OCR
Oxford Cambridge and RSA

GCSE

Mathematics

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

General Certificate of Secondary Education

Mark Scheme for November 2017

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations used in the detailed Mark Scheme.

Annotation	Meaning
	Correct
	Incorrect
	Benefit of doubt
	Follow through
	Ignore subsequent working (after correct answer obtained), provided method has been completed
	Method mark awarded 0
	Method mark awarded 1
	Method mark awarded 2
	Accuracy mark awarded 1
	Independent mark awarded 1
	Independent mark awarded 2
	Misread
	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

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, 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 × (*their* '37' + 16), or FT 300 – $\sqrt{}$(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by eg 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 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 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 (ie **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.

MARK SCHEME

Question			Answer	Marks	Part marks and guidance	
1	**a**		B	**1**		
	b		E	**1**		
	c		D	**1**		
2	**a**		1	**1**	condone 3	
	b		4	**1**		
	c		isosceles	**1**		ignore spelling providing intention is clear
	d		Valid explanation	**1**	Such as 'it does not have 2 lines of symmetry'	Any incorrect statement scores 0. See Appendix
3			100 gram packet with a correct comparison ISW	**3**	**M1** for **correctly** finding the cost of 1 gram, 25 grams, 100 grams or other amount suitable for comparison and **M1** for attempting to find the cost of the **same** amount of tea for **each** packet weight (eg 25 grams or 100 grams) evaluation does not need to be correct	eg 100g of 25g pkt costs [£]4.2[0] eg 25g of 100g pkt costs [£]1.04 other comparisons must be correct to 3sf or better Or for attempt to find two values of grams per pound or grams per pence
4			0 and 5	**3**	**B1** for one correct and **M1** for putting times in order **isw**	given values or their 9 or their 10 values eg 0,0,2,2,6,7,7,9

Question			Answer	Marks	Part marks and guidance	
5			$\frac{13}{50}$ final answer	2	**M1** for $\frac{26}{100}$ **seen** After 0 scored, **SC1** for their fraction written in simplest form	SC1 dep on a fraction that reduces
6	a	i	13*c* – 7*d* final answer	3	**B2** for one term correct in final answer or **M1** for [4(*c* + 2*d*)] = 4*c* + 8*d* **seen** or [3(3*c* – 5*d*)] = 9*c* – 15*d* **seen**	13*c* + - 7*d* scores B2 only
		ii	20*ab* final answer	1		Accept 20*ba*
	b	i	2(3*g* +4*h*) final answer	1		Condone omission of final bracket
		ii	5*x*(*x* – 3) final answer	2	**M1** for 5(x^2 – 3*x*) or *x*(5*x* – 15) or 5x(x + 3)	Condone omission of final bracket
7	a	i	3	1		
		ii	22	1		
	b	i	32	1		
		ii	20	1		Accept ± 20
	c		10	3	**M2** for two values from 20, 4 and 8 used correctly in calculation or **M1** for 20 or 4 or 8	eg $\frac{23\times4}{8}$ or (24 ÷ 8) x 4
8	a		140 **isw**	2	**B1** for 120 **seen**	Accept 2 h[ours] 20 m[inutes]
	b		2.5 **oe**	2	**B1** for 75 **seen** or **M1** for *their* 75 ÷ 30 correctly evaluated	To 2 significant figures or better

Question			Answer	Marks	Part marks and guidance	
9			42	6	**M1** for $\frac{6\times 2}{2}$ **oe** **A1** for [area triangle] = 6 **M1** for $\frac{3+5}{2}\times 8$ **oe** **A1** for [area trapezium] = 32 **M1** for 10 × 8 – (*their* area of triangle + *their* area of trapezium) or for 2 × 2 + (*their* area of triangle + *their* area of trapezium)	Accept other equivalent methods Could be implied by 24 + 8
10	a		3 **:** 2 or 1.5:1 or $1:\frac{2}{3}$	2	**M1** for 72 **:** 48 **oe** or **SC1** for 2:3 or 1:1.5 or $\frac{2}{3}:1$	For 2 marks or SC1 do not isw
	b		[cycle =] 24 [walk =] 16	3	**M1** 80 employees to 240° equivalent to 1 employee to 3° **soi** or for cycle + walk = 40 **soi** **M1** for $\frac{48}{\text{their } 3}$ or $\frac{72}{\text{their } 3}$ **soi** or attempt to divide 40 employees in the ratio 72 **:** 48	eg 240 ÷ 80 One answer correct or correct answers reversed implies M1M1
11	a		1.25	3	**B2** for 125 [cm] **oe seen** or ans **figs** 125 or **M1** for 4 ft 2 in = 50 [inches] **soi** and **M1** for *their* 50 × 2.5 **soi**	 Condone eg 48 for *their* 50

