2023 national curriculum tests

Key stage 2

Mathematics test mark schemes

Paper 1: arithmetic
Paper 2: reasoning
Paper 3: reasoning

Standards & Testing Agency

Contents

1. Introduction

The Standards and Testing Agency (STA) is responsible for the development and delivery of statutory tests and assessments. STA is an executive agency of the Department for Education.

The 2023 tests assess the national curriculum. This test has been developed to meet the specification set out in the test framework[1] for mathematics at key stage 2.

A new test and new mark schemes will be produced each year.

Key stage 2 tests are marked by external markers, who receive training to ensure the mark schemes are applied consistently and fairly. The mark schemes are provided to show teachers how the tests are marked. The pupil examples are based on responses gathered from the test trialling process.

Scaled score conversion tables are not included in this document. Conversion tables will be produced as part of the standards maintenance process. Scaled score conversion tables[2] for the 2023 tests will be published in July 2023. The standards confirmation meeting will take place in June 2023.

2. Structure of the test

The key stage 2 mathematics test comprises:

- Paper 1: arithmetic (40 marks)
- Paper 2: reasoning (35 marks)
- Paper 3: reasoning (35 marks)

3. Content domain coverage

The 2023 test meets the specification in the test framework. Table 1 sets out the areas of the content domain that are assessed in Papers 1, 2 and 3.

The references are taken from the test framework. A question assessing 4C7, for example, sets out to 'multiply two-digit and three-digit numbers by a one-digit number using a formal written layout' and is taken from the year 4 programme of study.

1 www.gov.uk/government/publications/key-stage-2-mathematics-test-framework
2 www.gov.uk/guidance/scaled-scores-at-key-stage-2

Table 1: Content domain coverage of the 2023 key stage 2 mathematics test

Where 2 or more references are given, the primary reference is given first.

Paper 1: arithmetic	
Qu.	**Content domain reference**
1	3N2b
2	4C2
3	4C7
4	4C2
5	4C6b
6	5C6b
7	5F8/5F10
8	4C2
9	4C6b
10	3C7
11	4C6b
12	3C1
13	4C6b
14	6F5a
15	5C7b
16	5F4
17	6F9a
18	5F4
19	5F8/5F10
20	6C7a
21	6F5b
22	4F4
23	6C9
24	6F9b
25	6C7b
26	5C7b
27	6R2
28	6F5b
29	6C7a
30	6R2
31	6F9b
32	3F4/3C4
33	6C7b
34	6F4
35	6R2
36	5F5

Paper 2: reasoning	
Qu.	**Content domain reference**
1	3M4c/4N3b
2	5N5
3	4P3a/4P3b
4	3S2
5	6R4/6A5
6	4M9/3M9a
7	4N5/4N1/6A3
8	4N4b
9	6G5
10	4C3/3C8
11a	5N1/4N2b
11b	5N1/4N2b
12	4G2b
13	5F5/4F10a
14	5G4c/5G4a
15	5F3/6F3
16	5C8c/3M4f
17	5C8b/5C7b
18	5F4/6F2
19	5C8a/5C6a
20	6C7a/6C8
21	5M6
22	4F2/5F4
23	6R2/6C8
24	6S1/6R2
25a	5C8a/5C6a
25b	5M9c/5M5/5F10
26a	6A2/6C9
26b	6A2/6C9

Paper 3: reasoning	
Qu.	**Content domain reference**
1	3N3
2	5N2/5N3a
3	6P2
4	5N1/6A3
5	4F7
6	6N3
7	3F1c/3F10
8	5G2b
9	3C6
10	5C5d
11	4C4
12	6G3b
13	6C8/6C9
14a	5F11/5F12
14b	5F11/5F12
15a	3M4d/3M4f/4M4b
15b	3M4f
16	6C7b/6C8/6C6
17	6F4/6F11
18a	5S1/4S1
18b	6S3/6C8
19	5M9c/5M9a
20	6A1/4M7a
21	6R2
22	6A3/6G2a
23	6F6/6F11

4. Explanation of the mark schemes

The marking information for each question is set out in the form of tables (sections 7, 8 and 9).

The purpose of the mark scheme is to define the acceptable answers for each question within the test. Answers other than those listed may be acceptable if they meet the marking criteria.

The '**Qu.**' column on the left-hand side of each table provides a quick reference to the question number and part.

The '**Requirement**' column may include two types of information:

- a statement of the requirements for the award of each mark, with an indication of whether credit can be given for an appropriate method
- examples of some different types of correct answer

The '**Mark**' column indicates the total number of marks available for each question part.

The '**Additional guidance**' column indicates alternative acceptable answers and guidance, such as the range of acceptable answers, where necessary. This column may also provide details of specific types of answer which are unacceptable. For most questions, there will be unacceptable answers that are not listed.

5. General marking guidance

5.1 Applying the mark schemes

To ensure consistency of marking, the most frequent procedural queries are listed in section 5.2 along with the action the marker will take. This is followed by further guidance in section 6 relating to marking questions involving money, time and other measures. Unless otherwise specified in the mark scheme, markers will apply these guidelines in all cases.

Recording marks awarded

Pupils' test papers are scanned so that marking can be conducted on screen by trained markers.

For each question, markers record the award of 3, 2, 1 or 0 marks as appropriate, according to the mark scheme criteria. There is provision in the software to record questions not attempted. The software aggregates marks automatically.

5.2 General marking principles

Table 2: General marking principles for all papers

1. The answer does not closely match any of the examples given in the mark scheme.	Markers will use their judgement to decide whether the answer corresponds with details in the 'Requirement' column of the mark scheme. Reference will also be made to the 'Additional guidance' column.
2. The answer is provided in a non-standard way.	Pupils may provide evidence in any form as long as its meaning can be understood. Diagrams, symbols or words are acceptable for explanations or for presenting an answer.
3. The correct answer or working has been crossed out or erased and not replaced.	The mark(s) will not be awarded for crossed-out or erased answers or working.
4. More than one answer is given.	If all answers given are correct (or a range of answers is given, all of which are correct), the mark(s) will be awarded unless the mark scheme states otherwise. If both correct and incorrect answers are given, the mark(s) will not be awarded unless the mark scheme states otherwise.
5. No answer is given in the expected place, but the correct answer is given elsewhere.	Where a pupil has unambiguously indicated the correct answer, the mark(s) will be awarded. In particular, where a word or number is expected, a pupil may meet the requirement by annotating a graph or labelling a diagram elsewhere in the question.
6. The answer is correct, but the wrong working is shown.	A correct final answer will be awarded the mark(s).
7. The pupil has used alternative notation for a decimal point in a number.	No alternative notation is accepted as representing a decimal point in a number, for example, a comma. Refer to section 6 for guidance on marking specific types of question.
8. The pupil has used a symbol as a thousands separator.	If the pupil has used a comma as a thousands separator (positioned either correctly or incorrectly) and the digits are in the correct order, then the mark(s) will be awarded. If any other symbol, for example, a decimal point or apostrophe, is used, the mark(s) will not be awarded, although method marks may still be available.

