$

$$a^2(m-n) - 2a(m-n) + (m-n) \checkmark$$

$$(m-n)(a^2 - 2a + 1) \checkmark \checkmark$$

$$(m-n)(a-1)(a-1) \checkmark$$

(4)

5.2

$$(m-n)(a-1)^2$$

$$(m-n)(a-1)(m+n)$$

$$\frac{(a-1)(m+n)(a+1)}{(a-1)(m+n)(a+1)}$$

$$\text{HCF} = a-1 \checkmark$$

$$\text{LCM} = (m-n)(a-1)^2(m+n)(a+1) \checkmark \checkmark \checkmark$$

(4)

5.3.2

$$\left(1 - \frac{x}{y}\right) \div \left(\frac{1}{x} - \frac{1}{y}\right)$$

$$\left(\frac{1}{1} - \frac{x}{y}\right) \div \left(\frac{1}{x} - \frac{1}{y}\right)$$

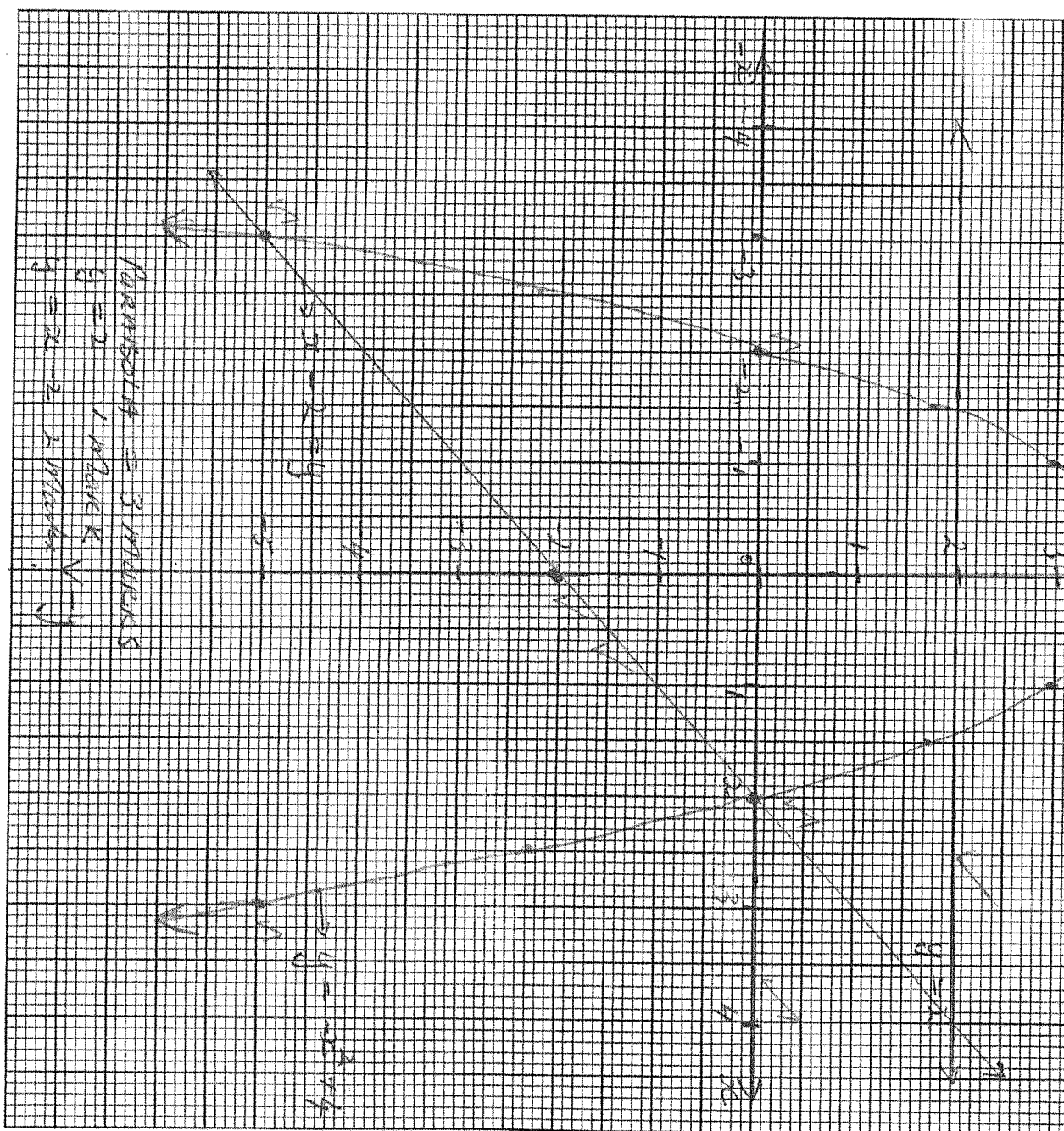
$$\frac{y-x}{y} \div \frac{(y-x)}{xy} \quad \checkmark \quad \checkmark$$

$$\frac{y-x}{y} \times \frac{xy}{y-x} \quad \checkmark$$

$$x \quad \checkmark$$

(4)
[20]

TOTAL: 100



Parabola = 3 marks
 $y = x^2 + 4$ 1 mark
 $y = x - 2$ 2 marks

Parabola = 3 marks
 $y = x^2 + 4$ = 1 mark
 $y = x - 2$ = 2 marks

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