Ministry of Education
Training • Employment
Youth • Sports & Culture
Building Brighter Futures

Department of
Education Services
building excellence together

# The Cayman Islands
# National Curriculum
# 2008

# Mathematics
# Programme of study and attainment targets
# Key Stages 1 and 2

Cayman Islands Government

## Acknowledgements

The overview document sets out the guiding philosophy and principles of the new Cayman Islands curriculum. It guides all the subject documents and approaches to teaching and learning in the revised curriculum.

The overview document was the result of substantial teamwork on the part of many stakeholders who contributed their time, expertise and resources. Their assistance is greatly appreciated.

The documents were prepared by groups of teachers led by the curriculum development officers, Clive Baker, Curriculum Development Officer (secondary) and Favourita Blanchard, Curriculum Development Officer (primary). They were guided in their work by the chair of the curriculum review, Helena McVeigh, Chief Inspector of schools, Schools' Inspectorate, who also edited all of the documents.

The members of the subject groups, including teachers and inspectors, must be thanked for their helpful insights and suggestions to the curriculum documents.

The subject panel members for mathematics were as follows:

Dipchand Bahall, Teacher, Cayman Prep & High
Tracey Belgrave, Teacher, University College of the Cayman Islands (UCCI)
John Benedict, Teacher, Bodden Town Primary
Desiree Charles, Education Officer for mathematics, Education Department
Gillian Dasent, Teacher, Savannah Primary
Caroline Dawes, Senior Inspector, Schools' Inspectorate
Barbara Peace-Ebanks, SENCO, Red Bay Primary
Sarah Inkpen, Teacher, UCCI
Dionne Smith, Teacher, Cayman Brac High
Edward Todd, Teacher, John Gray High

The work of the curriculum review team was overseen by the Curriculum Steering Committee, whose members comprise:

Helena McVeigh, (Chair)
Herbert Crawford, Senior Education Officer, Education Department
Brian Chapell, UCCI
Jordana Clarke, IT trainer, Walkers (former teacher)
Jacqueline Ebanks, Teacher, Montessori-by-the-Sea
Peter Embleton, Principal (Years 7-13), St. Ignatius Catholic School
Alan Hewitt, Deputy Principal, John Gray High School
Willean Hill, Librarian, George Town Primary School
Vikki Myrie, Teacher, Creek and Spot Bay Primary School
Kiva Powell, Teacher, Savannah Primary School
Malcolm Saunders, Teacher, George Hicks Campus
Pachent Smythe, Senior Inspector, Schools' Inspectorate
Annette Vaughan, Teacher, John A Cumber Primary School
Mark Scotland, Chair of the Savannah PTA
Wil Pineau, CEO, Chamber of Commerce
Pat Bell, Water Authority, representing HR personnel

## Aims

Learning mathematics contributes to the achievement of the curriculum aims for all young people (the 'Educated Caymanian') to become numerate, good communicators and good at finding solutions to problems. The mathematics curriculum aims to develop these skills in our children and young people.

The mathematics curriculum encompasses many skills that help students function effectively, personally, academically and vocationally. Mathematics, where possible, needs to be developed in contexts that are meaningful to real life situations. Even when it appears to be abstract, the mathematics curriculum is helping to develop students' problem-solving, logical thinking and reasoning skills – which are all crucial attributes in the modern workplace.

In order for our young people to leave school numerate and competent in solving problems, the mathematics curriculum should actively develop students' mathematical thinking.

Mathematical thinking is about:

- Understanding the idea of process, not just learning techniques
- Stopping to think - being logical and systematic
- Taking a larger problem and breaking it down into smaller ones
- Solving a smaller problem to apply to a larger one
- Being precise and systematic
- Being able to see the next question
- Asking interesting questions
- Predicting based on experience
- Developing mathematical language to make explanations more precise
- Being able to share mathematics and mathematical thinking
- Developing new challenges - asking 'what if?' and 'what if not?' questions

## Overview

Mathematics is an integral part of our existence. It is a powerful form of communication that enables us to represent, to interpret, to explain and to predict.