9. The answer in the answer box is wrong due to a transcription error.	A transcription error occurs when a pupil miscopies their answer from the end of their working into the answer box. Each part (integer, numerator, denominator) of a mixed number is considered separately when applying transcription error rules. Where appropriate, detailed guidance will be given in the mark scheme. For questions with no guidance, marks will only be awarded for a transcription error if the wrong answer is due to: • transposed digits in a number (for example, 243 is written as 324) **OR** • one digit changed in a number of 4 or more digits (for example, 2,345 is written as 2,845) The mark(s) will not be awarded for any other transcription error including: • a decimal point positioned incorrectly (for example, 12.34 is written as 1.234 or 1234) • a change by a power of 10 (for example, 200 is written as 20 or 2,000) • a digit added or removed (for example, 123,456 written as 1233,456 or 12,456) • a negative sign added or removed
10. The answer is numerically or algebraically equivalent to the answer in the mark scheme.	Answers should be given as single values in their simplest form unless the mark scheme states otherwise, for example, for $\square = 536 - 30$, the answer $500 + 6$ will not be awarded the mark. For integer answers, for example, 20, the answer $\frac{20}{1}$ will be awarded the mark; $\frac{80}{4}$ will not be awarded the mark. For decimal answers that include recurring digit(s), there must be an unambiguous indication of the recurring digit(s). For example, for $\frac{1}{6}$, $0.1\dot{6}$ or $0.1\overline{6}$ will be awarded the mark and for $\frac{1}{7}$, $0.\dot{1}42857\dot{}$ or $0.\overline{142857}$ will be awarded the mark. For fraction answers that can be expressed as a mixed number, the fraction paired with the integer must be a proper fraction, for example, $1\frac{6}{4}$ will not be awarded the mark although method marks may still be available. Where alternative responses are acceptable, this will be indicated in the 'Additional guidance' column.

Table 3: General marking principles for paper 1 only (arithmetic)

11. The answer in the answer box is wrong due to a misread of numbers given in the question.	Misreads are not allowed in Paper 1; the mark(s) will not be awarded.
12. The pupil has not recorded their working beneath the given long multiplication or long division.	If a pupil carries out their working somewhere on the page other than beneath the given question as expected, then the pupil must start by rewriting the original question in order for it to be considered as a formal method. Please note that the operation sign does not need to be given for long multiplication, provided the pupil's working shows the intention to multiply.
13. The answer to the long division question expresses a remainder.	If a pupil reaches an integer answer using a formal method with no more than one arithmetic error, for example, 25, then the mark(s) will be awarded for 25 r0 or 25.0, but the mark(s) will not be awarded for an answer of 250 For answers with a remainder, the remainder must be expressed correctly. If a pupil shows a remainder that is the same size as the divisor or larger, for example, a remainder of 28 or 29 when dividing by 28, the mark(s) will not be awarded because the method is incomplete. If a pupil reaches a non-integer answer using a formal method with no more than one arithmetic error, for example, when dividing by 28, the pupil reaches the answer 6 r14, then the mark(s) will be awarded for $6\frac{14}{28}$ or 6.5, but the mark(s) will not be awarded for 6 r$\frac{14}{28}$ or 6.14 or 614
14. The long division method involves subtracting chunks of different sizes.	If a pupil's formal method involves subtracting chunks, it is not necessary to show a separate addition of the chunks. If the answer is not the correct total for their chunks, then that is treated as one arithmetic error. A method is considered as chunking when the size of the chunks are shown alongside the algorithm. It should be noted that this method will only be accepted if all chunks are of different sizes.

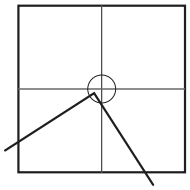
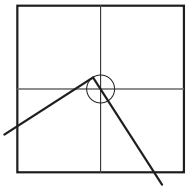
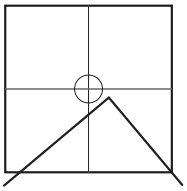
Table 4: General marking principles for papers 2 and 3 only (reasoning)

15. More than one method is given.	If a pupil gives more than one method, then the intended method is taken as the one which leads to the answer in the answer box or an identified answer elsewhere. If no answer is given, then all methods must be appropriate for the method mark(s) to be awarded.
16. There appears to be a misread of numbers or information given in the question that affects the pupil's working and/or explanation.	This occurs when a pupil misreads a number given in the question and consistently uses a different number that does not alter the original intention or difficulty of the question. For example, if 243 is misread and written as 248, both numbers may be regarded as comparable in difficulty. However, if 243 is misread and written as 245 or 240, the misread number may be regarded as making the question easier. The misread of a number may affect the award of marks. Any misread number must be seen, not implied. Where appropriate, detailed guidance will be given in the mark scheme. If no guidance is given, markers will examine each case to decide whether the mark(s) will be awarded. The mark(s) will not be awarded if: • it is a **ONE-mark** question • there is more than one misread number in a question • the mathematics is simplified • it is an 'explain' question • it is a misread of other information (not numbers) • the misread number is the same as any other number in the question For **TWO-mark** questions that have a method mark, one mark will be awarded if an appropriate method is correctly followed through with the misread number to give the correct follow-through answer, provided the mathematics has not been simplified. For **THREE-mark** questions, refer to the additional guidance.
17. A misread or an arithmetic error results in an answer with multiple decimal places.	In some instances, a misread or an arithmetic error in a method leads to an answer with one or more decimal places. In such cases, the method mark(s) will be awarded for an answer that is correctly truncated or rounded provided the method is appropriate and the additional guidance does not specify otherwise. For example, 1.2345 is truncated to 1.2

