



Key stage 1 mathematics

Sample questions, mark schemes and commentary for 2016 assessments

Introduction to sample materials

The new national curriculum will be assessed for the first time in May 2016. This set of sample materials is being published to give teachers an indication of how the new curriculum will be assessed. The materials presented here primarily focus on new areas of the curriculum and how questions assessing those areas might appear.

The examples in this document have not been through the rigorous development process that live tests go through. We will decide on final question formats once we have data from trialling the test materials. This means that some of the question types may not appear in the live tests. We will publish complete sample tests in 2015 that will reflect our findings and will be indicative of the final live tests.

These materials have been reviewed by teachers and their comments have been taken into account.

As the questions have not been trialled in schools, the mark schemes do not consider the full range of acceptable responses or include example pupil responses. They only give a basic indication of the types of response that would be credited.

The questions in the English grammar, punctuation and spelling, mathematics and science tests will appear in order of difficulty, where possible. In English reading, the texts appear in order of difficulty. In these sample materials, the texts and questions are not necessarily in order of difficulty, nor do they reflect the range of question difficulties that will appear in the final tests.

Test frameworks that illustrate the test model, content domain and performance descriptors for the 2016 national curriculum tests are on GOV.UK at www.gov.uk/sta. Please note that these sample materials are not designed to match the frameworks in terms of ratios of question/item type or coverage. They do not form complete tests as described by the test frameworks and are, therefore, not sample tests.

We recommend that these materials are not used for assessment purposes.

The key stage 1 tests will, in most instances, contain a small number of practice questions and there will be administration guidance provided where necessary (for example, for task specific elements).

Some decisions relating to the administration of key stage 1 tests have not yet been confirmed for 2016. It is possible that some of the arrangements may change; for example, there may be a narrower administration window and teachers may have limited time between receiving the tests and administering them. As with the current arrangements, the tests will be internally marked and the results will be used by teachers in order to support teacher assessment. There will be new tests released each year from 2016.

Key features of the mathematics tests

From 2016, questions in the mathematics national curriculum tests will be linked to specific areas of the new national curriculum. These references are shown in the test frameworks. The tests will be written to meet the test specification set out in the test frameworks.

At key stages 1 and 2, the new tests for mathematics will have two components. The first component is an arithmetic paper testing fluency through calculations. The second component assesses the ability to reason and apply mathematics.

The key change for statutory assessment at both key stages 1 and 2 will be the introduction of an arithmetic paper. All of the questions in this paper intend to assess pupils' arithmetic ability; therefore the questions themselves will be context free.

The key stage 1 mathematics test will consist of two components.

- **Paper 1:** an arithmetic paper. This will comprise of a practice question and a number of questions which will be linked to national curriculum areas such as number, calculations and fractions.

We will be reviewing the number of arithmetic items that the pupils are able to answer in the time available based on trialling. As many of the short answer questions should be answered using recall at key stage 1, the number of questions in the arithmetic paper may increase.

As you can see in the sample questions, the working area provided for pupils is a grid. This is designed to match most key stage 1 mathematics exercise books so it will be familiar to pupils. It is expected that pupils will use informal or formal methods to help them work out the answer to each question (if needs be). The grid used in the sample materials may or may not be used in the final live tests. The decision will be based on the evidence from pupils and teachers in trialling.

Additional marks will not be awarded for working out, but pupils should be encouraged to use an appropriate method for the more difficult calculations. It is expected that pupils will use mental methods to work out the answers for some questions.

It is currently proposed that mathematical equipment is not used in the arithmetic paper. This decision will be reviewed once trialling has taken place.

- **Paper 2:** assesses pupils' ability to apply mathematics to problems and to reason. The test will contain a mixture of contextualised and context-free questions, and real life and abstract problems. Language will be appropriate to key stage 1; word length will be kept to a minimum for accessibility reasons.

The first question will be a practice aural question. No marks will be awarded. The next five questions will be aural questions, similar to the previous versions of the national curriculum tests. These will be read to pupils so they can become more familiar with the test environment. Pupils will work on their own for the rest of the test, unless they require access arrangements.

There will be a variety of question types in the tests; the questions will, therefore, reflect the range on the 'Response Strategy' scale as defined in the cognitive domain in the test framework. One question type in key stage 1 mathematics will be the 'working mark' question. Pupils will be given one mark if they show appropriate working, even if the answer is incorrect. They will receive two marks if the answer is correct.

In the first trial, we will review how pupils use mathematical equipment in paper 2, eg number lines, 100 square. A decision as to whether pupils will be able to access mathematical equipment in paper 2 will be made after the trial.

