2022 national curriculum tests

Key stage 2

Mathematics test mark schemes

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

**Standards
& Testing
Agency**

2022 key stage 2 mathematics test mark schemes

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 2022 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 2022 tests will be published in July 2022. The standards confirmation meeting will take place in June 2022.

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 2022 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.

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

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Table 1: Content domain coverage of the 2022 key stage 2 mathematics test

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

Paper 1: arithmetic		Paper 2: reasoning		Paper 3: reasoning	
Qu.	**Content domain reference**	**Qu.**	**Content domain reference**	**Qu.**	**Content domain reference**
1	4C2	1	6N2	1	5G3b
2	4C6b	2	3C8/3C6	2	4C6c/3C6
3	3N2b	3	5N3a/5C1	3	3M9a
4	4C6b	4a	4N2a/4N4b	4	4F6a/4F6b
5	3C1	4b	4N2a/4N4b	5	3C4/3C2
6	4F8/5F10	5	5C6b/5M5	6a	5N5/4S2
7	4C6b	6	4F10b/5M9d	6b	5N5/4S2
8	4C6b	7	4F4	7	5C4
9	4C2	8	5F2a	8	4N4b
10	5C6b	9	3S1	9	5C6b
11	4C6b	10	4M9/4F10b	10	5M9a/6A4
12	4C6b	11	6F2	11	5C8a
13	4C6b	12	5M5/3M1b	12a	5C8b
14	5C2	13	6S1	12b	5C8b
15	4C7	14	6C7b/6C8	13	5F4
16	6F9a	15	4C6b/3N2a	14	6A2/5M9a
17	6C7b	16	5F7	15a	5G4b
18	6F4	17	5C8a	15b	3G4b
19	6C7a	18	5C4	16	5F2b
20	6F9a	19	6G5/5G4b	17	5M9a/5F5
21	6F4	20	5C7a/6C8	18	6R2
22	5F5	21a	6A4/6A1	19	5C5b/5C5d
23	5F8/5F10	21b	6A4/6A1	20	6S3/6C8/5N4
24	6F5b	22	6R1	21	6P3/5M9b
25	6F4	23	6M9/6M5		
26	5F8/5F10	24	6G4a/5G4b		
27	6R2	25	6P2		
28	6R2				
29	6C7b				
30	6R2				
31	6F4				
32	6F4				
33	6C7a				
34	6F4				
35	6C9				
36	5F5				

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, 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 ▢ = 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 $\frac{1}{7}$, $0.\dot{1}4285\dot{7}$ 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)

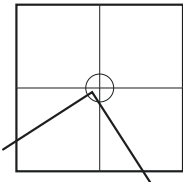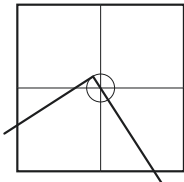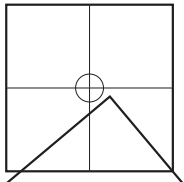| 11. The answer in the answer box is wrong due to a misread of numbers given in the question.	Misreads are not allowed in Paper 1; the mark(s) will not be awarded.
12. The pupil has not recorded their working beneath the given long multiplication or long division.	If a pupil carries out their working 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

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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:		Incorrect or ambiguous use of pounds or pence or use of comma as a decimal point, for example:	
	£3.20p	£0.40 pence	£320	£40
	£3 20 pence	£0 40p	£320p	£40p
	£3 20	£0-40	£3.2	0.4
	£3-20	£0:40	3.20p	0.40p
	£3:20	£0;40	£3,20	0,40
	£3;20	£.40		£0,40p
	3.20	0.40		
	320	40		
	3 pounds 20			

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:		Incorrect or ambiguous time interval or use of comma as a decimal point, for example:	
	(0)2 h 30	150 minutes	2.30	230
	(0)2 h 30 min	150	2.3	2.30 min
	(0)2 30	2.5 hours	2.3 hours	2,5 hours
	(0)2-30	$2\frac{1}{2}$ hours	2.3 h	2,30
	Digital electronic time, for example: (0)2:30	(0)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	7,305	1m	
2	0	1m	
3	292	1m	
4	1,200	1m	
5	415	1m	
6	15.08	1m	
7	30	1m	
8	168	1m	
9	5,459	1m	
10	10,100	1m	
11	80	1m	
12	660	1m	
13	120	1m	
14	495,000	1m	
15	4,172	1m	
16	0.212	1m	