18. The pupil has reversed values within a calculation involving subtraction or division.	When values within the calculation are reversed, the mark(s) will only be awarded when the answer corresponds to the correct calculation. For example, if the correct calculation is 12 ÷ 4, the method mark(s) may be awarded for 4 ÷ 12 = 3, but not for an answer other than 3 Reversed values within a calculation are not acceptable in 'explain' questions.
19. The pupil omits an operation sign within their working.	If the correct sign of +, − , ×, or ÷ for an arithmetic operation is missing, then the mark(s) will only be awarded if the working shown by the pupil is clear enough to indicate that the required operation has been performed. This applies even if the results of the required operation are incorrect. Where carrying or decomposition figures are seen, this is evidence of intention. For example, where the following is seen in working, the layout of the response implies addition or subtraction: 456 123 ——— • if the answer is larger than the greater of the given values, for example, 679, then addition is implied • if the answer is less than the first given value, for example, 323, then subtraction is implied

20. The pupil has used 'an appropriate method'.	For some questions, the mark scheme allows the award of the method mark(s) for 'evidence of an appropriate method', even if the answer is missing or incorrect. Refer to the 'Additional guidance' column where appropriate. For the award of the method mark(s) for an appropriate method, there must be evidence of **all** the steps of the appropriate method (any method that would lead to the correct answer if there were no arithmetic errors and no additional steps). This means that, for every step, either: • the appropriate calculation to be carried out must be shown **OR** • if the calculation has not been written down, the correct answer or correct follow-through answer must be shown Where the calculation shown would lead to a correct final answer, even if the processed numbers do not appear to be taken from the question, a method mark may be awarded unless the mark scheme specifies otherwise.
21. The pupil has used a trial and improvement method.	'Trial and improvement' is regarded as an acceptable method, unless the mark scheme states otherwise. For a 'trial and improvement' method to be awarded the method mark(s): • there must be at least 3 trials, carried out correctly, which all reduce the range in which the answer is known to lie • there can be additional trials, which are correctly or incorrectly carried out, and which may not reduce the range in which the answer is known to lie • a final answer is not needed, unless the mark scheme states otherwise

22. The answer in the answer box is wrong but the correct answer is reached in the working.	Extra working occurs when a pupil writes the correct answer in their working, and then continues to process the information further. When the answer in the answer box is wrong and does not match the answer reached in the working, it is impossible to know why the pupil has written a different answer and it is assumed that extra working has occurred. GMP 9 on transcription errors still applies. If the extra working does not contradict the pupil's appropriate method, the method mark(s) will be awarded. If the extra working contradicts the pupil's appropriate method, the method mark(s) will not be awarded.
23. The pupil miscopies a value from one part of their method into the next part.	There will be instances when a pupil reaches a value in their working, then restarts from a different value. The mark(s) will not be awarded if: • it is a **ONE-mark** question • there is more than one miscopy in the working • the miscopy does not follow transcription error rules (see GMP 9) The method mark(s) will only be awarded if an appropriate method is correctly shown using the miscopied number (which must follow transcription error rules).
24. The correct answer is embedded in the working.	An embedded answer occurs when a pupil shows the correct answer within their working but then selects the wrong answer from their working as their final answer or leaves the answer box blank. For example, if a pupil shows $2.5 \times 6 = 3 \times 5$ in the last line of their working and writes 5 in the answer box, whereas the correct answer is 3, then this will affect the award of marks. Where appropriate, detailed guidance will be given in the mark scheme. If no guidance is given, markers will examine each case to decide whether the mark(s) will be awarded. For **ONE-mark** questions, the mark will not be awarded. For **TWO-mark** questions that have a method mark, one mark will be awarded, provided the pupil does not give redundant extra working that contradicts work already done or which adds to their appropriate method. For **THREE-mark** questions, refer to the additional guidance.

25. The phrase 'sight of' is used in the mark scheme.	For some questions, the mark scheme allows the mark(s) to be awarded for sight of a particular number or numbers within a method. Such numbers are the correct answers to partial steps within a method.
26. The answer correctly follows through from earlier incorrect work.	'Follow-through' marks for an answer will only be awarded when specifically stated in the mark scheme.
27. The pupil has drawn lines which do not meet at the correct point.	Where the mark scheme states that 'slight inaccuracies in drawing' should be accepted, this means that the mark(s) will be awarded for responses marked within or on a circle of radius 2mm with its centre at the correct point.  within the circle - accepted  on the circle - accepted  outside the circle - not accepted

6. Marking specific types of question: summary of additional guidance

6.1 Answers involving money

	Accept	Do not accept
Where the £ sign is given, for example: £3.20, £7 £	£3.20 £7 £7.00 Any unambiguous indication of the correct amount, for example: £3.20p £3 20 pence £3 20 £3-20 £3:20 £3;20	Incorrect placement of pounds or pence, for example: £320 £320p Incorrect placement of decimal point or incorrect use or omission of 0 or use of comma as a decimal point, for example: £3.2 £3 200 £32 0 £3-2-0 £3,20
Where the p sign is given, for example: 40p p	40p Any unambiguous indication of the correct amount, for example: £0.40p 0 40p £0-40p 0:40p £0;40p	Incorrect or ambiguous use of pounds or pence or use of comma as a decimal point, for example: 0.40p £40p £0,40p

	Accept	Do not accept
Where a unit is not given, for example: £3.20, 40p ☐	£3.20 40p 320p £0.40 Any unambiguous indication of the correct amount, for example: £3.20p £0.40 pence £3 20 pence £0 40p £3 20 £0-40 £3-20 £0:40 £3:20 £0;40 £3;20 £.40 3.20 0.40 320 40 3 pounds 20	Incorrect or ambiguous use of pounds or pence or use of comma as a decimal point, for example: £320 £40 £320p £40p £3.2 0.4 3.20p 0.40p £3,20 0,40 £0,40p

6.2 Answers involving time

	Accept	Do not accept
A time interval, for example: 2 hours 30 minutes	2 hours 30 minutes Any unambiguous, correct indication, for example: (0)2 h 30 150 minutes (0)2 h 30 min 150 (0)2 30 2.5 hours (0)2-30 $2\frac{1}{2}$ hours Digital electronic time, for example: (0)2:30 (0)2;30	Incorrect or ambiguous time interval or use of comma as a decimal point, for example: 2.30 230 2.3 2.30 min 2.3 hours 2,5 hours 2.3 h 2,30 2 h 3 1 h 90 min

	Accept	Do not accept
A specific time, for example: 8:40 am, 17:20	(0)8:40 am (0)8:40 twenty to nine Any unambiguous, correct indication, for example: (0)8.40 (0)8;40 0840 (0)8 40 (0)8-40 Unambiguous change to 12 or 24-hour clock, for example: 17:20 as 5:20 pm or 17:20 pm	Incorrect time, for example: 8.4 am 8.40 pm Incorrect placement of separators, spaces, etc. or incorrect use or omission of 0 or use of a comma as a decimal point, for example: 840 8:4:0 8.4 084 8,40

6.3 Answers involving measures

	Accept	Do not accept
Where units are given, for example: 8.6 kg kg m l	8.6 kg Any unambiguous indication of the correct measurement, for example: 8.60 kg 8.6000 kg 8 kg 600 g	Incorrect or ambiguous use of units or use of comma as a decimal point, for example: 8600 kg 8 kg 600 8,60 kg 8,6000 kg

If a pupil gives an answer with a unit different from the unit in the answer box, then their answer must be equivalent to the correct answer provided, unless otherwise indicated in the mark scheme.

