Assessment in KS1
ATM/MA Primary Group

Introduction

The end of statutory assessment in KS1 offers schools the opportunity to review how their assessment practices support children's learning, and how colleagues are best supported, moving forward. The following questions and sample tasks are designed to stimulate discussions within schools and illustrate how teachers can make the most effective use of assessment to determine:

- how secure children are in Y1 content
- whether they have a flexible and deep understanding of content from Y2
- their preparedness for content in Y3.

Two of the key recommendations in the recent Ofsted report for mathematics leaders are:
"All schools should make sure that curriculums emphasise secure learning of, rather than encountering, mathematical knowledge, and curriculum sequencing prepares children for transitions between key stages and phases.
Primary schools should make sure that all children learn to apply facts and methods to wider problem-solving and geometry knowledge is sequenced throughout, rather than at the end of, each year's curriculum."
Coordinating mathematical success: the mathematics subject report
Ofsted, 13 July 2023

We recognise that all schools have different strategies for recording the data they gather. To support this data collection, we share here examples of tasks referenced to a range of national curriculum domains at this stage of learning.

1. How do our assessment systems support learners?

For assessment to have an impact on pupil progress, it must be used to inform teaching. High quality learning takes place when we, as teachers, are deeply aware of the strengths and gaps in pupil understanding and build lessons which move them on from where they are. A test alone does not give us this information. It is only by enabling pupils to engage in dialogue with their peers and with adults, in listening and looking at how they respond to tasks, that we can ascertain the way they are thinking and the depth of their understanding.

'How do we know what to teach tomorrow, if we do not know what the children have learnt today?'
Peacock, A. (2016) *Assessment for Learning without Limits.* Open University Press.

2. What mathematical qualities do we want our children to develop at KS1 and how can we assess these?

Supporting our children as they grow into able and confident mathematicians with the skills they need to thrive throughout their education and beyond, requires thoughtful planning and a shared vision. Schools may wish to reflect on what qualities they want to nurture in every classroom in order to give children opportunities to develop their resilience, confidence, curiosity and ability to be able to communicate their thinking with conviction.

Creating opportunities to listen to and observe children as they tackle meaningful tasks, provides an insightful source of evidence of their development as mathematicians. The sample tasks which form part of this document show how questions from recent KS1 SATs papers can be adapted to become tasks which provide a wealth of evidence of pupil attainment.

3. How can we assess reasoning and problem solving?

The National Curriculum has three aims, so it is important that assessments provide opportunities to assess each of the aims. These are to:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that children develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- can **solve problems** by applying their mathematics to a variety of routine and non- routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The sample tasks and supplementary questions we have provided illustrate how teachers can observe children working with their peers to obtain rich assessment evidence of children's developing fluency, reasoning and problem-solving.

4. How can we be confident in our assessments?

We recognise that it can be difficult to be confident that our assessments align with those of teachers across the country. It is therefore critical that cross-school moderation continues, despite this no longer being a statutory requirement. Comparing observations with teachers from partner classes or other nearby schools will help validate assessments.

The occasional use of standardised tests, such as the SATs papers, can be of value in comparing teacher assessments both within and between schools. The DfE exemplification documents published in 2018 *(https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/763056/2018_key_stage_1_teacher_assessment_exemplification_mathematics.pdf)* are also a good source of comparison. However, teachers need to be alert to discrepancies between what test questions show and what they were expecting from their children and consider the learning opportunities they are offering in the light of their reflections

Teachers should be considering questions such as: Do the assessments match what they would expect from their children? Do the assessment outcomes align with what is seen in lessons, heard in dialogue and recorded? If not, why not?

Learning goes beyond being able to accurately answer questions. We also need to assess understanding.

Children may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that children really understand the idea by asking questions such as 'Why?', 'What

happens if …?', and checking that children can use the procedures or skills to solve a variety of problems.
https://www.ncetm.org.uk/classroom-resources/assessment-materials-primary/

5. Do we need a written test for children at the end of KS1?

As teachers rebuild their confidence in their own assessments, in the long term, tests should **not** be needed. The example tasks that follow are intended to build colleagues' confidence in using task-based assessments. Colleagues may also choose to use questions from old test papers, in more creative and useful ways, such as selecting some key questions for groups of children to tackle, and using this to inform future planning for a unit of work. In the short term, if schools feel it is necessary to present their Y2 children with a test paper, we recommend the use of earlier (rather than later) SATs papers which represent a reasonable breadth of curriculum.

