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Secondary School, Kirkop

HALF YEARLY EXAMINATION – 2015/2016

TRACK

2

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 (20 marks)

1	2	3	4	5	6	7	8	9	10
9	17, 19, 23, 29	252 or 270	$\frac{1}{4}$	400	3	-7	$2y^2 + 6xy - 2$ o.e.	C.	$\frac{m-2}{3}$
11	12	13	14	15	16	17	18	19	20
15	$\frac{3}{5}$	30	24	B	10	60 000	7396.8	250	$\frac{2}{3}$, $0.\dot{6}$

Main Paper (80 marks)

Quest.	Requirements	Mark	Additional Guidance	Total
1	(a) 14.235532 14.2	M1 A1		4
	(b) $\frac{700 \times 20}{600 + 400} = \frac{14000}{1000}$ = 14	M1 A1		
2	(a) $3(2-x) - 2(x-1)$ = $6 - 3x - 2x + 2$ = $8 - 5x$	M1 M1 A1	Accept any other valid method. Accept $6 + 4b$	7
	(b) $2x(3y + 4z + 2)$	B1		
	(c) i) $15x^3$ ii) $\frac{6(3+2b)}{3} = 2(3+2b)$	B1 M1 A1		
3	(a) i) 5.72×10^3 ii) 6.21×10^{-4}	B1 B1		4
	(b) 230000 = 2.3×10^5	M1 A1		
4	(a) i) a^6 ii) m^7 ii) y^{15}	B1 M1A1 B1	Both correct	5
	(b) i) $<$ ii) $>$	B1		

5	(a)	$x^2 = 4.2^2 + 3.6^2$ $= \sqrt{4.2^2 + 3.6^2}$ $= 5.53$	M1 A1	Accept any other valid method	4
	(b)	$\tan \theta = \frac{4.2}{3.6}$ $\theta = \tan^{-1}\left(\frac{4.2}{3.6}\right)$ $\theta = 49.3987$ $\theta = 49^\circ$	M1 A1		
6	(a)	i) $4.05 \times 100 \times 100 \times 100$ $= 4050000$ ii) 4.05×10^6	M1 A1 B1	f.t.	7
	(b)	$15l^2 = 1500$ $l^2 = \frac{1500}{15}$ $l^2 = 100$ $l = 10$	M1 M1 M1 A1		
7	(a)	$\frac{30 \times 200}{16} = 375$	M1 A1	Accept other valid methods	4
	(b)	$\frac{1170 \times 16}{260} = 72$	M1 A1		
8	(a)	$k = 4(3) + 5(-2)$ $= 12 - 10$ $= 2$	M1 A1	For correct substitution	7
	(b)	$5n = k - 4m$ $n = \frac{k - 4m}{5}$	M1 A1		
	(c)	Step 2 is incorrect $\frac{11 + 25}{4} = 9$	B1 M1 A1		

9	(a)	<p>To find AD</p> $\cos 39^\circ = \frac{3}{AD}$ $AD = \frac{3}{\cos 39^\circ}$ $AD = 3.860\dots$ $AD = 3.86 \text{ (2d.p.)}$	<p>M1</p> <p>M1</p> <p>A1</p>	f.t.	10
	(b)	<p>To find AE</p> $\tan 39^\circ = \frac{AE}{3}$ $\tan 39^\circ \times 3 = AE$ $AE = 2.4293\dots$ $AE = 2.43 \text{ (2d.p.)}$	<p>M1</p> <p>M1</p> <p>A1</p>		
	(b)	$A = \frac{h(a+b)}{2}$ $= \frac{2.4293\dots(6+10)}{2}$ $= 19.44\dots$ $= 19.4(3sf)$	<p>M1</p> <p>M2</p> <p>A1</p>		
10	(a)	CF = 24	B1	(5, 12, 13) triangle o.e.	8
	(b)	$\sin \theta = \frac{10}{26}$ $\theta = \sin^{-1}\left(\frac{10}{26}\right)$ $\theta = 22.6198$ $\angle BCD = 22.6198 \times 2$ $= 45^\circ$	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>		
	(c)	$\frac{b \times h}{2} + L \times B$ $= \frac{20 \times 24}{2} + 20 \times 7$ $= 240 + 140$ $= 380$	<p>M1</p> <p>M1</p> <p>A1</p>		

11	(a)	$C.S.A. = 2\pi rh$ or πdh $= 2 \times \pi \times 5 \times 20$ (o.e.) $= 628.318$ $= 628 \text{ cm}^2$	M1 M1 M1 A1	f.t.	10
	(b)	$V = \pi r^2 h$ $= \pi \times 5^2 \times 20$ $= 1570.79$ $= 1570 \text{ cm}^3$	M1 M1 A1		
	(c)	$x^3 = 1570.79...$ $x = \sqrt[3]{1570.79...}$ $x = 11.62...$ $x = 11.6 \text{ cm}$	M1 M1 A1		
12	(a)	9, 1, 1 - 2 , - 2 , - 2 7 , 2 , - 2	M3	M1 for every three correct entries f.t. (M1 for at least 3 correct points) Seen or implied Both correct	10
	(b)	Correct scale Correct plotting Smooth curve	M1 M2 A1		
	(c)	To find intersection of $y = x^2 - 2$ with $y = 4$ Correct drawing of $y = 4$ $x = 2.4$, -2.4 (± 0.2)	M1 M1 A1		