If a pupil leaves the answer box empty but writes the answer elsewhere on the page without any units, then that answer is assumed to have the units given in the answer box, subject to the conditions listed above.

7. Mark schemes for Paper 1: arithmetic

Qu.	Requirement	Mark	Additional guidance
1	697	**1m**	
2	6,594	**1m**	
3	2,808	**1m**	
4	8,413	**1m**	
5	240	**1m**	
6	960	**1m**	
7	14.753	**1m**	
8	2,754	**1m**	
9	50	**1m**	
10	520	**1m**	
11	400	**1m**	
12	6	**1m**	
13	900	**1m**	
14	$\frac{10}{63}$	**1m**	Accept equivalent fractions or the **exact** decimal equivalent, e.g. $0.\overline{158730}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
15	83	**1m**	
16	$\frac{13}{16}$	**1m**	Accept equivalent fractions or the **exact** decimal equivalent, e.g. 0.8125 **Do not** accept rounded or truncated decimals.
17	0.03	**1m**	

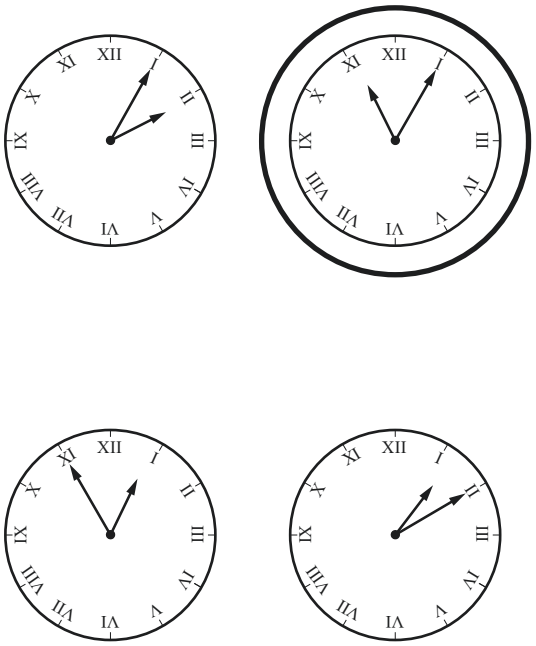
Qu.	Requirement	Mark	Additional guidance
18	$\frac{17}{18}$	**1m**	Accept equivalent fractions or the **exact** decimal equivalent, e.g. $0.94\dot{}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
19	13.375	**1m**	
20	Award **TWO** marks for the correct answer of 37,592 If the answer is incorrect, award **ONE** mark for the formal method of long multiplication with no more than **ONE** arithmetic error, e.g. • 508 × 74 = 2032 + 35560 = 37582 *(error)* **OR** • 508 × 74 = 2032 + 35060 = 37092 *(error)*	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. **Do not** award any marks if the error is in the place value, e.g. the omission of the zero when multiplying by tens. 508 × 74 = 2032 + 3556 = 5588 *(place value error)*
21	$\frac{1}{24}$	**1m**	Accept equivalent fractions or the **exact** decimal equivalent, e.g. $0.041\dot{6}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
22	2	**1m**	Accept equivalent fractions. **Do not** accept answers such as $1\frac{7}{7}$
23	78	**1m**	
24	38.4	**1m**	

Qu.	Requirement	Mark	Additional guidance
25	Award **TWO** marks for the correct answer of 13 If the answer is incorrect, award **ONE** mark for the formal methods of division with no more than **ONE** arithmetic error, i.e. • long division algorithm, e.g. 15 r 25 47 | 611 – 470 260 *(error)* – 235 25 **OR** 18 *(error)* 47 | 611 – 470 10 × 47 141 – 141 3 × 47 0 • short division algorithm, e.g. 1 5 r 6 *(error)* 47 | 61^{24}1	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. Short division methods **must** be supported by evidence of appropriate carrying figures to indicate the use of a division algorithm, and be a complete method. The carrying figure **must** be less than the divisor.
26	1,149 r1 **OR** 1,149.2 **OR** $1{,}149\frac{1}{5}$	**1m**	Accept equivalent mixed numbers. **Do not** accept 1,149 r$\frac{1}{5}$
27	364	**1m**	**Do not** accept 364%
28	$\frac{1}{18}$	**1m**	Accept equivalent fractions or an exact decimal equivalent, e.g. $0.0\dot{5}$ **Do not** accept rounded or truncated decimals.

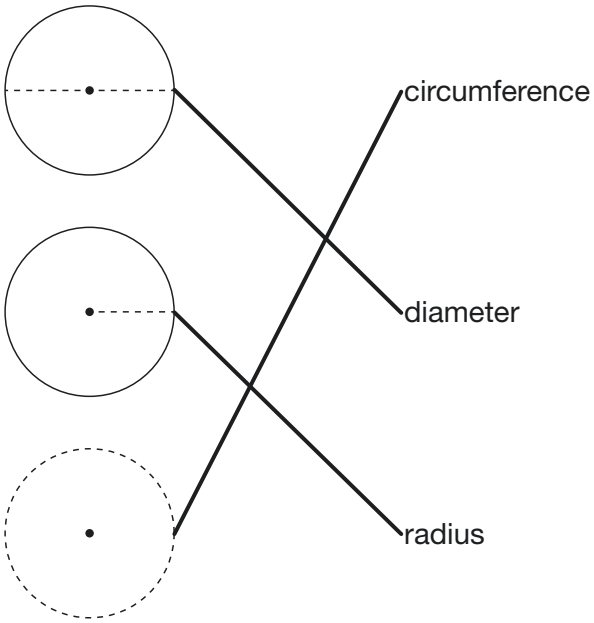
Qu.	Requirement	Mark	Additional guidance
29	Award **TWO** marks for the correct answer of 224,761 If the answer is incorrect, award **ONE** mark for the formal method of long multiplication with no more than **ONE** arithmetic error, e.g. • 5227 × 43 = 15681 + 209080 = 214761 *(error)* **OR** • 5227 × 43 = 10681 *(error)* + 209080 = 219761	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. **Do not** award any marks if the error is in the place value, e.g. the omission of the zero when multiplying by tens: 5227 × 43 = 15681 + 20908 *(place value error)* = 36589
30	171	**1m**	**Do not** accept 171%
31	14.8	**1m**	
32	$\frac{3}{10}$	**1m**	Accept equivalent fractions or an **exact** decimal equivalent, e.g. 0.3 **Do not** accept 30%