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Qu.	Requirement	Mark	Additional guidance
17	Award **TWO** marks for the correct answer of 32 If the answer is incorrect, award **ONE** mark for the formal method of division with no more than **ONE** arithmetic error, i.e. • long division algorithm, e.g. $$\begin{array}{r} 32 \text{ r}3 \\ 21\overline{)\,672} \\ -\ \underline{630} \\ 45 \text{ (error)} \\ -\ \underline{42} \\ 3 \end{array}$$ **OR** $$\begin{array}{r} 52 \text{ (error)} \\ 21\overline{)\,672} \\ -\ \underline{630} \qquad 30 \times 21 \\ 42 \\ -\ \underline{42} \qquad 2 \times 21 \\ 0 \end{array}$$ • short division algorithm, e.g. $$\begin{array}{r} 3\,3 \text{ (error)} \\ 21\overline{)\,67^{4}2} \end{array}$$	**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.
18	$1\dfrac{1}{9}$ **OR** $\dfrac{10}{9}$	1m	Accept equivalent mixed numbers, fractions or an **exact** decimal equivalent, e.g. $1.\dot{1}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.

Qu.	Requirement	Mark	Additional guidance

19	Award **TWO** marks for the correct answer of 50,381
	
	If the answer is incorrect, award **ONE** mark for a formal method of long multiplication with no more than **ONE** arithmetic error, e.g.
	
	• 607
	   × 83
	    1821
	  48560
	  49381 *(error)*
	
	OR
	
	• 607
	   × 83
	    1822 *(error)*
	  48560
	  50382
		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:
			
			      607
			   × 83
			    1821
			   4856 *(place value error)*
			   6677

20	13,050	1m	
21	3	1m	Accept equivalent fractions. **Do not** accept answers such as $2\frac{3}{3}$
22	21	1m	
23	2.877	1m	
24	$\frac{1}{16}$	1m	Accept equivalent fractions or an **exact** decimal equivalent, e.g. 0.0625 **Do not** accept rounded or truncated decimals.
25	$\frac{5}{6}$	1m	Accept equivalent fractions or an **exact** decimal equivalent, e.g. $0.8\dot{3}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
26	23.988	1m	
27	480	1m	**Do not** accept 480%
28	60	1m	**Do not** accept 60%

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Qu.	Requirement	Mark	Additional guidance
29	Award **TWO** marks for the correct answer of 42 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. $$\begin{array}{r} 41\ r67 \\ 73\overline{)3066} \\ -\ \underline{2920} \\ 140\ (error) \\ -\ \underline{73} \\ 67 \end{array}$$ **OR** $$\begin{array}{r} 32\ (error) \\ 73\overline{)3066} \\ -\ \underline{730} \quad 10\times73 \\ 2336 \\ -\ \underline{2190} \quad 30\times73 \\ 146 \\ \underline{146} \quad 2\times73 \\ 0 \end{array}$$ • short division algorithm, e.g. $$\begin{array}{r} 41\ r71 \quad (error) \\ 73\overline{)306^{14}6} \end{array}$$	**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.
30	92	**1m**	**Do not** accept 92%
31	$\dfrac{11}{63}$	**1m**	Accept equivalent fractions or an **exact** decimal equivalent, e.g. $0.\overline{174603}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.

Qu.	Requirement	Mark	Additional guidance
32	$1\frac{5}{6}$ **OR** $\frac{11}{6}$	1m	Accept equivalent mixed numbers, fractions or an **exact** decimal equivalent, e.g. $1.8\dot{3}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
33	Award **TWO** marks for the correct answer of 273,226 If the answer is incorrect, award **ONE** mark for a formal method of long multiplication with no more than **ONE** arithmetic error, e.g. • 4078 × ___67 28546 244680 ___273126___ (error) **OR** • 4078 × ___67 28544 (error) 244680 273224	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: 4078 × ___67 28546 ___24468___ (place value error) 53014
34	$7\frac{3}{4}$ **OR** $\frac{31}{4}$	1m	Accept equivalent mixed numbers, fractions or an **exact** decimal equivalent, e.g. 7.75 **Do not** accept rounded or truncated decimals.
35	8	1m	
36	320	1m	**Do not** accept $\frac{1600}{5}$