All pupils at the end of key stage 1 will be expected to take both papers.

Timings for the test

Expected approximate timings for the individual papers are:

- **Paper 1:** the guidance time for this test is 15 minutes. This will be confirmed once the test development process is complete
- **Paper 2:** approximately 35 minutes.

The key stage 1 papers will not be strictly timed. Schools will be given guidance to ensure that pupils have sufficient time to demonstrate what they understand, know and can do without prolonging the test inappropriately. Teachers will be able to choose when / if pupils require breaks throughout the assessment or whether to stop the test early if appropriate.

Paper 1: arithmetic questions

1

$$15 + 11 =$$



Qu	Requirement	Mark	Additional guidance
1	26	1m	

Commentary: Assessing the addition of two two-digit numbers. Pupils who are able to do this sum mentally will have a time advantage.

Content domain: 2C1a - Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

2C1b - Add and subtract numbers mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers.

2

$45 \div 5 =$



Qu	Requirement	Mark	Additional guidance
2	9	1m	

Commentary: This question was chosen because knowing division facts involving the five times table is new to the curriculum.

In this question, pupils are asked to recall a known fact.

Content domain: 2C6 - Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

3

$55 - 17 =$



Qu	Requirement	Mark	Additional guidance
3	38	1m	

Commentary: This item was chosen to exemplify the more demanding subtraction questions that will appear in the arithmetic paper.

Pupils have to apply a learned procedure to answer this question; there is more than one numeric step involved.

Content domain: 2C1b - Add and subtract numbers mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers.

4

$$\boxed{} - 9 = 8$$



Qu	Requirement	Mark	Additional guidance
4	17	1m	

Commentary: Assessing addition facts up to 20, and inverse.

Content domain: 2C1a - Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

2C3 - Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.

5

$$\frac{3}{4} \text{ of } 20 = \boxed{}$$



Qu	Requirement	Mark	Additional guidance
5	15	1m	

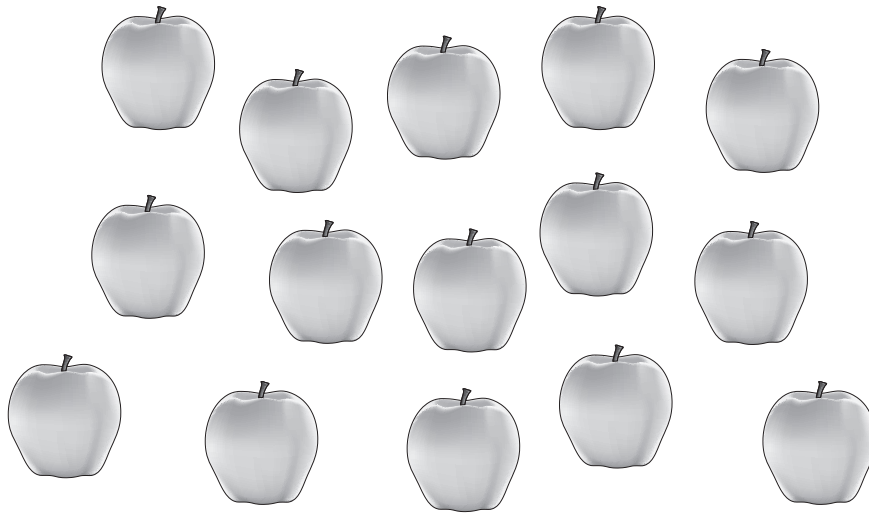
Commentary: This question demonstrates the increased demand in the new curriculum when working with fractions.

Pupils will have to apply a learned procedure to answer this question.

Content domain: 2F1a - Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity.

Paper 2: contextualised and applied questions

6 Circle $\frac{1}{3}$ of the apples below.



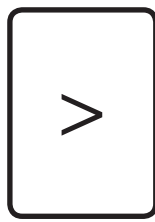
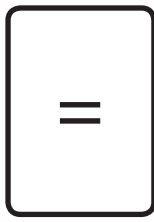
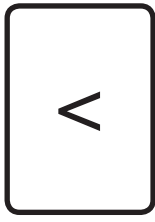
Qu	Requirement	Mark	Additional guidance
6		1 mark	Accept any other clear indication of 5 apples being selected.

Commentary: Fractions in the new curriculum go beyond halves and quarters. This item represents a high level of demand within the fraction strand at key stage 1.

Content domain: 2F1a - Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity.

7

Look at these signs.