As the national curriculum states: "By the end of each key stage, children are expected to know, **apply and understand** the matters, skills and processes specified in the relevant programme of study."

Sample tasks

We offer six tasks taken from KS1 SATs papers with supplementary questions to illustrate how teachers can observe children working with their peers and ask questions to probe their thinking to obtain rich assessment evidence of children's mathematical understanding. The tasks focus on the following areas:

1. Additive reasoning
2. Properties of 2D shapes
3. Properties of 3D shapes
4. Statistics
5. Measures
6. Money

When carrying out these tasks, check for the following indications that a pupil really understands a mathematical concept, idea or technique. Can they:

- *Describe it in his or her own words;*
- *Represent it in a variety of ways (e.g. using concrete materials, pictures and symbols)*
- *Explain it to someone else;*
- *Make up his or her own examples (and non-examples) of it;*
- *See connections between it and other facts or ideas;*
- *Recognise it in new situations and contexts;*
- *Make use of it in various ways, including in new situations*

NCETM 2015, adapted from John Holt, (1964) *How Children Fail*. Da Capo Lifelong Books.
https://www.ncetm.org.uk/classroom-resources/assessment-materials-primary/

Sample Task 1: Additive Reasoning

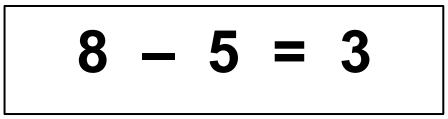
KS1 SATs test paper 1, Q19, 2023

1. **Play hiding games**
   Use up to ten counters of any kind between 2 children
   Children take turns to close their eyes while their partner hides some of the counters under their hand.
   They open their eyes and calculate how many counters are hiding.

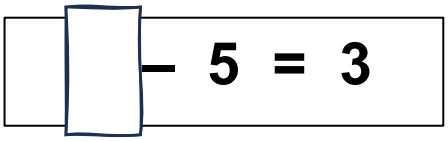
   Look and listen for:
   - Do children count on from the number of counters they can see, or do they use recall of number bonds?
   - Can children explain how they worked it out?
   - Can they record one or two of the hidings as a number sentence? (e.g. 5+3=8, 8-5 = 3)
   - Can they explain which number in the sentence they were trying to 'guess'?

   Play the same game using pennies in a purse or use a story scenario such as fishes in a cave or toy 'friends' in a tent that is meaningful to children.

2. **Make sliders**
   Children use a strip of paper (e.g. half a sheet of A4) and write a chosen number fact on it in large text. E.g.

   They use the other half of the paper to make a sleeve which will cover one number or one symbol and will slide along the first strip.

   Children work with changing partners to slide the slider along the strip and hide different parts of the number sentence (number or symbol) and challenge each new partner to work out what is hidden behind the slider, and explain how they worked it out.

   After several games, **look and listen for:**
   Can children work out what is hidden? (There are 5 different possibilities: 3 numbers and 2 symbols).
   Can they explain how they worked it out?
   Children may be able to work out some and not others, e.g. they can explain what is hidden when the = or the 3 are hidden, but find the others challenging)
   Do they count on their fingers, or do they use recall of number bonds?
   Can they explain how they worked it out?
   For a more controlled assessment, teachers may wish to prepare some sliders in advance to be able to assess each of the 5 possibilities.

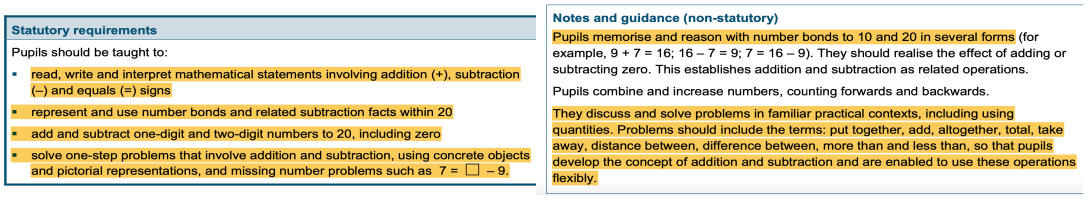
NB the notion of a number being 'hidden' is often easier for children to manage than a number being 'missing'.

Assessing the mathematics - going deeper

To find out what else they know, ask:

1. What calculation must you do to work out which number is hidden/missing?
2. Can you represent this number sentence on a number line, with blocks, with coins?
3. What if the answer was 13? 23? 123?
4. What if we were subtracting 15? 25? 125?
5. Can you tell me a word problem that would need/use this number sentence?
6. Can you tell me a word problem about measuring that would need/use this number sentence?
7. Can you write both numbers to make this calculation correct:
   [ ] – [ ] = 3, or [ ] – 5 = [ ]
   How many different ways?

