

KULLEĠĠ SAN BENEDITTU

Secondary School, Kirkop

HALF YEARLY EXAMINATION – 2015/2016

Track

3

FORM 4

MATHEMATICS

Marking Scheme

Aids for Marking of Scripts

Types of Marks

- **M**(ethod) marks are awarded for knowing a correct method of solution and attempting to apply it. Method marks cannot be lost for arithmetic mistakes. They can only be awarded if the method used would have led to the correct answer had not an arithmetic mistake been made. In general a correct method is implied by a correct answer and therefore **when a correct answer is given and no work is shown, no method marks are lost.**
- **A**(ccuracy) marks are given for correct answer only (c.a.o.) Incorrect answers, even though nearly correct, score no marks. Accuracy marks are also awarded for incorrect answers which are correctly followed through (f.t.) from an incorrect previous answer, **provided that f.t. is indicated in the mark scheme.** No method (M) or accuracy (A) marks are awarded when a wrong method leads to a correct answer.
- **B** marks are accuracy marks awarded for specific results or statements independent of the method used.

Misreading

M marks can still be earned (unless that part of the question is trivialized) but the final A marks are lost.

Crossed out working

An answer or working that is crossed out and not replaced is marked as if it were not crossed out. If the answer or working is replaced, then the crossed out answer or working is ignored and should not be considered for marking.

Units

In general, missing or inaccurate units are not penalised unless otherwise indicated in the mark scheme.

Other

- Incorrect working or statements following a correct answer are ignored.
- Marks are not sub-divisible; no half marks may be awarded.
- Other abbreviations used:
 - o.e. (or equivalent)
 - e.e.o.o. (each error or omission)
- Markers are advised to indicate the M, A or B marks awarded in the body of the script and then write their total in the margin. The total mark for each question should be written in the table included at the top of page 1 of the main paper. This measure facilitates the moderation of papers.

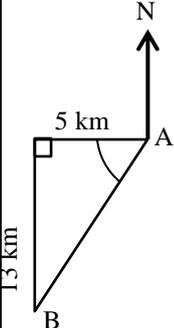
NON CALCULATOR PAPER (Total: 20 Marks)

No. 1	No. 2	No. 3	No. 4	No. 5
$9\frac{1}{8}$	2×10^5	$10xy^6$	-2	137
No. 6	No. 7	No. 8	No. 9	No. 10
$(3x + 4)(3x - 4)$	$\frac{5}{13}$	42	$\sqrt{\frac{v}{\pi h}}$	$y = x + 2$
No. 11	No. 12	No. 13	No. 14	No. 15
20	60	200	21	56
No. 16	No. 17	No. 18	No. 19	No. 20
$(x + 6)(x - 1)$	3	4	$\frac{1}{3}$	Repeat 4 [FD 50 RT 90] o.e as long as it includes a repeat function

MAIN PAPER (Total: 80 Marks)

Quest.	Requirements		Additional Guidelines
1.	a $154 = 2 \times 7 \times 11$ $165 = 3 \times 5 \times 11$	B1 B1	5 (f.t.) (f.t.)
	b LCM = $2 \times 3 \times 5 \times 7 \times 11$ = 2310 HCF = 11	M1 A1 B1	
2.	a USA	B1	6 Award 1 mark if first <u>or</u> last country correct
	b Guyana	B1	
	c $2.25 \times 10^8 - 5.68 \times 10^7 = 168200000$ = 1.682×10^8	M1 A1	
	d Guyana, Jamaica, New Zealand, Australia, Canada, UK, USA	B2	
3.	$100\% + 13\% = 113\% = \frac{113}{100} = 1.13$ $100\% + 16\% = 116\% = \frac{116}{100} = 1.16$ $1.13 \times 1.16 = 1.3108$ $1.3108 \times 100 = 131.08\%$ $131.08 - 100\% = 31.08\%$	M1 M1 A1	3
4.	a 0.025	B1	3 accept also answers in standard form
	b 0.0536	B1	
	c 35 000 000	B1	