Write the correct sign in each box.

$$85 \quad \boxed{\phantom{<}} \quad 58$$

$$36 \quad \boxed{\phantom{<}} \quad 36$$

$$47 \quad \boxed{\phantom{<}} \quad 74$$



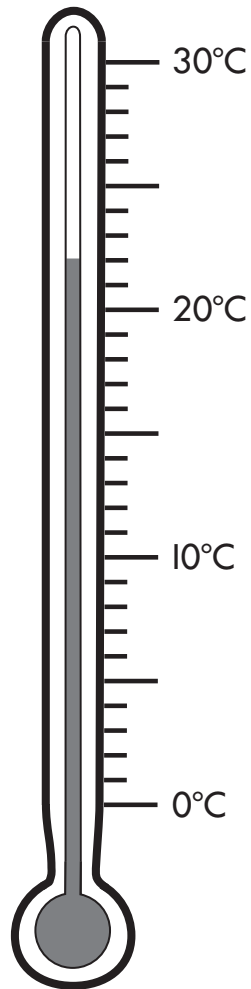
Qu	Requirement	Mark	Additional guidance
7	$85 > 58$ $36 = 36$ $47 < 74$	1 mark	All boxes must be correct for the award of the mark.

Commentary: This item was chosen because the inequality signs are new to the curriculum. There are two references to inequality signs: one which relates to number and the other relates to measurement. Pupils are required to know the meaning of these mathematical symbols. In this example item the pupils have to compare two-digit numbers using the appropriate sign.

Content domain: 2N2b - Compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs.

8

Look at the thermometer.



What temperature is shown?

°C



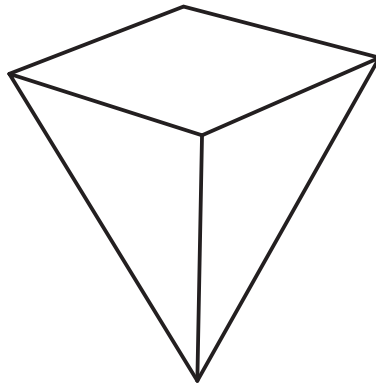
Qu	Requirement	Mark	Additional guidance
8	22	1 mark	

Commentary: Measuring temperature is new to the key stage 1 curriculum. The demand in this sample question requires pupils to accurately read a thermometer scale.

Content domain: 2M2 - Choose and use appropriate standard units to estimate and measure length/ height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ ml) to the nearest appropriate unit using rulers, scales, thermometers and measuring vessels.

9

How many vertices does a square-based pyramid have?



vertices

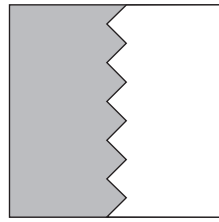
Qu	Requirement	Mark	Additional guidance
9	5 (vertices)	1 mark	

Commentary: Knowing the term 'vertices' is specifically mentioned in the new curriculum at key stage 1. The square-based pyramid is rotated to ensure that all the vertices are visible, reducing the spatial reasoning demand.

Content domain: 2G2b - Identify and describe the properties of 3-D shapes including the number of edges, vertices and faces.

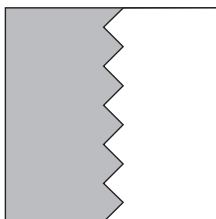
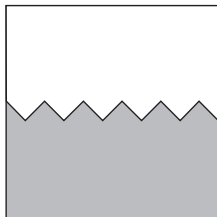
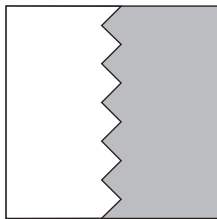
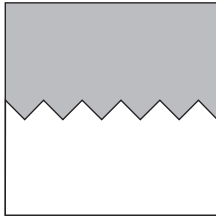
10

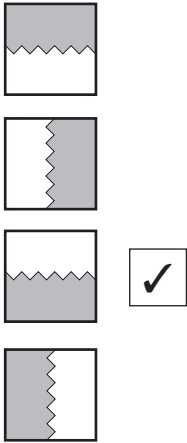
This tile is rotated **clockwise** through a three-quarter turn.



What will the tile look like **after** it has been turned?

Tick **one**.



Qu	Requirement	Mark	Additional guidance
10		1 mark	Do not award the mark if more than one answer is indicated.

Commentary: Understanding the concept of a 'three quarter turn' is new to the curriculum. This item demonstrates a shaded tile being rotated and demands that the pupils recognise that rotation. The pupils will have to manipulate the shape to select the appropriate answer.

