OCR
Oxford Cambridge and RSA

GCSE

Mathematics (9-1)

Unit **J560/02:** Paper 2 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for November 2018

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2018

Annotations used in the detailed Mark Scheme.

Annotation	Meaning
✓	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

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

1. **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 for a correct final answer, a partially correct 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, i.e. 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, e.g. FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by e.g. FT 3 × *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 e.g. 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 and applies as a default.
   - **nfww** 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. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (i.e. **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

7. In questions with a final answer line following working space,

   (i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

   (ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, 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.

8. In questions with a final answer line:

(i) If one answer is provided on the answer line, mark the method that leads to that answer.

(ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

(iii) If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.

9. In questions with no final answer line:

(i) If a single response is provided, mark as usual.

(ii) If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.

10. 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.

11. 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.

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

13. 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.

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.

Question			Answer	Marks	Part marks and guidance	
1	(a)		Correct 2 lines of symmetry (only)	1		Accept dotted lines
	(b)		2	1		
2	(a)		6	2	**M1** for 12 ÷ 2 oe	
	(b)		$1\frac{3}{5}$	2	**M1** for $\frac{8}{5}$ or $\frac{8\times1}{5}$	
	(c)		$\frac{2}{6}$ oe nfww	4	**M3** for $1 - \frac{1}{6} -$ *their* $(\frac{3}{6})$ oe or **M2** for *their* $(\frac{5}{6}) \times \frac{3}{5}$ soi or $\frac{3}{6}$ seen or **M1** for $1 - \frac{1}{6}$ or $\frac{5}{6}$ seen **If 0 scored** SC2 $1 - \frac{23}{30} = \frac{7}{30}$ **or** SC1 for $\frac{1}{6} + \frac{3}{5} = \frac{23}{30}$	Mark to candidates advantage <u>Alternative method using diagram</u> **SC1** drawing pizza and shading $\frac{1}{6}$ Or **SC2** for drawing 3 more of the five Slices (i.e. 4 out of 6 parts shaded)
3	(a)		equilateral	1		Ignore spelling
	(b)	(i)	rhombus	1		Ignore spelling
		(ii)	rectangle	1		Ignore spelling

Question			Answer	Marks	Part marks and guidance	
	(c)		5 faces and 8 edges	**2**	**B1** for 5 faces or 8 edges **or** **SC1** for 8 faces and 5 edges	
4	**(a)**	**(i)**	1.22	**2**	**M1** for six or seven heights seen in the correct order	1.13, 1.15, 1.20, 1,22, 1,23, 1,24,1.30
		(ii)	0.17 or 17 cm	**2**	**M1** for 1.30 – 1.13 or 30 – 13 **soi**	
		(iii)	1.21	**2**	**M1** for 8.47 ÷ 7 **soi**	
	(b)		x such that $1.22 \leq x < 1.30$	**2**	**M1** for selecting a value stating/indicating that this leaves median unchanged or for selecting a value stating/indicating that this reduces the value of mean or for selecting a value stating/indicating that this reduces the total of the heights	
5	**(a)**	**(i)**	28	**1**		Allow ±0.50
		(ii)	95	**1**		Allow ±1

Question			Answer	Marks	Part marks and guidance	
		(iii)	72	3	Allow ±2 **B1** for 1kg costs £0.40 soi **M1** *their* 0.4 × 180 or *their* cost × $\frac{180}{\textit{their}\text{ equivalent weight}}$ or **M1** for finding costs of weights that sum to 180 kg **M1** for addition of these costs	e.g. 10kg costs £4 **e.g. 4 x** $\frac{180}{10}$ **Note:** award **M2** for e.g. cost of 60 kg × 3 attempted
	(b)		one valid reason	**1**	Such as 'the vertical scale is not linear'	e.g. vertical scale is wrong vertical scale does not start from 0
6			36% with a comparison of two correct values in the same form (e.g. because 0.36 is bigger than 0.35)	**4**	**B1** for one correct conversion **and** **M1** for attempt to express both $\frac{7}{20}$ and 36% in the same form enabling a comparison **and** **A1ft** for correctly deciding which is bigger	e.g. $\frac{7}{20}$ = 0.35, 35% or 35/100; 36% = 0.36 or 36/100
7	**(a)**		3	**1**		
	(b)		49	**2**	**M1** for 7 × 7 **oe**	
	(c)		$\frac{1}{6}$	**1**		

