

Mathematics A

General Certificate of Secondary Education

Unit **A502/02**: Mathematics B (Higher Tier)

Mark Scheme for January 2011

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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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Confidential marking instructions for examiners (January 2011)
A502/02 GCSE Mathematics A (J562)

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 Two additional situations may appear in the mark scheme allowing the award of **A** marks or independent (**B**) marks:
 - i. Correct answer with no working
 - ii. Follows correctly from a previous answer whether correct or not (“ft” on mark scheme and on the annotations tool).
6. 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).
7. 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.
- 8 Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the 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.
9. 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 still be awarded.
- 10 Ranges of answers given in the mark scheme are always inclusive.

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

12 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.

13 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.

14 Anything in the mark scheme which is in square brackets [...] is not required for the mark to be earned, but if present it must be correct.

Abbreviations

The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- 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 **rot** in the mark scheme it means **rounded or truncated**.
- 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.
- Where you see **figs 237**, for example, this means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2·37, 2·370, 0·00237 would be acceptable but 23070 or 2374 would not.

1	(a)	(i) 124°	1		accept answer on diagram if answer line blank
		(ii) Alternate angles	1	Condone Z angles, alternates alternative : (angles on a straight) line (add to 180°) and allied/interior angles	more than one conflicting reason then mark the worst eg alternate <u>and</u> corresponding scores 0 however ignore references to “angles in a quadrilateral”
	(b)	71°	4	B1 for angle ABC = 56 identified M1 for 360 – 52 – (a)(i) – their 56 clearly linked or B1 angle DGC = 52 identified A1 for DGF = 128 and M1 for $\frac{270 - \text{their } 128}{2}$ A1FT for their correct answer	all angles can be marked on the diagram or identified with a correct label such as DGF
2	(a)	72	1		
	(b)	(i) $\frac{2}{5}$	2	M1 for $\frac{32}{80}$ oe	
		(ii) 48	2	M1 for 80 ÷ 5 or 240 ÷ 5 or 16 seen or $\frac{48}{80}$ as final answer	allow $\frac{1}{5}$ of 80 for M1

	(c)	$\frac{3}{5}, \frac{13}{20}, \frac{2}{3}, \frac{11}{15}$ with four correct converted fractions with same denominator seen	4	<p>B3 if 3 fractions correct to the same common denominator or B2 for any 2 fractions correct to the same common denominator or M1 for attempt at converting any 2 fractions to same common denominator</p> <p>If no other marks scored allow SC1 for correct answer $\frac{3}{5} = \frac{36}{60}, \frac{11}{15} = \frac{44}{60}, \frac{2}{3} = \frac{40}{60}, \frac{13}{20} = \frac{39}{60}$</p>	<p>allow if converted to decimals correct to at least 2dp; $\frac{3}{5} = 0.6$ $\frac{13}{20} = 0.65$ $\frac{2}{3} = 0.66$ or 0.67 $\frac{11}{15} = 0.73$ (accept percentages) allow dot notation correctly used</p> <p>BOD if numerator is not an integer</p>
3		35 or 25 or 37.5 following correct approximations	3	<p>M2 for numerator 120 – 50 or 100 – 50 or 125 – 50 and denominator 3.3 – 1.3 or 3 – 1 or M1 for any 2 correct approximations seen</p>	<p>BOD if both parts reversed condone 37.5 rounded to 37 or 38 condone 3.5 – 1.5 in denominator SC1 for 74.6 ÷ 1.96 rounded to 75 ÷ 2 then answer of 37.5</p>
4		$x \leq 6$	2	M1 for $7x \leq 47 - 5$ or better, or 6 seen	<p>Condone use of < condone use of equal sign for M1 Ignore wrong simplification after correct first step</p>
5	(a)	Correct plots and ruled line between $w = 50$ and $w = 260$	3	<p>B2 for all 5 points correct or B1 for any 2 points correct and B1 for a ruled line through at least 4 correct points</p>	<p>accuracy: the centre of their cross, dot or top of their stick should lie within the 'circle' on the overlay</p>
	(b)	9.9 to 10.1	1	or FT <i>their</i> straight line	

	(c)	0.02 oe	2	M1 for an attempt at $\frac{\Delta L}{\Delta W}$ from <i>their</i> graph	equivalents include $\frac{1}{50}$ and 2% and isw any attempt to simplify their answer
	(d)	$L = (\text{their } 0.02)W + (\text{their } 10)$	1		
	(e)	No data for weights that big	1	Spring might snap, equation may be invalid for large values of W or limit to the length, etc	
6	(a)	5 points correct Ruled line of best fit	2 1	B1 for any 2 points correct between the overlay lines	Accuracy: the centre of their cross or dot should lie within the 'circle' on the overlay
	(b)	Correct solution well explained e.g. Answer of around £160 pp, use of lobf commented on with people = 10 to get cost in region of £1200. Adding of £400 and $\div 10$ explained. Other possibilities involve renting a larger cottage or 2 cottages. Correct and clear language throughout. Limited comments on either using lobf or adding of £400 and $\div 10$. Answer probably around £100 - £200 pp. Comments may be in form of sentences or bullet points. No correct work seen	4-3 2-1 0	For lower mark – there might be lack of clarity in explaining either using the lobf or adding of £400 and $\div 10$ or minor errors in spelling, punctuation or grammar. For lower mark – either one aspect of the calculation seen or some explanation maybe with poor spelling, punctuation and grammar	Reading should be in range 1050 - 1300 Use and mention of lobf and $\div 10$ is awarded 2 marks but $400 \div 10$ only 1. See exemplars.

7		$x = 5$ $y = \frac{1}{2}$ oe with correct manipulative algebra	4	M1 for multiplying both equations to get either coefficient equal (allow 1 error in each equation) M1 dep for adding or subtracting as appropriate (allow 1 error) A1 for either x or y correct if non-manipulative method used (eg t-a-i) award SC1 for correct answers	mark best attempt If no more than 1 error in the multiplication, FT for a maximum of 3 marks
8	(a)	12.5	3	B1 for $SF = \frac{20}{8}$ oe M1 for <i>their</i> $SF \times 5$	B1 can be awarded in either part
	(b)	6	2	M1 for $15 \div \textit{their} SF$	
9	(a)	(ii) $1 + \sqrt{5}$	3	B2 for $6 + 3\sqrt{5} - 2\sqrt{5} - \sqrt{25}$ or better or B1 for any 2 terms including negative sign seen	eg $20\sqrt{70}$ seen and attempt to multiply will score BOD M1 eg if $60\sqrt{7} \times 2\sqrt{7} \text{ cm}^2$ seen this will score M0 B1 (BOD) for attempt to use units cm^2 correctly
	(b)	840	2	M1 for $120\sqrt{49}$ or better or 84 or a correct attempt to convert one measurement and multiply	
		mm^2	1	Dependent on consistent units used Note that 8.4cm^2 is correct and scores 3	
10	(a)	$6a + 6b$ cao	1		
	(b)	$3b$ cao	1	condone with brackets	
	(c)	$6a + \textit{their} 3b$	1		

	(d)	$3b - 2a$	2	M1 for $\overline{MC} + \overline{CN}$	M1 implied by $3b + 2a$ or an unsimplified version of the correct answer allow $\begin{pmatrix} 3b \\ -2a \end{pmatrix}$ for 2 marks if “form” penalised previously
11	(a)	(i) 1 (ii) $\frac{1}{64}$	1 2	M1 for $\frac{1}{n}$ or $(\pm)64$ seen	
	(b)	250	2	M1 for 10 or 10 000 or evidence of $\sqrt{\quad}$	125 (million) could be evidence of M1

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