Year 1 content – is it secure?



Statutory requirements

Pupils should be taught to:

- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ – 9.

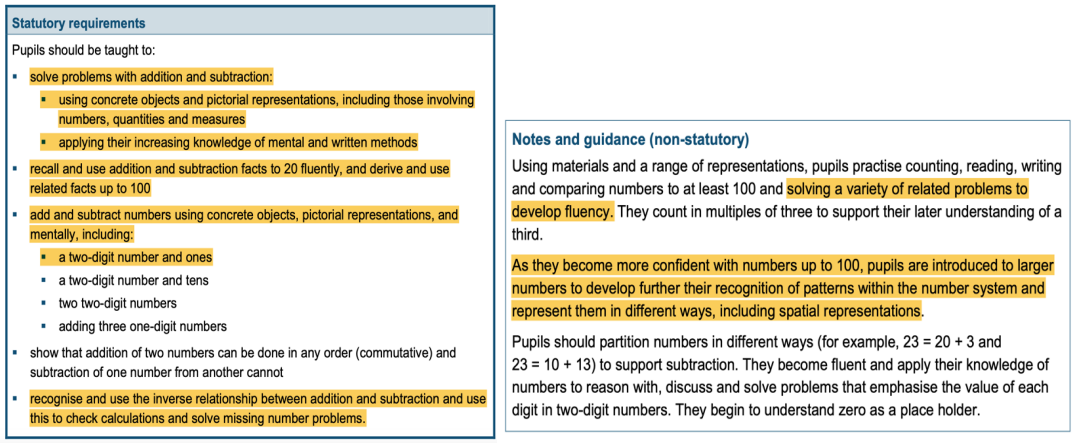
Notes and guidance (non-statutory)

Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.

Pupils combine and increase numbers, counting forwards and backwards.

They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

Year 2 content – do they demonstrate a flexible, deep understanding?



Statutory requirements

Pupils should be taught to:

- 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
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

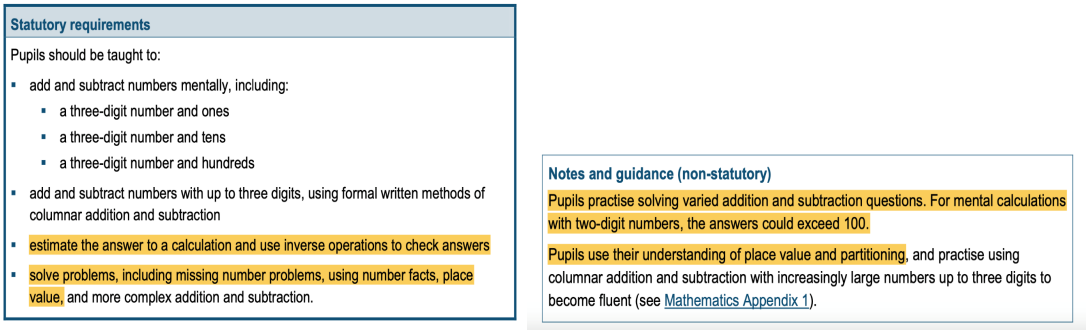
Notes and guidance (non-statutory)

Using materials and a range of representations, pupils practise counting, reading, writing and comparing numbers to at least 100 and solving a variety of related problems to develop fluency. They count in multiples of three to support their later understanding of a third.

As they become more confident with numbers up to 100, pupils are introduced to larger numbers to develop further their recognition of patterns within the number system and represent them in different ways, including spatial representations.

Pupils should partition numbers in different ways (for example, 23 = 20 + 3 and 23 = 10 + 13) to support subtraction. They become fluent and apply their knowledge of numbers to reason with, discuss and solve problems that emphasise the value of each digit in two-digit numbers. They begin to understand zero as a place holder.