The study of mathematics involves a search for patterns and relationships, through which we can explore, explain and interpret the world around us.

We all require a fundamental knowledge of numbers, measurement, spatial relationships and statistics in our daily lives. At the same time, more sophisticated understanding of these areas form the basis of a myriad of vital activities in science, technology, humanities and the arts. Beyond this specific value, the study of mathematics develops logical reasoning and problem solving skills and provides a powerful means of communication in the global society.

Mathematics is exciting, challenging and satisfying. It holds an inherent interest for young children, and this can be maintained throughout their schooling through effective and engaging teaching.

## What is numeracy?

Numeracy is a proficiency that involves confidence and competence with numbers and measures. It requires an understanding of the number system, a repertoire of computational skills and an inclination and ability to solve number problems in a variety of contexts.

Numeracy also demands a practical understanding of the ways in which information is gathered by counting and measuring, and of how it is presented in graphs, diagrams, charts and tables.

# How teachers should use the programme of study and attainment targets

The programme of study identifies the experiences and opportunities that students must be given to enable them to gain the knowledge, skills and understanding specified in the attainment targets.

**The strands**

The programme of study for mathematics is divided into four strands:

i. Using and applying mathematics
ii. Number and algebra
iii. Measurement and geometry
iv. Statistics

The first strand, using and applying, incorporates problem-solving, communicating and reasoning and is assessed through the other strands.

This division into strands is a convenient way of emphasizing the outcomes for students learning mathematics. Learning in each strand should not necessarily happen independently. Teachers' planning should make explicit the links between the strands, drawing upon learning in different areas and making explicit the connections between them.

**Attainment targets**

The attainment targets specify the knowledge, skills and understanding that students should acquire through the key stage. Levels 1 through 5 have been included in this document, although most students in Key Stage 1 will be working between levels 1 and 3 and students in Key Stage 2 will be working between levels 2 and 5. Further details about the attainment targets are given in appendix 1.

# Mathematics programme of study for Key Stage 1

**Introduction**

At the beginning of a student's education, it is essential to lay a secure foundation of mathematical knowledge, skills and understanding. Students will embark on Key Stage 1 with a diversity of mathematical experiences, aptitudes and abilities. These should be identified and used as the basis for all planning.

Time should be allowed for students to develop and consolidate their mathematical ideas using practical materials before moving on to more formal recording. Through engaging in a wide range of activities, students should begin to develop their skills in mental mathematics. They should be given opportunities, on a regular basis, to estimate and approximate, and to make simple predictions in all areas of mathematics. These skills should be developed systematically and progressively throughout the key stage.

The sections of the programme of study interrelate. *Using and applying* should pervade the entire mathematics programme. Students should use and apply mathematics in practical tasks, in real-life situations and within mathematics itself.

Throughout Key Stage 1, teachers should provide opportunities for students to develop a range of skills, knowledge and understanding within the four strands targets for mathematics through well-planned practical activities.

The following skills, knowledge and understanding should be taught at a level that is appropriate to the needs of students in Key Stage 1.

**Mathematical activities**

Students should be engaged in a wide range of purposeful activities that should:

- Involve them in different modes of learning, including playing, exploring investigating, doing and observing, speaking and listening, discussing and asking questions
- Match their stage of development and ability
- Include opportunities for both cooperative and independent learning
- Bring together different areas of mathematics
- Develop skills in mental arithmetic
- Use, where appropriate, their own interests, experiences or questions, either as a starting point or as further lines of development
- Be balanced between activities that develop knowledge, skills and understanding and those that develop the ability to solve problems
- Be balanced between those that are closed and short in duration and those that are open-ended and have scope for development over a longer period of time