8. Mark schemes for Paper 2: reasoning

Qu.	Requirement	Mark	Additional guidance
1	Correct response circled, as shown: 9,206,499　　(9,215,300)　　9,206,504 9,215,298　　9,206,909	1m	Accept alternative unambiguous positive indication of the correct answer.
2	5	1m	
3	30,000	1m	
4a	Emma	1m	Accept unambiguous abbreviations, e.g. E, or recognisable misspellings. Accept 1,400 for the award of the mark.
4b	Olivia	1m	Accept unambiguous abbreviations, e.g. O, or recognisable misspellings. Accept 1,220 for the award of the mark.
5	2,300	1m	
6	2.25	1m	Refer to section 6.3 on page 16 for additional guidance on marking answers involving measures.
7	$\frac{6}{10}$	1m	Accept equivalent fractions and decimals, e.g. $\frac{3}{5}$ and 0.6 **Do not** accept 60%
8	Correct answer circled, as shown: $\frac{5}{8}$　　$\frac{14}{8}$　　$\left(\frac{19}{8}\right)$　　$\frac{23}{8}$　　$\frac{26}{8}$	1m	Accept alternative unambiguous positive indication of the correct answer.
9	52	1m	

Qu.	Requirement	Mark	Additional guidance
10	Award **TWO** marks for the correct answer of (£)2.85 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 190 ÷ 2 = 85 *(error)* 190 + 85 **OR** • 1.90 × 1.5	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. Accept for **ONE** mark an answer of (£)285 **OR** £285p as evidence of an appropriate method. Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
11	Award **ONE** mark for both numbers correct, as shown: $\dfrac{3}{10} = \dfrac{\boxed{6}}{20}$ $\dfrac{12}{15} = \dfrac{4}{\boxed{5}}$	1m	
12	Masses in correct order, as shown: $\boxed{2\,kg}$ $\boxed{1500\,g}$ $\boxed{1.4\,kg}$ $\boxed{300\,g}$ **heaviest** **OR** Accept correct conversions, e.g. 2000g 1500g 1400g 300g **OR** 2000 1500 1.4 300	1m	Misreads and transcription errors are **not** allowed. Accept with correct units or without units. Accept masses written in reverse order **AND** the label heaviest changed to follow suit.

2022 key stage 2 mathematics test mark schemes

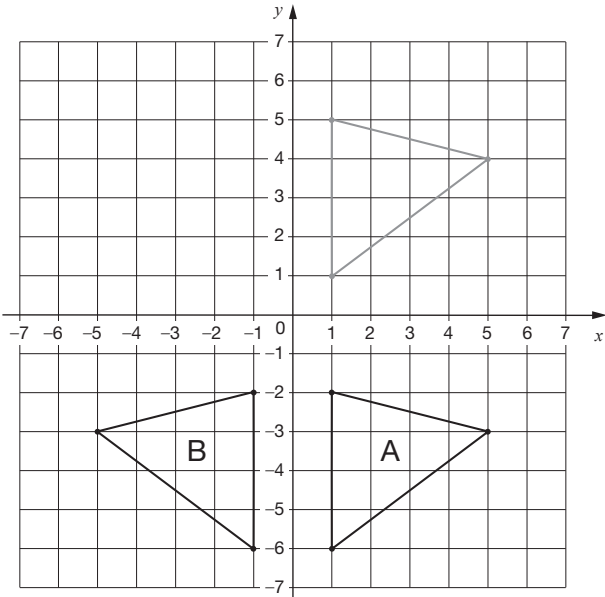| Qu.	Requirement	Mark	Additional guidance
13	Award **ONE** mark for each part of Dev's journey matched with the correct sentence, as shown: A to B — Dev cycles 3 km in 10 minutes. B to C — Dev cycles less than 1 km in 10 minutes. C to D — Dev rests for 10 minutes. D to E — Dev cycles 1 km in 10 minutes. (Matching: A to B → Dev cycles 3 km in 10 minutes; B to C → Dev rests for 10 minutes; C to D → Dev cycles less than 1 km in 10 minutes; D to E → Dev cycles 1 km in 10 minutes)	1m	Lines need not touch the boxes, provided the intention is clear. **Do not** accept any part of the journey which has been matched to more than one sentence.
14	50	1m	
15	Award **TWO** marks for all four signs correct, as shown: $1 \times 2 \times 3 \boxed{=} 1 + 2 + 3$ $2 \times 2 \times 2 \boxed{>} 2 + 2 + 2$ $1 \times 10 \times 10 \boxed{>} 1 + 10 + 10$ $0 \times 10 \times 10 \boxed{<} 0 + 10 + 10$ If the answer is incorrect, award **ONE** mark for three signs placed correctly.	Up to 2m	Accept unambiguous drawings of the correct signs.
16	Award **ONE** mark for two boxes ticked correctly, as shown: 28.07 ☐ 28.65 ✓ 28.71 ✓ 28.75 ☐ 28.97 ☐	1m	Accept alternative unambiguous positive indication of the correct answer, e.g. Y.

