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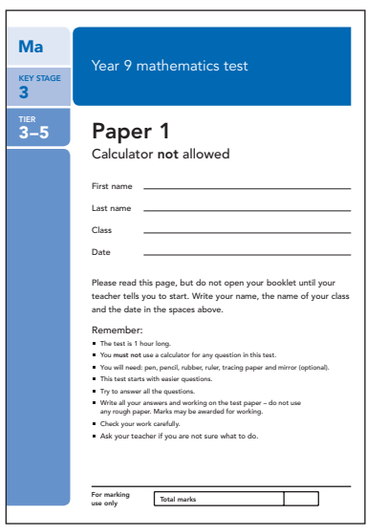
KEY STAGE 3

LEVELS 3–8

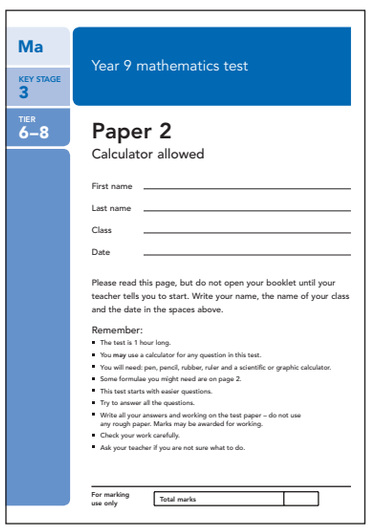
OPTIONAL

Year 9 optional tests

Teacher's guide


Ma
KEY STAGE 3
TIER 3–5
Year 9 mathematics test
Paper 1
Calculator not allowed
First name
Last name
Class
Date
Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, the name of your class and the date in the spaces above.
Remember:
- The test is 1 hour long.
- You must not use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler, tracing paper and mirror (optional).
- This test starts with easier questions.
- Try to answer all the questions.
- Write all your answers and working on the test paper – do not use any rough paper. Marks may be awarded for working.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.
For marking use only
Total marks

Paper 1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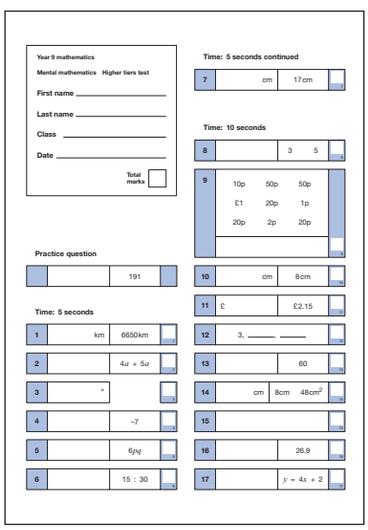
KEY STAGE 3
TIER 6–8
Year 9 mathematics test
Paper 2
Calculator allowed
First name
Last name
Class
Date
Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, the name of your class and the date in the spaces above.
Remember:
- The test is 1 hour long.
- You may use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler and a scientific or graphic calculator.
- Some formulae you might need are on page 2.
- This test starts with easier questions.
- Try to answer all the questions.
- Write all your answers and working on the test paper – do not use any rough paper. Marks may be awarded for working.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.
For marking use only
Total marks

Paper 2


Year 9 mathematics
Mental mathematics Higher tiers test
First name
Last name
Class
Date
Total marks
Practice question
191
Time: 5 seconds
1 km 6650km
2 4a + 5a
3 °
4 −7
5 6pq
6 15 : 30
Time: 5 seconds continued
7 cm 17 cm
Time: 10 seconds
8 3 5
9 10p 50p 50p £1 20p 1p 20p 2p 20p
10 cm 8cm
11 £ £2.15
12 3, ___, ___
13 60
14 cm 8cm 48cm²
15
16 26.9
17 y = 4x + 2

Mental mathematics

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83 Piccadilly
London
W1J 8QA
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Introduction

The years 7, 8 and 9 optional tests in mathematics enable schools to measure pupils' progress during key stage 3. These new optional tests are administered and marked in the same way as the optional tests introduced in 2004, providing consistency for teachers and fresh material for pupil assessment.

The balance of marks reflects the structure of the national curriculum, and of the statutory tests at the end of key stage 3.

The optional tests can be taken when schools choose. They can be used as summative end-of-year tests or they may be used in whole or in part at any point in the school year to give valuable diagnostic information about pupils' strengths and weaknesses.

This guide will explain how to administer and mark the tests. It also provides the information needed to enable total marks to be converted to national curriculum levels.

Pupils must take the two papers from the same tier in order for the total marks to be translated accurately into a national curriculum level for mathematics.

The stucture and timing of the tests

Who are the tests suitable for?

This suite of year 9 optional tests is available in four tiers. The principal target levels for the written papers are:

Tier	Target level
3–5	4
4–6	5
5–7	6
6–8	7 – with opportunities for pupils working at level 8 and accessing the key stage 4 programme of study to show their achievement

Pupils must take the appropriate mental mathematics test depending on the written test tier of entry. It is for schools to determine the appropriate tier of entry, using their own discretion and taking into account relevant factors about pupils' performance.

Written papers – Paper 1 and Paper 2

There are two written papers:

- Paper 1 (a non-calculator paper)
- Paper 2 (a calculator paper)

Pupils are allowed 60 minutes for each of Paper 1 and Paper 2. Each paper consists of about 25 questions. Where a question part is worth more than one mark, pupils are able to obtain partial credit for their working even if the final answer is incorrect. Pupils write their working and answers in spaces provided within the answer booklets.

A total of 120 marks is available in each of tiers 3–5, 4–6, 5–7 and 6–8.

It is recommended that the written papers are taken on different days.

Questions are of a variety of types. Some are context-free, but others are placed within everyday, classroom or mathematical contexts. Some questions are routine tests of skill while others assess application or understanding. Pupils may be required to organise multi-step calculations for themselves. Some questions ask pupils to explain their reasoning.

In the tier 4–6, 5–7 and 6–8 papers, the formula for the area of a trapezium will be given as $\frac{1}{2}(a+b)h$.

In answering questions on the written papers, pupils may wish to use symbols for unevaluated powers or roots in their working and answers. For example, working and answers could involve symbols such as $\sqrt{5}$ or 5π. Correct answers including such symbols will attract full marks unless the question explicitly requires a numerical approximation. Correct working including such symbols will attract all relevant marks for working.

In some questions, units may not be given in the answer space and no prompts for the units will be given. Pupils will be expected to include units when they are not provided to gain all the marks allocated for that question.

Where a probability is numerically evaluated, it should be given as a fraction, decimal or percentage. Ratios will not be accepted. For example: ½, 0.5 or 50% will be accepted but '1:1', '1 to 1', 'evens', '1 out of 2' or '1 in 2' will not.

Mental mathematics test

The 30-mark mental mathematics test will take about 20 minutes to administer. Each question is worth one mark. The test should be administered using the CD or cassette, although a transcript is also provided in case equipment malfunctions on the day of the test. Pupils hear each question twice, and are then given 5, 10 or 15 seconds to write their response on the pupil answer sheet.

Pupils taking the tier 4–6, 5–7 or 6–8 written tests must take the higher tiers mental mathematics test. Pupils taking the 3–5 written tier must take the lower tier mental mathematics test.

All tests assess concepts from attainment targets 2, 3 and 4, with equal emphasis being given to the levels covered. It is not recommended that all three tests are administered on the same day.

Summary of the year 9 optional tests

Paper 1 All tiers	Paper 2 All tiers	Mental mathematics Lower and higher tiers
60 minutes	60 minutes	20 minutes
60 marks	60 marks	30 marks

Access arrangements

These tests have been designed to be accessible to the majority of pupils working at the levels that the tests assess. A small number of pupils may require additional arrangements to be made in order for them to access the tests.

For some pupils, for example those who suffer from attention-related difficulties, breaking the tests into shorter sessions may be beneficial. For others, working separately away from the main group with an assistant might aid concentration and more closely resemble their normal working conditions.

If you have chosen to use the Year 9 optional test in mathematics with the full cohort, you are free to make adaptations to the tests that will improve their accessibility for pupils with special educational needs and for pupils for whom English is an additional language. In making any changes to the way the tests are used, the focus should be on the assessment needs of the individual pupil. Any adaptations should be similar to those made to the materials which pupils work with in the classroom.

Examples of appropriate adaptations

School-based adaptations to the tests may include:

- allowance of up to 25% additional time
- use of readers, prompters, signers and amanuenses
- provision of tactile shapes and number cards
- use of transcripts and word processors
- separating the tests into sections, taping, photocopying onto coloured paper, use of coloured overlays, use of apparatus
- enhancing the shading on diagrams, including charts and graphs, to increase visual clarity
- enlarging diagrams, cutting them out, embossing or mounting them on card or other material according to normal classroom practice
- translation of words or phrases in the test papers that are likely to prove difficult for pupils for whom English is an additional language, and also if required for pupils who use British sign language (BSL) or other sign-supported communication
- use of bilingual dictionaries.

Access arrangements should not provide an unfair advantage. It is important to ensure that any assistance given does not alter the nature of the test questions, and that any answer given is the pupil's own.

Modified versions of the tests

Modified large print, enlarged print and braille test papers for visually impaired pupils, and modifications for the administration of the mental mathematics test to pupils with hearing impairment, are available from the QCDA modified test agency. Additional guidance notes for teachers administering the modified versions of the tests are supplied with the test papers.

If you have any questions about ordering the modified tests, contact the QCDA modified optional test agency on: 0300 303 3019

For further guidance on access arrangements please refer to *Access arrangements for key stage 3 non-statutory tests*, available on the QCDA *Tests and exams support* website at: http://testsandexams.qcda.gov.uk/

Administering the written papers

This information is provided for anyone who is involved in administering the tests, including teachers, other members of school staff, and other adults who may be assisting in test administration. Further guidance can be found on pages 90–93.

The tests should be carried out under test conditions; they may be held in a school hall, classroom or any other suitable accommodation.

Equipment needed for the written papers

In addition to pens, pencils, rubbers and rulers, the following equipment will need to be available to pupils when they take the written papers:

Paper 1: Tracing paper and a mirror (optional) – tier 3–5 only.

Paper 2: Calculator – tiers 3–5 and 4–6.
Scientific or graphic calculator – tiers 5–7 and 6–8.

Pupils must not have access to a calculator during Paper 1.

Timing

Pupils should be given 60 minutes to complete each written test. You may indicate to the pupils when they are halfway through the time allowed for the test, and again a few minutes before they have to stop.

Introducing the written tests

Test administrators are advised to draw pupils' attention to the 'Remember' section on the front cover of the test booklet, and to the instructions on page 2. Care should be taken when distributing the papers to ensure each pupil is given the correct tier for the test.

Examples of what might be said at the beginning of the tests are given below. Test administrators might find these useful when preparing opening comments for the mathematics tests.

- *This is the year 9 mathematics test Paper 1 [or Paper 2].*
- *The test is one hour long.*
- *For Paper 2, make sure you have the same tier as you had for Paper 1.*
- *Check the list of equipment on the front cover of your paper, to make sure you have what you may need.*
- *Write your name, class and the date on the front of the test paper.*
- *The test starts with easier questions. Try to answer all the questions in the booklet.*
- *Write all your answers and working on the test paper – do not use rough paper. Marks may be awarded for your working even if your answer is wrong.*

- *The number of marks allocated to each part of a question is indicated beside each question. Where two or three marks are available, two or three distinct points are required for a full answer.*
- *Remember to check your work carefully.*
- *I will tell you when you are halfway through the test and also tell you when you are into the last five minutes. I will tell you when the test is over and when to stop writing.*
- *If you have any urgent questions during the test, you should put your hand up and wait for someone to come to you. You must not talk to each other.*
- *You should now open your test booklet. The test has started.*

For Paper 2:

- *You may use a calculator in this test. Make sure you have your calculator and that it is working properly.*

Helping pupils during the tests

Teachers should ensure that pupils are clear about what they have to do but should not provide help with the mathematics being tested. Teachers should not help by explaining specific mathematical terms, nor by interpreting graphs or mathematical tables or diagrams.

If a pupil asks for clarification of a mathematical symbol or notation then the teacher may read it to the pupil but should not indicate the operation or process to be used.

Administering the mental mathematics test

The mental mathematics test is recorded on CD and cassette and consists of 30 questions with a recorded running time of approximately 20 minutes. The recording starts with instructions to pupils and these are followed by the questions. There are two opportunities for the teacher to pause the CD or cassette, each one indicated by a bleep. The first pause comes near the beginning of the recording, once the instructions have been given. This will allow the teacher to clarify any instructions that have not been understood by the pupils. The second pause follows the practice question. After this second pause, the recording should be allowed to play without interruption.

Equipment needed for the mental mathematics test

Teachers administering the mental mathematics test will need a CD or cassette player.

Pupils should only have pens or pencils. They should not have rubbers, rulers, calculators, any mathematical equipment or access to paper for working out answers.