Year 3



Statutory requirements

Pupils should be taught to:

- add and subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

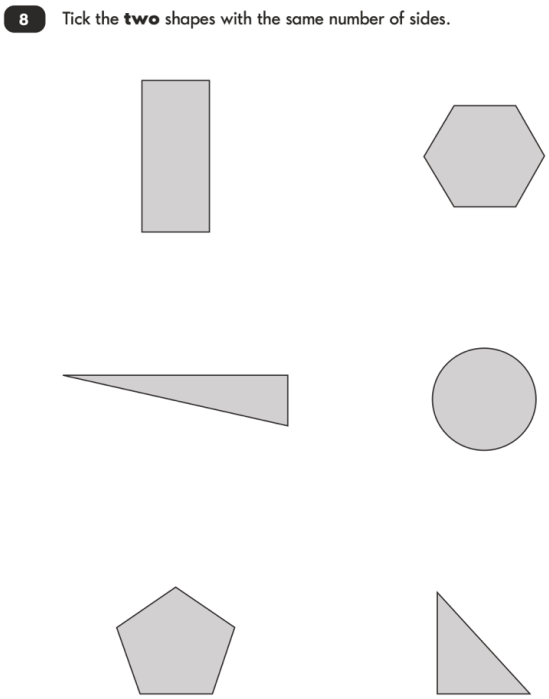
Notes and guidance (non-statutory)

Pupils practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.

Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent (see Mathematics Appendix 1).

Mathematics Programmes of Study: Key Stages 1 and 2 National Curriculum in England. DfE 2013

Sample Task 2: Properties of 2D shapes

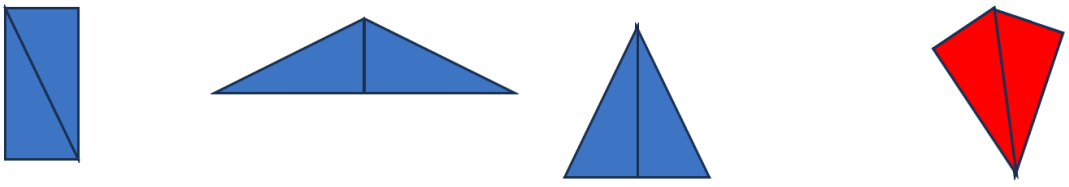


KS1 SATs test paper 2, Q8, 2023

Assessing the mathematics around this question

1. Joining flat (2D) shapes
   Each child (or pair of children) needs two identical right-angled triangles (it may be helpful for children to have access to more than two triangles, so they can make a selection of shapes using 2, and then compare them)

Give them an opportunity to talk about/describe them.
Ask them to: "*Fit these two triangles together along a whole side to make a new shape*" and to talk about what they make. They should be able to make two different triangles and a rectangle:



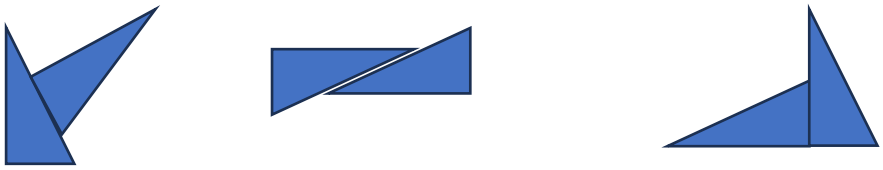
Show, or choose children to show the examples shown.
Encourage them to explain why the kite is *not* a triangle or a rectangle, and what is the same and what is different about the two triangles.

Look and listen for:

- Children describing the shapes using mathematical language to describe their properties, eg straight, vertex, corner.
- Children explaining why the kite is not a rectangle or triangle using mathematical language, e.g. a rectangle has two long sides and two short sides opposite each other.
- Do they enjoy fitting the triangles together to make new shapes? Do they persist in trying to making new and different shapes?

Assessing the mathematics – going deeper

Ask children to make more shapes by joining the triangles along part of a side e.g:



Can they describe the shapes they make and recognise similar shapes, perhaps by counting their sides?
Ask: "*Which of the shapes you have made are symmetrical*?"
Give the children a mirror so they can explore this question and experiment with where to place the mirror to check for symmetry. This is not a KS1 requirement and should only be introduced if it comes from children's observations

Exploring different polygons that can be made encourages children to seek multiple possibilities.
Ask: "*What's the same and what's different*"' about two different shapes to prompt reasoning. Children often will focus only on one of these – difference.

Look and listen for:

- Can the children describe the less familiar shapes using mathematical language to describe their properties?
- Do they recognise symmetry in the shapes? See comment above
- Do they use the mathematical names for the shapes?
- Do they recognise and describe similarities and differences between shapes they have made?
- Make an observation about how many *different* shapes might be possible based on what they have tried?

Children can go on to explore similar questions but starting with, two equilateral triangles; two isosceles right-angled triangles; two scalene triangles. What is the same and what is different about the outcomes?

Year 1 content – is it secure?

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:

- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects.

Notes and guidance (non-statutory)

Pupils handle and name a wide variety of common 2-D and 3-D shapes including: quadrilaterals and polygons, and cuboids, prisms and cones, and identify the properties of each shape (for example, number of sides, number of faces). Pupils identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces.