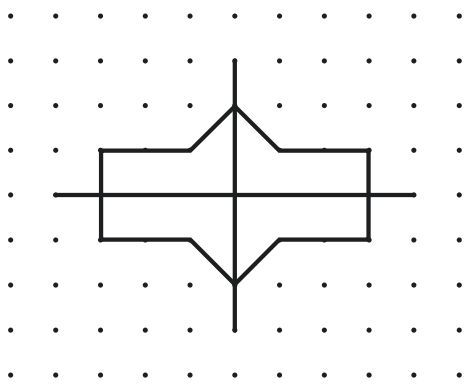
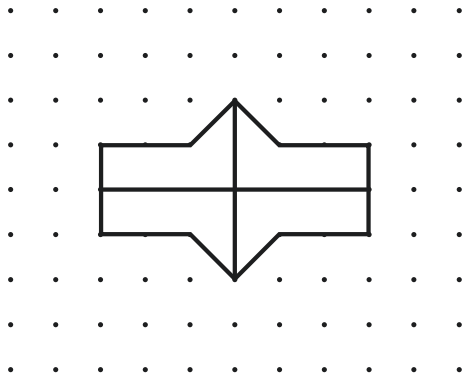
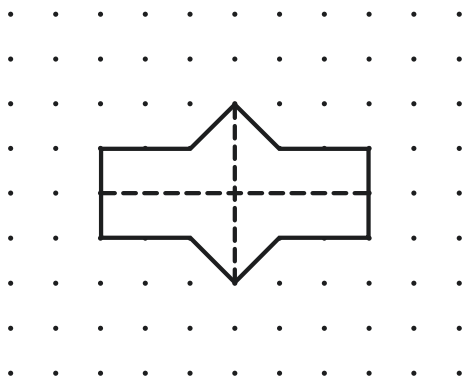
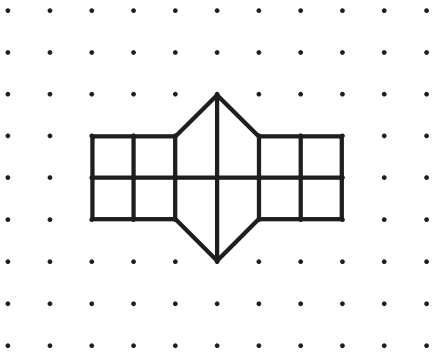
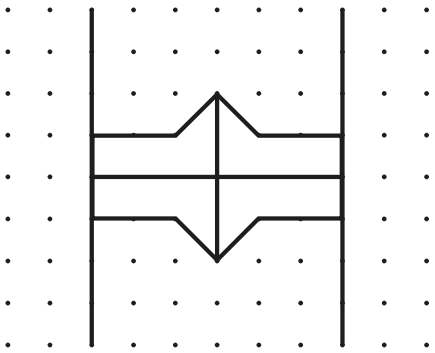
Qu.	Requirement	Mark	Additional guidance
33	Award **TWO** marks for the correct answer of 172 If the answer is incorrect, award **ONE** mark for the formal methods of division with no more than **ONE** arithmetic error, i.e. • long division algorithm, e.g. 172 r 10 26 | 4472 – 2600 1872 – 1820 52 – 42 *(error)* 10 **OR** 162 *(error)* 26 | 4472 – 2600 100 × 26 1872 – 1820 70 × 26 52 52 2 × 26 • short division algorithm, e.g. 1 7 3 *(error)* 26 | 44 18 7 5 2	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. Short division methods **must** be supported by evidence of appropriate carrying figures to indicate the use of a division algorithm, and be a complete method. The carrying figures **must** be less than the divisor.
34	$2\frac{1}{12}$ **OR** $\frac{25}{12}$	**1m**	Accept equivalent mixed numbers, fractions or an **exact** decimal equivalent, e.g. $2.08\dot{3}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
35	285	**1m**	**Do not** accept 285%
36	600	**1m**	**Do not** accept $\frac{1800}{3}$

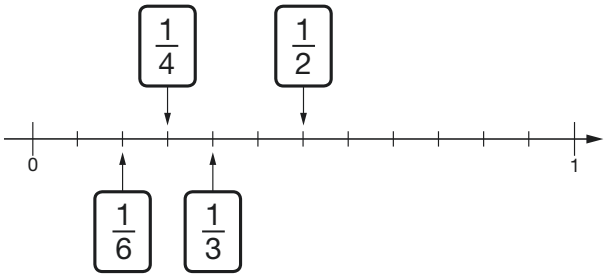
8. Mark schemes for Paper 2: reasoning

Qu.	Requirement	Mark	Additional guidance
1	Award **ONE** mark for the correct clock circled, as shown: 	1m	Accept alternative unambiguous positive indication of the correct answer.
2	Award **ONE** mark for the correct order as shown: **–10°C** **–4°C** **1°C** **3°C** **6°C** **Lowest**	1m	Misreads and transcription errors are **not** allowed. Accept temperatures in reverse order **AND** the label lowest changed to follow suit.
3	(**6** , **2**)	1m	
4	7	1m	

Qu.	Requirement	Mark	Additional guidance
5	Award **ONE** mark for a correct explanation that demonstrates why Stefan's total number of wheels is incorrect, e.g. Uses 5 cars and 3 motorbikes to show that the total number of wheels cannot be 28 because there are 26 wheels, e.g. • 5 × 4 = 20 3 × 2 = 6 20 + 6 = 26 (not 28) • 20 and 6 - he is wrong because you need an extra pair of wheels. • because on 5 cars there are 20 wheels but on 3 motorbikes there are 6 wheels so he would need another motorbike to have 28 wheels. • 26 (not 28) **OR** Uses 3 motorbikes and the total of 28 wheels to show that the number of cars cannot be 5, e.g. • 3 motorbikes would have 6 wheels which leaves 22 wheels for the cars. But 22 divided by 4 is five and a half cars, so that can't be possible. **OR** Uses 5 cars and the total number of 28 wheels to show that the number of motorbikes cannot be 3, e.g. • There are 5 cars with 20 wheels. And there must be 4 motorbikes for him to have 28 wheels, so Stefan is wrong. **OR** Demonstrates that Stefan would have either two extra wheels or an extra motorbike, e.g. • He is wrong because he has counted 2 more wheels.	1m	**Do not** accept vague or incomplete explanations, e.g. • 20 and 6 • because 3 motorbikes is 6 wheels. • he is two off the answer. **Do not** accept responses that restate the question e.g. 3 motorbikes and 5 cars does not equal 28 **Do not** accept explanations which include incorrect mathematics or incorrect information relevant to the explanation.