Question			Answer	Marks	Part marks and guidance	
8			[£]25 or 2500p nfww	6	**B3** for [£]265 or **B2** for 22000[p] or [£]220 or **M1** for 200 × 110 or 2.[00] × 110 **and** **B2** for [£]240 or **M1** for 20 ×12	
9	(a)		$x = y + 2$	1		Condone $y + 2 = x$
	(b)		$d = \frac{C}{\pi}$ or $d = C \div \pi$	1		Condone $\frac{C}{\pi} = d$ or $C \div \pi = d$
10	(a)	(i)	$x = 3$	1		
		(ii)	$y = x$	1		Condone y = x ± 0
	(b)		Correct sketch of the graph of $y = x^2$.	1		U shaped graph, approximately symmetrical going through the origin
11			Flour 350 Butter 280 Sugar 140	4	**M1** for [5 :] 4 : 2 **soi** and **M1** for 770 ÷ *their*(5 + 4 + 2) and **M1** for 5 × *their* 70 or 4 × *their* 70 or 2 × *their* 70	Can be implied by 1 part = 70 **soi** *their*(5 + 4 + 2) must come from *their* stated 3 part ratio

Question			Answer	Marks	Part marks and guidance	
12	(a)		20	2	**M1** for 80 ÷ 4 oe	NOT 8 ÷ 0.4
	(b)		$\frac{20 \times 40}{2} = 400$	3	**M2** for $\frac{20 \times 40}{2}$ or **M1** for 20 or 40 or 2	For 3 marks all 3 values must be rounded to 1sf
13	(a)		3.16×10^{-3}	1		
	(b)		8×10^{7}	2	**M1** for 80 000 000 **seen** or $n \times 10^{7}$	Condone $10^{7} \times n$ for M1
14	(a)		19 31	1		
	(b)		2 10 12	2	**B1** for 12 as third term or B1 *their* 1st term + *their* 2nd terms = *their* third term.	E.g. -2, 12, 10
15	(a)		$3x^2 + xy - 2y^2$ final answer	3	**M2** for $3x^2 - 2xy + 3xy - 2y^2$ **oe** or **M1** for two correct terms	Accept e.g. 3yx May be seen in a table for M1
	(b)		$c = 4$ $d = -1$	5	**M4** for $3d + 20 = 17$ **oe** or **M3** for $6 + c = 10$ or $3d + 5c = 17$ or $6x + cx = 10x$ or **M2** for $6x + 3d + cx + 5c$ **oe** or **M1 for** $6x + 3d$ or $cx + 5c$ OR **B3** for $c = 4$ and **B2** for $d = -1$	Accept e.g. c5

Question			Answer	Marks	Part marks and guidance	
	(c)		2, 5 nfww	3	**M2** for (x – 2) and (x – 5) or **M1** for (x + *a*) and (x + b) where *ab* = 10 or *a* + *b* = ¯7 **B1** ft their quadratic factors If 0 scored **SC1** for answer ±2 and ±5	
16	(a)		36 and 45	1		
	(b)		Even and prime are not mutually exclusive oe $\frac{8}{12}$ oe	1 1		e.g. 2 is both prime and even 2 is counted twice One number is prime and even Do not accept there are only 2 prime numbers
17	(a)		12	3	**M2** for $\frac{57.8-54.2}{0.3}$ **oe** or **M1** for 57.8 – 54.2 or 3.6 **seen** or for repeated subtraction of 0.3 from 57.8 or for repeated addition of 0.3 to 54.2	Minimum of 2 repeats Minimum of 2 repeats
	(b)		Answer would be bigger **oe**	1		e.g. It would take more days It will take longer
18			2000	3	**M2** for 2400 ÷ $\frac{100+20}{100}$ **oe** or **M1** for 1.2(0) **oe seen** or for 2400 associated with 120[%]	