Introducing the mental mathematics test

Ensure that the pupils understand that:

- they must complete the test on their own
- they will be told how long they have to answer each question and that the time will increase from 5 to 10 to 15 seconds as the test progresses through the three sections
- for some of the questions, the information they will need is included above or beside the answer box on the pupil answer sheet
- they are not allowed to use a calculator or any other mathematical equipment
- if they want to change their answer, they should put a cross through their first answer
- they should answer as many questions as they can. If they find a question too difficult, they should put a cross in the answer box and wait for the next question
- they will not be allowed to ask any questions once the test has started
- the small box to the right of each answer box is for marking use only.

Emergency use of the transcript

This section contains a transcript of the lower and higher tiers year 9 mental mathematics test. It should be used only in the event of an equipment failure. In such an event you should follow the instructions below.

For Lower and Higher tier tests:

1 You must have access to a clock or watch that measures accurately in seconds.

2 Read out the following script, using exactly these words:

Listen carefully to the instructions I am going to give you. After I have finished reading them, there will be time for you to ask any questions you might have. However, you will not be able to ask any questions once the test has begun.

I will start by reading a practice question. Then I am going to ask you 30 questions for the test. On your sheet there is an answer box for each question, where you should write the answer to the question and nothing else. You should work out the answer to each question in your head, but you may jot things down outside the answer box if this helps you. Do not try to write down your calculations because this will waste time and you may miss the next question. For some of the questions, important information is already written down for you on the sheet.

I will read out each question twice. Listen carefully both times. You will then have time to work out your answer. If you cannot work out an answer, put a cross in the answer box. If you make a mistake, cross out the wrong answer and write the correct answer next to it. There are some easy and some harder questions so don't be put off if you cannot answer a question.

3 Pause and answer any questions that the pupils have.

4 Read out the following:

Here is the practice question to show you what to do. I will read the question twice, and you will have five seconds to work out the answer and write it in the answer box.

Add ten to the number on your answer sheet.

5 Repeat the question

Add ten to the number on your answer sheet.

6 Wait 5 seconds (measured accurately using a clock or watch), then read out the following:

Now put down your pen or pencil.

7 Pause and answer any questions that the pupils have. When they are ready to begin the test, tell the pupils that you will not be able to answer any further questions, or interrupt the test, once you have started reading out the question.

8 The questions follow. They must be read out exactly as written. Start by stating the question number, then read out each question twice in quick succession before leaving the 5-, 10- or 15- second response time. These timings must be strictly adhered to.

9 At the end of the test, tell the pupils to put down their pens or pencils, then collect their answer sheets.

Introducing the mental mathematics test

Lower tier test

'Now we are ready to start the test.

For the first group of questions you will have 5 seconds to work out each answer and write it down.'

1	Round six pounds and fifty-three pence to the nearest pound.
2	Add thirty-eight and nineteen.
3	Multiply nine by four.
4	Write in figures the number two thousand and seventy-four.
5	How many millilitres are there in half a litre?
6	What number is three less than minus two?
7	What is forty-two point six divided by ten?
8	What is the square root of thirty-six?
9	An event is certain to happen. Write down the probability that it will happen.

'For the next group of questions you will have 10 seconds to work out each answer and write it down.'

10	In a survey, pupils were asked whether they had school dinner or not. The pictogram shows the results. Nine pupils said yes. How many pupils said no?
11	A sequence of numbers starts at forty-one and goes down in steps of three. Write the next two numbers in the sequence.
12	Packs of washing powder cost one pound forty-nine pence each. Tim bought two packs. How much money did he spend on washing powder?
13	The two fifty-five pm train was ten minutes late leaving the station. At what time did the train leave?
14	Shade one third of the rectangle on your answer sheet.
15	The diagram on your answer sheet shows what musical instruments some pupils play. How many pupils play guitar?

'Now turn over your answer sheet.'

16	Double one hundred and twenty-seven.
17	Look at the equation. What is the value of m when n is twelve?
18	Work out ten per cent of fifty pounds.
19	Each side of a regular hexagon is four centimetres long. What is its perimeter?
20	Look at the scale on your answer sheet. What number is the arrow pointing to?
21	Some pupils in a class were asked whether or not they owned a bicycle. The bar chart shows the results. How many pupils were asked altogether?
22	Look at the graph on your answer sheet. It shows the exchange rate between pounds and euros. How many euros have the same value as twenty pounds?
23	How many faces does a triangular-based pyramid have?
24	What is the value of the expression on your answer sheet when k is three?

'For the next group of questions you will have 15 seconds to work out each answer and write it down.'

25	Look at the shapes drawn on a square grid. Tick the shape that does not have any lines of symmetry.
26	Add together five multiplied by five and four multiplied by four.
27	Tom saved twenty pence pieces. He saved six pounds and forty pence altogether. How many twenty pence pieces is that?
28	Look at the triangle on your answer sheet. Angle a is fifty-five degrees. How many degrees is angle b?
29	Add three-quarters to one and a half.
30	Look at the shaded triangle drawn on a centimetre square grid. What is the area of this triangle?

'Put your pens down. The test is finished.'

Higher tiers test

'Now we are ready to start the test.

For the first group of questions you will have 5 seconds to work out each answer and write it down.'

1	The river Nile is six thousand six hundred and fifty kilometres long. Round this number to the nearest thousand.
2	Look at the expression on your answer sheet. Write it as simply as possible.
3	What is the sum of the angles in a triangle?
4	Subtract three from minus seven.
5	Look at the expression on your answer sheet. Double it.
6	Write the ratio fifteen to thirty as simply as possible.
7	The length of a pencil is seventeen centimetres, to the nearest centimetre. What is the least value it could be?

'For the next group of questions you will have 10 seconds to work out each answer and write it down.'

8	Write down the smallest positive number that is both a multiple of three and a multiple of five.
9	Your answer sheet shows the coins I have in my pocket. Which coin is the mode?
10	A square has a side length of eight centimetres. What is its perimeter?
11	I spend two pounds fifteen pence in a shop. How much change should I receive from a five pound note?
12	The rule for a sequence is subtract seven each time. If the first number is three write the next two numbers in the sequence.
13	What is three-quarters of sixty?
14	A rectangle has a length of eight centimetres and an area of forty-eight square centimetres. What is the width of the rectangle?
15	A 3-D shape has a square base and four triangular faces. What is the mathematical name of the 3-D shape?
16	Look at the number. Halve it.
17	Look at the equation. What is the value of x when y is fourteen?

'Now turn over your answer sheet.'

18	Look at the kite. What is the size of angle m?
19	Divide minus twenty-four by eight.
20	Look at the numbers. Put a ring round the number that is closest to one.
21	A car travels three kilometres in six minutes. What is the car's average speed in kilometres per hour?
22	Look at the expression. Multiply out the brackets.

'For the next group of questions you will have 15 seconds to work out each answer and write it down.'

23	The scale on a map is one centimetre to five kilometres. The distance between two houses is twenty kilometres. What is the distance between these two houses on the map?
24	Write down a two-digit number that is a multiple of four with digits that add to six.
25	Look at the numbers. Put a ring round the median.
26	A school team played twenty-four games. They won eight games. Use the pie chart to work out how many games ended in a draw.
27	Water flows from a tap at the rate of eleven litres per minute. How much water will flow if the tap is left on for one hour?
28	A bus driver recorded the number of people who got on her bus each morning. The stem and leaf diagram shows the results after two weeks. On how many mornings were there fewer than twenty-five people?
29	Look at the calculation. Give an approximate answer.
30	Look at the diagram. Write down the value of k.

'Put your pens down. The test is finished.'

Introduction to the mark scheme

The structure of the mark scheme

Pages 19–25 of this booklet contain guidelines on how to mark the tests. This general guidance should be observed unless specific instructions to the contrary are given, and should be read before marking begins. It could form the basis of departmental INSET to ensure standardisation of marking within, and between, schools.

The marking information for questions within the written tests is set out in the form of tables which start on page 26 (Paper 1) and page 51 (Paper 2). The columns on the left-hand side of each table provide a quick reference to the question number, question part and the total number of marks available for that question part. There is also an indication of where it may be necessary to refer to the general guidance.

The **Correct response** column usually includes 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 correct working, and whether the marks are independent or cumulative
- examples of some different types of correct response, including the most common.

The **Additional guidance** column indicates alternative acceptable responses, and provides details of specific types of response that are minimally acceptable or unacceptable. Other guidance, such as when 'follow-through' is allowed, is provided as necessary.

Questions with a *Using and applying mathematics* element are identified in the mark scheme by an encircled U with a number that indicates the significance of using and applying mathematics in answering the question. The U number can be any whole number from 1 to the number of marks in the question.

For some graphical and diagrammatical responses, including those in which judgements on accuracy are required, **marking overlays** have been provided as the centre pages of this booklet.

Recording marks on the test paper

All questions, even those not attempted by the pupil, should be marked, with a 1 or a 0 entered in each marking space. Where two marks can be split into one mark gained and one mark lost, with no explicit order, then this should be recorded by the marker as 1
0

The total marks awarded for a double page can be written in the box at the bottom of the right-hand page, enabling the correct total to be more easily transferred to the front of the test paper.

Marking the mental mathematics test

Guidance for marking the mental mathematics test starts on page 79 of this booklet. For convenience, a copy of the transcript has been included opposite the mark scheme. The general guidance for marking the written tests, which starts on page 19, also applies to marking the mental mathematics test.

All questions, even those not attempted by the pupil, should be marked with a 1 or a 0 entered in each marking space.

Finding levels

A total of 150 marks is available at each tier (60 from Paper 1, 60 from Paper 2 and 30 from the mental mathematics test). The sum of the marks allocated from these three components indicates the level at which the pupil is working.

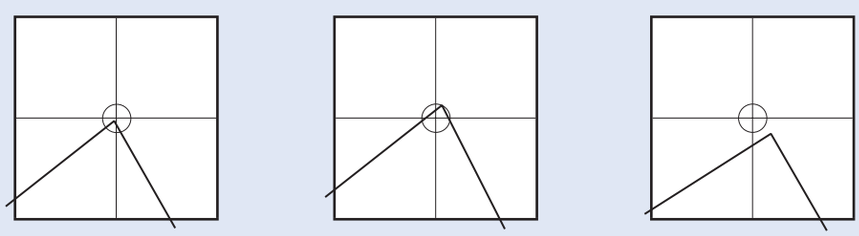
The level thresholds can be found on pages 88–89.

General guidance for marking

Answers that are numerically or algebraically equivalent are acceptable unless the mark scheme states otherwise.

In order to ensure consistency of marking, the most frequent procedural queries are listed on the following two pages with the prescribed correct action. This is followed by further guidance relating specifically to the marking of questions that involve money, negative numbers, time, measures, coordinates, probability or algebra. Unless otherwise specified in the mark schemes, markers should apply the following guidelines in all cases.

What if…	Marking procedure	
The pupil's response is numerically or algebraically equivalent to the answer in the mark scheme.	Markers should award the mark unless the mark scheme states otherwise.	
The pupil's response does not match closely any of the examples given.	Markers should use their judgement in deciding whether the response corresponds with the statement of the requirements given in the 'Correct response' column. Refer also to the 'Additional guidance'.	
The pupil has responded in a non-standard way.	Calculations, formulae and written responses do not have to be set out in any particular format. 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 indicating a response. Any correct method of setting out working, however idiosyncratic, should be accepted. Provided there is no ambiguity, condone the continental practice of using a comma for a decimal point.	
There appears to be a misreading affecting the working.	This is when the pupil misreads the information given in the question and uses different information without altering the original intention or difficulty level of the question. For each misread that occurs, deduct one mark only.	
No answer is given in the expected place, but the correct answer is given elsewhere.	Where a pupil has shown understanding of the question, the mark(s) should be given. In particular, where a word or number response is expected, a pupil may meet the requirement by annotating a graph or labelling a diagram elsewhere in the question.	
The final answer is wrong, but the correct answer is shown in the working.	Where appropriate, detailed guidance will be given in the mark scheme and must be adhered to. If no guidance is given, markers will need to examine each case to decide whether:	
	• the incorrect answer is due to a transcription error	If so, award the mark.
	• in questions not testing accuracy, the correct answer has been given but then rounded or truncated	If so, award the mark.
	• the pupil has continued to give redundant extra working which does not contradict work already done	If so, award the mark.
	• the pupil has continued, in the same part of the question, to give redundant extra working which does contradict work already done.	If so, do not award the mark. Where a question part carries more than one mark, only the final mark should be withheld.
The pupil's answer is correct but the wrong working is shown.	A correct response should always be marked as correct unless the mark scheme states otherwise.	

