OCR
Oxford Cambridge and RSA

Higher

GCSE

Mathematics - Paper 5

J560/05: Paper 5 (Higher tier)

General Certificate of Secondary Education

Mark Scheme for June 2025

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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.

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 and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.

5. **Crossed-Out Responses**
   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 may give candidates the benefit of the doubt and mark the crossed-out response where legible.

   Rubric Error Responses – Optional Questions
   Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM Assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple-Choice Question Responses
When a multiple-choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).
When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)
Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth two or more marks)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space).

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add the annotation 'SEEN' to confirm that the work has been seen and mark any responses using the annotations in section 11.

7. 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.

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

8. The RM Assessor **comments box** is used by 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.**

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response: Not applicable in F501
To determine the level – start at the highest level and work down until you reach the level that matches the answer
To determine the mark within the level, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

11. Annotations available in RM Assessor. These **must** be used whenever appropriate during your marking.

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
BP	Blank page
SEEN	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

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. 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**.
   - **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.

3. 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.

4. 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.

5. 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.

   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).

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 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.

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. 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.

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 marks for the poorer response unless the candidate has clearly indicated which response is to be marked.

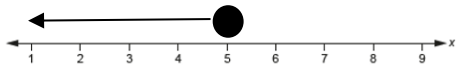
   When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the **MR** annotation. **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.

10. 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.

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

12. For methods not described in the mark scheme, such as visual representations like bar models, ratio tables, give equivalent marks for equivalent work. If in doubt, consult your Team Leader.

13. If in any case the mark scheme operates with considerable unfairness consult your Team Leader.

Question			Answer	Marks	Part marks and guidance	
1	(a)		14	1		Accept 14.0
1	(b)		[0].25 or $\frac{1}{4}$	1		
2			Shows 56% or 0.56 and 0.54 or $\frac{56}{100}$ and $\frac{54}{100}$ or equivalent fractions with a common denominator or shows 13.5 [out of 25] and 14	3	**M2** for $\frac{14}{25}$ × 100 oe or 0.56 or for $\frac{54}{100}$ × 25 oe **OR** **M1** for $\frac{14}{25}$ seen or for $\frac{54}{100}$ or 0.54 seen	Allow 3 marks or M2 for correct values/method isw other working For M2 accept $\frac{10+4}{10+15}$×100 instead of $\frac{14}{25}$×100 For $\frac{14}{25}$ × 100 oe e.g. $\frac{14\times4}{25\times4}$ M2 implied by 13.5 Accept 14 out of 25 seen for M1
3			Rotation 90 clockwise oe (5, 2)	3	**B1** for each	More than one transformation scores zero Extra properties treat as choice Do not accept e.g. turn for rotation e.g. 270 [anticlockwise], –90 Condone 5, 2 but not $\binom{5}{2}$
4	(a)		x ≤ 5 final answer	1		
4	(b)			2	Allow correct or **FT** *their* inequality in part (a) **B1FT** *their* inequality in part (a) for an open circle with correct arrow/line or for a solid circle with incorrect arrow/line or for a solid circle with correct line/arrow but one additional circle on the line at the end	Arrow can be short If line rather than arrow, then line will need to reach 1 on number line for 2 marks B0 for solid circle and no line/arrow