5.	a(i)	$(x - 4)(2x + 1)$ or $2x^2 - 7x - 4$	B1		
	a(ii)	$(10 - 4)(20 + 1)$ $6 \times 21 = 126$	M1 A1		correct substitution f.t. for incorrect expression
	b(i)	$3x(x - 2)$	B1 B1	9	for $3x$ for complete answer
	b(ii)	$(5x + 9y)(5x - 9y)$	B1 B1		for $(5x + 9y)$ for $(5x - 9y)$
	b(iii)	$3(p^2 + 4p - 12)$ $3(p - 2)(p + 6)$	B1 B1		Award B1 for $(3p - 6)(p + 6)$ or $(p - 2)(3p + 18)$
6.	a	$\frac{100}{115} \times 150\,000$ $= \text{€ } 130,434.7826$ $= \text{€ } 130,000$	M1 M1 A1	6	
	b	$100\% \rightarrow 150,000$ $115\% \rightarrow ?$ $\frac{115}{100} \times 150\,000$ $= \text{€ } 172,500$	M1 M1 A1		
7.	a	Correct marking of angle of elevation	B1	5	
	b	$\tan 38^\circ = \frac{opp}{9}$ $9 \tan 38^\circ$ $7.0315... + 1.5$ $= 8.53$	M1 M1 A1		
	c	Angle increases	B1		
8.	a	Area of trapezium = $\frac{(a+b)h}{2} = \frac{(5+3)12}{2}$ $= 8 \times 6 = 48$	M1 A1	6	or otherwise
	b	Volume = 48×15 $= 720$	M1 A1		f.t. for incorrect area of cross-section
	c	$1000\text{cm}^3 = 1 \text{ litre}$ $720\,000\,000\text{cm}^3 = ?$ $720\,000$	M1 A1		f.t. for incorrect volume of pool
9.	a	$x = \frac{3}{a-b}$	B1	8	
	b	$x^2 = \frac{a}{y}$ $x = \pm \sqrt{\frac{a}{y}}$	M1 A1		do not award mark if negative sign is not given
	c	$bx = c^2$ $x = \frac{c^2}{b}$	M1 A1		
	d	$ax - bx = rt - t$ $x(a - b) = rt - t$ $x = \frac{t(r - 1)}{a - b}$	M1 M1 A1		Accept also $\frac{rt-t}{a-b}$

10.		<p>Simple interest:</p> $I = \frac{PTR}{100}$ $= \frac{360\,000,000 \times 5 \times 5}{100} = \text{€ } 90,000,000$ <p>Compound interest:</p> $A = P\left(1 + \frac{r}{100}\right)^n$ $A = 360,000,000 \left(1 + \frac{2}{100}\right)^5$ $I = \text{€}397,469,089.20 - \text{€}360,000,000$ $= \text{€ } 37,469,089.20$ <p>Total Interest:</p> $\text{€ } 90,000,000 + \text{€ } 37,469,089.20$ $= \text{€}127,469,089.20$	<p>M1 A1</p> <p>M1</p> <p>M1 A1</p> <p>B1</p>	6	f.t. for incorrect simple interest or incorrect compound interest
11.	<p>a</p> <p>b</p> <p>c</p>	 $AB^2 = 5^2 + 13^2$ $AB^2 = 25 + 169$ $AB = \sqrt{194} = 13.92838 \dots$ $= 13.9$ $\tan \theta = \frac{13}{5}$ $\theta = \tan^{-1}\left(\frac{13}{5}\right)$ $\theta = 68.962 \dots$ $\theta = 270 - 68.962$ $\theta = 201.038$ $\theta = 201^\circ$	<p>B1 B1</p> <p>M1 A1</p> <p>M1 M1 A1</p>	8	<p>correct drawing of 5km west correct drawing of 13km south</p> <p>accept use of sin or cos</p> <p>f.t. for incorrect value of AB</p>

12.	a	$2A = (a + b)h$ $\frac{2A}{h} = a + b$ $\frac{2A}{h} - b = a \quad \text{or} \quad a = \frac{2A - bh}{h}$	M1 M1 A1	6	accept any other valid method																																
	b	$a = \frac{2A}{h} - b$ $a = \frac{2 \times 25}{5} - 3$ $a = \frac{50}{5} - 3$ $a = 10 - 3$ $= 7$	M1 M1 A1																																		
13.	a	<table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>x</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>2x</td><td>-6</td><td>-4</td><td>-2</td><td>0</td><td>2</td><td>4</td><td>6</td></tr> <tr><td>+5</td><td>+5</td><td>+5</td><td>+5</td><td>+5</td><td>+5</td><td>+5</td><td>+5</td></tr> <tr><td>y</td><td>-1</td><td>1</td><td>3</td><td>5</td><td>7</td><td>9</td><td>11</td></tr> </table>	x	-3	-2	-1	0	1	2	3	2x	-6	-4	-2	0	2	4	6	+5	+5	+5	+5	+5	+5	+5	+5	y	-1	1	3	5	7	9	11	B3	9	B1 for every 7 correct entries
	x	-3	-2	-1	0	1	2	3																													
	2x	-6	-4	-2	0	2	4	6																													
	+5	+5	+5	+5	+5	+5	+5	+5																													
y	-1	1	3	5	7	9	11																														
b	Suitable scales Correct plotting Correct straight line	B1 B1 B1	f.t.																																		
c	i) $x = 0.5$ (± 0.2) ii) $y = 5.4$ (± 0.2)	B1 B1	(f.t.) (f.t.)																																		
d	C	B1																																			