

# H

**GCSE (9–1)**

**Mathematics**

**J560/06: Paper 6 (Higher tier)**

General Certificate of Secondary Education

**Mark Scheme for November 2022**

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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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## MARKING INSTRUCTIONS

### PREPARATION FOR MARKING RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.
3. Log-in to RM Assessor then mark and annotate the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

### MARKING

4. Mark strictly to the mark scheme.
5. Marks awarded must relate directly to the marking criteria.
6. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
7. If you are in any doubt about applying the mark scheme, consult your Team Leader via the RM Assessor messaging system.
8. Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners should give candidates the benefit of the doubt and mark the crossed out response where legible.
9. When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.
10. On each blank page the annotation **BP** must be inserted to confirm that the page has been checked. For additional objects (if present), a tick must be inserted on each page to confirm that it has been checked.

11. There is a NR (No Response) option. Award NR (No Response)
- if there is nothing written at all in the answer space
  - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
  - OR if there is a mark (e.g. a dash, a question mark) which is not an attempt at the question.







The hash key (#) on your keyboard will enter NR.

Note: Award 0 marks for an attempt that earns no credit (including copying out the question).

12. The RM Assessor **comments box** is used by the Principal Examiner or your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

If you have any questions or comments for your Team Leader, use the RM Assessor messaging system.

13. Assistant Examiners should send a brief report on the performance of candidates to their Team Leader (Supervisor) by the end of the marking period. Please follow the direction of your Team Leader about which questions you should report on and how to submit your report. Your report should contain notes on particular strengths displayed as well as common errors or weaknesses.
14. Annotations available in RM Assessor. These **must** be used whenever appropriate during your marking.

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

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## Mark Scheme

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<b>M1</b>	Method mark awarded 1
<b>M2</b>	Method mark awarded 2
<b>A1</b>	Accuracy mark awarded 1
<b>B1</b>	Independent mark awarded 1
<b>B2</b>	Independent mark awarded 2
<b>MR</b>	Misread
<b>SC</b>	Special case
<b>^</b>	Omission sign
<b>BP</b>	Blank page
<b>SEEN</b>	Seen

For a response awarded zero (or full) marks a single appropriate annotation (cross, tick, M0 or ^) is sufficient, but not required.  
 For responses that are not awarded either 0 or full marks, you must make it clear how you have arrived at the mark you have awarded and all responses must have enough annotation for a reviewer to decide if the mark awarded is correct without having to mark it independently.

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

**Subject-Specific Marking Instructions**

15. **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.
16. 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.
  - **nfw** means **not from wrong working**.
  - **oe** means **or equivalent**.
  - **rot** means **rounded or truncated**.
  - **soi** means **seen or implied**.
  - **dep** means that the marks are **dependent** on the marks indicated. You must check that the candidate has met all the criteria specified for the mark to be awarded.
  - **with correct working** means that full marks **must not** be awarded without some working. The required minimum amount of working will be defined in the guidance column and **SC** marks given for unsupported answers.
17. 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.
18. Unless the command word requires that working is shown and the working required is stated in the mark scheme, 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.
19. 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. 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.

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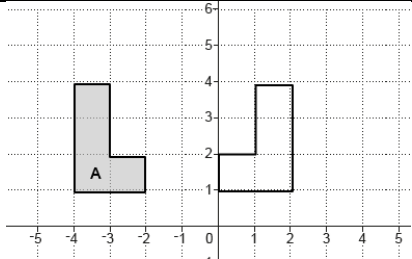
Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, e.g. FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '52 + 72'). Answers to part questions which are being followed through are indicated by e.g. FT 3 × *their* (a).

20. 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'.
21. In questions **with a final answer line and incorrect answer given**:
- (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 if there is no other method leading to the incorrect answer. Use the **M0**, **M1**, **M2** annotations as appropriate and place the annotation ✕ next to the wrong answer.
22. 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. A correct step, value or statement that is not part of the method that leads to the given answer should be awarded **M0** and/or **B0**.
  - (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 marks for the poorer response unless the candidate has clearly indicated which method is to be marked.
23. 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 marks for the poorer response unless the candidate has clearly indicated which response is to be marked.