Question			Answer	Marks	Part marks and guidance	
5			40	3	**M2** for $\frac{11}{20}$ or $\frac{22}{40}$ or $[1]\frac{15}{20} - [1]\frac{4}{20}$ or $[1]\frac{4}{20} + \frac{22}{d} = [1]\frac{15}{20}$ or $\left[\frac{22}{d} =\right]\frac{35}{20} - \frac{24}{20}$ oe or $\frac{24}{20} + \frac{22}{d} = \frac{35}{20}$ oe	Accept other equivalent fractions with a common denominator for M2 or M1 M2 implied by $\frac{22}{0.55}$ For M2 accept e.g. $\frac{7\times5}{4\times5} - \frac{6\times4}{4\times5}$ Accept e.g. $\left[-\frac{22}{d} =\right]\frac{24}{20} - \frac{35}{20}$ for M2
					or **M1** for $[1]\frac{3}{4} - [1]\frac{1}{5}$ oe or $\frac{35}{20}$ and $\frac{k}{20}$ or $\frac{k}{20}$ and $\frac{24}{20}$ or $[1]\frac{15}{20}$ and $[1]\frac{p}{20}$ or $[1]\frac{p}{20}$ and $[1]\frac{4}{20}$	M1 implied by 0.55 or [1].75 – [1].2 $p < 20$
					OR	
					M2 for $7 \times 5 \times d - 6 \times 4 \times d = 22 \times 5 \times 4$ or better	$35d - 24d = 440$
					or **M1** for $\frac{6\times d+22\times5}{5d} = \frac{7}{4}$ oe	$\frac{6d+110}{5d} = \frac{7}{4}$, accept e.g. $\frac{6d}{5d} + \frac{110}{5d} = \frac{7}{4}$
					or $\frac{4\times6\times d+22\times5\times4}{20d} = \frac{7\times5\times d}{20d}$ oe	$\frac{24d+440}{20d} = \frac{35d}{20d}$

6	**(a)**		8 with correct working	**4**	**B3** for answer 7 with correct working OR Listing: **M3** for [10], 80, 150, 220, 290, 360, 430, 500 or for 70, 140, 210, 280, 350, 420, 490 or **M2** for two correct lists up to at least the first common term 80 or 70 Or **M1** for a list with at least [10,] 24, 38, 52, 66, 80 **or** [10,] 45, 80 or a list with at least 14, 28, 42, 56, 70 **or** 35, 70 OR Calculation: **M3** for (500 – 10) ÷ 70 [+ 1] oe or **M2** for 2 × 5 × 7 implied by LCM = 70 or **M1** for showing prime factors of 14 and 35 [14 =] 2, 7 and [35 =] 5, 7 If **0** or **1** scored, instead award **SC2** for answer 8 with no or insufficient working If **0** scored, instead award **SC1** for answer 7 with no or insufficient working	Correct working requires evidence of at least **M2** If answer 8 and M2 earned award 4 marks If answer 7 and M2 earned award B3 If candidate uses both listing and calculation methods, mark the better of these methods e.g. [10,] 24, 38, 52, 66, 80 and [10,] 45, 80 or 14, 28, 42, 56, 70 … and 35, 70. isw errors beyond 80 or 70 for M2 but not M3 isw any errors beyond these values For M3 accept e.g. 10 + 70(*n* [–1]) = 500 Condone e.g. HCF = 70 but 70 must come from use of prime factors Allow e.g. 2, 7 and 5, 7 on factor trees or in Venn diagram Do not award SC2 if clearly from wrong working Do not award SC1 if clearly from wrong working

Question			Answer	Marks	Part marks and guidance	
6	(b)		$14n - 4$ oe final answer	2	**B1** for answer $14n + k$ oe or $-4 + pn$ oe ($p \neq 0$) or for correct answer seen then spoilt	Accept unsimplified for 2 marks or B1 Condone $n = 14n - 4$ Condone use of other variable e.g. $14x - 4$ for 2 marks or B1
7	(a)		Draws ruled line $y = 2x - 3$ **AND** $x = 2$ and $y = 1$	4	**M2** for drawing ruled line $y = 2x - 3$ or **M1** for correct line but freehand or for ruled line with gradient 2 or for ruled line with positive gradient passing through (0, –3) **B2FT** for $x = 2$ and $y = 1$ or **B1FT** for one correct value	Accuracy - use overlay as a guide and line must touch circles For M2 must reach at least (0, –3) and intersection with $x + y = 3$ **FT** *their* intersection of *their* ruled or freehand line with given line Allow correct or FT for B2 and B1 If intersection is not on integer values allow reasonable estimated readings
7	(b)		Showing $2y - 4x = 7$ can be written as $y = 2x + 3.5$ oe Or Rearranges equations to the same form for comparison e.g. $2y = 4x + 6$ and $2y = 4x + 7$, or $2y - 4x = 6$ and $2y - 4x = 7$ or states that both have gradient of 2 with no error in rearrangement seen correct oe and the lines are parallel/have same gradient/ have no solutions oe	1 **1dep**	Accept other working that supports a conclusion of parallel or no solutions Dep on first mark and with no errors seen	eg $2(2x + 3) - 4x = 7$ and $4x + 6 - 4x = 7$ or better $2y = 4x + 6$ and $2y - 4x = 7$ then eliminates x or y leading e.g. $6 - 7$ oe or 'no solutions'