What if…	Marking procedure
The pupil has made a conceptual error.	In some questions, a method mark is available provided the pupil has made a computational, rather than conceptual, error. A computational error is a 'slip' such as writing 4 × 6 = 18 in an otherwise correct long multiplication. A conceptual error is a more serious misunderstanding of the relevant mathematics; when such an error is seen, no method marks may be awarded. Examples of conceptual errors are: • misunderstanding of place value, such as multiplying by 2 rather than 20 when calculating 35 × 27 • subtracting the smaller value from the larger in calculations such as 45 – 26 to give the answer 21 • incorrect signs when working with negative numbers.
The correct response has been crossed or rubbed out and not replaced.	Any legible crossed or rubbed out work that has not been replaced should be marked according to the mark scheme. If the work is replaced, then crossed or rubbed out work should not be considered.
More than one answer is given.	If all answers given are correct, or a correct range is given, the mark should be awarded unless prohibited by the mark scheme. If both correct and incorrect responses are given, no mark should be awarded.
The pupil's answer correctly follows through from earlier incorrect work.	Follow-through marks may be awarded only when specifically stated in the mark scheme, but should not be allowed if the difficulty level of the question has been lowered. Either the correct response or an acceptable follow-through response should be marked as correct.
The answer is correct but, in a later part of the question, the pupil has contradicted this response.	A mark given for one part should not be disallowed for working or answers given in a different part, unless the mark scheme specifically states otherwise.
The pupil's accuracy is marginal according to the overlay provided.	Overlays can never be 100% accurate. However, provided the answer is within or touches the boundaries given, the mark(s) should be awarded.
The pupil has drawn lines which do not meet at the correct point.	Markers should interpret the phrase 'lines not accurate' to mean meeting within or on a circle of radius 2mm with centre at the correct point.  within the circle accepted — on the circle accepted — outside the circle not accepted

Responses 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, eg £3.20p £3 20 pence £3 20 £3,20 £3-20 £3:20 320p with £ sign crossed out	✗ Incorrect placement of pounds or pence, eg £320 £320p Incorrect placement of decimal point, or incorrect use or omission of 0, eg £3.2 £3 200 £32 0 £3-2-0
Where the p sign is given *for example:* *40p*	✓ 40p Any unambiguous indication of the correct amount, eg £0.40p £.40p £0.40 with p sign crossed out	✗ Incorrect or ambiguous use of pounds or pence, eg 0.40p £40p
Where no sign is given *for example:* *£3.20, 40p*	✓ £3.20 320p 40p £0.40 Any unambiguous indication of the correct amount in £ or p as shown above At **levels 3 and 4 only** also accept omission of units, eg 3.20 320 40 0.40	✗ Omission of final zero, eg 3.2 0.4

Responses involving negative numbers

	✓ Accept	✗ Do not accept
For example: *–2*		To avoid penalising the error below more than once within each question, do not award the mark for the *first* occurence of the error within each question. Where a question part carries more than one mark, only the final mark should be withheld. ✗ Incorrect notation, eg 2–

Responses involving time

	✓ Accept	× Do not accept
A time interval *for example:* *2 hours 30 minutes*	✓ 2 hours 30 minutes Any unambiguous, correct indication, eg $2\frac{1}{2}$ hours 2.5 hours 2h 30 2h 30 min 2 30 Digital electronic time, ie 2:30	× Incorrect or ambiguous time interval, eg 2.3 hours 2.3h 2h 3 2.30 min 2.30 2-30 2,30 2.3
A specific time *for example:* *8:40am, 17:20*	✓ 8:40am 8:40 twenty to nine Any unambiguous, correct indication, eg 08.40 8.40 0840 8 40 8-40 8,40 Unambiguous change to 12 or 24 hour clock, eg 17:20 as 5:20pm or 17:20pm	× Incorrect time, eg 8.4am 8.40pm Incorrect placement of separators, spaces, etc or incorrect use or omission of 0, eg 840 8:4:0 8.4 084 84

Responses involving measures

	✓ Accept	× Do not accept
Where units are given *(eg kg, m, l)* *for example:* *8.6kg*	✓ 8.6kg Any unambiguous indication of the correct measurement, eg 8.60kg 8.6000kg 8kg 600g	× Incorrect or ambiguous use of units, eg 8600kg

Note

If a pupil leaves the answer box empty but writes the answer elsewhere on the page, then that answer must be consistent with the units given in the answer box and the conditions listed above.

If a pupil changes the unit given in the answer box, then their answer must be equivalent to the correct answer, using the unit they have chosen, unless otherwise indicated in the mark scheme.

Responses involving coordinates

	✓ Accept	✖ Do not accept
For example: *(5, 7)*	✓ Unconventional notation, eg (05, 07) (five, seven) $(\overset{x}{5},\ \overset{y}{7})$ $(x=5,\ y=7)$	✖ Incorrect or ambiguous notation, eg (7, 5) $(\overset{y}{7},\ \overset{x}{5})$ $(5x,\ 7y)$ $(5^x,\ 7^y)$ $(x-5,\ y-7)$

Responses involving probability

	✓ Accept	! Take care ✖ Do not accept
A numerical probability should be expressed as a decimal, fraction or percentage only. *for example:* *0.7* $\frac{7}{10}$ *70%*	✓ Equivalent decimals, fractions and percentages, eg 0.700 $\frac{70}{100}$ $\frac{35}{50}$ 70.0%	The first **four** categories of error below should be ignored if accompanied by an acceptable response, but should not be accepted on their own. However, to avoid penalising the first **three** types of error below more than once within each question, do not award the mark for the *first* occurrence of each type of error unaccompanied by an acceptable response. Where a question part carries more than one mark, only the final mark should be withheld.
	✓ A probability correctly expressed in one acceptable form which is then incorrectly converted, but is still less than 1 and greater than 0, eg $\frac{70}{100} = \frac{18}{25}$	! A probability that is incorrectly expressed, eg 7 in 10 7 over 10 7 out of 10 7 from 10 ! A probability expressed as a percentage without a percentage sign. ! A fraction with other than integers in the numerator and/or denominator. ! A probability expressed as a ratio, eg 7:10 7:3 7 to 10 ✖ A probability greater than 1 or less than 0

Responses involving the use of algebra

	✓ Accept	! Take care ✖ Do not accept
For example: $2 + n$ $n + 2$ $2n$ $\frac{n}{2}$ n^2	✓ Unambiguous use of a different case or variable, eg N used for n x used for n	! Unconventional notation, eg $n \times 2$, or $2 \times n$, or $n2$ or $n + n$ for $2n$ $n \times n$ for n^2 $n \div 2$ for $\frac{n}{2}$ or $\frac{1}{2}n$ $2 + 1n$ for $2 + n$ $2 + 0n$ for 2 Within a question that demands simplification, do not accept as part of a final answer involving algebra. Accept within a method when awarding partial credit, or within an explanation or general working. ✖ Embedded values given when solving equations, eg in solving $3x + 2 = 32$, $3 \times 10 + 2 = 32$ for $x = 10$ To avoid penalising the two types of error below more than once within each question, do not award the mark for the *first* occurrence of each type within each question. Where a question part carries more than one mark, only the final mark should be withheld.
	✓ Words used to precede or follow equations or expressions, eg $t = n + 2$ tiles or tiles $= t = n + 2$ for $t = n + 2$	! Words or units used within equations or expressions, eg n tiles + 2 n cm + 2 Do not accept on their own. Ignore if accompanying an acceptable response.
	✓ Unambiguous letters used to indicate expressions, eg $t = n + 2$ for $n + 2$	✖ Ambiguous letters used to indicate expressions, eg $n = n + 2$ for $n + 2$

Mark scheme for Paper 1

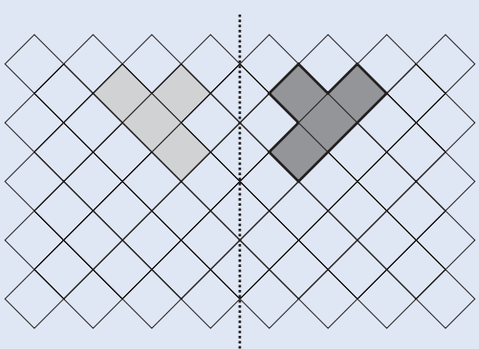
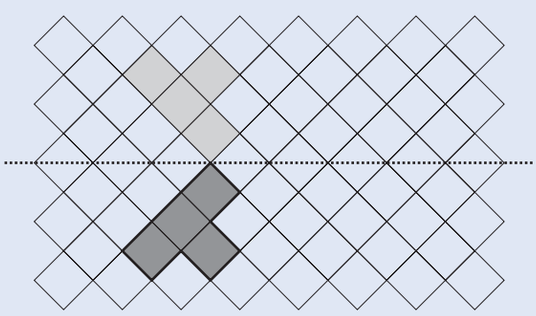
Tier & Question						**Light bulbs**
3–5	4–6	5–7	6–8			
1				**Mark**	**Correct response**	**Additional guidance**
a				**1m**	40 and 60, in either order	
b				**1m**	Coloured	✓ ***Unambiguous indication*** eg • C

Tier & Question						**Number grid**
3–5	4–6	5–7	6–8			
2				**Mark**	**Correct response**	**Additional guidance**
a				**1m**	132	
b				**1m**	Indicates two different squares with a total of 132	✓ ***Squares not shaded but a correct pair of numbers indicated in working*** Note to markers: Four squares with a total of 264 will usually create a pattern with rotation symmetry of order 2 about the number 66 on the grid, eg • However, the correct indications of either 51 and 81 or 61 and 71 do not show this symmetry ! ***Follow-through*** For part (b), accept any two squares shaded that sum to their (a)
c				**1m**	264	! ***Follow-through*** For part (c), accept 2 × their (a), provided their (a) is a three-digit number or the sum of their two shaded squares in part (b) + 132 or the sum of their two shaded squares in part (b) + their (a) provided their (a) is a three-digit number

Drinks

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
3 a				**2m**	124	
				or		
				1m	Shows a complete correct method with not more than one computational error eg • 24 42 58 *126 (error)* • 24 + 42 = *64 (error)*, 64 + 58 = 122	
b				**1m**	£ 7(.00)	

Reflections

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
4				**1m**	Shows the correct reflection, ie 	✓ ***Reflection not shaded*** ! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear
				1m	Shows the correct reflection, ie 	

True or false

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
5						
				2m	Gives all four correct responses, ie ☑ ☒ ☑ ☒	! ***Other indication*** Accept provided unambiguous. However do not accept blank for ☒
				or		
				1m	Gives any three correct responses	

Measures

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
6						
				1m	Indicates a watering can, ie ☐ ☐ ☑ ☐	

Missing numbers

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
7						
				1m	164	
				1m	54	

Scale balance

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
8						
				1m	3	

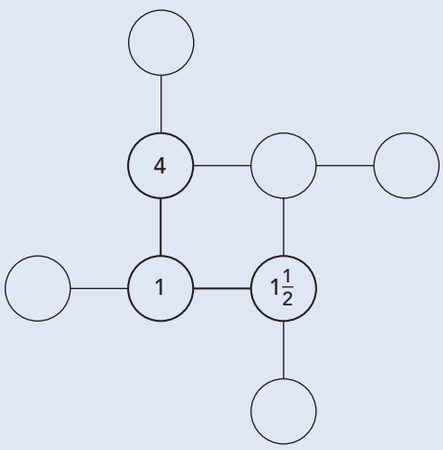
Birthday

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
9						
a				1m	Jun(e) 26th	! ***Month omitted*** For part (a), condone eg, accept • 26 For part (b), do not accept
b				1m	Nov(ember)	! ***Redundant information*** Ignore eg, for part (b) accept • Friday, Nov 5th 2003 ! ***Date given in different form*** For part (a), accept only if unambiguous eg, for part (a) accept • 26/6 • 6/26 (US notation) For part (b), accept • 11

Runners

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
10						
				1m	6	
				1m	11	
				U1		

Add to 8

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
11	1			**2m**	Gives all three correct values, ie 	✓ ***Equivalent fractions or decimals***
				or **1m**	Gives any two correct values in the correct places	
				U1		

Clubs

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
12	2					
a	a			**1m**	Indicates two symbols for Girls	! ***Features of faces omitted or circles inaccurate in size*** Accept provided the pupil's intention is clear ! ***Response includes half symbols*** eg • Condone if unambiguous
b	b			**1m**	5	
				U1		

Mark scheme for Paper 1

Lesson time

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
13	3					
a	a			1m	10:10	! ***Response uses the 24 hour clock*** Accept provided the time is correct eg, accept • 14:35 for part (b) eg, do not accept • 22:10 for part (a) • 00:15 for part (c)
b	b			1m	(0)2:35	
c	c			1m	12:15	! ***Response includes both start and finish times*** Condone

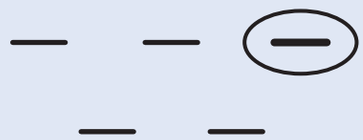
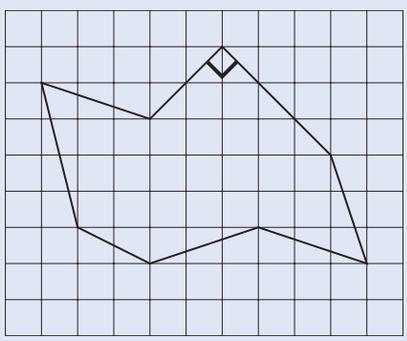
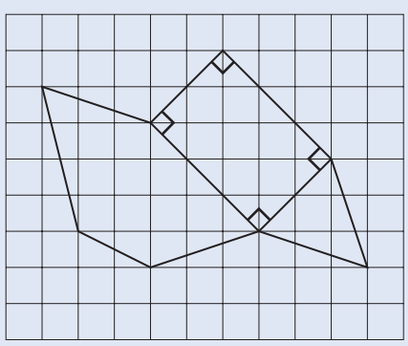
Balancing