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24. 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. If a candidate corrects the misread in a later part, do not continue to follow through, but award **A** and **B** marks for the correct answer only.
25. 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.
26. Ranges of answers given in the mark scheme are always inclusive.
27. 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.
28. If in any case the mark scheme operates with considerable unfairness consult your Team Leader.



Question		Answer	Marks	Part marks and guidance	
1	(a)	Translation $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$	1 1		Marks spoilt if extra transformations  Do not accept coordinates, with a fraction bar or in words
	(b)		2	<b>B1</b> for correct orientation but wrong location or for correct reflection but in $y = -1$	
2		12	3	<b>B2</b> for 8 [batches] or <b>M1</b> for at least 2 ratios or pairs equivalent to 3:5 or $16 \div (5 - 3)$	e.g. $8 \times 1.5$  Allow decimals e.g. 1:1.6 to 1.7 or 0.6:1 6:10, 9:15, 12:20, 15:25, 18:30, 21:35, 24:40, 27:45, ... Does not need to contain ratio symbol
3		276 000	2	<b>M1</b> for $23\,000 \times 12$ oe  If 0 scored, <b>SC1</b> for 299 000 as final answer	
4	(a)	$0.3 + 0.75 [= 1.05]$ is greater than 1	1		Condone additional statements that do not contradict See appendix Condone 100% for 1

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Question		Answer	Marks	Part marks and guidance	
	(b)	Correct tree diagram	3	<p><b>B1</b> for <math>P(\text{draw}) = 0.15</math></p> <p><b>B1</b> for two correctly placed sets of three branches with win/draw/lose labels</p> <p><b>B1</b> for 0.3, <i>their</i> 0.15 and 0.55 correctly placed on all branches</p>	<p>May be on diagram or in a calculation e.g. <math>0.3 + 0.55 + 0.15 = 1</math> oe</p> <p>Ignore probabilities Accept e.g. W/D/L as labels</p> <p>Condone omission of <i>their</i> 0.15 on printed branches</p>
	(c)	[0].165 oe	2	<b>M1</b> for $[0].3 \times [0].55$	oe may be $\frac{33}{200}$ or equivalent fraction or 16.5%
5	(a)	$4.36[35] \times 10^9$ or $4.364 \times 10^9$ or $4.4 \times 10^9$	3	<p><b>B2</b> for 4 363 500 000 or 4 400 000 000 oe</p> <p>or</p> <p><b>M1</b> for 29.09 × figs 15 soi by figs 436</p>	oe is other correct answers not in standard form eg $43.635 \times 10^8$
	(b)	0.52[2...]	2	<b>M1</b> for $78\,340\,000 \div \text{figs } 15 \text{ soi by figs } 52$	
6	(a)	Positive	1		Ignore comments about strength but not that contradict e.g strong positive decrease
	(b) (i)	Clear indication of the point at (27, 25)	1		
	(ii)	Hot day [with] few visitors or Outlier	1		See Appendix

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Question		Answer	Marks	Part marks and guidance	
	(c)	Ruled line of best fit  52 to 78	<b>B1</b>  <b>B1</b>		Overlay is a guide only; <i>their</i> line must be between or through (15, 40) to (17.5, 40) and (22.5, 80) to (25, 80)  If more than one line, mark the worst unless one clearly chosen e.g. vertical line from 21 to the line $\frac{1}{2}$ square tolerance
7	(a)	Method must include dimensions (accept $6^2$ for $6 \times 6$ and $6^3$ for $6 \times 6 \times 6$ and $12^2$ for $12 \times 12$ )  $4 \times (6 \times 12) + 2 \times (12 \times 12)$ or $4 \times 2 \times (6 \times 6) + 2 \times 4 \times (6 \times 6)$ or $8 \times (6 \times 6) + 8 \times (6 \times 6)$ or $4 \times 6 \times (6 \times 6) - 8 \times (6 \times 6)$ or $24 \times (6 \times 6) - 8 \times (6 \times 6)$ or $16 \times (6 \times 6)$  [=576]	<b>2</b>	<b>M1</b> for full method for surface area  $4 \times 72 + 2 \times 144$ or $4 \times 2 \times 36 + 2 \times 4 \times 36$ or $8 \times 36 + 8 \times 36$ or $24 \times 36 - 8 \times 36$ oe  or  $16 \times 36$	Brackets do not need to be shown <b>0</b> for  $288 + 288$          $864 - 288$      $4 \times 6 \times 4 \times 6$ $24 \times 24$