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Part marks and guidance</th><th></th></tr>
<tr><td>8</td><td></td><td></td><td>incorrect oe
and
shows
[30 ÷ (7 – 2) × 14 =] 84 oe</td><td>5</td><td>M4 for 30 ÷ (7 – 2) × 14 oe
or total 84
or
M3 for 30 ÷ (7 – 2) × k oe where k = 1, 2, 5, 7
or
B3 for [totals] 140 and 210
or
B2 for [total] 140 or 210
or
M1 for 30 ÷ (5 – 2) × k oe where k = 1, 2, 5, 7
or 14
or for 30 ÷ (7 – 5) × k oe where k = 1, 2, 5, 7
or 14</td><td>Accept for M4 e.g. 12 + 30 + 42
For all marks isw other totals/working, could use trials to reach acceptable totals
M3 may be implied by 12 , 30 and 42 seen

If method not shown
M1 may be implied by 20, 50 and 70 seen
If method not shown
M1 may be implied by 30, 75 and 105 seen</td></tr>
<tr><td>9</td><td></td><td></td><td>Correct two-way table constructed and completed
<table><tr><td></td><td>Autumn</td><td>Spring</td><td>Summer</td></tr><tr><td>Class A</td><td>90</td><td>120</td><td>40</td></tr><tr><td>Class B</td><td>63</td><td>126</td><td>47</td></tr></table></td><td>6</td><td>B3 for 63 and 126
or B2 for 63 or 126
or M1 for 120 × 1.05 oe or for [5% =] 6
or for $\frac{7}{10}$ × 90 oe or for $\left[\frac{3}{10}=\right]$ 27

M2 for correctly designed table with headings

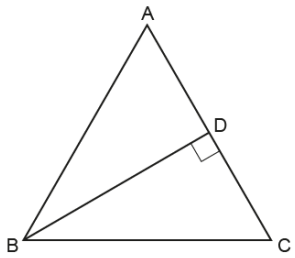
or M1 for 3 by 2 or 2 by 3 table with no headings or error[s] in headings

A1 (dep on M2 or M1 for table) for six correct or FT entries placed consistently in table</td><td>For all marks ignore additional columns or rows on table for attempts to find totals.
Ignore extra rows if not used
For M and A marks ignore calculations in cells alongside values in 3 by 2 table

Accept e.g. 3 by 2 table
Condone internal/external lines omitted in table
Accept abbreviated heading e.g. A S S
Allow table headings in any order

FT their 63 and their 126</td></tr>
</table>

Question			Answer	Marks	Part marks and guidance	
10			$6x - 25$ final answer	4	**B1** for $x - 5$ **B2FT** for $4x - 20$ or 4(*their* $(x - 5)$) correctly expanded or **B1FT** for $4(x - 5)$ or 4(*their* $(x - 5)$)	accept e.g. $1x - 5$ *Their* $x - 5$ must be two term expression with one algebraic term e.g. $5 - x$
11			Mass = 1050 or 1000	B1		For B1 accept 1050 or 1000 seen
			Volume = *their* mass ÷ 8 oe	M2	**M1** for *their* mass ÷ 7.9 oe	For M2 or M1 allow use of 1050 or 1000 or *their* mass ÷ 8, *their* mass could be in kg
			Length = $\sqrt[3]{their\ \text{volume}}$	M1	or [Volume =]$10 \times 10 \times 10 = 1000$	If cube root not shown allow implied by 5 nfww after 125 shown
			Unreasonable oe and length = 5 [cm]	A1	Dep on B1M2M1 or incorrect and shows [Volume =]1000 and 125	For A1 If 5 [cm] is shown in working it does not need to be stated in conclusion
			OR	OR		
			[Volume =] $10 \times 10 \times 10$ or 10^3	M1		Accept Volume = 1000
			Mass = $(10 \times 10 \times 10) \times 8$ oe	M2	**M1** for $(10 \times 10 \times 10) \times 7.9$ oe	
			Their mass converted to kg or 1050 [g] or 1000 [g]	B1		
			Unreasonable oe and either 8 kg with 1 kg or [1.05 kg] or 8000 g with 1050 g or 1000 g	A1	Dep on M1M2B1	For A1 values could be shown in working and do not need to be stated in conclusion See Appendix 1 for alternate method