Pupils read and write names for shapes that are appropriate for their word reading and spelling.

Pupils draw lines and shapes using a straight edge.

Year 2 content – do they demonstrate a flexible, deep understanding?

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:

- recognise and name common 2-D and 3-D shapes, including:
  - 2-D shapes [for example, rectangles (including squares), circles and triangles]
  - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres].

Notes and guidance (non-statutory)

Pupils handle common 2-D and 3-D shapes, naming these and related everyday objects fluently. They recognise these shapes in different orientations and sizes, and know that rectangles, triangles, cuboids and pyramids are not always similar to each other.

Mathematics Programmes of Study: Key Stages 1 and 2 National Curriculum in England. DfE 2013

Sample Task 3: Properties of 3D shapes

9 Each object looks like a **cuboid**, **cone** or **cylinder**.

Complete the table.

One is done for you.

Object	Cuboid	Cone	Cylinder
			✓
			
			
			

KS1 SATs test paper 2, Q9, 2023

Assessing the mathematics around this question

1. Prints

The children use a selection of 3D shapes; large sheets of paper, paint and sponges in shallow trays.
Children choose and name a shape to print with.

Ask them to talk about the shape they have chosen and identify the 2D shapes of each face. If necessary prompt their thinking by asking: *"What do you notice?" "What shapes can you see?" "When you print with this shape, what shapes do you think your prints will make?"*
"Will you be able to print a circle?" "Why? Why not?"
"Try printing with a different shape, do you think the faces will be the same or different from your last shape?

Look and listen for:
Do children:

- Recognise and use the mathematical names for the 3D shapes?
- Recognise and use the mathematical names for the faces of 3D shapes?
- Discuss the properties of different shapes, recognising similarities and differences?
- Make an observation about which shaped prints might be possible based on what they observe?

Assessing the mathematics – going deeper

Ask each child to print each face of their shape once onto a large sheet of paper.
Display the prints and the shapes that were used (mix them all up).
Can children match the faces to the 3D shape that was used to make them?
Can they explain their reasoning?

2. Feely bag

You will need a selection of common 3D shapes and an opaque bag big enough to hold them.
With the children watching, put all the shapes into the feely bag.
Children take it in turns to either, feel inside the bag for a specific shape (named by themselves or the adult); or, to feel in the bag and describe what they feel as well as what shape they think they are holding, before removing it to show the rest of the group.

When all the shapes are removed, invite the children to sort them according to their own chosen criteria. This will direct the children to notice the properties of the shapes: "*How might we sort these out?" "Why do you think /say that*?" "*What other ways could you sort your shapes?" "Where might you find these shapes in everyday life?"*

Look and listen for:
Do children

- use the correct mathematical language to describe the properties of the shapes
- make suggestions for mathematical ways to sort the shape (i.e. relating to the name of the shape, the number of edges, faces or vertices, whether they have curved edges or faces)

Year 1 content – is it secure?

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:

- recognise and name common 2-D and 3-D shapes, including:
  - 2-D shapes [for example, rectangles (including squares), circles and triangles]
  - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres].

Notes and guidance (non-statutory)

Pupils handle common 2-D and 3-D shapes, naming these and related everyday objects fluently. They recognise these shapes in different orientations and sizes, and know that rectangles, triangles, cuboids and pyramids are not always similar to each other.

Year 3

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:

- draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- recognise angles as a property of shape or a description of a turn
- identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines.

Notes and guidance (non-statutory)

Pupils' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. Pupils extend their use of the properties of shapes. They should be able to describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle.

Pupils connect decimals and rounding to drawing and measuring straight lines in centimetres, in a variety of contexts.

Year 2 content – do they demonstrate a flexible, deep understanding?

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:

- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects.

Notes and guidance (non-statutory)

Pupils handle and name a wide variety of common 2-D and 3-D shapes including: quadrilaterals and polygons, and cuboids, prisms and cones, and identify the properties of each shape (for example, number of sides, number of faces). Pupils identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces.

Pupils read and write names for shapes that are appropriate for their word reading and spelling.

Pupils draw lines and shapes using a straight edge.

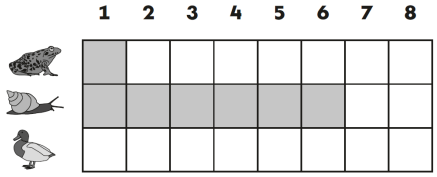
Mathematics Programmes of Study: Key Stages 1 and 2 National Curriculum in England. DfE 2013

Sample Task 4: Statistics

This block diagram shows how many animals are in a pond.

