

**Mathematics A**

General Certificate of Secondary Education

Component **J512/01**: Paper 1

**Mark Scheme for January 2012**

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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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Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

**Annotations used in the detailed Mark Scheme.**

<b>Annotation</b>	<b>Meaning</b>
✓	Correct
✗	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
^	Omission sign

These should be used whenever appropriate during your marking.

The **M**, **A**, **B** etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks.

It is vital that you annotate these scripts to show how the marks have been awarded.

It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

**Subject-Specific Marking Instructions**

- M** marks are for using a correct method and are not lost for purely numerical errors.  
**A** marks are for an accurate answer and 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.  
**SC** marks are for special cases that are worthy of some credit.

- 2 Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

- 3 Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT  $180 \times (\textit{their} '37' + 16)$ , or FT  $300 - \sqrt{(\textit{their} '5^2 + 7^2')}$ . Answers to part questions which are being followed through are indicated by eg FT  $3 \times \textit{their} (a)$ .

For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

- 4 Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.
- 5 The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
- **isw** means **ignore subsequent working** (after correct answer obtained).
- **nfw** means **not from wrong working**.
- **oe** means **or equivalent**.
- **rot** means **rounded or truncated**.
- **seen** 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.
- **soi** means **seen or implied**.

- 6 Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.
- 7 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).

- 8 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.
- 9 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.
- 10 If the correct answer is seen in the body of working
- and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.
  - but the answer space is blank, allow full marks. Place the annotation ✓ next to the correct answer.
  - but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✖ next to the wrong answer.
- 11 Ranges of answers given in the mark scheme are always inclusive.
- 12 For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.
- 13 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.

Question		Answer	Marks	Part Marks and Guidance	
1	(a)	3	1		
	(b)	62	1		
	(c)	7	1		
	(d)	40	1		
	(e)	57 & 23 only	1		isw eg answer of 80 following correct numbers seen in working scores 1
	(f)	25 & 4 only	1		isw eg answer of 100 following correct numbers seen in working scores 1
2	(a)	(i)	Cuboid	1	
		(ii)	Square-based pyramid	1	Condone square-based or pyramid
		(iii)	Triangular prism	1	Condone triangular
	(b)		Correct reflection	2	<b>B1</b> for any 3 of the 5 corners correct $\pm 2\text{mm}$ Condone freehand Condone overshoots Ignore shading Overlay available If extra lines or corners B1 max
	(c)		First and last shape only indicated	1	

Question		Answer	Marks	Part Marks and Guidance	
3	(a)	B or 'My dog will ...'	1		Condone lower case throughout
	(b)	A or 'It will snow ...'	1	Condone C or 'It will rain ...'	
	(c)	D or '... dice will show 1,2,3,4,5 or 6'	1		
	(d)	E or '... dice will show an even number'	1		
4	(a) (i)	0.25	1		
	(ii)	0.3[0]	1		
	(b)	0.2, $\frac{1}{4}$ , 30%	1		Condone correct alternative forms eg 0.2, 0.25, 0.3 scores 1
5	(a) (i)	12, 40	2	<b>B1</b> for either correct in correct place	
	(ii)	Going up in 7, Add 7, +7, $7n-2$ etc	1	Condone extra correct information Condone $n+7$	eg 'Start at 5 then +7' scores 1 but 'Add 6, then 7, then 8 etc' scores 0 $7n$ scores 0
	(b) (i)	9	1		
	(ii)	9	1	Condone 91	

Question		Answer	Marks	Part Marks and Guidance	
6					Ignore extra correct zeros throughout Q6 eg 0.3000 and 9.00 both score 1 Allow words or digits
	(a)	7000	1	Allow 1000 or (7) thousand	Thousandths scores 0
	(b)	0.3	1	Allow 0.1 or (3) tenths	0 for ambiguous answers eg 0.3 tenths
	(c)	200	1	Allow 100 or (2) hundred	Hundredths scores 0
	(d)	9	1	Allow (9) units, ones	
7	(a)	(5, 1)	1		If all 4 coords reversed allow 2/4 (ie 0,0,1,1). If c or d incorrect allow just 1.  If (5x, 1y) penalise once only then FT
	(b)	(-3, 3)	1		
	(c)	(1, 2)	1	FT midpoint of <i>their</i> (a) and (b)	
	(d)	(-3, 0)	1		