Question			Answer	Marks	Part marks and guidance	
12						For the M marks, must be clear distinct statements involving equalities of pairs of named sides or pairs of named angles with the reason (if given) alongside the statement Throughout accept A for angle BAD and C for angle BCD.
			Proof of congruency e.g.			
			[Angle] ADB = [Angle] CDB = 90°	**M3**	**M2** for 2 correct statements with reason[s] or 3 correct statements but incorrect/no reason[s] or **M1** for 1 correct statement with reason or 2 correct but incorrect/no reasons	Do not accept ADB = 90 alone without = angle CDB, accept right angle for 90 Accept e.g. BD = BD, BD is shared, BD is in both If more than 3 statements given, mark to candidates advantage and isw incorrect/incomplete statements alongside correct work for method marks
			BD is common oe			
			AB = BC equilateral [triangle] or given oe			
			OR			
			[Angle] ABD = [Angle] CBD = 30°			
			BD is common **oe**			Accept equivalent proofs for AAS involving any two of the three angles and either BD is common or AB = BC (given) Accept [Angle] BAD= [Angle] BCD = 60 or equilateral [triangle] Do **not** accept AD = DC
			AB = BC equilateral [triangle] or given			
			[Triangle BDC is congruent to triangle BAD] (RHS) or (SAS)	**A1**	Dep on M3 and no incorrect work seen and condition must fit statements given	See Appendix 2

Question			Answer	Marks	Part marks and guidance	
13			27	3	**B2** for [p =] $3\sqrt{m}$ oe or [p =] $3\sqrt{81}$ oe or **M2** for $15 \times \sqrt{\frac{81}{25}}$ oe or **M1** for $p = k\sqrt{m}$ oe or better **M1** for p = *their* $k\sqrt{81}$ oe	oe e.g. $p = 3m^{\frac{1}{2}}$, $\frac{p}{\sqrt{m}} = 3$, $\frac{p}{3} = \sqrt{81}$ oe e.g. $p = km^{\frac{1}{2}}$, $\frac{p}{\sqrt{m}} = k$, $pk = \sqrt{m}$ *their k* must be numeric
14	(a)		32	2	**B1** for 2^5 oe or for $1024^{\left[\frac{1}{2}\right]}$ or **M1** for $\sqrt[2]{4}^5$ or better	M1 accept e.g. 4 × 4 × 2 $\left(4^{\frac{1}{2}}\right)^5$ alone is not enough for M1
	(b)		$\frac{1}{3}x^2$ or $\frac{x^2}{3}$ final answer	4	**B3** for answer $\frac{1}{3}x^k$ ($k \neq 0$) or $\frac{9}{27}x^2$ or **B2** for answer kx^2 ($k \neq 0$) or $\frac{9}{27}x^k$ or **B1** for $\frac{1}{27}$ seen or $\frac{9}{27}$ seen or x^{-6} oe seen	B1 oe e.g. x^6 seen in the denominator of a fraction
15	(a)		$(x – 3)^2 – 4$ final answer	3	**B1** for $(x – 3)^2$ **B2FT** for [+] 5 – (*their* (a))^2 correctly evaluated after $(x – \textit{their } a)^2$ shown or **M1** for [+] 5 – (*their* (a))^2 shown If 0 scored, **SC2** for final answer $(x – 3) – 4$	FT can be implied eg answer $(x – 6)^2 – 31$ gets B2FT
15	(b)		(3, –4)	2	correct or **FT** *their* part **(a)** **B1FT** for one correct coordinate	Dep on *their* part (a) in form $(x – a)^2 – b$