Qu.	Requirement	Mark	Additional guidance
17	9 **OR** 12 **OR** 18 **OR** 36	1m	Award **ONE** mark for more than one correct answer given and no incorrect answers.
18	Award **TWO** marks for the correct answer of 821 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 800 × 2 = 1600 511 + 268 = 779 1600 – 779 **OR** • 800 – 511 = 289 800 – 268 = 542 *(error)* 542 + 289 **OR** • 800 – 511 – 268 = 23 *(error)* 800 + 23	Up to 2m	Answer need not be obtained for the award of **ONE** mark.
19	15	1m	Refer to section 6.3 on page 16 for additional guidance on marking answers involving measures.
20	Award **TWO** marks for the correct answer of 12 If the answer is incorrect, award **ONE** mark for evidence of an appropriate complete method with no more than one arithmetic error, e.g. • 16 × 15 = 210 *(error)* 10 × 18 = 180 210 + 180 = 390 432 – 390 = 42 **OR** Award **ONE** mark for sight of 420 (as evidence of the sum of the two correct products).	Up to 2m	Misreads are **not** allowed.

2022 key stage 2 mathematics test mark schemes

Qu.	Requirement	Mark	Additional guidance
21a	16	**1m**	
21b	30	**1m**	If the answer to part b is incorrect, award **ONE** mark for an answer of: • $(200 - 5n) \div 4$ Where n represents the answer to part a of the question, the value of n **must** be between 12 and 18 (inclusive). Any follow-through fraction or decimal answer must be expressed as an exact value.
22	Award **TWO** marks for the correct answer of 4,200 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • $750 \div 250 = 3$ $1,150 + 250 = 1,400$ $1,400 \times 3$ **OR** • $750 \div 250 = 3$ $1,150 \times 3 = 3,350$ *(error)* $3,350 + 750$ Award **ONE** mark for sight of 3450, 3.45 **OR** 3.450 (as evidence of correctly calculating how much yellow paint is required).	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark.

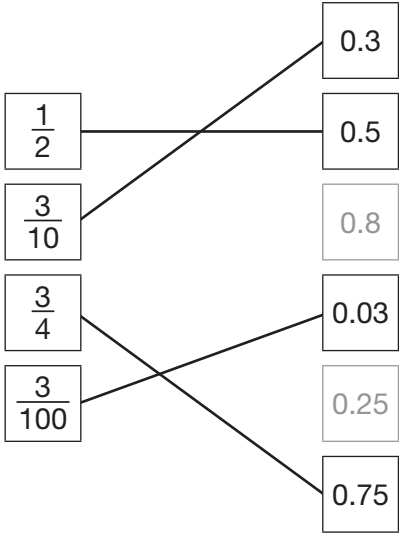| Qu.	Requirement	Mark	Additional guidance
23	Award **TWO** marks for the correct answer of 30 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 1.25kg – 1.1kg = 0.05kg *(error)* 1100g – 920g = 180g 180 – 50 = 130g **OR** Award **ONE** mark for the correct weight of the banana and the orange, e.g. 0.15(kg) **AND** 180(g)	**Up to 2m**	Accept for **TWO** marks 0.03kg for final answer in working and the answer box blank **OR** 0.03 in the answer box where the grams has been replaced with kilograms. Accept for **ONE** mark 0.03 (g) in the answer box **OR** as the final answer in working and answer box blank. Answer need not be obtained for the award of **ONE** mark. Any conversion of units must be correct. **Do not** award the mark for a method that contains an incorrect conversion, e.g. 1.25 – 1.1 = 0.16 *(error)* 1100 – 920 = 180 180 – 16 *(conversion error)*
24	Award **TWO** marks for the correct answer of $x = 75$ **AND** $y = 15$ If the answer is incorrect, award **ONE** mark for evidence of an appropriate method calculating both angles, e.g. • 180 – 30 = 150 150 ÷ 2 = 70 *(error)* 90 – 70 **OR** Award **ONE** mark for either correct x **OR** y.	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. If there is no evidence of an appropriate method and the values for x **AND** y are incorrect, accept for **ONE** mark $x + y = 90$, unless x is between 65–69 (inclusive) **AND** y is between 21–25 (inclusive).