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
14	4					
a	a			1m	3	
b	b			1m U1	2	

Plastic bottles

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
15	5					
a	a			1m	8	
b	b			1m	90	

Shape on a grid

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
16	6					
a	a			1m	Indicates octagon, ie 	
b	b			1m	Indicates the right angle on the shape eg • 	✓ ***Unambiguous indication*** ! ***Indication of vertex rather than angle*** eg • Vertex circled Condone ! ***Extra line(s) added to shape to create additional right angle(s)*** Ignore alongside a correct response but do not accept alone eg, accept •  × ***Incorrect angle labelled as a right angle***

Tier & Question						***ab***
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
17	7					
a	a			**1m**	Completes the row for 5 correctly eg • $a + b$ • $b + a$ • $3b - 2a$ • $a + 3$ • $b + 2$ • $2 \times a + 1$	! ***Unsimplified expression or unconventional notation*** eg, in part (a) • $b + b + b - a - a$ • $1a + 1b$ Condone × ***Responses given are not algebraic*** eg, do not accept • 3 + 2 for 5 • 2 × 2 + 2 × 2 for 8
				1m **U1**	Completes the row for 8 correctly eg • $2b + a$ • $4 \times a$ • $a + 6$ • $b + 5$ • $a \times b + a$ • $2 \times a \times a$	
b	b			**1m**	Gives $a = 3$	
				1m **U1**	Gives $b = 4$	! ***Follow-through*** Accept follow-through as 7 – their value for a

Tier & Question						**Finding points**
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
18	8					
				2m ***or*** **1m**	(12, 9) Gives a correct x-coordinate or a correct y-coordinate for P, even if the other is incorrect or omitted or Shows or implies that the width of the rectangle is 4 units eg • 9 – 5 = 4 • or Gives P as (9, 12)	× ***Response of (0, 9) or (12, 5)*** ! ***Improper subtraction of coordinates*** eg, accept • (0, 9) – (0, 5) = (0, 4) as evidence that the width of the rectangle is 4

Changing units

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
19	**9**					
				1m	Gives an answer between 5.4 and 5.6 inclusive	

Conversion graph

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
20	**10**	**1**				
				1m	Gives a value between 47.5 and 48.5 inclusive	
				1m	Gives a value between 43 and 44 inclusive	

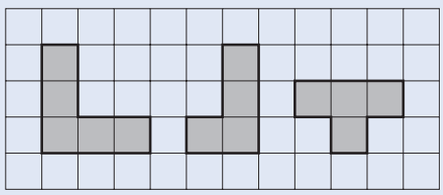
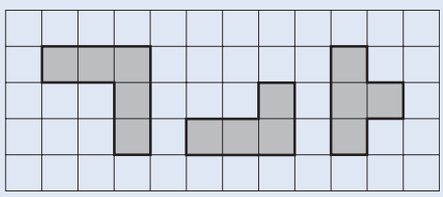
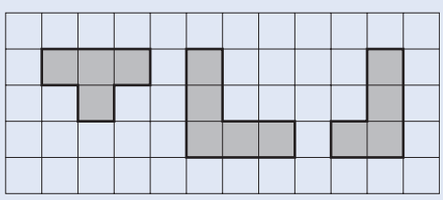
Brackets

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
21	**11**	**2**				
a	a	a		**1m**	16	
b	b	b		**1m**	Puts brackets in the correct positions to make the calculation correct, ie 2 + 16 ÷ (2 + 6) = 4	! ***Multiple pairs of brackets*** Accept provided the brackets are paired and unambiguous, even if redundant eg, accept • 2 + (16 ÷ (2 + 6)) = 4

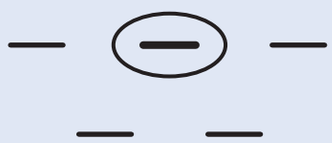
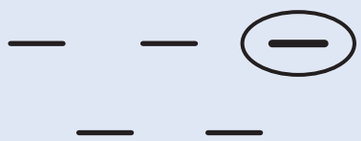
Train journey

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
22	**12**	**3**				
a	a	a		**1m**	**5** hours and **2** minutes	
b	b	b		**1m**	Enters the correct time in the table, ie 18 01	! ***Response uses the 12 hour clock*** Accept provided there is correct indication of pm, even if informal eg, accept • 6 01pm • 6:01 evening • 1 min past 6 pm

Cubes

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
23	13	4		**2m**	Uses the grid to draw all three correct views in any orientations eg •  • 	✓ ***Internal lines and/or shading omitted*** ! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear
				or **1m**	Draws two correct views in any orientations or Draws all three correct shapes in any orientations, even if the order is not correct eg • 	
				U2		

Largest value

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
24	**14**	**5**				
a	a	a		**1m**	Indicates only $10 - y$, ie 	! ***Correct expression indicated but incorrect values shown*** Condone
b	b	b		**1m**	Indicates only y^2, ie 	
c	c	c		**1m** **U1**	Gives a value such that $y < 1.5$	✓ ***Fractions, decimals and negative values***

Temperature

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
25	**15**	**6**				
a	a	a		**1m**	Gives a time between 9:40 and 9:50 inclusive	! ***Use of 24-hour clock*** Condone provided time is correct eg, accept • 09:45
b	b	b		**1m**	Gives a value between 22.8 and 23.2 inclusive, or equivalent	
c	c	c		**1m**	Gives a value between 4.8 and 5.2 inclusive, or equivalent	

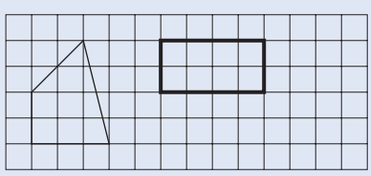
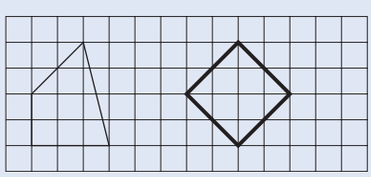
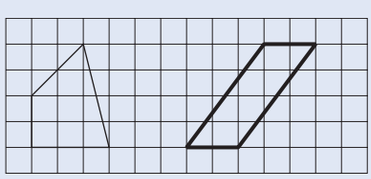
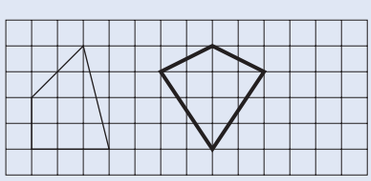
UK population

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
26	**16**	**7**				
a	a	a		**1m**	Gives a value between 1.5 and 1.9 inclusive	✓ ***Equivalent fractions or decimals*** ! ***Answer of 2*** Accept if no incorrect working shown
b	b	b		**1m**	Indicates 5%, ie ☐ ☑ ☐ ☐	

Halfway

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
27	17	8				
a	a	a		1m	2	
b	b	b		1m	–28	

Quadrilateral

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
28	18	9		2m	Draws a different quadrilateral with an area of 8 squares eg •  •  •  • 	! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ! ***Vertices not on intersections of grid or on grid lines*** Accept provided the vertices are within 2mm of positions that would give their shape an area of 8 × ***For 2m, quadrilateral drawn is a rotation or reflection of the one given***
				or 1m	Shows the value 8 or Draws the given quadrilateral repeated, but reflected and/or rotated or Draws a straight-sided shape with an area of 8 that is not a quadrilateral	

Equation

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	19	**10**	**1**			
	a	a	a	**1m**	980	
	b	b	b	**1m**	112	

Angle k

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	20	**11**	**2**			
				2m	35	
				or		
				1m	Shows the values 50 and 95 or the value 145 or Shows a complete correct method with not more than one computational error eg • 180 – 130 = 50, 180 – 85 = *105 (error)*, 180 – 50 – 105 = 25 • (130 + 85) – 180	

Terms

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	21	**12**	**3**			
				2m	Gives the values –40 and –130 in either order	
				or		
				1m	Shows the value –40 or –130 with the other value incorrect or omitted or Shows the value 360	! ***For 1m, follow-through from an incorrect value*** Accept provided both values are negative and their difference is 90

Values

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	22	**13**	**4**			
	a	a	a	**1m**	Gives two different values of x that are less than or equal to zero eg • –1 then –2 • $-\frac{1}{4}$ then –0.1 • 0 then –10	
	b	b	b	**1m**	4	! ***Range of answers given*** Condone eg, accept • y is less than or equal to 4

Eurovision song contest

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	23	**14**	**5**			
	a	a	a	**1m**	Gives a value greater than 265 but less than 270	
	b	b	b	**1m**	9	
	c	c	c	**1m**	Gives a value greater than 20 but less than 25	

Prisms

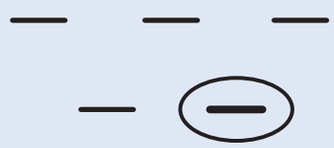
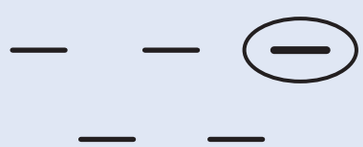
Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	24	**15**	**6**			
	a	a	a	**1m**	Completes the three entries of the table correctly, ie Triangular prism: vertices 6; rectangular faces 3; total faces 5	
	b	b	b	**3m**	Completes all four entries of the table correctly, ie Hexagon(al) prism: 12, 6, 8 Octagon(al) prism: 16, 8, 10	
				or **2m**	Completes three entries correctly	
				or **1m**	Completes two entries correctly	
				U1		

Mark scheme for Paper 1

Fraction size

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	25	**16**	**7**	**2m**	Completes the three numbers correctly, ie 2 2 3 or 3 2 3 or 2 3 3	! ***For 2m or 1m, final value given as 1 or 2*** eg, for 2m • 2 2 1 eg, for 1m • *4 (error)* 2 2 Condone
				or		
				1m	Completes any two of the numbers correctly eg • 3 *3 (error)* 3 or Completes the three numbers so that only one fraction is out of sequence eg	
				U1	• 4 *n (error)* 3	

Ringing expressions

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	26	**17**	**8**			
	a	a	a	**1m**	Indicates $2n + 2$, ie 	
	b	b	b	**1m**	Indicates $n(n + 2)$, ie 	

Mark scheme for Paper 1

Counters

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
	27	**18**	**9**			
				1m	Completes the first two sentences correctly, ie green red	✓ ***Unambiguous indication*** ! ***Numbers given alongside correct colour*** Ignore
				1m	Completes the last sentence correctly, ie red and yellow, in either order	

Age of trees

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
		19	**10**	**1m**	Gives a value between 2.7 and 3.3 inclusive	✓ ***Equivalent fractions or decimals***
				U1		
				1m	Gives a value between 1.1 and 1.4 inclusive	

Removing

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		20	11			
		a	a	2m	Completes the three values in the table correctly, ie 8 24 24	
				or 1m	Completes two of the values correctly	
				1m	Gives at least two correct units in the correct positions	Markers may find the following useful: cm^3 cm^2 cm
		b	b	2m	Makes all three correct decisions, ie Has increased / Has stayed the same / Has decreased ✓ ✓ ✓	
				or 1m	Makes two correct decisions	
				U1		

Thinking difference

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		21	12			
				1m	7	
				1m	1	

Tier & Question						
3–5	4–6	5–7	6–8			
		22	13	Mark	Correct response	Additional guidance
				Marking overlay available		**Lines and brackets**
		a	a	**1m**	Indicates $y = 3(x + 2)$ and gives a correct explanation eg • $y = 3(x + 2)$ crosses the y-axis at 6 because when $x = 0$, $y = 3 \times 2 = 6$ • $y = 3x + 2$ would have a y-intercept at 2, so it can't be this one • For $y = 3(x + 2)$, when $x = –2$, $y = 0$, so it crosses the x-axis at –2 • The point (1, 9) is on line A but not B, and fits the equation y = $3(x + 2)$ because when $y = 9$, $x = 1$ ie $y = 3 \times (1 + 2)$ • (0, 6) is not on the line $y = 3x + 2$ because $3 \times 0 + 2 \neq 6$	✓ ***Minimally acceptable explanation*** eg • Crosses the y-axis at 6 • $y = 3x + 2$ crosses the y-axis at 2 • Crosses the x-axis at –2 • When $x = 1$, $y = 9$ since $3 \times 3 = 9$! ***Incomplete explanation*** eg • $y = 3(x + 2)$ crosses at 6 • Crosses the y-axis at 2
				(U1)		
		b	b	**2m**	Draws both straight lines correctly within the tolerances as shown on the overlay	! ***Lines not ruled or accurate*** Accept provided lines are within tolerance for their entire length
				or		
				1m	Draws one straight line correctly within the tolerances as shown on the overlay or Draws two straight lines both with a gradient of 2, but with incorrect y-intercepts or Draws one straight line with y-intercept 2 and another with y-intercept 4, but both lines have incorrect gradients	! ***Lines not of full length*** Condone lines of at least 10cm in length, provided they show the correct y-intercepts