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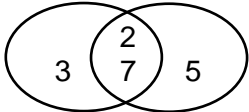
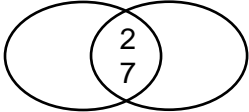
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Question		Answer	Marks	Part marks and guidance	
	(b)	12.5 nfww	4	<p><b>M2</b> for <math>(2 \times 6 \times 6) + (4 \times 6 \times 24)</math> oe or <b>M1</b> for calculating the surface area of one or more faces of the cuboid</p> <p>AND</p> <p><b>M1</b> for <math>\frac{\text{their } 648}{576} [\times 100]</math> oe or <math>\frac{(\text{their } 648) - 576}{576} [\times 100]</math> oe</p> <p><u>Alternative method</u> <b>M2</b> for 16 and 18 [exposed faces] or <b>M1</b> for 16 or 18 [exposed faces]</p> <p>AND</p> <p><b>M1</b> for <math>\frac{\text{their } 18}{\text{their } 16} [\times 100]</math> or <math>\frac{\text{their } 18 - \text{their } 16}{\text{their } 16} [\times 100]</math></p>	<p>soi by <math>72 + 576</math> or 648</p> <p>e.g. <math>6 \times 6</math> soi by 36 <math>6 \times 24</math> soi by 144</p> <p><i>Their</i> 648 from attempt at surface area involving <math>6 \times (6 \text{ or } 24)</math> soi by 1.125 or 112.5</p> <p>soi by 0.125 oe may be <math>\frac{72}{576} [\times 100]</math></p> <p>soi by 1.125 or 112.5</p> <p>soi by 0.125</p>
8		57.5	4	<p><b>M2</b> for <math>\frac{7 \times 25}{10}</math> oe soi by 17.5 or <b>M1</b> for <math>25 \div 10</math> or <math>10 \div 25</math> or <math>7 \div 10</math> or <math>10 \div 7</math></p> <p>AND</p> <p><b>M1</b> for <math>15 + 25 + \text{their } 17.5</math></p>	<p>Evidence may be seen on diagram</p> <p>Implied by 2.5 or 0.4 or 0.7 or 1.4...</p> <p><i>their</i> 17.5 from <i>their</i> valid attempt using scale factors to find AB</p>

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Question		Answer	Marks	Part marks and guidance	
9		7 nfw	3	<p><b>M2</b> for <math>6k + 3 [= 45]</math></p> <p>or</p> <p><b>M1</b> for <math>6k</math> or <math>2^3</math> soi</p> <p><u>Alternative method:</u></p> <p><b>M2</b> for <math>2^k = \sqrt[6]{2^{42}}</math> or <math>2^k = 128</math></p> <p>or</p> <p><b>M1</b> for <math>(2^k)^6 =</math> any of the below  <math>\frac{2^{45}}{2^3}</math>, <math>2^{42}</math>, <math>4.398... \times 10^{12}</math>, <math>4.4[0] \times 10^{12}</math></p>	<p>Could be implied by manipulation of powers followed by <math>\div 6</math></p> <p>Accept <math>\frac{2^{45}}{2^3}</math>, <math>4.398... \times 10^{12}</math> or <math>4.4[0] \times 10^{12}</math> in place of <math>2^{42}</math></p> <p>Do not accept <math>(2^k)^6 = \frac{2^{45}}{8}</math></p>
10		42 and 70	3	<p><b>M2</b> for</p>  <p>or</p> <p><b>M1</b> for</p>  <p>or for 2 with 7 and 2 with 3, 5, 7</p> <p><u>Alternative method:</u></p> <p><b>M1</b> for at least four correct multiples of 14 apart from 14</p> <p><b>M1</b> for at least four correct factor pairs of 210 apart from 1 &amp; 210</p>	<p>For <b>M2</b> or <b>M1</b> allow 14 for 2 and 7 in the overlap</p> <p>As lists, products or factor trees etc</p> <p>Ignore errors when counting four correct 28, <u>42</u>, 56, <u>70</u>, 84, 98, ...</p> <p>2 &amp; 105, 3 &amp; <u>70</u>, 4 &amp; 55, 5 &amp; <u>42</u>, 6 &amp; 35, 7 &amp; 30, 10 &amp; 21, 14 &amp; 15</p>