Question			Answer	Marks	Part marks and guidance	
16			$a = \frac{3p-2b}{1+p}$ final answer	4	**M1** for $p(3 - a) = a + 2b$ or better **M1** for expanding bracket **M1** for isolating terms in a **M1** for removing a as a factor and dividing by bracket to the answer	For 4 marks accept $a = \frac{2b-3p}{-p-1}$ as final answer If answer $a = 3p - 2b/1 + p$ check working and if seen written correctly allow 4 marks Each method step FT previous step $3p - pa = a + 2b$ if correct, implies M1M1 $3p - 2b = a + pa$ if correct Dep on at least two terms in a when fraction removed If answer incorrect then max 3 marks
17	(a)		Completes table with $0 < m \leq 2 = 5$ and $10 < t \leq 20 = 3$ **and** Draws correct bars on histogram $2 < m \leq 5$ to 4 $5 < m \leq 10$ to 3.6	4	**B2** for both frequencies correct in table or **B1** for one frequency correct in table **B2** for both bars correct or **B1** for one bar correct or **M1** for [FD's =] $12 \div 3$ oe and $18 \div 5$ oe soi	 Bar must touch correct horizontal line for the majority of the interval For B2 no gaps between bars Do not accept omission of horizontal line at 4 on first bar
17	(b)		$17.5 \leq R < 19.5$	2	**B1** for each value	

Question			Answer	Marks	Part marks and guidance	
18			$6\frac{2}{5}$ final answer with correct working	5	**B4** for $\frac{64}{10}$ oe with correct working isw cancelling **OR** **B1** for [$0.\dot{2}$ =] $\frac{2}{9}$ oe fraction **B2** for $\frac{128}{90}$ oe fraction or **M1** for [n =1.422….] and [100n =] 142.2… oe or better or [n =] 1.422…. and [10n =] 14.22… or better or shows e.g. [n = 0.422….] and [100n =] 42.2… oe or better If 0, 1 or 2 scored, instead award **SC3** for $6\frac{2}{5}$ with no or insufficient working If 0 or 1 scored, instead award **SC2** for answer $\frac{64}{10}$ oe with no or insufficient working	Correct working requires $\frac{2}{9}$ oe fraction seen and $\frac{128}{90}$ oe fraction seen or alternate convincing approach e.g. B4 for $6\frac{4}{10}$, $\frac{32}{5}$, $\frac{576}{90}$, $\frac{1152}{180}$ with correct working For B2 condone e.g. $\frac{12.8}{9}$ oe any correct approach that allows elimination of the recurring decimal Implied by e.g. 90n = 128 , 9n = 12.8 implied by [1] $\frac{38}{90}$ oe seen

Question			Answer	Marks	Part marks and guidance	
19			34π final answer with correct working	5	**M2** for $\mathrm{AB}^2 = \frac{16\times360}{40}$ or better or **M1** for $\frac{40}{360}[\pi]\mathrm{AB}^2[= 16[\pi]]$ oe or area of full circle = $\frac{360}{40}$ ×16 $[\pi]$ or 144$[\pi]$ **A1** for AB = 12 or better e.g. $\frac{\mathrm{AB}}{2}$= 6 **M1** for $\pi\left(\frac{their\ \mathrm{AB}}{2}\right)^2 \div 2$ [+ 16π] oe If 0 or 1 scored instead award **SC2** for answer 34π with no or insufficient working If 0 scored, award **SC1** for AB = 12 with no or insufficient working	Correct working requires at least M2A1 For M2 accept AB^2 = 144 Accept other variable for AB e.g. *r* , *d* After M1, A1 implies M2 *their* AB must be clearly indicated in working or on diagram . Allow AB as the answer to *their* work with the sector BAC Do not award SC2 if clearly from wrong working Do not award SC1 if clearly from wrong working
20			$\frac{x-6}{x-7}$ final answer	4	**B1** for (x – 6)(x + 6) isw **AND** **B2** for (x + 6) (x – 7) isw or **M1** for x(x + 6) – 7(x + 6) seen or x(x – 7) + 6(x – 7) seen or for (x + a) (x + b) where a + b = –1 or ab = – 42 isw	If answer x – 6/x – 7 check working and if seen written correctly allow 4 marks
21	(a)		The two events are independent or probability of yellow stays the same or there are 10 sweets in the bag for the 2nd pick OR Puts the first sweet back oe e.g. the sweets are replaced	1		Do not accept incorrect statements e.g. You do not pick a yellow sweet first and if you do you put it back in the bag