Tier & Question						
3–5	4–6	5–7	6–8			
		23	14	Mark	Correct response	Additional guidance
						Powers and digits
				1m	2187	! ***Gives three answers in an unevaluated form*** eg • 3^7 2^8 or 4^4 2^0 or 4^0 Mark as 0, 0, 1
				1m	256	
				1m	1	

Simplify

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
		24	15			
		a	a	**2m**	$3x^2 + 5x + 4$	✗ ***For 2m, unconventional notation*** eg • $3 \times x^2 + 5x + 4$ • $3xx + 5x + 4$
				or		
				1m	Multiplies out both sets of brackets correctly, even if there is unconventional notation or incorrect further working eg • $3 \times x \times x + 5 \times x + 4$ • $5x - x^2$ and $4x^2 + 4$	
		b	b	**1m**	$x(3 - x)$ or $-x(x - 3)$	! ***Unconventional notation*** eg • $1x(3 - 1x)$ • $x \times 1(3 - x \times 1)$ • $(0 + x)(3 - x)$ Condone

Doing and undoing

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
		25	16			
				1m	One quarter or equivalent	
				(U1)		
				1m	Two-fifths or equivalent	
				(U1)		

Tier & Question						Four lines
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			17			
			a	**1m** **U1**	10	
			b	**2m** ***or*** **1m**	(3.5, 4) Transposes the x and y coordinates, ie (4, 3.5) or Gives either the correct x-coordinate or the correct y-coordinate or Shows or implies at least a correct first step in finding the point of intersection algebraically eg • $4x - 10 = -4x + 18$ • $0 = 8x - 28$ • $2y = 8$ • $8x = 28$ or Shows a correct method for finding at least one of the correct values, with not more than one error eg • $2y = 28$ *(error)*, so $y = 14$ • $0 = -8x + 8$ *(error)*, so $x = 1$ • $(6 - 2) \div 2 + 2$ • $(4 - 3) \div 2 = 1.5$ *(error)*, $3 + 1.5$	✓ ***Equivalent fraction or decimal***

Adding dice

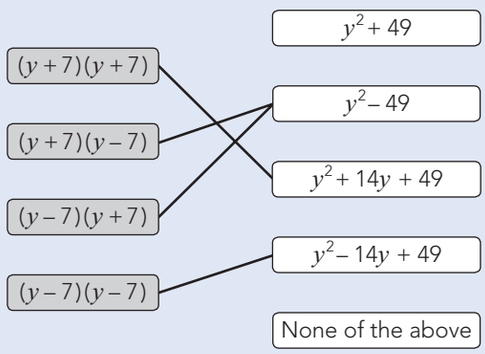
Tier & Question 3–5	4–6	5–7	6–8 18	Mark	Correct response	Additional guidance
			a	1m	$\frac{1}{36}$ or equivalent probability	✓ *0.027(...) or better*
			b	2m	Gives both correct probabilities in their correct positions, ie $\frac{1}{6}$ or equivalent probability $\frac{1}{12}$ or equivalent probability	
				or 1m	Gives one correct probability in its correct position	
			c	1m U1	3, 4, 5, 6 in any order	

Beads

Tier & Question 3–5	4–6	5–7	6–8 19	Mark	Correct response	Additional guidance
				2m	Completes the table correctly, ie	✓ *Equivalent fractions* × *Equivalent decimals*

Number of beads	Fraction
12	$\frac{1}{2}$
2	$\frac{1}{12}$
4	$\frac{1}{6}$
6	$\frac{1}{4}$

	or 1m	Completes at least two of the entries correctly or Shows or implies that 16 is $\frac{2}{3}$ of the total eg • $\frac{2}{3} = 16$ • $\frac{1}{3} = 8$ • There are 24 beads in the bag • $(1 - \frac{1}{12} - \frac{1}{4}) = \frac{8}{12}$ $\frac{8}{12} = 12 + 4$
	U2	• The sum of their two missing numbers of beads is 8

Tier & Question						
3–5	4–6	5–7	6–8			
			20	Mark	Correct response	Additional guidance
						y with 7
				2m	Matches all four expressions correctly, ie  	! ***Expressions on the left matched to more than one expression on the right*** For 2m or 1m, do not accept as a correct match
				or		
				1m	Matches at least two of the expressions correctly	

Tier & Question						
3–5	4–6	5–7	6–8			
			21	Mark	Correct response	Additional guidance
						Ten cards
			a	**1m**	$\frac{2}{5}$ or equivalent probability	
			b	**1m**	$\frac{2}{3}$ or equivalent probability	! ***Probabilities for parts (a) and (b) transposed but otherwise correct*** Mark as 0, 1 ! ***Value rounded*** For $\frac{2}{3}$ accept 0.66(…) or 0.67, or the percentage equivalents

Similarity

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			22			
			a	1m	Indicates the two correct triangles, ie A and D, in either order	✓ ***Indicates triangles 1 and 4***
			b	1m	Gives the missing dimension for triangle P, ie 3 or 27	
				1m	Gives the missing dimension for triangle Q, ie 4.8 or equivalent or $\frac{8}{15}$ or 0.53(…) or equivalent	

Finding y

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			23			
			a	1m	Completes the equation correctly eg • $y^2 + 10^2$ • $100 + y^2$	! ***$(2 + y)^2 = 10^2 + y^2$ seen, followed by incorrect working*** Condone
			b	2m	24	
				or 1m	Shows or implies a correct expansion of $(2 + y)^2$ even if there is incorrect or no further simplification eg • $4 + 4y + y^2$ • $2 \times 2 + 2 \times y + 2 \times y + y \times y$ • $y^2, 4y, 4$	✓ ***Correct expansion seen in part (a)***

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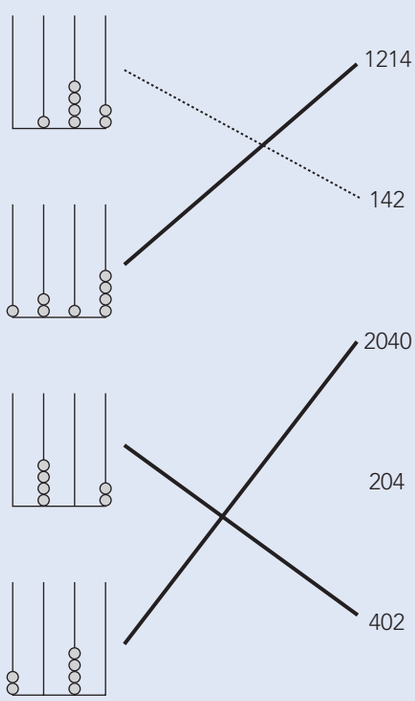
Mark scheme for Paper 2

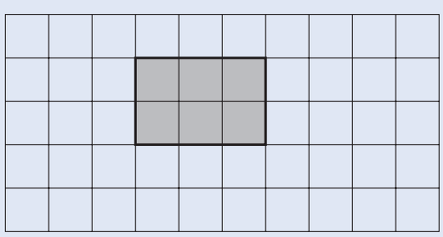
Tier & Question							
3–5	4–6	5–7	6–8			**Class table**	
1				**Mark**	**Correct response**	**Additional guidance**	
a				**1m**	D and G in either order	✓ ***Unambiguous indication of class names***	
b				**1m**	B and E in either order	! ***Year group included in response*** eg, for part (c) • 7F Ignore even if the year group is incorrect	
c				**1m**	F		

Tier & Question							
3–5	4–6	5–7	6–8			**Abacus**	
2				**Mark**	**Correct response**	**Additional guidance**	
				2m	Matches each abacus to its correct number, ie  ***or*** **1m** Makes two correct matches	✓ ***Unambiguous indication*** × ***Abacus matched to more than one number*** For 2m or 1m, do not accept as a correct match	

Favourite subject

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
3						
a				1m	Maths	
b				1m	21 to 24 inclusive	✓ ***Percentage qualified*** eg • About 23

Square tiles

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
4						
a				1m	Draws the correct rectangle in any orientation eg • 	✓ ***Shading omitted and/or internal lines drawn*** ! ***Rectangle drawn with an area of 6 squares that uses part-tiles*** Condone ! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ! ***External lines not drawn but correct six squares shaded*** Accept provided the pupil's intention is clear
b				1m U1	Gives a value x such that $x + 6$ is a square number eg • 3 • 10 • 94	

Planes

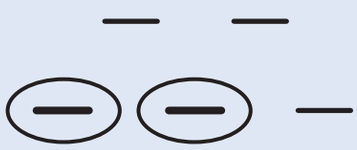
Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
5						
a				1m	15:20	! ***Use of the 12 hour clock*** Accept even if indication of pm is omitted Do not accept incorrect times eg, accept • 3:20 • Twenty past three eg, do not accept • 3:20 am
b				1m	40	

Tier & Question							Lockers
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance	
6							
a				1m	Indicates the 2nd row eg • 2		
b				1m	Gives a correct explanation The most common correct explanations: Use multiples of 4 eg • Numbers in the 4th row are multiples of 4 but 57 isn't a multiple of 4 • 4th row numbers are divisible by 4 but 57 isn't • It's a number in the 4 times table plus 1, so it's in the 1st row Use odd or even numbers eg • Numbers in the 4th row are all even, but 57 isn't • 57 is an odd number so it must be in an odd numbered row	✓ ***Minimally acceptable explanation*** eg • It's not a multiple of 4 • It's not in the 4 times table • 57 ÷ 4 is not a whole number • 4 doesn't go into 57 • It's 1 more than a multiple of 4 ✓ ***Minimally acceptable explanation*** eg • It's odd • They are even ! ***Explanation does not refer explicitly to 57*** Condone eg, accept • The 4th row is in the 4 times table • The 4th row has even numbers ! ***Explanation could be based on counting*** Condone eg, accept • 56 and 60 are in the 4th row, so 57 can't be • It's in the 1st row ✗ ***Incorrect or incomplete explanation*** eg • 57 doesn't go into 4 • The lockers don't go that far • All the 7s are in the 3rd row • Because the numbers in this row do not include 57 • It goes up in 4s
				U1			

Doubling

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
7						
a				1m	89	
b				1m	78	

Seventy

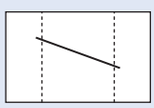
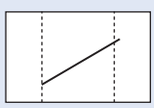
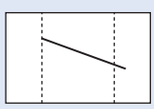
Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
8						
				1m	Indicates 73 and 67, ie 	✓ ***Unambiguous indication***

Two digits

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
9						
				2m ***or*** 1m	Gives all six correct two-digit numbers with no errors, ie 31, 32, 34, 41, 42, 43 in any order Gives at least four correct two-digit numbers even if there are other errors eg • 32, 33, 34, 41, 42	! ***Number(s) given with digits repeated*** Condone eg, for 2m accept • 31, 32, 33, 34, 41, 42, 43, 44 ! ***Correct number(s) repeated*** Ignore eg, for 2m accept • 31, 32, 34, 31, 41, 42, 43

Thinking lines

Marking overlay available

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
10						
				1m	For the first rectangle draws a line of length 4.5cm (±0.2cm) crossing both dotted lines	! ***Lines touch rather than cross the dotted lines*** For the first mark condone touching as crossing. For the second mark condone touching as not crossing provided that touching has not been condoned for the first mark. Do not allow touching at both ends eg •  Mark as 1  1 •  Mark as 1 0
				1m	For the second rectangle draws a line of length 5cm (±0.2cm) crossing only one dotted line	! ***Responses transposed*** Mark as 0, 1

Calculations

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
11	**1**					
				1m	936	
				1m	1385	
				1m	47	
				1m	19 044	

Home delivery

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
12	**2**					
a	a			**1m**	£ 5.99	
b	b			**1m**	£ 24.95	
c	c			**1m**	£ 3.99	

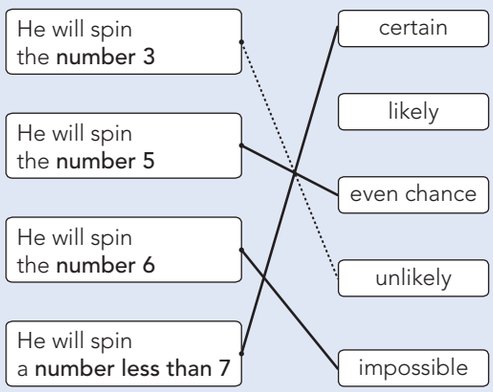
Choosing numbers

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
13	**3**					
				1m	Gives a multiple of 4 and a multiple of 5 to make the addition correct eg • 12 + 8 = 20 • 12 + 28 = 40 • 12 + 48 = 60 • 12 + 108 = 120	
				U1		
				1m	Gives a multiple of 3 and a multiple of 4 to make the addition correct, ie 6 + 24 = 30 or 18 + 12 = 30 or	
				U1	30 + 0 = 30	