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Question		Answer	Marks	Part marks and guidance	
11		$2(3x - 1)(5x + 2)$	3	<p><b>B2</b> for <math>(6x - 2)(5x + 2)</math> as final answer  or for <math>(3x - 1)(10x + 4)</math> as final answer  or for <math>(3x - 1)(5x + 2)</math> as final answer  or</p> <p><b>M1</b> for two brackets which give two correct terms  for <math>30x^2 + 2x - 4</math> or for <math>15x^2 + x - 2</math></p>	
12	(a)	0	1		

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Question		Answer	Marks	Part marks and guidance	
	(b)	12.37[5] or 12.38 or 12.4 all oe and with correct working	5	<p><b>M3</b> for <math>\frac{(15+40) \times 18}{2}</math></p> <p>or</p> <p><b>M2</b> for attempt at total area with one reading or one calculation error</p> <p>or</p> <p><b>M1</b> for one area calculation</p> <p>AND</p> <p><b>M1dep</b> for <i>their</i> <math>495 \div 40</math></p> <p>If <b>0</b> or <b>1</b> scored, instead award <b>SC2</b> for answer 12.37[5] or 12.38 or 12.4 all oe with no working or insufficient working</p> <p>If <b>0</b> scored <b>SC1</b> for 495 with no working or insufficient working</p>	<p>“Correct working” requires evidence of at least <b>M3</b></p> <p>Areas may be found in stages e.g. <b>M3</b> for <math>(\frac{1}{2} \times 10 \times 18) + (15 \times 18) + (\frac{1}{2} \times 15 \times 18)</math> implied by <math>90 + 270 + 135</math></p> <p>e.g. use of 16 rather than 18 throughout is one error but both triangles incorrect is two errors</p> <p>e.g. one of the above soi by 90, 270 or 135</p> <p>Dep on at least <b>M1</b></p>
13	(a)	$\frac{10}{3}$ oe	3	<p><b>M2</b> for <math>6t - 2 = 18</math> oe</p> <p>or</p> <p><b>M1</b> for <math>6t - 2</math> or <math>18 + 2</math> or <math>20</math></p>	<p>3.33[3...] or unsimplified, e.g. <math>20/6</math></p> <p>e.g. <math>6 = 20/t</math></p>
	(b)	[x =] $4(y - 3)$ oe	2	<p><b>M1</b> for <math>y = \frac{x}{4} + 3</math> or better</p> <p>or for correct reverse flowchart with arrows reversed <math>\longleftarrow \times 4 \longleftarrow - 3 \longleftarrow</math></p>	

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Question		Answer	Marks	Part marks and guidance	
14	(a)	55 nfww	3	<p><b>M2</b> for <math>[(40 \times 3) - (10 \times 3)] \div 2</math> oe implied by 45 or for <math>[(40 \times 3) - 10] \div 2</math> oe or <b>M1</b> for <math>40 \times 3</math> implied by 120</p> <p><u>Alternative method:</u> <b>M2</b> for <math>40 + (40 - 10) \div 2</math> or <b>M1</b> for <math>(40 - 10) \div 2</math></p>	
	(b)	[0].25 oe	3	<p><b>B1</b> for <math>y = \frac{k}{x^3}</math> oe soi by <math>16 = \frac{k}{2^3}</math> or <math>k = 128</math></p> <p><b>M1</b> for <math>y = \frac{\text{their } k}{8^3}</math></p> <p>OR</p> <p><b>M2</b> for <math>2^3 \times 16 = 8^3 \times y</math> or <math>16 \div (\frac{8}{2})^3</math></p>	
15	(a)	<p>[gradient =] <math>(4.5 - 3) \div (3 - 0)</math> oe</p> <p><math>y = (\text{their } 0.5)x + c</math> or <math>y = mx + 3</math> or <math>y - y_1 = \text{their } 0.5(x - x_1)</math> or <math>y - 4.5 = m(x - 3)</math> or <math>y - 3 = m(x - 0)</math></p> <p><math>y = 0.5x + 3</math> or <math>y - 4.5 = 0.5(x - 3)</math> oe or <math>y - 3 = 0.5(x - 0)</math> oe AND <math>2y = x + 6</math></p>	<p>1</p> <p>1</p> <p>1</p>	<p>Must show a correct calculation of the gradient</p> <p>This can be <math>y = 0.5x + 3</math> or <math>\frac{y-3}{x-0} = \text{their } 0.5</math> oe or <math>y - 4.5 = 0.5(x - 3)</math> oe</p> <p>If 0 scored <b>SC1</b> for verification of A and B</p>	Working backwards scores 0