There are **4 ducks** in the pond. 

Complete the block chart.



KS1 SATs test paper 2, Q7, 2023

Ben draws a tally chart of the birds he sees in his garden.

Complete Ben's tally chart.

Bird	Tally of birds	Number of birds
robin 	𝍸	3
blue tit 	𝍸 |	
sparrow 		10

KS1 SATs test paper 2, Q15, 2023

This table shows the shoe sizes of all the children in a class.

Shoe size	Number of children
9	7
10	8
11	12
12	2

How many children have a shoe size of **10 or smaller**?

KS1 SATs test paper 2, Q30, 2022

Assessing the mathematics around this question

1. Collecting and presenting data in a tally chart to answer a question

Set a problem for the class to solve:

Everyone in our class is 6 or 7 years old, so do the children in our class have size 6 or size 7 shoes?

(To prepare to use this task with the class adjust the numbers to match the ages in one's own class. Also be aware that the children will have to consider the fact that UK shoe sizes increase after size 13 to size 1 and the class will need to consider how to deal with half sizes e.g. does a 12 ½ count as a 12 or is it another category? Even though these might seem like difficult things for young children to grapple with, shoe size is familiar to many children as they are likely to have come across it in their everyday lives. Time also has a tricky scale where 1 can come after 12 and there are halves in time too therefore this sort of thinking is very useful in other areas of maths and in life. (There is a chance that some children have shoes labelled with continental sizes – how are these equivalent to UK sizes? How can we convert them?)

How can we find this out the answer to this question? Do they know what their shoe size is? Is it written somewhere on their shoe/sandal? Agree that they need to collect shoe sizes to be able to answer the question.

Collect data of the children's shoe sizes into a tally chart. This tally chart may take time to create as children may have to look at other shoes at home which do have labels on them or ask someone at home.

Return to answer the question by looking at the data in the completed tally chart: Do the children who are 6 and 7 years old in our class have size 6 or size 7 shoes? How do we know?

Look and listen for:

Do children

- correctly explain how to answer this question by referring to the data in the tally chart
- use comparison language E.g. No children in our class have size 6 or 7 feet we all have shoes bigger than size 8 or sizes 6 and 7 are smaller than the sizes of shoes in our class etc.

2. Presenting and interpreting data in tables, charts and pictograms

Work with the children to represent their shoe size data currently in a tally chart into a series of different tables/charts and graphs:

- Simple table
- Block chart
- Simple pictogram (one picture represents one child or in another pictogram could have one picture representing 2 children)

When looking at the charts/pictograms/tables that the class create ask: What do you notice? What do you wonder? E.g. I notice that 11 children have size 11 shoes or I notice that more children have size 12 shoes than size 11 shoes or I wonder why no one has bigger than a size 2 shoes?

Look and listen for:

Do children:

- successfully construct a chart/table/pictogram
- interpret the chart/table/graph through their explanation of what they notice and wonder.

3. Asking questions of data

Return to the question: Do children in our class have size 6 or size 7 shoes? Model other questions that the chart/table/list/pictogram can answer e.g. How many children have size 11 shoes? How many children have size 12 and 13 shoes? Do fewer children have size 13 than size 12? Does anyone in our class have bigger than a size 12 shoe? What is the size of the smallest shoe in our class? How many children in our class have a size 12 or bigger? Ask the children to generate further questions that can be answered by the chart/graph/table. Children may need to be offered specific vocabulary to help them e.g. more, bigger, most, fewer, or they may need sentence starters e.g., how many more children have …

Look and listen for:

Do children:

- generate questions that can be answered by the data in the table/chart/list/pictogram
- need a lot of support to come up with relevant questions.

4. Comparing different ways of presenting data

Once a range of different representations is created it is possible to compare representations e.g., what is the same and what is different about the tally chart and the table …the tally chart and the pictogram …? Ensure that the pictograms and charts are also rotated so that the bars are both vertical and horizontal.

Look and listen for:

Children who notice that the information is the same, but the representation is different e.g., for a particular shoe size the same number of children can be a presented as number or a tally or a bar or a picture.

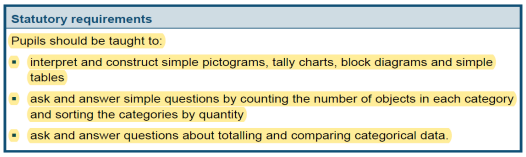
Assessing the mathematics – going deeper

Can you find examples of graphs/tables/charts in the classroom, the school, in these magazines, on this website …? What do you notice? What do you wonder?