Shape statement

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
14	**4**					
				2m	Makes four correct decisions, ie True ☐ False ☑ True ☑ False ☐ True ☑ False ☐ True ☐ False ☑	✓ ***Unambiguous indication*** eg • ✓ for True, ✗ for False
				or		
				1m	Makes three correct decisions	

Spinner

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
15	5			**2m**	Matches all three statements correctly, ie  	! ***Sentence matched to more than one description of probability*** For 2m or 1m, do not accept as a correct match
				or **1m**	Matches two statements correctly	

Radio

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
16	6			**2m**	Indicates A and shows the correct difference of 7 or (0).07	
				or **1m**	Shows the correct difference but makes an incorrect or no decision or Shows the digits 8348 and 8355 and the intention to subtract or Shows a complete correct method with not more than one computational error eg • (76.76 + 6.79) – (79.99 + 3.49) • 79.99 + 3.49 = *83.52 (error)* 76.76 + 6.79 = 83.55 83.55 – 83.52 = 3	
				1m	Gives the correct unit for their difference eg • p with 7 • £ with (0).07 • p with *3 (error)* • £ with *(0).03 (error)*	! ***Amount given without working*** eg, accept • p with 1 – 99 • £ with (0).01 – (0).99

Eels

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
17	7					
a	a			1m	Indicates the point (70, 60) on the graph	
b	b			1m	3	

School uniform

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
18	8					
				2m	£ 13	
				or		
				1m	Shows the value 8	
					or	
				U1	Shows or implies a complete correct method with not more than one computational error eg • 21 – (29 – 21) • 29 – 21 = *7 (error)*, 21 – 7 = 14	! ***For 1m, necessary brackets omitted*** As this is a level 4 mark, condone eg, for 1m accept • 21 – 29 – 21

TV channels

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
19	9	1				
				1m	ITV	✓ ***Unambiguous indication***
				1m	Others	
				1m	Indicates BBC2 and gives a value between 10 and 15 inclusive	! ***Indicates BBC2 and gives a range of percentages*** Accept provided range given is within correct values eg, accept • 10 – 12 eg, do not accept • 15 – 20

Children's party

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
20	**10**	**2**				
a	a	a		**1m**	£ 131(.00)	
b	b	b		**2m** ***or*** **1m**	15 Shows or implies a complete correct method with not more than one computational error eg • (225.5(0) – 23) ÷ 13.5(0) • 202.5(0) ÷ 13.5(0)	

Tile patterns

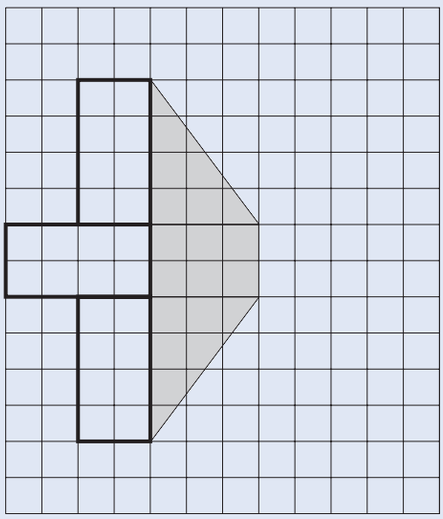
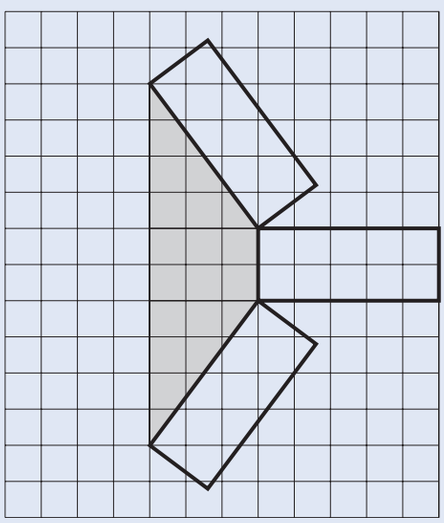
Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
21	**11**	**3**				
a	a	a		**1m**	$2n + 2$	! ***Throughout the question, unsimplified expression, or expression with unnecessary addition, subtraction, multiplication or division symbols, or other unconventional notation*** eg, for part (a) • $2 \times n + 2$ • $n2 + 2$ eg, for part (b) • $1n + 1$ • $(2n + 2) \div 2$ Condone
b	b	b		**1m**	$n + 1$	! ***Follow-through as their (a) ÷ 2*** Provided that their (a) is an algebraic expression with two terms

Thrushes

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
23	**12**	**4**				
a	a	a		**1m**	Song Thrush	✓ ***Unambiguous indication of name*** eg • S
b	b	b		**1m** U1	Indicates No and gives a correct explanation eg • The Ring Ouzel has bigger eggs than two bigger birds • The Blackbird has smaller eggs than a smaller bird • The Fieldfare has smaller eggs than a smaller bird • Ring Ouzel has the second biggest eggs but is only the fourth biggest in size • The average egg lengths are not in order of size in the table	✓ ***Minimally acceptable explanation*** eg • Ring Ouzel has big eggs • Blackbird has smaller eggs than Ring Ouzel • Fieldfare has smaller eggs than Ring Ouzel • The 4th bird down the size table has bigger eggs than the one above it • 30 is bigger than 29 × ***Incomplete or incorrect explanation*** eg • Doesn't work for the Blackbird • The Fieldfare doesn't follow this rule • Ring Ouzel has 30mm eggs

Open garden

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
22	**13**	**5**				
				2m ***or*** **1m**	£ 469.35 Shows the digits 46935 or Shows the digits 8775 and 3816(0) or Shows or implies a complete correct method with not more than one computational error eg • 106 × 3.6(0) + 39 × 2.25 • (145 – 39) × 3.60 + (39 × 2.25) • 39 × 2.25 = 87.75 *107 (error)* × 3.6(0) = 385.2(0) 87.75 + 385.2(0)= 472.95	

Tier & Question						
3–5	4–6	5–7	6–8		*Marking overlay available*	**Net**
24	**14**	**6**		**Mark**	**Correct response**	**Additional guidance**
				1m	On the LHS draws a 4 by 2 rectangle in one of the three possible correct positions, ie 	! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ! ***Tabs drawn*** Ignore if unambiguous
				1m	Draws a 5 by 2 rectangle in one of the three possible correct positions, ie 	! ***5 by 2 rectangle drawn on the hypotenuse of a triangle*** Accept provided vertices are within the tolerance as shown on the overlay

Multiple

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
25	15	7				
a	a	a		1m U1	Indicates No and gives a correct explanation The most common correct explanations: Give a counter-example eg • 60 is also a multiple of 3 that ends in 0 • 100 × 3 = 300 Reason generally about numbers ending in 0 that are also multiples of 3 eg • Any other multiple of 30 will also be a multiple of 3 and end in 0 • Because 30 is a multiple of 3 and ends in 0, you can do 30 × anything and that will still be true	! ***Throughout the question, incorrect or irrelevant examples and explanations given*** Condone only if accompanying a correct explanation eg, for part (a) accept • 60 and 80 eg, for part (b) accept • 2 × 5 = 10, 3 × 5 = 15 ✓ ***Minimally acceptable explanation*** eg • Any multiple of 30 other than 30 seen • 30 × 2 ✓ ***Minimally acceptable explanation*** eg • You can have any multiple of 30 ✗ ***Incomplete or incorrect explanation*** eg • There are unlimited numbers that are also multiples of 3 and end in 0 • 3 goes into 6, 9 and 12 as well
b	b	b		1m U1	Indicates No and gives a correct explanation The most common correct explanations: Give a counter example eg • 2 and 5 go into 10 as well • 20 ÷ 5 = 4 and 20 ÷ 2 = 10 • 100 ÷ 5 ÷ 2 = 10 Reason generally about numbers divisible by both 5 and 2 eg • All multiples of 5 end in 0 or 5 and all multiples of 2 end in 0, 2, 4, 6 or 8, so any number ending in 0 is a multiple of 5 and 2 • 5 × 2 = 10, so any number that is divisible by 10 is also divisible by 5 and 2	✓ ***Minimally acceptable explanation*** eg • Gives a multiple of 10 other than 30 ✓ ***Minimally acceptable explanation*** eg • You can have any number ending in 0 ✗ ***Incomplete or incorrect explanation*** eg • There are unlimited numbers that are also divisible by 5 and 2 • 5 goes into 15 and 2 goes into 4 as well

Angles

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	26	**16**	**8**	**2m**	Completes the table correctly, ie	✓ ***Cells that should contain zero left blank***

	A	B	C	D
… 45° angles	1	0	2	1
… 90° angles	2	4	1	1
… 135° angles	1	0	0	3

or

1m Completes any two columns of the table correctly

or

Completes any two rows of the table correctly

What number?

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
a	a	a		**1m**	Gives a number bigger than $5\frac{2}{3}$ but smaller than 6 eg • 5.7 • $5\frac{7}{8}$ • $5\frac{3}{4}$	✓ ***Improper fraction*** eg • $\frac{23}{4}$
b	b	b		**1m**	Gives a number bigger than 5.6 but smaller than $5\frac{2}{3}$ eg • 5.65 • $5\frac{16}{25}$	

Shaded rectangle

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	18	**10**	**1**	**2m**	50	
				or		
				1m	Shows or implies that the dimensions of the rectangle are 5(cm) and 10(cm) eg • 5 + 10 + 5 + 10 = 30 • 10 × 10 ÷ 2 or Shows or implies the calculation 30 ÷ 6 or 30 ÷ 3 eg • 5 + 5 + 5 + 5 + 5 + 5 = 30	

Kite perimeter

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	19	**11**	**2**			
	a	a	a	**1m**	40	
	b	b	b	**2m** ***or*** **1m**	24 Shows a correct equation eg • $4n + 4 = 100$ • $n + n + n + 2 + n + 2 = 100$ • $4n = 96$ or Shows or implies a complete correct method with not more than one computational error eg • $(100 - 4) \div 4$ • $\frac{96}{4}$	✗ ***Necessary brackets omitted*** eg • $100 - 4 \div 4$ ✗ ***For 1m, method used is trial and improvement***

Dice probability

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	20	**12**	**3**			
	a	a	a	**1m**	$\frac{5}{6}$ or equivalent probability	✓ ***0.83(...) or better***
	b	b	b	**1m**	$\frac{1}{2}$ or equivalent probability	

Coat

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	21	**13**	**4**			
				2m ***or*** **1m**	£ 55.25 Shows the digits 975 or Shows or implies a complete correct method with not more than one computational error eg • $65 - 6.5 - 3.25$ • 0.85×65 • $6.5 + 3.15$ *(error)* $= 9.65$, Answer: 55.35	

Cuboid diagonal

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
	22	**14**	**5**	**2m** ***or*** **1m**	7 Shows or implies a correct substitution into the equation and the correct interpretation of at least one of the 'squared' symbols eg • 49 seen • 7^2 • $36 + 4 + 9$ • $6 \times 6 + 2^2 + 3^2$ or Shows or implies a complete correct method for finding the value of d with not more than one computational error eg • $6^2 + 2^2 + 3^2 = 48$ *(error)*, $\sqrt{48} = 6.9(\ldots)$	× ***–7*** × ***Conceptual error*** eg • $6^2 + 2^2 + 3^2 = 12 + 4 + 6$, $\sqrt{22} = 4.7$

Tier & Question						Possible?
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	23	**15**	**6**			
	a	a	a	**1m** U1	Indicates No and gives a correct explanation eg • Angles in a triangle add up to 180° 150 + 10 + 10 = 170	✓ ***Minimally acceptable explanation*** eg • 150 + 10 + 10 ≠ 180 • The total is not 180 • They have to add to 180 • The total is too low by 10 ✗ ***Incomplete explanation that mentions 170 but does not state or imply the value 180*** eg • 150 + 10 + 10 = 170 • They add to 170 but it should be more
	b	b	b	**1m** U1	Indicates No and gives a correct explanation eg • A triangle can only be drawn if the two shorter sides have a total length longer than the longest side •	✓ ***Minimally acceptable explanation*** eg • 10 + 10 is less than 150 • The shorter sides will not meet • The 10cm sides will not meet • The 10cm sides are too short compared with 150cm • One of the sides needs to be longer/shorter to be able to join the triangle up ✗ ***Incomplete explanation*** eg • The 10cm sides are too short • The sides will not meet • 150cm line is too long • 2 sides of the triangle would not touch to make a triangle

Tier & Question						Class 9A
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	24	**16**	**7**			
				2m ***or*** **1m**	9 Shows or implies a complete correct method with not more than one computational error eg • (360 – 75 – 90 – 60) ÷ (75 ÷ 5) • 135 ÷ 15 • 360 ÷ 15 = *25 (error)*, 25 – 5 – 6 – 4 =10 or Shows or implies that one pupil is represented by 15° on the chart	