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Question		Answer	Marks	Part marks and guidance
	(b)	$x \leq 3$ oe $x + y > 3$ oe $2y \leq x + 6$ oe	5	<p><b>B2</b> for <math>x \leq 3</math> oe  or <b>B1</b> for <math>x = 3</math> oe or <math>x &lt; 3</math> oe  or <b>SC1</b> for <math>x \geq 3</math> oe or for <math>0 \leq x \leq 3</math></p> <p>AND</p> <p><b>B2</b> for <math>x + y &gt; 3</math> oe  or <b>B1</b> for <math>x + y = 3</math> oe  or <b>SC1</b> for <math>x + y \geq 3</math> oe</p> <p>AND</p> <p><b>B1</b> for <math>2y \leq x + 6</math></p>

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Question			Answer	Marks	Part marks and guidance	
16			11 [hours] 35 [mins] with correct working	5	<p><b>B4</b> for answers 11 [hours] 34 [mins] or 11 [hours] 34.5[...] to 34.8 [mins], with correct working</p> <p>OR</p> <p><b>B1</b> for 9550  <b>B1</b> for 825  <b>M1</b> for <math>(9550 \text{ to } 9650) \div (815 \text{ to } 825)</math>  <b>M1</b> for <i>their</i> <math>0.57... \times 60</math> oe</p> <p>If <b>0</b>, <b>1</b> or <b>2</b> scored, instead award  <b>SC3</b> for answer 11 [hours] 35 [mins] with no working or insufficient working</p> <p>If <b>0</b> or <b>1</b> scored, instead award  <b>SC2</b> for answer 11 [hours] 34 [mins] or 11 [hours] 34.5[...] to 34.8 [mins] with no working or insufficient working</p> <p>If <b>0</b> scored, instead award  <b>SC1</b> for 11.57[...] or 11.58 with no working or insufficient working</p>	<p>“Correct working” requires evidence of at least <b>B1B1M1</b></p> <p>Allow 824.9[9...] for 825  With no contradictory choice  With no contradictory choice  Do not imply this first <b>M1</b> mark.  <i>their</i> 0.57 following from distance <math>\div</math> speed implied by 11.57 to 11.85</p>
17	(a)	(i)	20	1		
		(ii)	25	1		

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Question		Answer	Marks	Part marks and guidance	
	(b)	Box plot drawn with: Lowest = 25 Lower Quartile = 45 Median = 60 Upper quartile = 65 Highest = 75	3	B2 for 4 or 5 correct markers or B1 for 3 correct markers	If more than 5 markers, mark the worst 5  Award the markers even if not correctly representing the information
	(c)	Calculation/reasoning/use of figures  Correct interpretation	1  1dep		See Appendix
18	(a)	(10, 0)	1		
	(b)	$-\sqrt{91}$	3	B2 for $\sqrt{91}$ or -9.539[...] or -9.54 or B1 for 9.539[...] or 9.54 or M1 for $9 + y^2 = 100$ oe	$\pm$ answers treat as choice

