



**F**

**GCSE (9–1)**

**Mathematics**

**J560/01:** Paper 1 (Foundation tier)

General Certificate of Secondary Education

**Mark Scheme for November 2019**

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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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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
^	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 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.
- 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  $180 \times (\text{their '37' + 16})$ , or FT  $300 - \sqrt{(\text{their '5^2 + 7^2'})}$ . Answers to part questions which are being followed through are indicated by eg FT  $3 \times \text{their (a)}$ .

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.
- **cao** means **correct answer only**.
  - **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 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'. Place the annotation ✓ next to the correct answer.

If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

If the correct answer is seen in the 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. 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		Trapezium	1		Allow correct embellishment
	b		Sphere	1		
2	a		3 5 6 15 in any order	2	B1 for two or three correct factors	
	b		5	1		
3	a	i	(4, 9)	1		
	a	ii	(-2, -3)	1		
	b		Point plotted at (7, -2)	1		
	c		$y = 2x + 4$ final answer	2	B1 for $2x + 4$ or $y = 2x \pm c$ $c \neq 1$	
4	a	i	200	1		
	a	ii	150	2	B1 for 275 or 125	
	a	iii	50 represented on the pictogram	3	B2 for 50 as answer  Or  M1 for $250 + 125 + 200 + 275$ so by 850 M1 for $900 - \text{their } 850$	Horizontal or vertical       Their 850 must come from addition of 4 numbers. Their 850 must be less than 900

Question			Answer	Marks	Part marks and guidance	
	<b>b</b>		$\frac{2}{5}$ nfw	<b>4</b>	<b>B3</b> for $\frac{8}{20}$ oe nfw or <b>B2</b> for identifying 2,3,5,7,11,13,17,19 as being prime (and no non-primes identified) or <b>B1</b> for identifying 2,3,5,7,11,13,17,19 identified as being prime with no more than 2 errors  and <b>M1</b> for $\frac{\text{their number of primes}}{20}$	e.g. 1, 2, 3, 5, 7, 11, 13, 17, 19 1, 2, 5, 7, 11, 13, 17, 19 (errors; 1 included, 3 omitted) 3, 5, 7, 11, 13, 17, 19 (omission of 2) <i>Their</i> number of primes must be less than 20
	<b>c</b>		57.8[0]	<b>3</b>	<b>M2</b> for $0.85 \times 68$ oe or <b>M1</b> for $0.15 \times 68$ implied by 10.2[0]	68 – (0.15 × 68) If non calculator method, it must be a full method.
<b>5</b>	<b>a</b>		2a	<b>1</b>		
	<b>b</b>		11g + 3f final answer	<b>2</b>	<b>B1</b> for 11g or 3f in answer	
<b>6</b>			$x < 2$ or $2 > x$	<b>2</b>	<b>B1</b> for $x \leq 2$ or $x > 2$	
<b>7</b>	<b>a</b>		3(2 + 3y) final answer	<b>1</b>		Condone missing final bracket
	<b>b</b>		2x(x + 3) final answer	<b>2</b>	<b>B1</b> for x(2x + 6) or 2(x <sup>2</sup> + 3x)	Condone missing final bracket

Question			Answer	Marks	Part marks and guidance	
8	a		9	2	M1 for $379 \div 45$ soi by 8.4...	Allow M1 for repeated addition or subtraction if method shown. If only numbers listed addition must reach 360 45, 90, 135, 180, 225, 270, 315, 360. subtraction must reach 19 334, 289, 244, 199, 154, 109, 64, 19
	b	i	Shows $\frac{35}{50}$ [= 0.7] or  $\frac{15}{50} = 0.3$ , $1 - 0.3$ [= 0.7]	2	M1 for 35  Or M1 for $\frac{10}{50} + \frac{5}{50}$ oe or $\frac{15}{50}$	Allow $35 \div 50$  Allow $15 \div 50$
		ii	States or gives a reason why past games may not be representative/relevant to this game	1		eg Past opponents may be a different standard eg Past games may have been played at home eg Best players may now be injured