## Using and applying mathematics

**Students should be given opportunities to:**

- Select, (with help from the teacher), materials and equipment required for a task; know the appropriate materials and equipment to select for a task by appreciating the special characteristics of these materials and equipment
- Select and use the mathematics appropriate to a task, *for example, counting on when giving change in a shopping activity*
- Develop different approaches to solving problems and look for ways to overcome difficulties, *for example*
  - *comparing and ordering heights of children in a group to find the tallest and the smallest*
  - *drawing a simple diagram to find which lunch item is the most popular*
- Begin to organise their own work and work systematically, *for example, find the components of 14 cents using different coins and record the results; plan how the lengths of different items in the classroom should be measured and the results recorded*
- Understand the language of number, of properties of shapes and of comparatives, *for example, bigger than, the same 'weight' as, next to and before*
- Talk about their work, initially by responding to questions from the teacher; ask questions about their work, *for example, 'How could I record the handspans of everyone in my group?'*
- Explain, using appropriate mathematical vocabulary, how they worked out their answer and how they know a particular answer is right or wrong
- Understand and use mathematical symbols, *for example, '+' and '='*
- Use a variety of forms of mathematical representation, presenting results in a clear and organised way
- Recognise simple patterns and relationships and make predictions about them based on experience, *for example, predict the next number in the sequence, 3, 6, 9, 12....*
- Copy, continue and devise repeating patterns, *for example, continuing a bead threading pattern of red, red, blue, red, red, blue . . .*
- Distinguish between odd and even numbers
- *A*sk and respond to open-ended questions, *for example*
  - *'What would happen if more cubes were added to one side of the balance?' and Why?'*
  - *'How would you find how much more one container holds than another?'*
  - *'What would be the best way to record these results?'*
- Explain their way of working, *for example*
  - *give reasons for sorting when using a Carroll diagram*
  - *explain how they know they have found all the ways of making 25c with different coins*
- Know ways to check their own work, *for example, by repeating measurements or repeating calculations by adding from the top downwards or using a calculator*

## Number and algebra

### Counting and understanding number

**Students should be given opportunities to:**

- Count orally, knowing the number names, initially working with small numbers; count collections of objects and know that the size of a set is given by the last number in the count; understand the empty set and the conservation of number
- Read, write and order whole numbers, initially to 10, progressing to at least 1000; use the knowledge that the position of a digit indicates its value
- Make a sensible estimate of a small number of objects, *for example, know that there are about 5 fish in a fish tank;* begin to approximate to the nearest 10 or 100, *for example, 68 is almost 70. 287 is nearer to 300 than 200*
- Recognise and use simple everyday fractions and their notation in practical situations, *for example, 1/2 and 1/4 of an apple; 1/2 of 10 counters; 1/2 of the children in a group*
- Recognise and know how to use coins in simple contexts, *for example, shop play;* use and understand the conventional way of recording in money; add and subtract money, initially involving small amounts and progressing to working with money up to $10; use these skills in problem-solving situations

### Knowing and using number facts

**Students should be given opportunities to:**

- Explore and record addition and subtraction patterns and patterns in number tables, *for example, the hundred square,* explaining and using them to make predictions, initially working with number patterns up to 20 and then to 100; progress to exploring multiplication and division patterns
- Understand the commutative property of addition and the relationship between addition and subtraction, *for example,*
  - *3 + 2 = 2 + 3*
  - *if 4 + 3 = 7, then 7 – 4 = 3*
- Understand the use of a symbol to stand for an unknown number, *for example,*
  - *6 = 2 +* □
  - *▲ – 3 = 2;*
- Understand and use simple function machines

### Calculating

**Students should be given opportunities to:**

- Understand the operations of addition and subtraction (as take away or comparison or complementary); add and subtract, initially using small numbers and progressing to working with hundreds, tens and units; develop a variety of methods for adding and subtracting; use these skills to solve problems involving whole numbers
- Progress to understanding the operations of multiplication and simple division and use them to solve problems with whole numbers, including working with remainders
- Know addition and subtraction facts, initially to 10, and then to 20; add mentally up to three single digit numbers; subtract mentally a single digit number from a two-digit number; add mentally two two-digit numbers, using informal jottings; know multiplication tables relating to the 2s, 5s, 10s and other tables, as appropriate; use these facts in problem-solving situations