Qu.	Requirement	Mark	Additional guidance
6	£3.61	**1m**	Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
7	Award **ONE** mark for the correct order, as shown: 75 50 25 **0** **–25**	**1m**	**Do not** accept 25–
8	24,400	**1m**	**Do not** accept 400
9	Award **ONE** mark for all three diagrams matched correctly, as shown: 	**1m**	Lines need not touch the diagrams and names, provided the intention is clear. **Do not** accept a diagram matched to more than one name.
10	216	**1m**	
11a	20,039	**1m**	
11b	18,939	**1m**	

Qu.	Requirement	Mark	Additional guidance
12	Both lines of symmetry drawn correctly, as shown:  **OR**  **OR** 	**1m**	Accept slight inaccuracies in drawing lines provided the intention is clear. Within the shape, both lines of symmetry must be within 2mm of the correct end points for the award of a mark. (See page 13 for guidance.) **Do not** award the mark if additional lines are given, e.g.  **OR** 
13	110	**1m**	
14	Award **ONE** mark for an answer in the range of 128 to 132 inclusive.	**1m**	

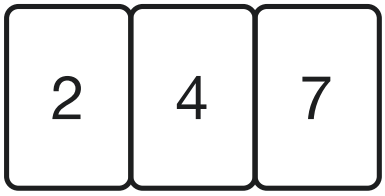
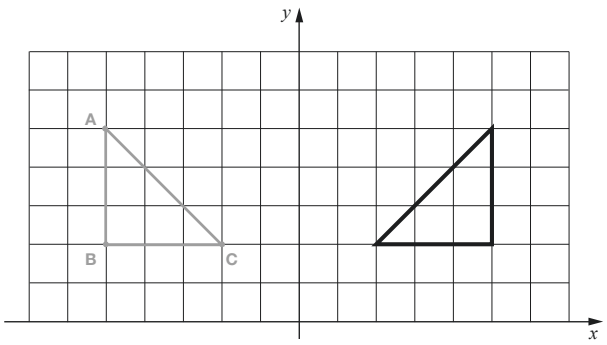
Qu.	Requirement	Mark	Additional guidance
15	All four fractions correctly placed on the number line, as shown:  	**1m**	Misreads are **not** allowed. Accept equivalent fractions.
16	5	**1m**	Refer to section 6.3 on page 16 for additional guidance on marking answers involving measures.
17	Award **TWO** marks for the correct answer of 33 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • $4 \times 50 = 200$ $200 \div 6 = 30$ (*error*) **OR** • $50 \div 6 = 8$ r 2 (8 r 2) × 4 = 32 r 8 **OR** Award **ONE** mark for sight of: • $33\frac{1}{3}$ **OR** $33.\dot{3}$ **OR** 33.33 r **OR** 33.3 **OR** 33 r 2 (as evidence of completing $200 \div 6$ correctly without interpreting the remainder in context)	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. If the pupil reaches an answer with a remainder and subsequently rounds to the nearest integer value either side, then the method remains appropriate for the award of **ONE** mark, e.g. • $200 \div 6 = 31$ r 8 Acceptable rounded answers would be 31 **OR** 32 For the 'sight of' mark, accept equivalent fractions. Award **ONE** mark for an answer of 34.

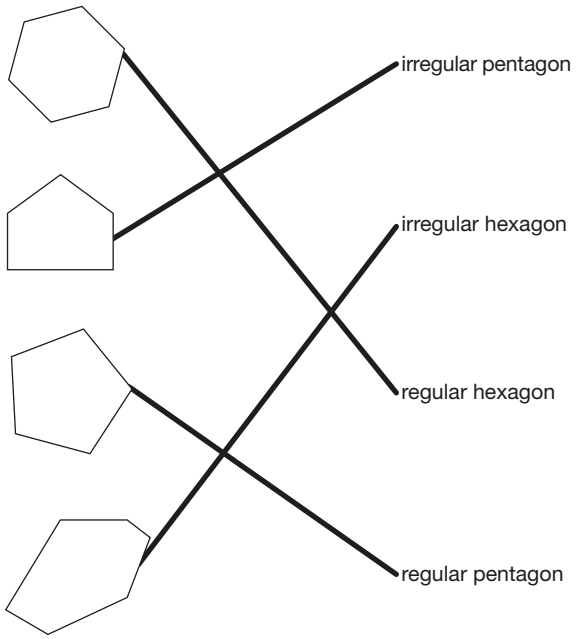
Qu.	Requirement	Mark	Additional guidance
18	Award **TWO** marks for the correct answer of $\frac{7}{20}$ If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • $\frac{3}{5} \overset{(3\times4)}{\underset{(5\times4)}{=}} \frac{12}{20}$ $\frac{1}{20} + \frac{12}{20} = \frac{13}{20}$ $1 - \frac{13}{20}$ • $\frac{1}{20} + \frac{3}{5} = \frac{13}{20}$ $1 - \frac{13}{20}$ **OR** • Award **ONE** mark for sight of $\frac{13}{20}$ (as evidence of correctly totalling price A and price B tickets).	**Up to 2m**	Accept for **TWO** marks for an equivalent fraction of $\frac{7}{20}$ e.g. $\frac{35}{100}$ Answer need not be obtained for the award of **ONE** mark. Also accept for **ONE** mark equivalent fractions for $\frac{13}{20}$ e.g. $\frac{65}{100}$
19	200	**1m**	
20	Award **TWO** marks for boxes completed correctly, as shown: $\begin{array}{r} \boxed{3}235 \\ \times \quad \boxed{5}3 \\ \hline 9705 \\ 16175\,0 \\ \hline 17145\,5 \end{array}$ If the answer is incorrect, award **ONE** mark for either box completed correctly.	**Up to 2m**	