Question			Answer	Marks	Part marks and guidance	
21	(b)		$\frac{28}{90}$ oe with correct working	5		Correct working requires evidence of at least M4 isw cancelling/conversion to dec/% after $\frac{28}{90}$ leading to answer For method marks throughout e.g. RY = $\frac{4}{10} \times \frac{2}{9}$ ignore label RY
					M4 for $\frac{4}{10} \times \frac{2}{9} + \frac{2}{10} \times \frac{4}{9} + \frac{4}{10} \times \frac{3}{9}$ oe	M4 accept $\frac{8}{90} + \frac{8}{90} + \frac{12}{90}$ or $\frac{4}{45} + \frac{4}{45} + \frac{6}{45}$ oe
					or **M3** for the addition of two of the above products oe (no extras) or all three products oe shown with no more than one extra product oe	M3 accept e.g. $\frac{8}{90}$ + $\frac{12}{90}$ or $\frac{4}{45}$ + $\frac{6}{45}$ oe
					or **M2** for one or more of the above products (standalone or added to extras)	M2 accept e.g. $\frac{8}{90}$ or $\frac{4}{45}$ or $\frac{12}{90}$ or $\frac{6}{45}$ oe nfww M3 and M2 spoiled if part of a larger product with other probabilities
					or **M1** for only GY, YG and GG identified	M1 may be seen in a list or indicated on a tree
					or for $\frac{4}{10}$ and $\frac{n}{9}$ seen or for $\frac{2}{10}$ and $\frac{n}{9}$ seen	Where $0 < n < 9$
					or for $\frac{k}{10} \times \frac{p}{9}$ oe seen	Where $0 < k < 10$ and $0 < p < 9$ M1 implied by $\frac{m}{90}$ seen , $1 < m < 90$
					If **0** or 1 scored, instead award **SC2** for answer $\frac{28}{90}$ oe with no or insufficient working	

Question			Answer	Marks	Part marks and guidance	
22			21 with correct working	6		Correct working requires evidence of at least M2A1B1
					M2 for $\sqrt{7^2 + 5^2 - 2 \times 7 \times 5 \times 0.8}$ oe	Allow M2 for square root soi later after correct substitution seen For M2, accept e.g. $\sqrt{49 + 25 - 70 \times 0.8}$
					or **M1** for $7^2 + 5^2 - 2 \times 7 \times 5 \times 0.8$ oe	For M1 accept 49 + 25 – 70 × 0.8
					A1 for $\sqrt{18}$ or $3\sqrt{2}$	After M1 and $\sqrt{18}$ allow M2A1
					AND	
					B1 for sin 45 = $\frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$	For **B1** sin 45 must be used within the method e.g. not just seen as sin 45 = $\frac{\sqrt{2}}{2}$
					M1 for $\frac{1}{2} \times 14 \times their\text{BD} \times \sin 45$ oe	*Their* BD must be clearly indicated in working or on diagram . Allow BD as the answer to *their* work with triangle ABD
					If 0 or 1 scored instead award **SC2** for answer 21 with no or insufficient working If 0 scored instead award **SC1** for BD =$\sqrt{18}$ oe	See Appendix 3

Appendix 1 Question 11

A further possibility is to show that the density of the 10 cm cube is different to 7.9 g/cm^3

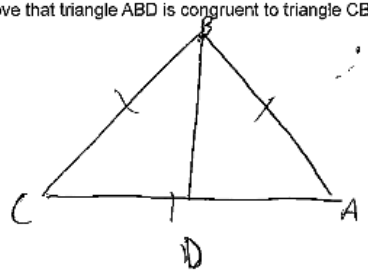
11			Mass = 1050 or 1000 or 0.0079 or 0.008	**B1**		For B1 accept 1050 or 1000 or 0.0079 or 0.008 seen
			[Volume =]10 × 10 × 10 or 10^3	**M1**		Accept Volume = 1000
			1000 ÷ (10 × 10 × 10) oe or 1[kg] ÷ (10 × 10 × 10) oe	**M2**	**M1** for 1050 ÷ (10 × 10 × 10) oe or 1.05[kg] ÷ (10 × 10 × 10) oe	
			Unreasonable oe and [density =] 1 oe or [density =]0.001 and 0.0079 or 0.008	**A1**	Dep on M1M2B1	For A1 , [density =] 1 could be shown in working and does not need to be stated in conclusion

Appendix 2 Question 12

For the M marks, statements may be embedded within longer text but they must be clear distinct statements involving equalities of pairs of named sides or pairs of named angles with (if given) the reason alongside the statement. Do not accept annotation on the diagram as implying method. This question is also assessing clear communication of the mathematics.