## Measurement and geometry

### Understanding Shape

**Students should be given opportunities to:**

- Sort 2-D and 3-D shapes in different ways, giving reasons for each method of sorting
- Make constructions, pictures and patterns with 2-D and 3-D shapes using scrap and commercial materials
- Name 2-D and 3-D shapes including squares, rectangles, circles, triangles, cubes, cuboids, cones, cylinders and spheres; describe these shapes using mathematical language, including 'corners', edges, sides and faces; recognise reflective symmetry in simple cases in their immediate environment, *for example, a butterfly, a particular road sign*

- State a position using prepositions, *for example, on, inside, above, under, behind, next to;* recognise, in practical situations, different types of movement, including straight (forwards and backwards), right and left turns and turning over, laying the foundation of the notion of an angle as a measure of turn; give and understand instructions for turning through right angles; recognise right-angled corners in 2-D and 3-D shapes; know the four points of the compass

**Measuring**

**Students should be given opportunities to:**

- Compare and order objects, developing and using mathematical language associated with length, 'mass', capacity, area and time, *for example, the same as, heavier than, half empty, will cover*
- Use non-standard units in length, mass, capacity, area and time to measure a range of everyday objects and events; appreciate important ideas about measurement including the need for appropriate accuracy and the meaning of graduations on measuring instruments; recognise the need to use standard units
- Know the most commonly used units in length, mass, capacity and time, including metres, kilograms, litres, hours and minutes and use them to measure in purposeful contexts; progress to measuring with greater accuracy using, *for example, 1 cm, 1/2 kilogram and 1/2 litre*
- Sequence everyday events, *for example, breakfast time, lunch time and dinner time.* Know the time within a day is comprised of morning, afternoon, evening and night; know the days of the week, months of the year and seasons; explore calendar patterns
- Recognise times on the clock face, initially significant times, *for example, lunch time, home time* and progressing to the hour, half-hour and quarter hours; begin to read the five minute intervals on an analogue clock; compare analogue and digital displays for the hour and half-hour
- Make estimates using arbitrary and standard units, *for example, the number of cupfuls that would fill a jug; heavier or lighter than a kilogram; how long it would take to wash your hands*
- Choose and use simple measuring instruments, reading and interpreting them with some accuracy
- Understand the conservation of measures
- Know the months of the year; explore calendar patterns

## Statistics

**Students should be given opportunities to:**

- Sort everyday objects and talk about the reasons for sorting; select criteria for sorting a set of objects and apply consistently; sort and classify objects for one or two criteria; represent the results of classifying using Venn, Carroll and Tree diagrams with two criteria
- Collect data and record it, using real objects or drawings and talk about the outcome; progress to recording data in a range of ways, including simple pictograms, block graphs and bar charts
- Help to design an observation sheet and use it to record a set of data leading to a frequency table, *for example, recording the colours of cars passing the school;* collate and analyse the results
- Extract information from an increasing range of charts, diagrams and tables; enter and access information in a simple database including a computer database

# Mathematics programme of study for Key Stage 2

**Introduction**

Key Stage 1 and Key Stage 2 should be seen as a continuum. Students will come to Key Stage 2 with a spread of mathematical abilities and attainment and should be allowed to continue to make progress from their own starting points.

Time should be allowed for students to develop and consolidate their mathematical ideas using models and images before moving on to more formal recording. Through engaging in a wide range of activities, students should extend their skills in mental mathematics. They should be given opportunities, on a regular basis, to estimate and approximate, and to make simple predictions in all areas of mathematics. These skills should be developed systematically and progressively throughout the key stage.

The sections of the programme of study interrelate. Processes in mathematics should pervade the entire mathematics programme. Pupils should use and apply mathematics in practical tasks, in real-life situations and within mathematics itself.