Qu.	Requirement	Mark	Additional guidance
21	Award **TWO** marks for 267.5 **OR** $267\frac{1}{2}$ (cm) If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 30 × 8 = 210 (*error*) 2.5 × 11 = 27.5 210 + 27.5 **OR** • 30 ÷ 2.5 = 12 8 × 12 + 11 = 106 (*error*) 106 × 2.5 **OR** • 12 inches = 1 ft 1 ft + 8 ft = 9 ft 30 × 9 = 270 270 – 2.5	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark.
22	$\frac{3}{12}$	**1m**	Also accept equivalent fractions, e.g. $\frac{1}{4}$
23	Award **TWO** marks for the correct answer of 19 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 650 ÷ 10 = 65 65 × 2 = 130 650 + 130 = 780 780 ÷ 40 • 20% of 650 = 130 130 + 650 = 770 (*error*) 770 ÷ 40 **OR** Award **ONE** mark for sight of: • 19.5 **OR** $19\frac{1}{2}$ **OR** 19 r 20 **OR** 19 r 2 (as evidence of a complete method before rounding down)	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. If a pupil's method uses repeated addition or subtraction appropriately, only one step error is allowed, otherwise the method is not appropriate. If the pupil reaches an answer with a remainder and subsequently rounds to the nearest integer value either side, then the method remains appropriate for the award of **ONE** mark, e.g. 780 ÷ 40 = 14 r 2 (*error*) Acceptable rounded answers would be 14 **OR** 15 Award **ONE** mark for an answer of 20.

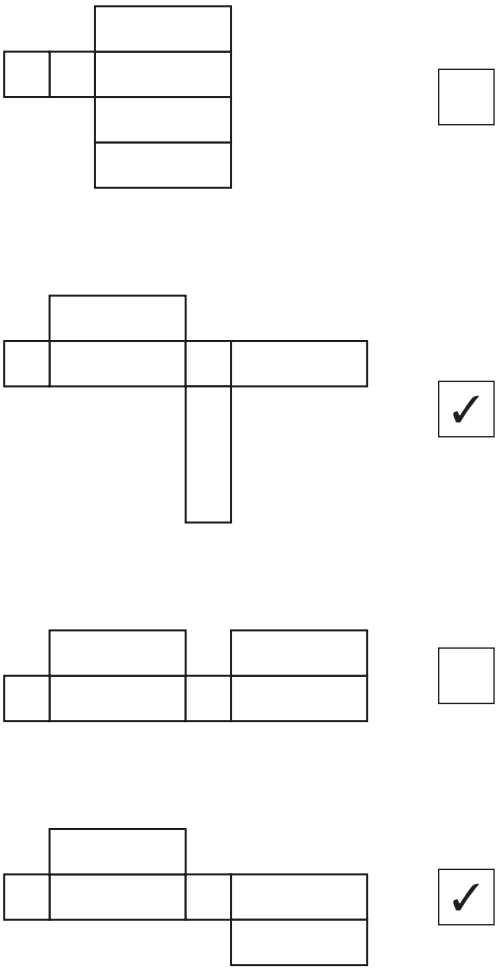
Qu.	Requirement	Mark	Additional guidance
24	564	**1m**	
25a	20	**1m**	
25b	Award **TWO** marks for the correct answer of 4.8 (g) If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 2.4 × 1000 = 240 (*error*) 240 ÷ 500 • 2.4 ÷ 500 = 0.0048 0.0048 × 1000	**Up to 2m**	Accept for **TWO** marks 0.0048 kg for final answer in working and the answer box blank **OR** 0.0048 in answer box where the grams has been replaced with kilograms (kg). Accept for **ONE** mark 0.0048g in the answer box **OR** as the final answer in the working and answer box blank. Answer need not be obtained for award of **ONE** mark.
26a	18	**1m**	
26b	3	**1m**	

9. Mark schemes for Paper 3: reasoning

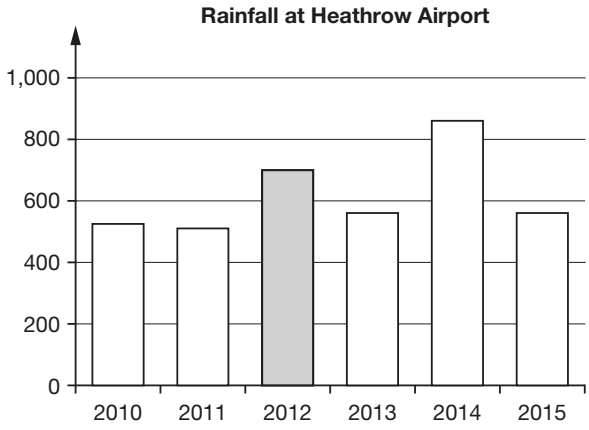
Qu.	Requirement	Mark	Additional guidance
1	Award **ONE** mark for digits placed correctly, as shown: 	1m	
2	Award **ONE** mark for the third box ticked correctly, as shown: 8,306 ☐ 80,036 ☐ 80,306 ☑ 800,306 ☐ 80,300,006 ☐	1m	Accept alternative unambiguous positive indication of the correct answer.
3	Diagram completed, as shown: 	1m	Ignore any attempt to label the reflected triangle. Accept slight inaccuracies in drawing, provided the intention is clear. See page 13 for guidance.
4	Award **ONE** mark for the correct order, as shown: 1,780 1,880 1,980 **2,080** **2,180**	1m	

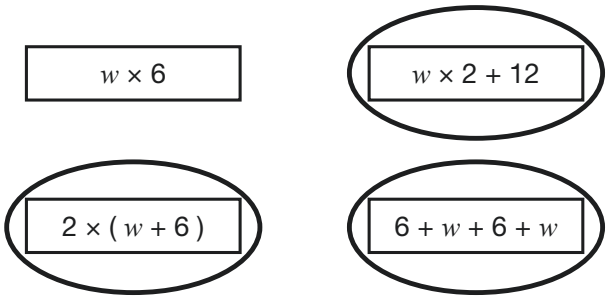
Qu.	Requirement	Mark	Additional guidance
5	Correct decimals circled, as shown: 13.2 14.7 **(15.9)** **(16.3)** 17.6	1m	Accept alternative unambiguous positive indication of the correct answer.
6	300,000	1m	
7	$10\frac{1}{2}$	1m	Also accept equivalent decimal answers, e.g. 10.5 **OR** 10.50
8	Award **ONE** mark for the four shapes matched correctly, as shown:  	1m	Lines need not touch the shapes and names, provided the intention is clear. **Do not** accept any shape that has been matched to more than one name.
9	Award **ONE** mark for an explanation that recognises that 32 is not a multiple of 3, e.g. • 32 is not in the 3× table • 32 ÷ 3 = 10 r2 or 10.66 (which are not whole numbers) • if you count in multiples of 3 from 0, you won't get 32 • 3 + 2 = 5, 5 is not a multiple of 3 so he is wrong. **OR** For a description that includes one or both of the multiples of 3 either side of 32, e.g. • if you do 10 × 3 = 30 and 11 × 3 = 33 there is no 32 • 10 × 3 = 30 and 32 is 2 away.	1m	**Do not** accept responses that restate the question, e.g. Jack is not correct because if you multiply 3 by any whole number you will not get 32. **Do not** accept vague or incomplete explanations, e.g. • If you multiply by 3 you will get 30, not 32 • 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 • 32 is not a factor of 3 **Do not** accept explanations which include incorrect mathematics or incorrect information relevant to the explanation.