2022 key stage 2 mathematics test mark schemes

Qu.	Requirement	Mark	Additional guidance
25	Award **TWO** marks for both triangles correctly drawn, as shown: Award **ONE** mark for either: • correct triangle A **OR** • correct triangle B **OR** • a correct reflection of an incorrectly translated triangle (maintaining congruency of the original triangle).	**Up to 2m**	Accept slight inaccuracies in drawing provided the intention is clear. (See page 13 for guidance.) Ignore any triangles drawn in the 2nd quadrant, unless it is a correct follow-through of triangle A.

9. Mark schemes for Paper 3: reasoning

Qu.	Requirement	Mark	Additional guidance
1	8	1m	
2	Award **ONE** mark for all multiplications completed correctly with the given cards, as shown: 24 = **3** × **8** 28 = **4** × **7** 30 = **5** × **6**	1m	Accept for each multiplication the numbers given in either order, e.g. 8 × 3 7 × 4 6 × 5

3	Award **TWO** marks for the correct answer of 15(p)
	
	If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g.
	
	• 30p + 45p + 60p = 135p
	  50p × 3 – 135p
	
	OR
	
	• 50 – 30 = 20
	  50 – 45 = 5
	  20 + 5 + 50 = 75
	  75 – 60
	
	OR
	
	• 150 – 45 = 95 *(error)*
	  95 – 60 = 35
	  35 – 30
		Up to 2m	Answer need not be obtained for the award of **ONE** mark.
			
			Accept for **ONE** mark an answer of 0.15(p) **OR** £15(p) as evidence of an appropriate method.
			
			Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.

2022 key stage 2 mathematics test mark schemes

Qu.	Requirement	Mark	Additional guidance
4	Award **TWO** marks for all four fractions matched to the correct decimal as shown: Award **ONE** mark for three fractions and decimals matched correctly.	**Up to 2m**	Lines need not touch the boxes, provided the intention is clear. **Do not** accept any fraction that has been matched to more than one decimal number.
5	Award **TWO** marks for the correct answer of 123 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 87 + 154 + 38 = 279 402 − 279 **OR** • 87 + 154 + 38 = 269 *(error)* 402 − 269	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark.
6a	−7	**1m**	**Do not** accept 7−
6b	8	**1m**	**Do not** accept −8

Qu.	Requirement	Mark	Additional guidance

7	Award **TWO** marks for the correct answer of 81,572
	
	Award **ONE** mark for evidence of an appropriate method, e.g.
	
	• 80,978
	  + 72,319
	       153,297
	
	     234,869 – 153,297
	
	OR
	
	• 234,869
	  – 80,978
	      153,891
	
	     153,891 – 72,319
	
	OR
	
	• 234,869
	  – 72,319
	      162,550
	
	     162,550 – 80,978
	
	OR
	
	Award **ONE** mark for sight of 153,297 **OR** 153,891 **OR** 162,550
		Up to 2m	Answer need not be obtained for the award of **ONE** mark.

8	Award **TWO** marks for the correct three numbers, as shown: to the nearest 1,000 **8,000** to the nearest 100 **7,500** to the nearest 10 **7,550** If the answer is incorrect, award **ONE** mark for **any two** of the numbers rounded correctly.	**Up to 2m**	**Do not** accept 500 or 50 for the second and third entries.

2022 key stage 2 mathematics test mark schemes

Qu.	Requirement	Mark	Additional guidance
9	41,600	1m	
10	Award **TWO** marks for the correct answer of 79(p) **OR** (£)0.79 If the answer is incorrect, award **ONE** mark for an appropriate method, e.g. • £4.75 − £1.98 = £2.77 £2.77 − £1.98 **OR** • 198 × 2 = 397p *(error)* £4.75 − 397p **OR** • £2 × 2 = £4 £4.75 − £4 = 75p 75p + 4p	Up to 2m	Answer need not be obtained for the award of **ONE** mark. Accept for **ONE** mark an answer of 0.79p **OR** £79(p) as evidence of a correct method. Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
11	Award **ONE** mark for: 21 **OR** 22 **OR** 23 **OR** 24	1m	Award **ONE** mark for more than one correct answer given and there are no incorrect answers. **Do not** accept decimal numbers.
12a	136	1m	
12b	310 **OR** −90	1m	
13	$\frac{1}{6}$	1m	Accept equivalent fractions or an exact decimal equivalent, e.g. $0.1\dot{6}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
14	£77.50	1m	Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
15a	90	1m	
15b	B	1m	Accept alternative unambiguous indication of the correct answer.