Content domain: 2P2 - Use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clock-wise and anti-clockwise).

11 Tick (✓) the number sentences that are correct.

$$2 + 6 = 6 + 2 \quad \square$$

$$5 \times 6 = 6 \times 5 \quad \square$$

$$6 - 2 = 2 - 6 \quad \square$$



Qu	Requirement	Mark	Additional guidance
11	<div style="border: 1px solid black; padding: 2px; display: inline-block;">$2 + 6 = 6 + 2$</div> ✓ <div style="border: 1px solid black; padding: 2px; display: inline-block;">$5 \times 6 = 6 \times 5$</div> ✓ <div style="border: 1px solid black; padding: 2px; display: inline-block;">$6 - 2 = 2 - 6$</div>	1 mark	For the mark both boxes must be indicated. Accept any other clear indication that subtraction is not commutative but addition and multiplication are.

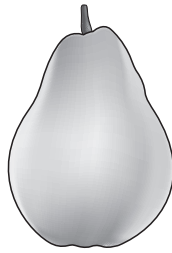
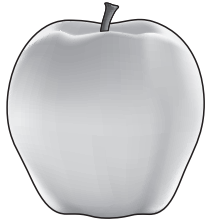
Commentary: Recognising that addition and multiplication are commutative and that subtraction and division are not, is one of the increased demands of the curriculum. Pupils should know the commutative facts; they should not need to resort to calculation to answer it.

Content domain: 2C9a - Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.

2C9b - Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.

12

Apples cost **10p** each. Pears cost **25p** each.



Amy buys **1 apple** and **2 pears**.

How much **change** does she get from **£1**?

Show
your
working

--

p



Qu	Requirement	Mark	Additional guidance
12	<p>Award TWO marks for the correct answer of 40 (p)</p> <p>If the answer is incorrect, award ONE mark for evidence of appropriate working, eg:</p> <p>$2 \times 25 = 50$</p> <p>$50 + 10 = 60$</p> <p>$\text{£}1 - 60 = \text{incorrect answer.}$</p>	Up to 2 marks	

Commentary: Solving problems involving money is not new to the curriculum. This item was chosen as an example of a ‘working mark’ question which is new to key stage 1. Pupils are expected to recognise the value of different denominations and notes, and therefore it is expected in this sample that they can subtract an amount from £1. As there is more than one numeric step required to answer this question, it has an increased level of complexity. Show your working questions will be signed by this layout.

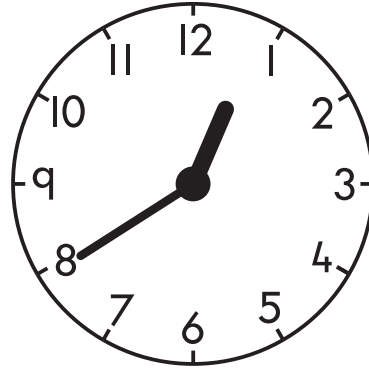
Content domain: 2C4 - Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods.

13

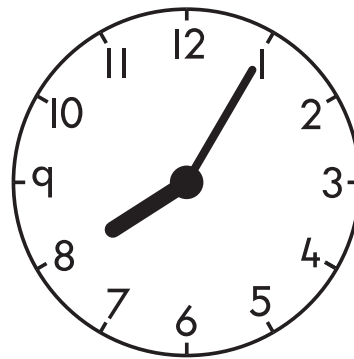
Draw lines to match the correct times to the clocks.

One has been done for you.