Look and listen for:

- Children recognising unfamiliar graphs and charts and being able to interpret them

Year 2 Statistics:

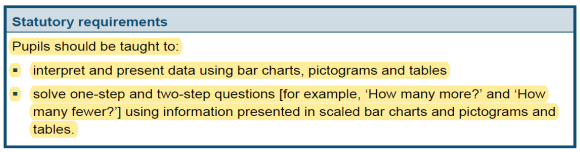


Statutory requirements

Pupils should be taught to:

- 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
- ask and answer questions about totalling and comparing categorical data.

Year 3 Statistics:



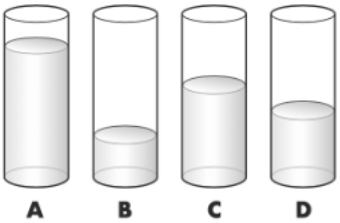
Statutory requirements

Pupils should be taught to:

- interpret and present data using bar charts, pictograms and tables
- solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

Mathematics Programmes of Study: Key Stages 1 and 2 National Curriculum in England. DfE 2013

Sample Task 5: Measures



Sort the glasses from **least full** to **most full**.

KS1 SATs test paper 2, Q6, 2016

Assessing the mathematics around this question

Provide a collection of transparent containers, some identical and some different sizes, cups and spoons in the water tray alongside a table to place the containers as they fill them. It helps if the water is coloured.

1. Discuss the meaning of full and empty. What does almost full/almost empty mean? What does it look like? Can children demonstrate this with a container and water?
2. Look at a bottle. Find three containers you think hold more than this bottle – how can you check? Find three containers you think hold less than this bottle – how can you check? Find a container you think holds about the same as this bottle. Did any of the containers surprise you? Why?
3. Compare two identical containers with two different amounts of liquid in them. Which has the most? How do you know?
4. Compare different sized containers. Which one might hold the most water? How do you know? Look out for the misconception. Ask: Can you order the containers? How can we check? Is there another way? Which is easiest? Compare:
    - Pouring from one container to another
    - Using a non-standard measure e.g. a cup.
    - Using a standard measure

Look and listen for:

Do children:

- Use mathematical language to describe the capacity of the containers e.g., full, empty, nearly full, nearly empty, less than half full, more than half full, holds more, holds less, holds the most, holds the least…
- Make conjectures based on what they already know e.g. I think this container will hold less water because…
- Believe that that the taller the container, the more liquid can be held regardless of other dimensions or have a similar misconception.

Assessing the mathematics – going deeper

- Present identical containers with different amounts of liquid in them. Can the children:

- Order the containers according to capacity and explain.
- Make statements comparing two containers using mathematical language.
- Put liquid in a further identical container between two of the ordered containers and explain.

- Present different containers with liquid up to the same level in all of them. Can the children:
  - Order the containers according to the amount of liquid and explain.
  - Make statements comparing two containers using mathematical language.
  - Put a container with liquid to the same level between two of the ordered containers and explain.
- Look at pictures of identical containers with different amounts of liquid in them. Can the children:
  - Order the containers according to capacity and explain. Look out or children focussing on the white space rather than the shaded area in the picture.
  - Make statements comparing two containers using mathematical language.
  - Draw on a further identical container between two of the ordered containers and explain.

Year 1 content – is it secure?

Statutory requirements

Pupils should be taught to:

- compare, describe and solve practical problems for:
  - lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]
  - mass/weight [for example, heavy/light, heavier than, lighter than]
  - capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]
  - time [for example, quicker, slower, earlier, later]
- measure and begin to record the following:
  - lengths and heights
  - mass/weight
  - capacity and volume
  - time (hours, minutes, seconds)
- recognise and know the value of different denominations of coins and notes
- sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]
- recognise and use language relating to dates, including days of the week, weeks, months and years
- tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.

Notes and guidance (non-statutory)

The pairs of terms: mass and weight, volume and capacity, are used interchangeably at this stage.

Pupils move from using and comparing different types of quantities and measures using non-standard units, including discrete (for example, counting) and continuous (for example, liquid) measurement, to using manageable common standard units.

In order to become familiar with standard measures, pupils begin to use measuring tools such as a ruler, weighing scales and containers.

Pupils use the language of time, including telling the time throughout the day, first using o'clock and then half past.

Year 2 content – do they demonstrate a flexible, deep understanding?