Throughout Key Stage 2, teachers should provide opportunities for students to develop a range of skills, knowledge and understanding within the four strands for mathematics through well-planned practical activities. that is appropriate to the needs and

The following skills, knowledge and understanding should be taught at a level that is appropriate to the needs of students in Key Stage 2.

**Mathematical activities**

Students should be engaged in a wide range of purposeful activities that should:

- Involve them in different modes of learning, including playing, exploring and investigating, doing and observing, speaking and listening, discussing and asking questions.
- Match their stage of development and abilities
- Include opportunities for both cooperative and independent learning
- Bring together different areas of mathematics
- Develop skills of mental mathematics
- Use, where appropriate, their own interests, experiences or questions, either as a starting point or as further lines of development
- Be balanced between activities which develop knowledge, skills and understanding and those which develop the ability to solve problems
- Be balanced between those which are closed and short in duration and those which are open-ended and have scope for development over a longer period of time

## Using and applying mathematics

**Students should be given opportunities to:**

- Appreciate the special characteristics of the materials and equipment they handle and so take increasing responsibility for selecting and using the materials and equipment required for their work
- Select and use the mathematics appropriate to the current work, *for example, counting squares to find the shape with the greatest area*
- Gather information for an activity, initially with help from the teacher; progress to identifying and obtaining the information needed to carry out their work, *for example, measure the dimensions of the classroom in order to draw a simple scale plan*
- Plan and organise their work, learning to work systematically, *for example, draw all the possible arrangements of six squares in order to find which ones are nets of a cube*
- Try different mathematical approaches to problems and look for ways to overcome difficulties
- Develop their own mathematical strategies for solving problems, initially through discussion with the teacher, *for example, use trial and improvement methods; work backwards; make organised lists; simplify the task; look for patterns;* review progress, making changes where necessary
- Understand and use the language of number; shape, measures, simple probability, relationships, *for example, 'multiple of', 'factor of ' and 'parallel to'*
- Interpret situations mathematically using appropriate symbols or diagrams, *for example % (percentage); >(greater than); < (less than)*
- Discuss their work; compare their ideas and methods with others, *for example, when finding ways to measure the capacity of their lungs or the thickness of a magazine; when investigating the number of children crossing the road to school in order to establish the need for a crossing patrol*
- Record results, initially in a given format; choose the most appropriate format and use it to present information and results clearly; explain the reasons for their choice of presentation
- Recognise general patterns and relationships and make predictions about them
- Ask and respond to open-ended questions; follow alternative suggestions
- Explain their thinking
- Understand general statements and investigate whether particular cases match them, *for example, odd number + even number = odd number; the taller people are, the more they 'weigh'*
- Make a general statement based on evidence, *for example from a road safety survey, most students are injured on the road between 2.30 and 3.30 in the afternoon; all triangles will tessellate*
- Check their results and consider whether they are reasonable, *for example, using inverse operations and estimating to find the approximate answer*

## Number and algebra

**Counting and understanding number**

**Students should be given opportunities to:**

- Read, write and order whole numbers, initially to 100 and progressing to using any whole number, understanding that the position of a digit signifies its value; use their understanding of place value to develop computational methods
- Extend understanding of place value to include decimals, initially to one decimal place and then up to two decimal places; use this to multiply and divide numbers by 10, 100 and 1000
- Estimate within calculations, initially with numbers within 100 and extending to all whole numbers; approximate numbers to the nearest 10 or 100; estimate and approximate to gain a feeling for the size of a solution to a problem, *for example, understand that 32 x 9 is approximately 30 x 10*
- Understand and use, in context, vulgar fractions, decimal fractions and percentages; understand the equivalence of simple fractions; explore the relationships between fractions and percentages, *for example, understand that half price is the same as 50% off*
- Understand and use the conventional way of recording money; use the four operations to solve problems
- Estimate and approximate to gain a feeling for the size of a solution to a problem before carrying out a calculation
- Interpret a calculator display in relation to money