Question			Answer	Marks	Part marks and guidance	
19	(a)	(i)	Triangle drawn at (-3, -2), (-5, -2) (-3, -6)	2	**M1** for rotation 180° but wrong centre or 3 correct points not joined	Use overlay condone good freehand, mark intention If triangle B transformed then treat as misread in both parts (i) and (ii)
		(ii)	Triangle drawn at (7, -5), (5, -5), (5, -1)	2	**M1** for translation by $\begin{pmatrix}2\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-7\end{pmatrix}$ or 3 correct points not joined	Use overlay condone good freehand, mark intention
	(b)		Enlargement ½ **oe** (-1, 2)	3	**B1** for each element	Marks spoilt if extra transformations Treat extra descriptors as choice Condone omission of brackets Accept centre as a vector
20	(a)		Correctly completes graph	2	**B1** for 2 or 3 correct plots or for 4 plots at correct height	Use overlay mark in 60% zoom For 2 marks, condone points not joined
	(b)		He is correct **oe** with 60 and 150 shown [= 2 : 5]	2	**M1** for 13 + 20 + 27 **oe** or 45 + 47 + 58 **oe**	
	(c)		Correct overall comment Correct seasonal comment	1 1	i.e. increasing **oe** e.g. [Sales were] weakest in 1st quarter [Sales were] strongest in 4th quarter	isw extra statements See AG isw extra statements
	(d)		The trend in his sales will continue [at a similar rate] **oe**	1		Accept any correct relevant comment referring to general trend or 4th quarter trend isw extra statements See AG
21			$36\pi - \pi x^2$ **oe** final answer	2	**M1** for πx^2 or $\pi \times 6^2$ **oe**	e.g. $\pi(36 - x^2)$ or $\pi\times6^2 - \pi\times x^2$

APPENDIX

Exemplar responses for Q20c

Response	Mark
He sells more at the end of the year, He always sells the least at the start of the year	**Seasonal 1** **Overall 0**
Tom sells more in the 4th quarter each year. Tom sold more in 2017 than 2015	**Seasonal 1** **Overall 0**
In quarter 2 2015 he sold about the same as in quarter 2 2016 He sells more each year	**Seasonal 0** **Overall 1**
Sold more computers in 2017 than the other 2 years Sales drop in the 3rd quarter each year	**Overall 0** **Seasonal 1**
Each quarter saw a difference in sales some higher some lower *not specific – which quarters* The number of computers sold each year has increased	**Seasonal 0** **Overall 1**
At the end of each year his sales have increased In quarter 3 in each year his sales drop	**Seasonal 1** **Overall 0**
His sales are rising on every 4 quarter during the year His sales fluctuate but are slowly rising	**Seasonal 1** **Overall 1**
Quarter 3 in 2016 has a decrease in sales on quarter 3 in 2015 2017 had the highest sales	**Seasonal 0** **Overall 0**
As the years went on the number of computers sold increased in quarter 4 Quarter 1 in 2015 was his lowest ever amount of sales	**Seasonal 1** **Overall 0**
The results seem to vary between each quarter They have increased	**Seasonal 0** **Overall 1**
The first quarter always has the lowest result It's inconsistent in 2017	**Seasonal 1** **Overall 0**
Every year quarter 1 increased by 7 He sold more computers in 2017	**Seasonal 0** **Overall 0**
In 2017 in quarter 4, Tom's number of computers that were sold was the highest Tom sold the least amount of computers in quarter 1 in 2015	**Seasonal 0** **Overall 0**

Exemplar responses for Q20d

Response	Mark
The number of computers he sells in the 4th quarter increases every year	1
Because in every 4th quarter he sells more than the year before	1
He assumes sales will continue to increase	1
The rate of number of sales has increased in quarter 4	1
That the sales continue to go up as they have previously	1
That his sales will continue to rise and beat the last 4th quarter sale which was 58	1
Sales will continue to rise [at a constant rate]	1
He has seen improvement in his graph	0
His sales will have a positive correlation between the year and amount sold	0
That he will sell more	0
That his figure in 2018 will be better than his figure in 2017	0

OCR (Oxford Cambridge and RSA Examinations)
The Triangle Building
Shaftesbury Road
Cambridge
CB2 8EA

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

© OCR 2018