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Question	Answer	Marks	Part marks and guidance
(c)	$(\sqrt{2}, 7\sqrt{2})$ and $(-\sqrt{2}, -7\sqrt{2})$ with correct working	<b>5</b>	<p><b>B4</b> for <math>(\sqrt{2}, 7\sqrt{2})</math> with correct working or <math>(-\sqrt{2}, -7\sqrt{2})</math> with correct working</p> <p>or</p> <p><b>M2</b> for <math>x^2 + (7x)^2 = 100</math> oe <b>A1</b> for <math>[x = \pm] \sqrt{2}</math></p> <p>or</p> <p><b>M1</b> for <math>7x</math> seen</p> <p>If <b>0</b> or <b>1</b> or <b>2</b> scored, instead award <b>SC3</b> for answer <math>(\sqrt{2}, 7\sqrt{2})</math> and <math>(-\sqrt{2}, -7\sqrt{2})</math> with no working or insufficient working</p> <p>If <b>0</b> or <b>M1</b> scored, instead award <b>SC2</b> for answer <math>(\sqrt{2}, 7\sqrt{2})</math> or <math>(-\sqrt{2}, -7\sqrt{2})</math> or for <math>(\frac{5\sqrt{2}}{2}, \frac{35\sqrt{2}}{2})</math> and <math>(-\frac{5\sqrt{2}}{2}, -\frac{35\sqrt{2}}{2})</math> with no working or insufficient working</p> <p>If <b>0</b> scored, instead award <b>SC1</b> for <math>[x = \pm] \sqrt{2}</math> or for <math>(\frac{5\sqrt{2}}{2}, \frac{35\sqrt{2}}{2})</math> or <math>(-\frac{5\sqrt{2}}{2}, -\frac{35\sqrt{2}}{2})</math> with no working</p> <p>“Correct working” requires evidence of at least <b>M2</b> Allow <math>\sqrt{98}</math> for <math>7\sqrt{2}</math></p> <p>Condone for <b>M1</b> if seen as <math>x^2 + 7x^2 = 100</math></p>

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Question	Answer	Marks	Part marks and guidance
19	Accept answers that round to 25.7 with correct working	6	<p>“Correct working” requires evidence of at least <b>M1</b> AND <b>M2</b></p> <p>(17.386...)</p> <p><b>M2</b> for <math>\frac{9 \times \sin 30}{\sin 15}</math> oe or <b>M1</b> for <math>\frac{9}{\sin 15} = \frac{[\dots]}{\sin 30}</math> oe</p> <p>AND</p> <p><b>M3</b> for correct cos rule with cos as the subject <math>\frac{13^2 + (\text{their } 17.386\dots)^2 - 8^2}{2 \times 13 \times (\text{their } 17.386\dots)}</math> oe or <b>M2</b> for the above (<b>M3</b>) with one error or wrong angle selected or for <math>8^2 = 13^2 + (\text{their } 17.386\dots)^2 - 2 \times 13 \times (\text{their } 17.386\dots) \times \cos[\dots]</math> or <b>M1</b> for the above (<b>M2</b>) with one error or wrong angle selected</p> <p>If <b>0</b> or <b>1</b> or <b>2</b> scored, instead award <b>SC3</b> for 25.7 (or an answer rounding to 25.7) with no working or insufficient working</p> <p>If <b>0</b> or <b>1</b> scored, instead award <b>SC2</b> for 0.898 to 0.902 with no working or insufficient working</p> <p>If <b>0</b> scored, instead award <b>SC1</b> for [QS =] 17.3 to 17.4 with no working</p> <p>(0.900...)</p> <p>e.g. for <math>\frac{8^2 + (\text{their } 17.386\dots)^2 - 13^2}{2 \times 8 \times (\text{their } 17.386\dots)}</math></p> <p>e.g. for <math>13^2 = 8^2 + (\text{their } 17.386\dots)^2 - 2 \times 8 \times (\text{their } 17.386\dots) \times \cos[\dots]</math></p>

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Question		Answer	Marks	Part marks and guidance	
20		$\frac{24x+5}{3x+5}$ final answer	4	<p><b>M3</b> for <math>\frac{30x+50-6x-45}{[3x+5]}</math> soi by <math>\frac{24x+5}{[3x+5]}</math></p> <p>or</p> <p><b>M2</b> for <math>\frac{30x+50-(6x+45)}{[3x+5]}</math> or <math>\frac{10(3x+5)-6x-45}{[3x+5]}</math></p> <p>or</p> <p><b>M1</b> for <math>10(3x+5)</math></p>	<p>Max <b>M3</b> if answer spoiled by further incorrect algebraic manipulation (eg. incorrect cancelling of terms)</p> <p>Allow full marks for a correct equivalent answer as a single fraction</p> <p>e.g. <math>\frac{48x+10}{6x+10}</math></p>