Question			Answer	Marks	Part marks and guidance	
9			12.6[0]	5	<p><b>B4</b> for 6.6[0] nfw</p> <p>OR (working with <math>x</math> as cost of a child)  <b>M1</b> for <math>x + 6</math>  <b>M1</b> for <math>x + 6 + x + 6 + x + x + x = 45</math>  <b>M1</b> for <math>5x + 12 = 45</math></p> <p>OR (working with <math>y</math> as cost of adult)  <b>M1</b> for <math>y - 6</math>  <b>M1</b> for <math>y + y + y - 6 + y - 6 + y - 6 = 45</math>  <b>M1</b> for <math>5y - 18 = 45</math>  <b>M1</b> for <math>5y = 63</math></p> <p>OR  <b>M1</b> for <math>a = c + 6</math> or <math>a = x + 6</math> or <math>c = a - 6</math>  <b>M1</b> for <math>2a + 3c = 45</math> oe  <b>M1</b> for correct method to eliminate one variable. Allow one arithmetic error</p> <p>OR</p> <p><b>M2</b> for <math>45 - 12</math> may be implied by 33  <b>M1</b> for <math>33 \div 5</math></p>	

Question			Answer	Marks	Part marks and guidance	
10			16 nfw	5	<p><b>M2</b> for 12 as area of triangle nfw</p> <p>or</p> <p><b>M1</b> for <math>(6 \times 4) \div 2</math></p> <p>AND</p> <p><b>M1</b> for <i>their</i> <math>12 \times 4</math>. <i>Their</i> 12 must be from an attempt at the area of the triangle</p> <p><b>M1</b> for <i>their</i> <math>48 \div 3</math></p>	<p><math>48 \div 3 \div 2 = \mathbf{M0}</math></p>
11			97.75	6	<p><b>M1</b> for <math>4 \times 8.5</math> implied by 34</p> <p><b>B1</b> for 5 [hours]</p> <p><b>M2</b> for <math>8.5 \times 1.5 \times \text{their } 5</math> implied by 63.75</p> <p>or</p> <p><b>M1</b> for <math>8.5 \times 1.5</math> implied by 12.75</p> <p>or <i>their</i> <math>5 \times 1.5</math> implied by 7.5</p> <p>or <i>their</i> <math>5 \times 8.5</math> implied by 42.5</p> <p>and</p> <p><b>M1</b> for <i>their</i> Friday total + <i>their</i> Saturday total</p> <p>Alternative method</p> <p><b>M1</b> for <math>9.5 \times 8.5</math> implied by 76.5[0]</p> <p><b>B1</b> for 5 [hours]</p> <p><b>M1</b> for <math>0.5 \times 8.5</math> implied by 4.25</p> <p><b>M1</b> for <i>their</i> <math>5 \times \text{their } (0.5 \times 8.5)</math> implied by 21.25</p> <p><b>M1</b> for <i>their</i> <math>(9 \times 8.5) + \text{their } ((5) \times 0.5 \times 8.5)</math></p>	<p>63.75 may imply B1 M2</p>

Question			Answer	Marks	Part marks and guidance	
12			150  cm <sup>2</sup>	4  1	<b>M1</b> for $\sqrt[3]{125}$ may be implied by 5 <b>M1</b> for <i>their</i> $5^2$ <b>M1</b> for <i>their</i> $5^2 \times 6$	This could be on a diagram
13			Shows correct working leading to 34.9[9...] seen [rounding to 35]	3	<b>M2</b> for $\tan^{-1} \frac{14}{20}$ or <b>M1</b> for $\tan [=] \frac{14}{20}$ or $\tan [=] 0.7$  or $\tan[x] [=] \frac{14}{20}$ or 0.7	If using Pythagoras , sin or cos, must have full method.  Accept change of variable
14			Robert with correct working and reason	4	<b>B1</b> for 6.5 hours or 6 ½ hours <b>M1</b> for $760 \div 9$ implied by 84[.4] <b>M1</b> for $559 \div$ <i>their</i> 6.5 implied by 86  Accept alternative method e.g <b>B1</b> for 540 and 390 <b>M1</b> for $760 \div 540$ implied by 1.407.. or 1.41 <b>M1</b> for $559 \div 390$ implied by 1.43[3]	Accept correct working in comparable alternative units
15			Accept any correctly matched pair where Andrea > Joel and values quoted are $165 < \text{Andrea} < 165.5$ $165 \leq \text{Joel} < 165.5$	3	<b>B1</b> for value $165 < \text{Andrea} < 165.5$ <b>B1</b> for value $165 \leq \text{Joel} < 170$	For B1 if choice of values given all must be in range, unless acceptable value(s) indicated Values must be clearly associated with either Andrea or Joel as appropriate.