Measurement

Statutory requirements

Pupils should be taught to:

- 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
- compare and order lengths, mass, volume/capacity and record the results using >, < and =
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- find different combinations of coins that equal the same amounts of money
- solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- compare and sequence intervals of time
- 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
- know the number of minutes in an hour and the number of hours in a day.

Notes and guidance (non-statutory)

Pupils use standard units of measurement with increasing accuracy, using their knowledge of the number system. They use the appropriate language and record using standard abbreviations.

Comparing measures includes simple multiples such as 'half as high'; 'twice as wide'.

They become fluent in telling the time on analogue clocks and recording it.

Pupils become fluent in counting and recognising coins. They read and say amounts of money confidently and use the symbols £ and p accurately, recording pounds and pence separately.

Year 3

Statutory requirements

Pupils should be taught to:

- measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- measure the perimeter of simple 2-D shapes
- add and subtract amounts of money to give change, using both £ and p in practical contexts
- tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight
- know the number of seconds in a minute and the number of days in each month, year and leap year
- compare durations of events [for example to calculate the time taken by particular events or tasks].

Mathematics Programmes of Study: Key Stages 1 and 2 National Curriculum in England. DfE 2013

Sample Task 6: Money

16 Look at these coins:

What is the largest amount you can make using **three** of these coins?

KS1 SATs test paper 2, Q17, 2017

Assessing the mathematics around this question

We recommend that children use real coins for all tasks.

Understanding the value of coins 1:

The children will need, one dice, lots of pennies and enough of each of the other coins so they can collect one each. Children can play in 2s or 3s. (start without the 50p as it will take so many throws to get to that amount – initially aim to get to 20p and then extend once the game is known).

Children take turns to roll the dice, and collect that number of pennies.

- After their turn they can exchange the correct number of pennies for one of the larger denomination coins.
- The winner is the first player to collect one of each denomination of coin.

Look and listen for:

Do the children know the value of each coin without having to check the numbers?

Can they talk about how many more pennies they need to collect the next coin?

Children: articulating accurately "penny/pence" (e.g. "One penny coin" "Two pence coin" "Fifty four pence") "pound/pounds" (e.g. "One pound coin" "Two pound coin" "Twenty pounds")

Understanding the value of coins 2:

You will need some extra coins of each denomination.

- Play the same game, but children collect the amount shown on the dice using the fewest number of coins
- (e.g. if they roll 3, they can collect a 2p and a 1p, or if they roll 5, they can collect a 5p)
- They continue to exchange coins to make the large denominations that they need.

Look and listen for:

- Are children fluent with the values of the coins?
- Can they suggest different ways of making the same amount (e.g. how could you take 6p (3 x 2p, 5p+1p, 6 x 1p)?
- Can they readily combine coins to make new amounts, e.g. they need 20p, do they have enough coins?
- Can they record the combinations of coins they can use for each amount? Do they record by drawing coins or writing amounts?

Building amounts

- The children put one of each denomination of coin on the table between them (as in the picture)
- They take turns to take a coin.
- They calculate the total of their coins as they go along.

- The player with the highest amount (or lowest) wins the game

Play the same game but with 2 of each coin, and allowing children to choose any 3 coins.
Play the same game but include £1 and £2 coins and notes.

Look and listen for:

- Children using mathematical language to compare coins and amounts made from coins (e.g. is worth more than / has a greater value than / is worth less than / has a lower value than / has the same value as / is worth the same as)
- Children fluently taking the highest remaining coin (to make the highest total)
- Do children calculate totals mentally? Do they choose to record the values to add them? Do they need to revert to exchanging higher value coins for pennies to calculate the amounts?
- Can children predict who has the highest amount?

Assessing the mathematics – going deeper

- Ask children to compare the quantities they make in the game and record them using symbolic notation (<, >, =).
- Can children correctly record quantities using pounds (£) and quantities using pence (p).

- Play a similar game, but play in reverse.
  Children begin with one coin each? e.g. 20p, and some spare coins of a lower denomination in a pot (the bank!)
  They take turns to roll the dice.
  They should return that amount to the bank, but they will need to take some change, e.g. roll 3, put your 20p in the bank, calculate your change, and take it from the bank.

Year 1 content – is it secure?

Measurement

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Year 3

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- compare durations of events [for example to calculate the time taken by particular events or tasks].

Year 2 content – do they demonstrate a flexible, deep understanding?

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Mathematics Programmes of Study: Key Stages 1 and 2

For more information, or to join the JPG, please contact the chair:
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