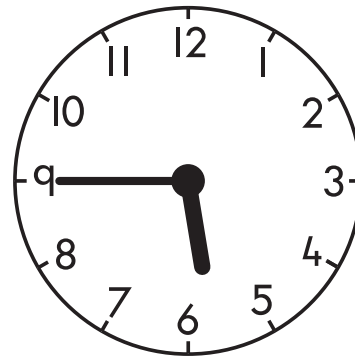
Nine o'clock



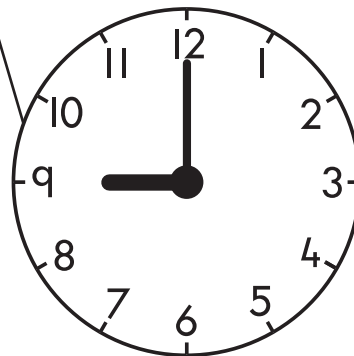
Five past eight

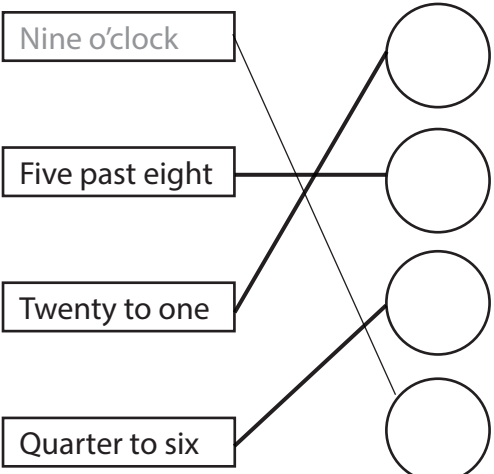


Twenty to one



Quarter to six



Qu	Requirement	Mark	Additional guidance
13		1 mark	<p>All times must match the correct clock to award the mark.</p> <p>Do not award the mark if more than one time is matching the same clock.</p>

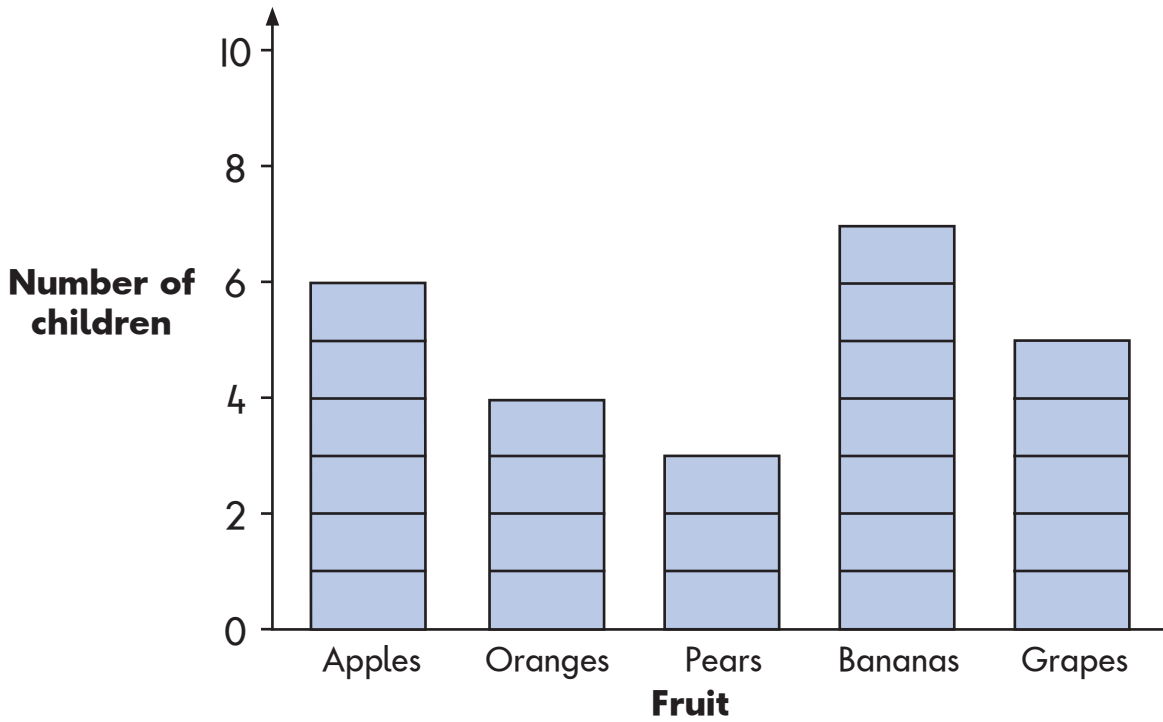
Commentary: The emphasis on being able to read time to five minutes is a new requirement of the key stage 1 curriculum.

While there are no numeric steps, pupils will have to apply learned facts to answer this question and select multiple responses.

Content domain: 2M4a - Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times.

14

This graph shows which fruit children like best.



How many children like bananas best?

How many **more** children choose grapes than pears?



Qu	Requirement	Mark	Additional guidance
14	7 (children)	1 mark	
	2 (children)	1 mark	

Commentary: Although not specifically new to key stage 1, this example question was chosen to reflect the statistical strand of the curriculum. This question was chosen to emphasise that this is still a requirement at key stage 1, and that it will be assessed.

Content domain: 2S1/2S2a - Interpret and construct simple pictograms, tally charts, block diagrams and simple tables.

Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity.

For more information, please contact the national curriculum assessments helpline on 0300 303 3013 or email assessments@education.gov.uk.

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Electronic version product code: STA/15/7202/e ISBN: 978-1-78315-404-3

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