Question		Answer	Marks	Part Marks and Guidance	
8	(a)	(DD DG) DL DA GG GL GA LL LA AA only	2	<b>B1</b> for 6 correct. Ignore repeats	No repeats for 2 LA is a repeat of AL etc
	(b)	$\frac{6}{10}$ , $\frac{3}{5}$ , 0.6(0), 60%	2	<b>M1</b> if 6 (non L) or 4 (L) choices without repeats clearly identified, in working or on diagram Or for $\frac{4}{10}$ , $\frac{2}{5}$ , 0.4(0), 40% as final answer Or for $\frac{9}{16}$ as final answer	eg 6:10, 6 out of 10 max 1  Condone extra probability words (eg likely etc) alongside a scoring answer on answer line.
9		£12.80	6	<b>M1</b> for $\frac{3}{4}$ of 6.80 or $\frac{1}{4}$ of 6.80 <b>A1</b> for 5.10, 5.1 or 510 <b>B1</b> for 66 or 0.66 or 33 + 33 or 33 × 2 <b>B1</b> for 144 or 1.44 or 48 + 48 + 48 or 48 × 3 <b>M1</b> for 20 – <i>their</i> (5.10 + 0.66 + 1.44) soi by their answer	1.70, 1.7 or 170 nfw implies M1  Condone subtraction written wrong way round provided answer correct for their figures. 7.10-20 = 12.90. Correct format required for 6 marks eg 12.8 gets 5 out of 6 marks
10	(a)	40	2	<b>M1</b> for 10 × 4	
	(b)	Correct/yes etc because 28 × 10 = 280 or 100 + 100 + 40 + 40 = 280	2	'No' alone or with working scores 0  Or <b>B1</b> for 28 soi or for 100 (or 200) and 40 (or 80) seen as lengths	'Yes' alone or with wrong reasoning scores 0 Condone "enlarge by 10" for ×10 Ignore units

Question		Answer	Marks	Part Marks and Guidance	
11	(a)	200	2	<b>B1</b> for 120 or 80 seen	120c and/or 80d alone scores 0
	(b)	(i) $m^5$	1		
		(ii) $7r + 5q$	2	Final answer <b>B1</b> for $7r$ or $5q$ correct	eg $7r + 5q = 12rq$ scores B1
12	(a)	18.7	1		
	(b)	(0)5.1	2	<b>M1</b> for $18.7 - 13.6$ or $187 - 136$ seen OR <b>SC2</b> for 51 following 187 in (a)	$13.6 - 18.7$ M0 But $13.6 - 18.7 = 5.1$ scores 2 BOD
	(c)	Range tells you about how spread out the data is	1	He would have to consider an average (to tell which class was faster).	Mark best part
13	(a)	Pentagon	1	Condone poor spelling	Ignore other qualifying words eg 'irregular' or 'improper'
	(b)	6	3	nfw <b>M2</b> for $(2e =) 33 - 2 \times 6.5 - 8$ or $(2e =) 12$ OR <b>M1</b> for $2 \times 6.5$ seen or 13 nfw	
14	(a)	Correct reflection $\pm 2$ mm	2	<b>B1</b> for 2 points correct or if reflected in x-axis	Overlay available Condone freehand. If both drawn correctly (or even all 3 reflections) then B1 (choice) Ignore labels
	(b)	37	2	<b>M1</b> for $180 - 90 - 53$ or $90 - 53$	
	(c)	53	1		

Question			Answer	Marks	Part Marks and Guidance	
15	(a)	(i)	0.1(0)	1		
		(ii)	125	1		
	(b)	(i)	87.5	2	Condone 88 nfw <b>M1</b> for 7 (or 700) $\div$ 8 or 1 (or 100) $\div$ 8 with attempt to evaluate	A list of multiples of 8 is not sufficient for M1
		(ii)	8.75	1	Condone 9 nfw FT <i>their</i> (b)(i) $\div$ 10	
16			Correct ruled triangle ( $\pm$ 2mm) with construction arcs	3	<b>B1</b> for any ruled line length 6cm or 7cm $\pm$ 2mm anywhere <b>M1</b> for two intersecting arcs centred on ends of given line, any radius Or <b>SC2</b> for correct ruled triangle without construction arcs <i>or</i> with incorrect arcs	Use the ruler here to measure the sides Arcs any length and compass drawn (check by eye) If the given line has been ignored up to 3 marks can still be earned
17	(a)		450	1		
	(b)		4.5 or 4½ isw	1		Ignore any units
	(c)		10	2	<b>B1</b> for 1000 $\div$ 400 soi by 2.5 oe or 400, 400, 200 oe or 1L = 1000 and 1 person = 100 oe	ie 'chunking' to 1000