## APPENDIX

## Q4(a)

Comment	Mark	Reason
0.3 + 0.75 add to greater than 1	1	
They add to greater than 1	1	Allow “they” or “the probabilities” etc for 0.3 and 0.75 (1.05 does not need to be seen)
0.3 + 0.75 = 1.05 which is more than 1. The probability of winning + losing should equal 1.	1	Winning + losing should $\leq 1$ but does not contradict required evidence
Probabilities add up to 1 and 0.3 + 0.75 = 1.05 which is beyond 1	1	First vague words do not contradict required evidence
0.3 + 0.75 = 1.05 and probability only goes to 1	1	BOD “only goes to” as meaning “cannot be greater than”
The probabilities should add to 1 but instead 1.05 which isn’t possible	0	“Which isn’t possible” not enough without $> 1$
0.3 + 0.75 = 1.05 so they cannot both be correct	0	True but doesn’t say why they cannot both be correct ( $0.3 + 0.75 > 1$ )
Probabilities must add to 1 or less	0	True general statement but not related it to this context
They must add up to less than 1	0	Incorrect, they could also add up to 1 but have not mentioned adding to $> 1$
They must add up to 1	0	Incorrect, they could also add up to less than 1 but have not mentioned adding to $> 1$
0.3 + 0.75 = 1.05 and it needs to be a whole number	0	Sum is correct but reason does not say more than 1
They cannot be right because probabilities must add to 1 which they don’t	0	Probabilities do not always add to 1 and the required evidence is not given

## Q6(b)(ii)

There were not many visitors even though it was a warm day	1	
There were not many visitors because of the storm	1	BOD "storm" in place of hot
High temperature but less visitors	1	
It's 27°, a hot temperature, yet there are less than 40 visitors	1	Implies low number of visitors
It's 27° and there were only 25 visitors	1	BOD 27 meaning "hot" and 25 implies low number of visitors
Because the temperature is high but attendance is lower than normal	1	Allow lower than normal for low
As there wasn't a lot of people but on other hot days there was a lot of people	1	Acceptable: high temperature low visitors
It was hot but not many people	1	Accept hot and implying low people numbers
Because it's hot however as it was stormy I don't think that many people would have gone	1	BOD Hot and not many people and allow "not many would have"
Outlier	1	
Anomaly	1	BOD equivalence to "outlier"
Not many visitors	0	Insufficient. There are other occasions when there are not many visitors does not mention heat
Because it was really hot	0	Insufficient. No mention of low number of visitors
It does not correspond to the correlation	0	Does not mention heat or visitor numbers
It does not fit with the rest of the points	0	Does not mention heat or visitor numbers
It is away from the correlation line	0	Does not mention heat or visitor numbers
It doesn't follow the increasing trend	0	Does not mention heat or visitor numbers



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Q17(c)

Mark Scheme

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Use of figures or reasoning needed to score any marks		
Use of figures or reasoning may be 1 mark. Interpretation is dependent on figures/reasoning		
$(58+66)/2=62$ . Incorrect, new mean will be more than 63.	<b>2</b>	Useful calculation; correct interpretation
$(58+66)/2=62$ . Incorrect, new mean will be less than 63.	<b>1</b>	Useful calculation; wrong interpretation
$(58+66)/2=62$ .	<b>1</b>	Useful calculation
Incorrect. The mean of the two apples is 62, so the mean of the remaining apples will rise.	<b>2</b>	Implied calculation; correct interpretation
$63-58=5$ ; $66-63=3$ . Incorrect, new mean will be more than 63.	<b>2</b>	Useful calculation; correct interpretation
$63-58=5$ ; $66-63=3$ . Incorrect, new mean will be less than 63.	<b>1</b>	Useful calculations; wrong interpretation
$63-58=5$ ; $66-63=3$ .	<b>1</b>	Useful calculations
If there were 10 apples, then new mean = $(63 \times 10 - 58 - 66)/8 = 63.25$ . The mean would increase	<b>2</b>	Useful calculation; correct interpretation
Useful figures/calculations/reasoning and "no"	<b>1</b>	"No" is insufficient interpretation
Useful figures/calculations/reasoning and "the mean will change"	<b>1</b>	The interpretation is equivalent to "no"
Mean will be smaller because Charlie ate 2 apples	<b>0</b>	Insufficient use of figures
No, because the total weight and the number of apples have changed	<b>0</b>	No calculations/reasoning/use of figures.
No, the mean will change	<b>0</b>	No calculations/reasoning/use of figures.

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