Question			Answer	Marks	Part marks and guidance	
16			Correct working leading to correct reason e.g. yes and 21.[3..] and 24 or 1280 and 1440 or [80 and] 90 or 2.6[.] or 2.7 [and 3] or 7.[1..] and 8	5	<b>M1</b> for unit calculation e.g. $48 \div 3$ <b>M1</b> for scale factor e.g. $80 \times 16$ <i>possibly in one stage</i> <b>M1</b> for first conversion e.g. $1280 \div 60$ <b>M1</b> for second conversion e.g. $3 \times 8$ <i>possibly in one stage</i> <b>A1 dep on M3 or M4</b> for 'Yes' and two correct comparative figures	Accept any correct method e.g. <b>M1</b> for $48 \div 3$ may be implied 16 <b>M1</b> for $80 \times$ <i>their</i> 16 may be implied 1280 <b>M1</b> for <i>their</i> $1280 \div 60$ may be implied by 21.33... <b>M1</b> for $3 \times 8$ may be implied by 24 <b>A1</b> for yes and $21.33... < 24$  Allow 21 hours 20 minutes
17	a		450 000	1		
	b		Singapore	1		
	c		Incorrect it is 3000 or 2969 to 2970 times bigger  or  Incorrect 769 0000 is 3000 or 2969 to 2970 times bigger than 2590 oe  or  Incorrect, $3 \times 10^3$ or 3000 times larger  or  Incorrect and evaluates Luxembourg's area $\times 3$ or Australia's area $\div 3$ with comment comparing the values	2	<b>M1</b> for $\frac{7.69 \times 10^6}{2.59 \times 10^3}$ oe  or  <b>M1</b> for $(2.59 \times 10^3) \times 3 = 7.77[0] \times 10^3$ or $2590 \times 3 = 7770$ or $(7.69 \times 10^6) \div 3 = 2.563333[3...] \times 10^6$ or $7\,690\,000 \div 3 = 2563333[.3...]$  or  <b>M1</b> for $10^3$ or 1000 times larger	Allow equivalent e.g wrong   $7690000 \div 2590 = 2969.11$   Figures must be in the same form for comparison, may be on the table

Question			Answer	Marks	Part marks and guidance	
	d		$2.5 \times 10^7$	4	<p><b>B3</b> for 25 000 000 or <math>2.5[0..] \times 10^7</math> or <math>2.4[7..] \times 10^7</math> or <math>2.48 \times 10^7</math></p> <p>or</p> <p><b>B2</b> for 24790 000 or <math>24.79 \times 10^6</math> oe</p> <p>or</p> <p><b>M1</b> for <math>1.71 \times 10^7 + 7.69 \times 10^6</math> oe implied by figs 2479</p> <p>If 0 or 1 scored <b>SC1</b> for <i>their</i> value rounded to 2 sf</p>	The unrounded value must be seen
18	(a)		$50 \times 30$ $\frac{50 \times 30}{1+2+3}$ [x1, 2 or 3] $2 \times 250 = 500$	<p>1</p> <p>1</p> <p>1</p>	<p>Accept any correct method e.g.</p> <p><b>M1</b> for <math>\frac{2}{1+2+3} = \frac{2}{6}</math></p> <p><b>M1</b> for <math>\frac{2}{6} \times 50</math> or <math>50/3</math></p> <p><b>M1</b> for <math>\frac{50}{3} \times 30 = 500</math></p> <p>Alternative method</p> <p><b>M1</b> for <math>30 \div 6 = 5</math></p> <p><b>M1</b> for <i>their</i> <math>(30 \div 6) \times 2</math></p> <p><b>M1</b> for <math>50 \times 10 = 500</math></p>	<p>watch for wrong method  <math>50 \times 20 = 1000</math>.  <math>1000 \div 2 = 500</math></p> <p>Mark to candidates advantage</p>