Drawing pins

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	25	**17**	**8**			
	a	a	a	**1m**	3333	✗ ***Answer of 3334***
	b	b	b	**2m**	4347	
				or		
				1m	Shows the value 4347.8(…) or 4348 or Shows or implies a correct method • 1000 ÷ 0.23 • (1 × 1000) ÷ 0.23 • 1 ÷ 0.00023	

Conversion

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	26	**18**	**9**			
		a	a	**2m**	30	
				or		
				1m	Shows the digits 5075(0) and 5375(0) or Shows a complete correct method with not more than one computational error eg • 2.15 × 250 – 2.03 × 250 • 0.12 × 250	
		b	b	**2m**	Gives an amount of money between £ 6.87 and £ 7(.00) inclusive	! ***Responses for parts (a) and (b) transposed but otherwise correct*** Mark as 0, 0, 1, 1
				or		
				1m	Shows the digits 687(…) or Shows the digits 123(…) and 116(…) or Shows a complete correct method with not more than one computational error eg • 250 ÷ 2.03 – 250 ÷ 2.15 • 250 ÷ 2.03 = 123.15 250 ÷ 2.15 = *111.11 (error)* Answer of £ 12.04	

Square numbers

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
		19	**10**			
				2m ***or*** **1m** (U1)	3311 Shows the value 441 or Shows a correct method with not more than one computational error eg • $2870 + 21^2$	× ***Conceptual error*** eg • $2870 + 21^2 = 2870 + 42$ $= 2912$

The Smith family

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
		20	**11**			
				2m ***or*** **1m** (U2)	22, with no evidence of an incorrect method Shows the value 110 or Shows or implies that the total age of the males is 56 eg • $2 \times 28 = 56$ • Mr Smith and Ben's ages must add up to 56 • Mr Smith could be 38 and Ben could be 18 or Shows a complete correct method with not more than one computational error eg • $(56 + 38 + 9 + 7) \div 5$ • $(54 + 56) \div 5$ • $2 \times 28 = 46$ *(error)*, $46 + 38 + 9 + 7 = 100$, $100 \div 5 = 20$	

Square and triangle

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		21	13	**3m**	11.2	✗ ***Method used is accurate or scale drawing***
				or		
				2m	Shows the value 11.18(…) or $5\sqrt{5}$ or $\sqrt{125}$ or Shows or implies a complete correct method with not more than one computational or rounding error eg • DE = $\sqrt{10^2 + 5^2}$ • Answer of *11.1 (rounding error)* • $10 \times 10 + 5 \times 5$ = *120 (error)* $\sqrt{120}$ = 11.0	✗ ***For 2m, conceptual error*** eg • $10^2 = 20$, $5^2 = 10$ $\sqrt{30} = 5.5$
				or		
				1m	Shows sufficient working to indicate a correct application of Pythagoras' theorem eg • $DE^2 = 10^2 + 5^2$	

Acorns

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		a	a	**1m**	Indicates the modal class is 19mm ≤ length < 20mm, ie ☐ ☑ ☐ ☐	
				U1		
		b	b	**1m**	Indicates the point at (20.3, 11.8)	
		c	c	**1m**	Indicates Diagram A	

World population

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
		23	**14**	**2m** ***or*** **1m**	1865 Shows the digits 3465 and 1600 or Shows or implies a complete correct method with not more than one error eg • 55 ÷ 100 × 6300 – 40 ÷ 100 × 4000 • 55% of 6300 is 3465 40% of 4000 is *1000 (error)* 3465 – 1000 = 2465	! ***For 2m or 1m, million re-stated*** eg, for 2m • 1865 000 000 Condone

*n*th terms

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
		24	**15**	**1m**	Completes the nth term correctly, ie $3n + 1$	! ***Throughout the question, expressions unsimplified or use unconventional notation*** eg, for the first mark • $n + n + n + 1$ • $n \times 3 + 1$ Condone
				1m	Completes the first four terms correctly, ie 6 9 12 15	
				1m	Completes the nth term correctly, ie $n^2 - 1$	
				1m	Completes the nth term correctly, ie $(n + 2)^2$	

Kilometre

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7 **25**	6–8 **16**			
		a	a	**1m**	Gives a correct explanation eg • 40 km in 60 mins 1 km in 60 ÷ 40 = 1.5 mins • 1 min 30 secs for 1 km 3 mins for 2 km 60 mins for 40 km • 1 min 30 secs = 1.5 mins 60 ÷ 1.5 = 40 • 1 km in 90 secs 90 × 40 = 3600 3600 secs = 60 mins • 40 km/h is $\frac{2}{3}$ km/min $\frac{2}{3} \times 1\frac{1}{2} = 1$ km • 60 km at 40 km/h = 1 hr 30 mins 1 hr 30 mins ÷ 60 = 1 min 30 secs • 60 km/h is 1 min for 1 km 20 km/h is 3 mins for 1 km 40 km/h is 1 min 30 secs for 1 km	✓ ***Minimally acceptable explanation*** eg • 60 ÷ 40 = 1.5 • 60 ÷ 1.5 = 40 • 40 ÷ 60 × 1.5 = 1 ✗ ***Conceptual error*** eg • 40 × 1.5
		b	b	**1m**	45	

Two numbers

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8 **17**			
				1m U1	0.1 and 0.9 or equivalent, in either order	

Gold

Tier & Question						
3–5	4–6	5–7	6–8			
			18	Mark	Correct response	Additional guidance
				3m	Gives a value between 163 000 and 171 000 inclusive	! ***For 3m or 2m, answer not rounded to 2 decimal places*** Condone
				or		
				2m	Shows a value between 321 000 and 336 000 inclusive [number of US dollars] or Shows a complete correct method with not more than one computational or rounding error eg • 17.8 × 9.2 × 4.4 × 19.3 ÷ 28.35 × 670 × 0.508	Markers may find the following values useful: 720.544 × 19.3 = 13906.499 ÷ 28.35 = 490.529 × 670 = 328654.478 × 0.508 = £166956.48
				or		
				1m	Shows a value between 479 and 502 inclusive [mass in ounces]	

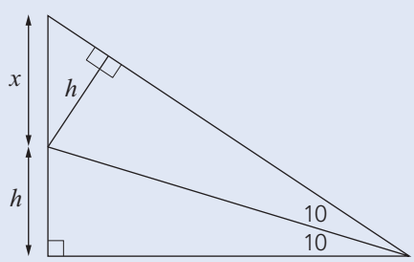
Camera flash

Tier & Question						
3–5	4–6	5–7	6–8			
			19	Mark	Correct response	Additional guidance
			a	**1m**	Gives a value between 5.25 and 5.35 inclusive	
			b	**1m**	Gives the value 10 or 11 and shows working to explain this value eg • 60 ÷ 5.3 = 11.3 • It takes about 6 seconds to take one photo and wait for the delay so 60 ÷ 6 = 10 • 60 ÷ 5.5 = 10.9, rounds down to 10 • 5.3 × 10 = 53 53 + 5.3 = 58.3, so 11	! ***Follow-through*** Accept 60 ÷ their (a), with the result rounded or truncated to a whole number

Tier & Question							**Planet**
3–5	4–6	5–7	6–8		Mark	Correct response	Additional guidance
			20				
				a	**1m**	7.8×10^8	! ***Zero(s) given after the last decimal place within standard form notation*** eg • 7.80×10^8 Condone ! ***Number given in millions*** Accept provided there is no ambiguity eg, accept • 7.8×10^2 million eg, do not accept • 7.8×10^2 • 7.8×10^8 million
				b	**3m** ***or*** **2m** ***or*** **1m** (U1)	43 Shows or implies a complete correct method eg • $(7.8 \times 10^8) \div (3.0 \times 10^5 \times 60)$ • 780 million $\div (3.0 \times 10^5)$, then $\div$ 60 • 43.(…) seen • 43 minutes, 20 seconds Shows or implies a correct method for a value in seconds eg • $(7.8 \times 10^8) \div (3.0 \times 10^5)$ • 780 000 000 $\div$ 300 000 • 780 million $\div 3.0 \times 10^5$ or Digits 26 seen	✓ ***For 2m or 1m, follow-through from part (a)***

Tier & Question							**Rubbish**
3–5	4–6	5–7	6–8		Mark	Correct response	Additional guidance
			21		**2m** ***or*** **1m**	Gives a value between 79.8(…) and 80 inclusive Shows the digits 798(…) or Shows or implies a complete correct method with not more than one computational or rounding error eg • 27 ÷ 6.8 × 20.1 • 20.1 ÷ 6.8 × 27 • 6.8 ÷ 27 × 100 = 25.185(…) 20.1 ÷ 25.185(…) • 27 ÷ 6.8 = 4 *(premature rounding)* 4 × 20.1 = 80.4	× ***Equivalent fractions or decimals***

Tier & Question							***a, b, c***
3–5	4–6	5–7	6–8		Mark	Correct response	Additional guidance
			22		**2m** ***or*** **1m** **U1**	17 Shows or implies that $2c = 7$ or Shows or implies that $a + b = 6\frac{1}{2}$ or equivalent, or that $2(a + b) = 13$ eg • $2a + 2b = 13$ or Manipulates the equations to enable $a + b + 3c$ to be calculated directly eg • $2a + 2b + 2c = 20$ $a + b - c = 3$	

Tier & Question							Ramp
3–5	4–6	5–7	6–8		Mark	Correct response	Additional guidance
			23				
			a		1m	Gives a correct justification eg • 150 × sin 10 = 26.04(…) • 150 × 0.17(…) = 26.0 to 1dp	✓ ***Minimally acceptable justification*** eg • 26.04(…) seen • 150 × sin 10 • 150 × cos 80 ✗ ***Assumes h is 26.0 and calculates a = 10°***
			b		2m	Gives a correct explanation eg • If h is 52, sin $a = \frac{52}{150}$ $\sin^{-1}a$ = 20.2(…) (or 20.3), which is more than double 10 • If a is 20, 150 × sin 20 = 51.3, which is less than double 26 or Gives an alternative explanation involving geometrical reasoning eg •  $x > h$ because x is the hypotenuse of the small right-angled triangle so if the angle a° doubles, h more than doubles	✓ ***For 2m, minimally acceptable explanation*** eg • 20.2(…) (or 20.3) seen • 51.3(…) seen
				or	**1m**	Shows correct use of trigonometry using one of the doubled values eg • sin $a = \frac{52}{150}$ • 150 × sin 20	

Tier & Question						
3–5	4–6	5–7	6–8			**Negative product**
			24	**Mark**	**Correct response**	**Additional guidance**
				3m	Completes both tables correctly, ie	✓ ***Unambiguous indication***

	must	could	cannot
$d > 0$			✓
$d = 0$			✓
$d < 0$		✓	

	must	could	cannot
$c > 0$		✓	
$c = 0$			✓
$c < 0$		✓	

or

2m Completes at least four rows in the tables correctly

or

1m Completes three rows in the tables correctly

Index to mark scheme for Paper 2

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Mark scheme for the mental mathematics tests

To assist the marking of the pupils' mental mathematics test scripts, a copy of the test transcript appears opposite the corresponding mental mathematics test mark scheme.

Please note that pupils should not be penalised if they record any information given in the question or show their working. Ignore any annotation, even if it is in the answer space, and mark only the answer. Accept an unambiguous answer written in the stimulus box, or elsewhere on the page, but clearly attributable to the relevant question.

General guidance for marking the written tests also applies to marking the mental mathematics test. In addition, please apply the following principles unless specific instructions to the contrary are given in the mark scheme:

- accept responses in words and/or figures,
  eg 7 point 3, 4 hundred
- accept any unambiguous indication of the correct response from a given list,
  eg circling, ticking, underlining
- accept unambiguous misspellings
- accept units that have been correctly converted to a different unit provided the new unit is indicated. Where units have been given on the answer sheet, do not penalise pupils for writing the units again
- accept responses with commas as spacers,
  eg 50,000
  but do not accept a point used as a spacer,
  eg 50.000

Lower tier mental mathematics test questions 1–15

1	Round six pounds and fifty-three pence to the nearest pound.
2	Add thirty-eight and nineteen.
3	Multiply nine by four.
4	Write in figures the number two thousand and seventy-four.
5	How many millilitres are there in half a litre?
6	What number is three less than minus two?
7	What is forty-two point six divided by ten?
8	What is the square root of thirty-six?
9	An event is certain to happen. Write down the probability that it will happen.
10	In a survey, pupils were asked whether they had school dinner or not. The pictogram shows the results. Nine pupils said yes. How many pupils said no?
11	A sequence of numbers starts at forty-one and goes down in steps of three. Write the next two numbers in the sequence.
12	Packs of washing powder cost one pound forty-nine pence each. Tim bought two packs. How much money did he spend on washing powder?
13	The two fifty-five pm train was ten minutes late leaving the station. At what time did the train leave?
14	Shade one third of the rectangle on your answer sheet.
15	The diagram on your answer sheet shows what musical instruments some pupils play. How many pupils play guitar?