Qu.	Requirement	Mark	Additional guidance
16	Award **TWO** marks for three boxes ticked correctly, as shown: $\frac{1}{4}$ ☐ $\frac{2}{5}$ ✓ $\frac{4}{10}$ ✓ $\frac{6}{10}$ ☐ $\frac{40}{100}$ ✓ If the answer is incorrect, award **ONE** mark for: • only two boxes ticked correctly and no incorrect boxes ticked. **OR** • three boxes ticked correctly and one incorrect box ticked.	**Up to 2m**	Accept alternative unambiguous positive indication of the correct answer, e.g. Y.
17	Award **TWO** marks for the correct answer of 108 If the answer is incorrect, award **ONE** mark for an appropriate method, e.g. • 7.5 × 4 = 30 11 × 4 = 44 8.5 × 4 = 34 30 + 44 + 34 **OR** • 7.5 + 11 + 8.5 = 27 27 × 4 **OR** • 7.5 + 7.5 + 7.5 + 7.5 + 11 + 11 + 11 + 11 + 8.5 + 8.5 + 8.5 + 8.5	**Up to 2m**	Misreads are **not** allowed. Answer need not be obtained for the award of **ONE** mark.

2022 key stage 2 mathematics test mark schemes

Qu.	Requirement	Mark	Additional guidance
18	Award **TWO** marks for the correct answer of (£)10.50 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • $70 \times 15 \div 100$ **OR** • $10 \times 15 \div 100 = £1.50$ $3 \times £1.50 = £4.50$ $£15 - £4.50$ **OR** Award **ONE** mark for sight of (£)4.50	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. Award **ONE** mark for a final answer of (£)10.5 **OR** (£)105 **OR** (£)1050 as evidence of an appropriate method. Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
19	Award **ONE** mark for a correct explanation, e.g. • It has 3 factors – the prime number, 1 and the square of the prime number. • The prime number has 2 factors; the squared prime number will be divisible by one, itself and the prime number. • All prime numbers squared have 3 factors. **OR** A correct explanation that gives a counter example, e.g. • 5 is prime $5^2 = 25$ 25 has 3 factors: 1, 5 and 25, not two • 7^2 has more than 2 factors – 1, 7 and 49 • $121 = 1 \times 121 = 11 \times 11$ • $3^2 = 9$ $9 - 1, 9, 3$ • $5^2 = 25$ Factors of 25 = 1, 5, 25 All squared primes have 3 factors.	1m	**Do not** accept vague or incomplete explanations, e.g. • A square number doesn't have 2 factors (repeat of the question) • $2^2 = 4$ (incomplete) • Prime numbers have 2 factors only (incomplete) • Prime numbers squared have more than 2 factors (vague) **Do not** accept explanations which include incorrect mathematics or incorrect information relevant to the explanation, e.g. • 49 = 1, 7, 49 • 5 squared is 25 1, 5, 5, 25 25 has four factors • All prime numbers squared have more than 3 factors

Qu.	Requirement	Mark	Additional guidance

20	Award **THREE** marks for the correct answer of 207,300
	
	If the answer is incorrect, award **TWO** marks for:
	
	• evidence of an appropriate complete method which contains no more than one error, e.g.
	
	    24,863
	  170,932
	  282,420
	+ 350,824
	  828,939 *(error)*
	
	828,939 ÷ 4 = 207,234 r3
	
	Rounded to the nearest hundred = 207,200
	
	OR
	
	• sight of 207,259 r3 **OR** 207,259 $\frac{3}{4}$
	  OR 207,259.75
	
	Award **ONE** mark for:
	
	• evidence of an appropriate method with more than one error.
		Up to 3m	Answer need not be obtained or rounded for the award of **ONE** mark.
			
			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.

21	Award **ONE** mark for x and y coordinates written correctly: (**6** , **3**)	1m	

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