Question			Answer	Marks	Part marks and guidance	
	(b)		32	5	<p><b>M1</b> for <math>\frac{250}{25}</math> or <math>\frac{500}{20}</math> or <math>\frac{750}{15}</math></p> <p><b>M1</b> for <i>their</i> <math>10 \times 5.5[0]</math> or <i>their</i> <math>25 \times 2[.00]</math> or <i>their</i> <math>50 \times 3.9[0]</math></p> <p><b>M1</b> for <i>their</i> <math>10 \times 5.5[0] + \text{their } 25 \times 2[.00] + \text{their } 50 \times 3.9[0]</math></p> <p><b>M1</b> for <math>\frac{396}{\text{their } 300}</math> or <math>\frac{396 - \text{their } 300}{\text{their } 300}</math></p> <p>Alternative method</p> <p><b>M1</b> for <math>\frac{\frac{30}{6} \times 1}{25}</math> or <math>\frac{\frac{30}{6} \times 2}{20}</math> or <math>\frac{\frac{30}{6} \times 3}{15}</math></p> <p>or <math>\frac{396}{50}</math></p> <p><b>M1</b> for <math>5.5[0] \times \text{their } [0].2</math> or <math>2[.00] \times \text{their } [0].5</math> or <math>3.9[0] \times \text{their } 1</math></p> <p><b>M1</b> for <i>their</i> <math>(5.5[0] \times [0].2) + \text{their } (2[.00] \times [0].5) + \text{their } (3.9[0] \times 1)</math></p> <p><b>M1</b> for <math>\frac{7.92}{\text{their } 6}</math> or <math>\frac{7.92 - \text{their } 6}{\text{their } 6}</math></p>	<p><b>M1</b> may be implied by 10 or 25 (no. of bags/part bags of cement, sand, stone)</p> <p><b>M2</b> may be implied by 55 and 195 (cost of cement, sand, stone)</p> <p><b>M3</b> may be implied by 300 or 6 nfww (total production cost)</p> <p><b>M1</b> may be implied by 0.2, 0.5 or 1 or 7.92 (no. of bags/part bags of cement, sand, stone or price of 1 bag)</p> <p><b>M2</b> may be implied by 1.1[0], 1[.00] or 3.9[0] (cost of cement, sand, stone for 1 bag)</p> <p><b>M3</b> may be implied by 6 nfww (total production cost of 1 bag)</p>
19	(a)		2 points plotted correctly	1		tolerance $\pm \frac{1}{2}$ small square
	(b)		positive	1		Ignore embellishments

Question			Answer	Marks	Part marks and guidance	
	(c)	(i)	acceptable ruled line	1		see overlay, it must be at least from $x = 10$ to $x = 45$ and between (10,4) to (10,12) and (45,40) to (45,50) if more than 1 line, both must be in tolerance, ignore horizontal and vertical lines.
		(ii)	35 to 44	1		for answers out of tolerance FT <i>their</i> ruled line with positive gradient with tolerance $\pm \frac{1}{2}$ small square
	(d)		42 or 41.7 or 41.66... or 41.67	4	<b>B1</b> for 5 <b>M1</b> for $\frac{\text{their } 5}{12}$ <b>M1</b> for $(\text{their } \frac{5}{12}) \times 100$ If 0 scored <b>SC2</b> for answer of 30 from $\frac{3}{10}$ or 36[.36...] or 36.4 from $\frac{4}{11}$	<i>their</i> 5 must be less than 12 implied by [0].4166...
20	(a)		Accept any correct reason e.g. No as lengths are unknown or lengths may be double each one or triangles are similar	1		See exemplars in appendix
	(b)		First correct reason  Second correct reason  Third correct reason and SAS	1  1  1	Reasons are Angle [I]G[H] = angle [L]J[K]  GH = JK  GI = JL	Reasons can be given in any order  Allow same angle, (36), but lines must be identified

**APPENDIX**Exemplar responses for Q8bii

<b>Response</b>	<b>Mark</b>
Some of the players may be injured	<b>1</b>
They may have bought new players	<b>1</b>
They may be playing a better team than previously	<b>1</b>
Past performance may not predict the future	<b>1</b>
They may be playing a better team ( Doesn't refer to change from past performance)	<b>0</b>
Plaza may have played more matches since Sam collected the data	<b>0</b>

Exemplar responses for Q20a

<b>Response</b>	<b>Mark</b>
No, lengths unknown	<b>1</b>
No, lengths may be different	<b>1</b>
No as triangles are similar	<b>1</b>



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