Example A

Prove that triangle ABD is congruent to triangle CBD.



• All sides equal

• Line BD is perpendicular to AC, meaning it is the mid point

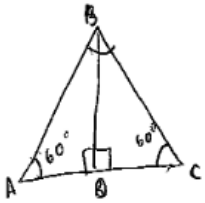
• Splitting a equilateral triangle creates 2 right angle triangles and because ~~they~~ it is equilateral ~~All sides~~ it should be the same on both sides. RHS, Right angle they both have, hypotenuse is the same and the side is the same.

Yes, it is congruent as said by RHS. This ~~do~~ means they are congruent as they all have a right angle, hypotenuse is the same and side is the same as ~~it~~ it was equilateral [4]

Turn over

Within the text there is no specific named equality of pairs of sides or pairs of angles stated. It is done in more general terms and this is not acceptable so M0

Example B



Equilateral = all angles are the same

$\angle ABC = \angle BAC = \angle BCA$

Each angle $= \frac{180}{3} = 60$

ΔABD [$\angle ABD = 60/2 = 30°$ 120
so $\angle BAD = 180 - (30 + 90)$
$= 60°$

ΔCBD [$\angle CBD = 60/3 = 30°$
so $\angle BCD = 180 - (30 + 90)$
$= 60°$ //

→ Both are right angled triangles that shares line BD

→ Both share the same angles of 90°, 30°, 60°

→ They form an equilateral triangle which has angles of the same angles (60, 60, 60) so both triangles must be equal [4]

There are no clear distinct equality statements of pairs of sides or pairs of angles with reasons.
The statement BD is shared appears in the text and earns M1

Example C

∠DBC and ∠DBA both equal 30° as angle ∠BAD and ∠DCB both are 60° so as triangle ABC is equilateral so with the perpendicular line creating 90° angles in order to get the full 180° they must be 30° so therefore ABD is congruent to CBD [4]

Within the text there are two clear distinct statement of equality of angles DBC = DBA = 30 and BAD = DCB = 60 with reasons. There is no statement about equalities of pairs of sides
Award M2

Example D

BDA = BDC

So BDA is 90°.

BD is the same in both triangles.

SAS

AC runs along both triangles.

So AD = AC

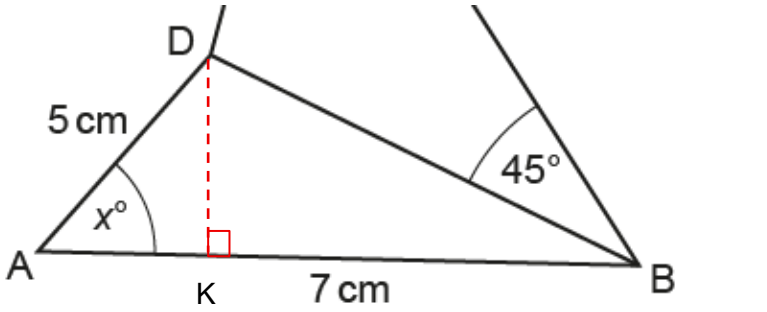
So triangles are SAS.

BDA = BDC stated and 90 is given for BDA next to the statement BOD M1
BD is shared earns M1

Award M2

Appendix 3 Question 22

Page 7 point 12 in general guidance of mark scheme - allow other equivalent correct methods e.g.



Using right-angled trig and perpendicular from D to AB (to K) to find DK and BK = 7 – AK.
Then Pythagoras to find BD

M2 for BD = $\sqrt{(7-5\times0.8)^2+(5\times0.6)^2}$ oe

or **M1** for $BD^2 = (7-5\times0.8)^2+(5\times0.6)^2$ oe

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