Question		Answer	Marks	Part Marks and Guidance	
18	(a)	114  (Co-)interior angles (add to 180) <b>Or</b> Alternate angles <u>AND</u> angles on a straight line <b>Or</b> Corresponding angles <u>AND</u> angles on a straight line	B1  B1	<u>Reason indep.</u> but NOT following $x=66$ Allow 'allied angles' <b>Or</b> any correct reasons supported by work which may be on the diagram.	Throughout, condone 'U angles', 'C angles' 'F angles' or 'Z angles' Condone reason(s) not on answer line.
	(b)	32 or 146 – <i>their</i> (a)  Corresponding angles <b>Or</b> Alternate angles <b>Or</b> angles on a straight line <u>AND</u> interior angles <b>Or</b> angles on a straight line <u>AND</u> angles in a triangle <u>AND</u> alternate angles <b>Or</b> Alternate angles <u>AND</u> opposite angles in a parallelogram	FT1  B1	<u>Dep.</u> on a correct/ correct FT answer <b>Or</b> any correct reasons supported by work which may be on the diagram.	Condone reason(s) not on answer line.
19	(a)	2 nfw	3	<b>B1</b> for $6x + 14 (= 26)$ or $(3x + 7 =) 13$ <b>And B1 FT</b> for correct next step in <i>their</i> equation <b>And B1 FT</b> for <i>their</i> 'correct' solution, evaluated <b>Or</b> <b>M1</b> for correct reverse flow <b>And M1</b> for three calculations in flow starting with 26 and with no more than one error <b>Or</b> <b>SC1</b> for correct embedded answer seen anywhere or use of $x = 2$	Allow top heavy fraction if non-integer answer, isw  $\div 3 \leftarrow -7 \leftarrow \div 2 \leftarrow$

Question		Answer	Marks	Part Marks and Guidance	
	(b)	4.5, $4\frac{1}{2}$ , $\frac{9}{2}$	3	<b>M2</b> for correctly collecting x <u>AND</u> correctly collecting numbers <b>Or M1</b> for <u>EITHER</u> correctly collecting x <u>OR</u> correctly collecting numbers <b>Or SC1</b> for correct embedded answer seen anywhere or use of $x = 4.5$ oe	
<b>20</b>	(a)	4 points correctly plotted	2	<b>B1</b> for 2 points correctly plotted	Centre of point within $\pm 1$ small sq. Ignore any extra points Use circles on overlay as a guide to position of points
	(b)	Positive	1	Ignore 'strong', 'weak' etc	
	(c)	Single ruled line on or within overlay boundaries	1	Any length which will stay within overlay if extended	
	(d)	63 to 67	1	Indep. of <i>their</i> line	
	(e)	Inappropriate to extrapolate <b>Or</b> Outside range of data used (oe)	1	<b>Or</b> 'data only goes to 18' oe <b>Or</b> 'weight may differ after a certain length' <b>Or</b> 'correlation may change after 18'	<b>NOT</b> 'graph only goes to 18' oe <i>Mark best part</i>
<b>21</b>	(a)	10	3	<b>B2</b> for 1000 – 900 or better <b>Or B1</b> for 1000 <u>or</u> 900 seen	$\pm 10$ implies B2 1000 must come from $10^3$ 900 must come from $4 \times 15^2$
	(b)	$\frac{6}{7}$	2	<b>M1</b> for $\frac{3}{4} \times \frac{8}{7}$ or equivalent fraction or $\frac{24}{28}$ or equivalent fraction	
<b>22</b>		300	3	<b>M1</b> for $5 \times 6 \div 2$ soi by 15 <b>And M1</b> for <i>their</i> (area of triangle) $\times 20$	eg $(6 \times 5) \times 20$ soi by 600

**OCR (Oxford Cambridge and RSA Examinations)**  
1 Hills Road  
Cambridge  
CB1 2EU

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

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