Question			Answer	Marks	Part marks and guidance	
	b		40	**3**	**B1** for (6 x 14) + 4 **soi** and **M1** for *their* 88 ÷ 2.2 **soi**	Condone eg 84 for *their* 88
12	**a**		64	**3**	**B2** for $\frac{64}{100}$ or **B1** for $\frac{32}{50}$ or **M1** for 32 ÷ 50 x 100 **oe**	
	b		Valid explanation	**1**	Such as 'the sample size was too small'	See Appendix
13			[length =] 15 [width =] 5	**3**	**M1** for perimeter PQRS = 16 or 2 × *their* length + 2 × *their* width = 40 **M1** for ratio length AB to BC **oe** = 3:1 **soi** or $\frac{40}{their 16}$ **soi**	Condone length = 5 width = 15 If answer line is blank accept 15 and 5 correctly placed on the diagram
14	**a**	**i**	Valid explanation	**1**	Such as 'distance is time times speed'	Need to see 'multiply' oe See Appendix
		ii	$5 - x$	**2**	**M1** for time to travel from A to C = 5[hours] **soi**	Must be seen in this part
		iii	$20(5 - x) = 100 - 20x$	**1**		
	b		78	**4**	**M1** for $26x + 100 - 20x = 118$ **M1** for *their* $6x$ = *their* 18 **M1** for $x = \frac{their\ 18}{their\ 6}$ **soi**	 Simplifying their equation to $ax = b$ Simplifying their $ax = b$ to $x = \frac{b}{a}$

Question			Answer	Marks	Part marks and guidance	
15	**a**		tangent	**1**		Ignore spelling providing intention is clear
	b		segment	**1**		Ignore spelling providing intention is clear
16	**a**	**i**	13	**1**		Ignore subsequent terms
		ii	128	**1**		Ignore subsequent terms
	b		$18 - 3n$ **oe**	**2**	**M1** for $-3n + k$ **oe** or for $mn + 18$ **oe** ($m \neq 0$)	For 2 or M1, condone eg $n = 18 - 3n$ For 2 or M1, condone use of *other* variable instead of n
17			122 with justification showing 121 or $11^2 + 1$ and 125 or $5^3 - 3$	**4**	**B3** for answer 122 OR **M1** for at least 5 square numbers (or 5 square numbers + 1) **isw** **M1** for at least 3 cube numbers (or 3 cube numbers – 3) **isw** **M1** for reducing their list to non-primes If 0 scored, **SC1** for answer 5 or 17 or 37 or 61 or 101	 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144 2, 5, 10, 17, 26, 37, 50, 65, 82, 101, 122, 145 1, 8, 27, 64, 125 5, 24, 61, 122 Implied by any non-prime answer less than 150

Question			Answer	Marks	Part marks and guidance	
18	a		$(x – 43)(x + 43)$ final answer	1		Condone omission of final bracket
	b		1400	2	**M1** for (57 + 43) (57 – 43) FT *their* quadratic factors in (a) or better or **B1** for 3249 or 1849 **seen**	M1 for FT factors $(x + 43)(x + 43)$ or $(x – 43)(x – 43)$ only
19	a		180 ÷ (1 + 2 + 3) × 3 [= 90]	2	**M1** for 180 ÷ (1 + 2 + 3) If 0 scored, **SC1** for angles 30, 60, 90	Condone 6 for 1 + 2 + 3
	b		7.5	4	**B1** for sin 30° or cos 60° = ½ **soi** **M2** for 15 sin 30 **oe** or **M1** for $x/15$ = sin 30 **oe**	
20			80	4	**M3** for 250 ÷ (8*k* +10*k* + 7*k*) × 8*k* **oe** or **M2** for 250 ÷ (8*k* +10*k* + 7*k*) **oe** or **M1** for two ratios with a common number of women implied by 8*k* (men) **and** 7*k* (children) seen, $k > 0$ or for 8 : 10 [: 7] or [4 :] 5 : 3.5 **seen**	M3 implied by 80, 100, 70 with 80 not selected e.g. 0.8 and 0.7, 4 and 3.5
21	a	i	Correct probabilities filled	1	First Throw $\frac{5}{6}$, Second Throw $\frac{1}{6}, \frac{5}{6}, \frac{1}{6}, \frac{5}{6}$	Accept equivalent fractions
		ii	$\frac{1}{36}$ **oe**	2	**M1** for $\frac{1}{6} \times their \frac{1}{6}$	FT *their* tree diagram