Mental mathematics test
Lower tier

Mark scheme questions 1–15

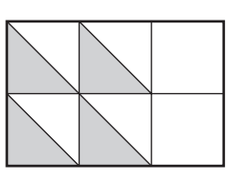
Time: 5 seconds

1	£ **7 (.00)**	
2	**57**	
3	**36**	
4	**2074**	
5	**500** ml	
6	**–5**	
7	**4.26**	

Time: 5 seconds continued

8	**6**	Accept –6 with 6 or alone
9	**1**	Accept equivalent probabilities, eg 100% Do not accept certain

Time: 10 seconds

10	**6** pupils	
11	**38** and **35**	Accept pair in either order
12	£ **2.98**	
13	**3.05** pm	
14	**Any two squares shaded**	Accept part squares shaded, eg 
15	**4**	

Lower tier mental mathematics test questions 16–30

16	Double one hundred and twenty-seven.
17	Look at the equation. What is the value of m when n is twelve?
18	Work out ten per cent of fifty pounds.
19	Each side of a regular hexagon is four centimetres long. What is its perimeter?
20	Look at the scale on your answer sheet. What number is the arrow pointing to?
21	Some pupils in a class were asked whether or not they owned a bicycle. The bar chart shows the results. How many pupils were asked altogether?
22	Look at the graph on your answer sheet. It shows the exchange rate between pounds and euros. How many euros have the same value as twenty pounds?
23	How many faces does a triangular-based pyramid have?
24	What is the value of the expression on your answer sheet when k is three?
25	Look at the shapes drawn on a square grid. Tick the shape that does not have any lines of symmetry.
26	Add together five multiplied by five and four multiplied by four.
27	Tom saved twenty pence pieces. He saved six pounds and forty pence altogether. How many twenty pence pieces is that?
28	Look at the triangle on your answer sheet. Angle a is fifty-five degrees. How many degrees is angle b?
29	Add three-quarters to one and a half.
30	Look at the shaded triangle drawn on a centimetre square grid. What is the area of this triangle?

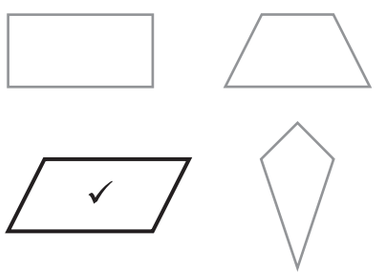
Time: 10 seconds continued

16	**254**	
17	**18**	
18	£ **5 (.00)**	Do not accept incorrect % signs
19	**24** cm	
20	**10.6**	Accept equivalent fractions or decimals
21	**12**	
22	**30** euros	

Time: 10 seconds continued

23	**4**	
24	**16**	

Time: 15 seconds

25	 Accept any unambiguous indication	
26	**41**	
27	**32**	
28	**35** °	
29	$2\frac{1}{4}$	Accept equivalent fractions or decimals
30	**6** cm^2	

Higher tiers mental mathematics test questions 1–17

1	The river Nile is six thousand six hundred and fifty kilometres long. Round this number to the nearest thousand.
2	Look at the expression on your answer sheet. Write it as simply as possible.
3	What is the sum of the angles in a triangle?
4	Subtract three from minus seven.
5	Look at the expression on your answer sheet. Double it.
6	Write the ratio fifteen to thirty as simply as possible.
7	The length of a pencil is seventeen centimetres, to the nearest centimetre. What is the least value it could be?
8	Write down the smallest positive number that is both a multiple of three and a multiple of five.
9	Your answer sheet shows the coins I have in my pocket. Which coin is the mode?
10	A square has a side length of eight centimetres. What is its perimeter?
11	I spend two pounds fifteen pence in a shop. How much change should I receive from a five pound note?
12	The rule for a sequence is subtract seven each time. If the first number is three write the next two numbers in the sequence.
13	What is three-quarters of sixty?
14	A rectangle has a length of eight centimetres and an area of forty-eight square centimetres. What is the width of the rectangle?
15	A 3-D shape has a square base and four triangular faces. What is the mathematical name of the 3-D shape?
16	Look at the number. Halve it.
17	Look at the equation. What is the value of x when y is fourteen?

Mental mathematics test
Higher tiers

Mark scheme questions 1–17

Time: 5 seconds

1	**7000** km	
2	**9*a***	
3	**180** °	
4	**–10**	
5	**12*pq***	Do not accept unconventional notation, eg 12 × *pq*
6	**1 : 2**	Do not accept equivalent ratios

Time: 5 seconds continued

7	**16.5** cm	Accept equivalent fractions or decimals

Time: 10 seconds

8	**15**	
9	**20p**	Accept any unambiguous indication, eg 20 or one or more of the 20p amounts circled
10	**32** cm	
11	£ **2.85**	
12	**–4** and **–11**	Accept pair in either order
13	**45**	
14	**6** cm	
15	**Square-based pyramid** Accept 'pyramid'	
16	**13.45**	Accept equivalent fractions or decimals
17	**3**	

Higher tiers mental mathematics test questions 18 – 30

18	Look at the kite. What is the size of angle m?
19	Divide minus twenty-four by eight.
20	Look at the numbers. Put a ring round the number that is closest to one.
21	A car travels three kilometres in six minutes. What is the car's average speed in kilometres per hour?
22	Look at the expression. Multiply out the brackets.
23	The scale on a map is one centimetre to five kilometres. The distance between two houses is twenty kilometres. What is the distance between these two houses on the map?
24	Write down a two-digit number that is a multiple of four with digits that add to six.
25	Look at the numbers. Put a ring round the median.
26	A school team played twenty-four games. They won eight games. Use the pie chart to work out how many games ended in a draw.
27	Water flows from a tap at the rate of eleven litres per minute. How much water will flow if the tap is left on for one hour?
28	A bus driver recorded the number of people who got on her bus each morning. The stem and leaf diagram shows the results after two weeks. On how many mornings were there fewer than twenty-five people?
29	Look at the calculation. Give an approximate answer.
30	Look at the diagram. Write down the value of k.

Time: 10 seconds continued

18	**130** °	
19	**–3**	
20	**1.001** 0.9 1.01 0.99 1.1	
21	**30** km/h	
22	**$15y - 3y^2$**	Accept unconventional notation, eg $15 \times y - 3 \times y \times y$ Do not accept incomplete processing, eg $3 \times 5y - 3y^2$

Time: 15 seconds

23	**4** cm	
24	**24** or **60**	
25	1 5 4 **2** 1	

Time: 15 seconds continued

26	**10** games	
27	**660** litres	
28	**4**	
29	**68 ≤ answer ≤ 80**	
30	**40**	Accept 40°

Mark scheme for the mental mathematics tests

Using the outcomes of the tests

This section provides information about interpreting the scores from the year 9 optional mathematics tests. It explains how teachers can use the test scores to find out more about pupils' attainment in the national curriculum.

In order to make use of the information in this section, you should administer the tests according to the guidance given in this booklet. It is particularly important that you observe the time limits given in the test instructions, and mark the questions strictly according to the mark scheme. If not, the information derived from this section cannot be used reliably.

To calculate the mathematics subject level the marks awarded on papers 1 and 2 should be totalled and added to the mark for the mental mathematics test.

Level thresholds

The following tables give an indication of the national curriculum levels for pupils attaining each of the score bands in the tests:

Tier 3–5

Level	Mark range
Below level 3	0–31
3	32–66
4	67–102
5	103–150

Tier 4–6

Level	Mark range
Below level 4	0–32
4	33–58
5	59–87
6	88–150

Tier 5–7

Level	Mark range
Below level 5	0–33
5	34–57
6	58–89
7	90–150

Tier 6–8

Level	Mark range
Below level 6	0–40
6	41–61
7	62–95
8	96–150

Using information from the tests for teaching and learning

Overall summative information about pupil performance in a school can be obtained by analysing the scores in the tests, and making statistical comparisons between groups of pupils and against national norms. Information about progress can also be derived by comparing scores and levels with those in other years.

Guidance on the administration of the tests

This summary guidance is for teaching assistants or other adults assisting in the administration of the year 9 optional mathematics tests. If a teaching assistant is to administer any part of the tests independently to a group of pupils then they will need to familiarise themselves with the detailed administration instructions found in the main part of the **Teacher's guide**.

Please read this guidance carefully as it gives information about the different tests and specifies what help may or may not be given to pupils taking the tests. **If pupils are given too much help, the test results may be invalid.**

Each pupil will sit three tests: two written mathematics tests and a mental mathematics test. It is not recommended that all three tests are administered on the same day.

The written tests

There are two written papers, Paper 1 (calculator not allowed) and Paper 2 (calculator allowed). Calculators must be available for Paper 2. Each written paper lasts 60 minutes, and contains 60 marks.

Guidance for assisting pupils

You may:

- read through with them the 'Remember' section on the front cover of the booklet, and the instructions on page 2
- give help with reading words or sentences in the test questions
- give help with reading calculations, including numerals and symbols within them but you should not indicate the operation or process involved. For example:

  % per cent (**not** out of every hundred)

- point to information on the test paper such as charts, diagrams, statements and equations, but you should not explain the information nor interpret it
- explain or rephrase general instruction words in the test, such as *put a ring round* in *Shape on a grid*, Paper 1, tier 3–5 question 16, tier 4–6 question 6
- explain or rephrase words used in everyday contexts, such as *recycling* in *Plastic bottles*, Paper 1, tier 3–5 question 15, tier 4–6 question 5
- encourage pupils to try to answer all the questions
- indicate any omitted questions when pupils have finished, so they can go back and try to answer them.

You should not:

- give any help with the mathematics as this will invalidate the assessment
- suggest to the pupils the mathematical reasoning or technique they should use
- give clues to the meaning of mathematical terms, such as *parallel* in *Shape statement*, Paper 2, tier 3–5 question 14, tier 4–6 question 4
- rephrase the wording of the questions (except as indicated on page 90)
- prompt the pupils to confirm or change answers by pointing, frowning, smiling, head shaking or nodding, offering rubbers, or asking leading questions.

Specific guidance for Paper 1 and Paper 2

Other words that can be clarified:

- Some other words and phrases may be explained to pupils because they are not part of the mathematical understanding being assessed for that question. The words and phrases that may be explained are set out below and some paraphrases are suggested.

Paper 1	3–5	4–6	5–7	6–8	Word or phrase	Suggested paraphrase
Number grid	2				Shaded	Coloured in
Reflections	4				Shaded	Coloured in
ab	17	7			Values	What numbers the letters could stand for
Largest value	24	14	5		Values	What numbers each expression stands for
Temperature	25	15	6		Estimate	Give the approximate time
Equation		19	10	1	Value	What number the expression stands for
Values		22	13	4	Value	What number the letter could stand for
Counters		27	18	9	At random	Without looking
Simplify			24	15	Factorise	Put into brackets
Ten cards				21	At random	Without looking
Finding y				23	Value	The number that the letter stands for

Paper 2	3–5	4–6	5–7	6–8	Word or phrase	Suggested paraphrase
Abacus	2				Abacus	Counting frame
Shaded rectangle		18	10	1	Shaded	Coloured in
Gold				18	Dimensions	Length of sides
a b c				22	At random	What number the expression stand for

Questions that must not be enlarged:

- If your school needs to enlarge questions or parts of questions to meet the specific requirements of individual pupils, and has not ordered the enlarged papers from the Modified Test Agency, the following questions must not be enlarged. This is because enlargement may affect the pupils' responses.

Paper 1	3–5	4–6	5–7	6–8
Quadrilateral	28	18	9	

Paper 2	3–5	4–6	5–7	6–8
Thinking lines	10			
Net	24	14	6	

The mental mathematics test

The mental mathematics tests are recorded on CD and cassette and consist of 30 timed questions. They should be administered using the CD or cassette, although transcripts are provided on pages 12–16 in case of equipment malfunction on the day of the test. They have an administration time of approximately 20 minutes each.

The tests start with instructions to pupils, and these are followed by the questions. There are two opportunities for the teacher to pause the CD or cassette, each one indicated by a bleep. The first pause comes near the beginning of the recording, once the instructions have been given. This will allow the teacher to clarify any instructions that have not been understood by the pupils. The second pause occurs after the practice question. After this second pause, the recording should be played without interruption.

You may:

- answer any questions pupils have after the first and second pause.

You should not:

- stop the recording after it has been restarted following the practice question
- enlarge the following question as enlargement may affect the pupils' responses.

Questions that must not be enlarged:

Mental mathemactics	Lower tier
	30

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Qualifications and Curriculum Development Agency

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For more copies:

QCDA Orderline, PO Box 29, Norwich NR3 1GN

orderline.qcda.gov.uk

email: orderline@qcda.gov.uk
Tel: 0300 303 3015
Fax: 0300 303 3016

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