Qu.	Requirement	Mark	Additional guidance
10	3	**1m**	Accept the answer of 9 as long as the exponent has been crossed out.
11	Award **TWO** marks for correct answer of 2,458 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 7,918 + 4,624 = 12,542 15,000 – 12,542 **OR** • 15,000 – 7,918 = 7,182 (*error*) 7,182 – 4,624 **OR** • 15,000 – 4,624 = 10,376 10,376 – 7,918 = 2,558 (*error*)	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark.

Qu.	Requirement	Mark	Additional guidance
12	Award **TWO** marks for two boxes correctly ticked, and no incorrect boxes ticked, as shown:  If the answer is incorrect, award **ONE** mark for: • two boxes ticked correctly and one incorrect box ticked. **OR** • only one box ticked correctly and no incorrect boxes ticked.	**Up to 2m**	Accept alternative unambiguous positive indication of the correct answer.

Qu.	Requirement	Mark	Additional guidance
13	9	**1m**	
14a	$\frac{1}{4}$	**1m**	**Do not** accept equivalent fractions.
14b	$\frac{2}{5}$	**1m**	**Do not** accept equivalent fractions.
15a	Award **ONE** mark for: • 5:50, (0)5:50 pm **OR** 17:50	**1m**	Accept answer in words, e.g. ten to six **OR** Answer written unconventionally, e.g. 10 to 6 Refer to section 6.2 on pages 15 and 16 for additional guidance on marking answers involving a time.
15b	Award **ONE** mark for: • 1 (hours) 45 (minutes)	**1m**	Award the mark if the answer is given in hours only or minutes only, i.e. • 1.75 (hours) Blank (minutes) **OR** • Blank (hours) 105 (minutes)
16	Award **TWO** marks for correct answer of 35(g) If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 870 – 30 = 840 840 ÷ 24 **OR** • 870 – 30 = 850 (*error*) 850 ÷ 24 = 35 r 10	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. If the pupil reaches an answer with a remainder and subsequently rounds to the nearest integer value either side, then the method remains appropriate for the award of **ONE** mark, e.g. 840 ÷ 24 = 36 r 10 Acceptable rounded answers would be 36 **OR** 37
17	$\frac{5}{6}$	**1m**	Accept equivalent fractions, e.g. $\frac{10}{12}$

Qu.	Requirement	Mark	Additional guidance
18a	Award **ONE** mark for drawing the bar in the range of 650 mm to 750 mm, e.g.  	**1m**	Ignore the width of the bar.
18b	Award **TWO** marks for the correct answer of 1,543 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 1,452 + 1,669 + 1,508 = 4,629 4,629 ÷ 3 **OR** • 1,452 + 1,669 + 1,508 = 4619 (*error*) 4619 ÷ 3 **OR** Award **ONE** mark for sight of 4629 (as evidence of the sum of sunshine hours)	**Up to 2m**	Answer need not be obtained or rounded for the award of **ONE** mark. Any acceptable rounding or truncating does not negate an appropriate method. Any value which does not result from correct rounding or truncating implies an additional step not shown.

Qu.	Requirement	Mark	Additional guidance
19	Award **TWO** marks for the correct answer of (£)2.65 If the answer is incorrect, award **ONE** mark for evidence of a complete method which contains no more than one arithmetic error, e.g. • £3.20 ÷ 2 = £1.60 $\frac{1}{4}$ of 60p = 15p 60p + 15p = 75p £1.60 + 75p = £2.25 (*error*) £5 – £2.25 = £2.75 **OR** • sight of (£)2.35 **OR** 235 (p) (as evidence of the total cost of mushrooms and carrots).	**Up to 2m**	Misreads are **not** allowed. Accept for **ONE** mark an answer of £265, £265p or £2,65 as evidence of an appropriate method. Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
20	Award **TWO** marks for the three correct expressions circled, as shown:  Award **ONE** mark for two correct expressions circled and no incorrect expressions circled.	**Up to 2m**	Accept alternative unambiguous positive indication of the correct answers.

Qu.	Requirement	Mark	Additional guidance
21	Award **THREE** marks for the correct answer of 323 Award **TWO** marks for: • An incorrect answer with evidence of an appropriate complete method with no more than one arithmetic error, e.g. 25 × 34 100 750 950 *(error)* 62% of 950 = 589 950 – 589 = 361 **OR** • 34 × 25 = 950 (*error*) 95 × 3 = 285 9.5 × 8 = 76 285 + 76 = 361 **OR** • sight of 527 (as evidence of calculating 62% of 850) Award **ONE** mark for: • evidence of an appropriate method with more than one error. **OR** • sight of 850 (as evidence of the multiplication step completed correctly)	**Up to 3m**	A misread of a number may affect the award of marks. No marks are awarded if there is more than one misread or if the mathematics is simplified. **TWO** marks will be awarded if an appropriate method with the misread number is followed through correctly. **ONE** mark will be awarded for evidence of an appropriate method with the misread number followed through correctly with no more than one error. Within an appropriate method, if the pupil has rounded appropriately with no more than one arithmetic error, the pupil may be awarded **TWO** marks. Answer need not be obtained for the award of **ONE** mark.
22	Number machine boxes completed correctly, as shown: **octagon** → **8** → **×5** → **÷2** → **20**	**1m**	

<table>
<tr><th>Qu.</th><th>Requirement</th><th>Mark</th><th>Additional guidance</th></tr>
<tr><td>23</td><td>Award TWO marks for two correct answers in the boxes, as shown:

<table>
<tr><th>a</th><th>b</th><th>$\frac{a}{b}$</th></tr>
<tr><td>1</td><td>4</td><td>0.25</td></tr>
<tr><td>3</td><td>20</td><td>0.15</td></tr>
<tr><td>5</td><td>8</td><td>0.625</td></tr>
</table>

Award ONE mark for one correct answer.</td><td>Up to 2m</td><td></td></tr>
</table>

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Standards & Testing Agency

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