OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics Syllabus A

General Certificate of Secondary Education **J512/04**

Paper 4

Mark Scheme for June 2010

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Marking Instructions & Abbreviations

Marking instructions

1 Mark strictly to the mark scheme.

2 Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.

3 Work crossed out but not replaced should be marked.

4 **M** (method) marks are not lost for purely numerical errors.
A (accuracy) marks depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
B marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.

5 As a general principle, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered, mark the poorer (poorest).

6 When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the **MR** annotation. **M** marks are not deducted for misreads.

7 If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or cao. If the answer is missing, but the correct answer is seen in the body allow full marks. If the correct answer is seen in working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would normally be given.

8 For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work.

9 For answers scoring no marks, you must either award NR (no response) or 0, as follows:

Award NR (no response) if:

- Nothing is written at all in the answer space
- There is any comment which does not in any way relate to the question being asked ("can't do", "don't know", etc.)
- There is any sort of mark that is not an attempt at the question (a dash, a question mark, etc.)

Award 0 if:

- There is any attempt that earns no credit. This could, for example, include the candidate copying all or some of the question, or any working that does not earn any marks, whether crossed out or not.

10 Where a follow through mark is indicated on the mark scheme for a particular part question, you must ensure that you refer back to the answer of the previous part question.

11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. answer on mark scheme is 15.75 which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

12. Anything in the mark scheme which is in brackets (…) is not required for the mark to be earned, but if present it must be correct.

13. Ranges of answers given in the mark scheme are always inclusive.

14 Annotating scripts. The following annotations are available:

✓and ✖
BOD - Benefit of doubt
FT - Follow through
ISW - Ignore subsequent working
M0, M1, M2 - Method mark awarded 0, 1, 2
A1 - Accuracy mark awarded
B1, B2 - Workless mark awarded 1, 2
MR - Misread
SC - Special case
∧ - Omission sign

These should be used whenever appropriate during your marking.

Abbreviations

- Where you see **oe** in the mark scheme it means **or equivalent.**
- Where you see **isw** in the mark scheme it means **ignore subsequent working** (after correct answer obtained), provided the method has been completed**.**
- Where you see **cao** in the mark scheme it means **correct answer only.**
- Where you see **soi** in the mark scheme it means **seen or implied.**
- Where you see **www** in the mark scheme it means **without wrong working.**
- Where you see **seen** in the mark scheme it means that you should award the mark if that number / expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
- Figs: for example **figs 237** means any answer with just these digits with leading or trailing zeros disregarding any decimal point. E.g. 237000, 2.37, 2.370, 0.00237 but not 23070 or 2374.

1	(a)	5.088	**2**	**M1** for 12.72/2.5 or 636/125 or 5.09
	(b)	10.19	**2**	**M1** for 10.18(9...) or 10.2(0)
2	(a)	$168 + 44x$ or $2(84 + 22x)$ or $2 \times 84 + 44x$	**1**	Mark final answer only
	(b)	8	**3**	Provided correct equation seen, no ft of expression in part (a) **M2** for $44x = 352$ **Or M1** for $2 \times 84 + 44x = 520$ oe If **M0**, then **SC2** for 8 or **SC1** for 0.08
3	(a)	280 ± 2°	**1**	
	(b)	(i) Correct line drawn ± 2°	**1**	
		(ii) X marked correctly	**1**	90° ± 10°, ft *their* line starting at S provided it is not the line PS and Richard's route is drawn on bearing > 180°
		(iii) 90° or right angle	**1**	
4	(a)	(i) 51.85 or 51.9 www	**2**	**M1** for ½ (4.9 + 7.3) × 8.5 or 4.9 × 8.5 + ½(7.3 – 4.9) × 8.5
		(ii) 82 Alternate (angles)	**1** **1**	Not Z angles or alternating or alternative
	(b)	43	**2**	**M1** for 43 or 47 seen in a correct position on the diagram
5	(a)	3 www	**3**	Award **SC2** for 50 m/min or 0.83(3..) m/s or 0.00083 km/s or 0.05 km/min **Or M2** for 0.75 ÷ 0.25 oe **Or M1** for 0.75 ÷ figs15
	(b)	5 35	**1**	Both
	(c)	83 www	**4**	**B3** for 15 + 43 + 25 **Or B2** for 5/12 × 60 or 25 **Or B1** for 5/12 If **B0** or **B1** or **B2**, then also **SC1** for 15 + 43 + *their* 25
6		Sometimes odd, sometimes even 5*n* is odd or even and +1 changes it to even or odd Or correct trials, clearly showing both *n* and output, of both odd & even number; if only trials used for reason, all trials must be correct	**1** **1**	If 0 and 0, then **SC1** for trials of **both** odd & even with conclusion correct for *their* results