Question			Answer	Marks	Part marks and guidance	
	b		$\frac{5}{6}\times\frac{5}{6}$ $\frac{5}{6}\times\frac{5}{6}\times\frac{1}{6} = \frac{25}{216}$	**M1** **A1**	If 0 scored **SC1** for $their\frac{5}{6}\times their\frac{5}{6}\times\frac{1}{6}$	M1 may be implied by a product of three fractions where two of them are $\frac{5}{6}$ For A1 product must be in this order FT *their* tree diagram bottom branch
22	**a**		Valid explanation	**1**	Such as 'because it is not in standard form'	eg because 12.3 is not a number between 1 and 10 See Appendix
	b		450 + 7300 = 7750 = 7.75×10^3	**M1** **A1**	or $0.45 \times 10^3 + 7.3 \times 10^3$ or $4.5 \times 10^2 + 73 \times 10^2$ or complete working leading to 7.75×10^3	Or correct use of a common power of 10
23	**a**	**i**	Valid explanation	**1**	Such as 'because 2*n* is always even so 2*n* + 1 will be odd'	Must mention even and odd See Appendix
		ii	2*n* + 3 **oe**	**1**		
	b		2*n* + 1 + 2*n* + 3 =4*n* + 4 [= 4(*n* + 1)] which is a multiple of 4	**M1** **A1**	If 0 scored **SC1** for 2*n* + 1 + *their (*2*n* + 3)	*their (*2*n* + 3) must be an algebraic expression in *n*

APPENDIX

Exemplar responses for Q2d

Response	Mark
Not all parallelograms have 2 order of rotational symmetry	**1**
Because **some** parallelograms have 4 lines of symmetry	**1**
Some parallelograms have more than order 2 rotation	**1**
Because there **can be** more than two lines of symmetry	**1**
A square has more than 2 lines of symmetry, it has 4	**1**
Not all parallelograms have 2 lines of symmetry	**1**
They do not have 2 lines of symmetry as only two of the sides are equal in length (statement in bold would score 1)	**0**
Because a square is a parallelogram, has 4 lines of symmetry and rotation symmetry of 1 (statement in bold would score 1)	**0**
Parrallelograms have no line of symmetry and 0 rotation symmetry (statement in bold would score 1)	**0**
Parallelograms have more than 2 lines of symmetry	**0**
The rotational symmetry would not be 2 as you can only turn it once and make it the same	**0**

Exemplar responses for Q12b

Response	Mark
The sample was not representative	**1**
The question was biased	**1**
The question is leading	**1**
Because it doesn't say on the survey where they are from	**1**
Because he only asked 50 people in his school	**1**
Because it is for his school not England	**1**
Because Jack only carried out his survey in school so the range isn't big enough for the whole of England	**1**
Because he asked 50 students meaning he didn't ask any adults or older people which decisions may be the opposite to what the students have said	**1**
He selected 50 students at random meaning more of one gender could have been asked than the other	**1**
He didn't ask the whole of England he only asked his mates (This is implying using the whole population not using sampling)	**0**
Because he hasn't asked the majority of the public, which he needs to ask	**0**
Not everyone said yes	**0**

Exemplar responses for Q14ai

Response	Mark
Because it's the average speed x the number of hours it takes	1
Because the average speed to A to B was 26km per hour so it's 26 x hours	1
Because you need to work at how many hours it took and times it by the speed	1
Because she cycled at 26 kmph and the x is how long it took so you multiply them (26kmph implies speed)	1 bod
Since to find the average speed you do **distance** x time so 26 x x → 26x	0
Because she did 26 km per hour and we don't know how many hours yet so we put x to show the number of hours	0
Because it's 26x the 1 hour	0
Because her average speed is 26	0

Exemplar responses for Q22a

Response	Mark
The first number eg (12.3) has to be between (1-10) so it should be (1.23)	1
It should be 1.23×10^8 not 12.3×10^7	1
It has to be a number between 1 – 10, 1.23×10^8 would be the correct answer	1
Because the first number has to be a one digit number before the decimal place	1
Because the decimal number always has to be below 10	1bod
Because the number needs to be between 1 – 10	0
This is not in standard form as you still have the decimal.	0
She didn't give the answer in standard form and she added (10^5 +10^2) wrong (statement in bold would score 1)	0
because standard form states that the number has to be between one and nine	0

Exemplar responses for Q23ai

Response	Mark
Any number x 2 will be even, so add 1 makes it odd	1
If I put a even or odd number, after x2 give me a even number but add 1, is a odd	1
2 x 1 = 2 2 + 1 = 3. (substitution of values isn't enough to score)	0
Any number you x by 2 then +1 will always be an odd number because 2 is an even number	0
Because if you x something by 2 and add one, it will be odd. (must identify even)	0
+1 to an even number and you get an odd one	0

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