7	(a)	4.5 or 4½	**3**	**M2** for $2x = 9$ or $(x =) 9/2$ **Or M1** for $3x = x + 9$ or $2x - 5 = 4$ If M0, then **SC2** for $3 \times 4.5 - 5 = 4.5 + 4$ (only as final answer)
	(b)	216	**2**	**M1** for $\frac{x}{3} = 72$ or $x - 6 = 210$
	(c)	$x > 4.4$ or $x > 4\ 2/5$	**2**	Mark final answer only **M1** for $5x > 22$ or 4.4 or 22/5
8		198	**3**	**M2** for $6 \times 11 \times 3$ **Or M1** for 11×3 only for area of base or $6 \times$ *their* base area
9	(a)	(i) $2 \times 2 \times 3 \times 3$ or $2^2 \times 3^2$ or $(2 \times 3)^2$ or $2^2 \times 3 \times 3$ or $2 \times 2 \times 3^2$	**2**	Mark final answer **M1** for factor tree or division or product of factors with at least two of the correct prime factors in each of these methods or all four prime factors **not** given as a product
		(ii) Prime numbers in product are in pairs or Only squares of prime factors or Prime factors are squared oe	**1**	ft (a)(i) if reference to 'it' or similar in *their* reason
	(b)	14 or 2×7	**3**	**M2** for $2 \times 5 \times 5 \times 7$ or $350 \div 25$ **Or M1** for factors of 350 e.g. factor tree or dividing 350 by square numbers only If M0, then **SC1** for 56 or 126 or 224

10	(a)	21.45 – 21.5	**4**	**M3** for sum of all correct midpoints × frequency / 31 (665/31) **Or M2** for sum of all correct midpoints × frequency (665) or sum of correct midpoints × frequency with at most one error / 31 **Or M1** for at least two midpoints × frequency If M0, then **SC2** for sum of all frequencies × value in correct interval / 31 or **SC1** for sum of all frequencies × value in correct interval
	(b)	Fully correct polygon points ± ½ small square	**2**	**M1** for all heights in correct class or all midpoints correct or 4 points correct Condone end points joined
	(c)	(i) $10 \leq m < 20$	**1**	
		(ii) $10 \leq m < 20$	**1**	
	(d)	Average higher in July oe	**1**	Must refer to average, mean, median or modal class, may not use these words
	(e)	(i) Allow any number or range 0 to less than 20 **15th & 16th** or **15½ th** value must lie in $10 \leq m < 20$ class interval	**M1** **A1**	**Alternative solution** **B2** for $10 \leq m < 20$ because that's already where the median is so adding one measurement to it would keep the median the same
		(ii) $40 \leq m < 50$	**1**	
11	(a)	4, -1.625	**1, 1**	
	(b)	Fully correct	**2**	**B1** for both points plotted correctly ± ½ small square **ft *their* points** **Or B1** for smooth cubic curve through at least 9 of the 10 points
	(c)	-2.4	**FT1**	Strict ft *their* curve ± ½ small square (*their* 'curve' should not be a single straight line)
12		$x = -½$, $y = 7$ www	**4**	Both, provided correct algebraic method **B3** for one correct following correct algebraic method **Or M2** for subtract equations with at least two terms correct or subst for x or for y **Or M1** for attempt to multiply equations so that x or y have same coefficient or rearrange as $x =$ or $y =$ If M0 or M1, then **SC2 only** for both answers correct from no method or wrong working or non-algebraic method e.g. T & E

13		6.5	**4**	**M3** for ((52 ÷ 0.8) ÷ 1000) × 100 **Or M2** for 52/0.8 or figs 65 seen **Or M1** for 0.8 or 80% oe used in working
14	(a)	(i) $x^4\ y^4$ or $(xy)^4$	**1**	
		(ii) $9\ x^8\ y^2$	**2**	**M1** for single product with two of 9, x^8, y^2 correct
	(b)	0.78 & 24.22	**3**	**M2** for $(25 \pm \sqrt{549})/2$ or $x - 12.5 = \pm\sqrt{137.25}$ **Or M1** for correct substitution into formula or correct use of complete square
	(c)	$y = 784/x$ oe	**2**	**M1** for $y = k/x$ oe or $196 = k/4$ oe or 784 seen
15	(a)	28.1 – 28.135 www or 28 with correct working shown	**3**	**M2** for $\sin^{-1}$ 5.8/12.3 **Or M1** for sin x = 5.8/12.3 or 5.8sin90/12.3
	(b)	8.1 – 8.12 www or 8 with correct working shown	**3**	**M2** for 10.3 × cos38 **Or M1** for cos38 = AB/10.3
	(c)	28.69 – 28.7 or 29 www	**2**	**M1** for ½ × 8.5 × 15.4 × sin 26 oe
16		17800 or 18000 www	**4**	**M3** for 17802 – 17805 www **Or M2** for 150/360 × 2 × π × 6800 **Or M1** for n/360 × 2 × π × 6800 If M0, then **SC1** for 150/360 × 2 × π × 13600 or 150/360 × π × 6800 or 150/360 × π × 6800^2 If M0, M1, M2 or SC1, allow also **SC1** for correct rounding *their* sensible answer to nearest hundred or thousand

17		Finding either correct bound Use of tan or appropriate trig method to find the angle, or using angle 7.2 to find a side Both an upper bound for 300 **and** a lower bound for 2450 identified and used **appropriately** in the same calculation or within a comparison Complete correct method using two of 305, 2445 and 7.2 'Yes' with correct comparison or supporting mathematical argument e.g. 7.1(1...) www with 7.2 or tan7.2 with 305/2445	**M1** **M1** **M1** **M1 dep** **A1**	 First 3 M marks are independent Dep on 1st 3 marks awarded
18	(a)	2/7 5/7 3/8 5/8 3/7 4/7	**1** **1** **1**	
	(b)	30/56 www oe fraction	**3**	**M2** for (3/8 × 5/7) + (5/8 × 3/7) **Or M1** for either 3/8 × 5/7 or 5/8 × 3/7

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