**Knowing and using number facts**

**Students should be given opportunities to:**

- Explore and predict patterns and sequences of whole numbers initially within 100 and extending to larger numbers, including counting in different sizes of step, doubling and halving numbers, finding multiplication patterns in the hundred square, predicting subsequent numbers in a sequence; follow simple sets of instructions to generate a sequence; devise rules for determining sequences
- Understand and use multiples and factors and terms, including prime, square and cube; appreciate that multiplication and division are inverse operations
- Interpret, generalise and use simple relationships expressed in numerical, spatial and practical situations, *for example, finding equivalent forms of two digit numbers; understanding square and triangular numbers;* understand and use simple function machines
- Understand that a letter can stand for an unknown number, *for example, 6 + a = 24*

**Calculating**

**Students should be given opportunities to:**

- Consolidate knowledge of addition and subtraction facts to 20; understand and use this knowledge to calculate quickly facts that they cannot recall; add mentally two two-digit numbers up to 100 and subtract mentally one two-digit number from another; know the multiplication facts to 12 x 12; use these facts when solving problems
- Engage in a range of activities to develop understanding of the four operations of number and their interrelationships; appreciate the use of brackets; develop a range of non-calculator methods of computation to include addition and subtraction with up to two decimal places and multiplication and division of decimals by whole numbers; use these operations to solve problems, using a calculator where necessary

## Measurement and geometry

**Understanding shape**

**Students should be given opportunities to:**

- Use materials, *for example, geoboards, construction sets and paper,* to construct and handle a wide range of regular and irregular 2-D shapes; classify these through examination of angles and sides; look for line and rotational symmetries in practical situations; reflect shapes, *for example, by using a mirror;* use shapes to explore and create tessellations
- Use materials, *for example, blocks, construction sets and cereal packets,* to

construct various 3-D shapes; investigate the number of faces, edges and vertices on these shapes; use nets to explore the relationship between 2-D and 3-D shapes

- Recognise geometrical properties and use these to solve problems, for example, investigate practically, 1/4 turns, 1/2 turns and whole turns to understand the notion of angle in the context of turning; find right angles in 2-D and 3-D shapes in the environment; understand clockwise and anticlockwise; know the eight points of the compass; use a programmable device
- Develop the language associated with line and angle, including vertical, horizontal, perpendicular, parallel, acute, obtuse and reflex
- Recognise properties of acute, obtuse and reflex angles, *for example, know that an acute angle is less than a right angle and that a reflex angle is greater than two right angles*
    - Investigate angles in triangles, including scalene, right angle, equilateral and isosceles, and quadrilaterals including square, rectangle, rhombus, kite, parallelogram, trapezium; measure and draw angles to the nearest degree up to 360° with reasonable accuracy
    - Use co-ordinates to plot points and draw shapes in the first quadrant

**Measuring**

**Students should be given opportunities to:**

- Develop skills in estimation of length, mass, weight, volume/capacity, time, area and temperature through practical activities, using metric units where appropriate
- Develop the language associated with a wider range of metric units and be confident with the terms metre, gram and litre, and their relevant prefixes of kilo, centi, milli
- Appreciate important ideas about measurement including the continuous nature of measurement and the need for appropriate accuracy
- Choose and use appropriate metric units and measuring instruments in a variety of situations, interpreting numbers on a range of measuring instruments, *for example, measure the perimeter of the playground to the nearest metre using a trundle wheel*
- Understand the relationship between units, *for example, know that kilograms and grams are used to weigh food;* convert from one metric unit to another, *for example, know that 175 centimetres is 1.75 metres;* use the four operations to solve problems, working with up to three decimal places, where appropriate
- Know the British units still in common use including foot, yard, mile, pound, pint and degrees Fahrenheit
- Understand and use negative numbers in context, *for example, know that if the temperature rises during the day from -3°C to 4°C, the temperature has risen by 7 degrees*
- Understand the concept of perimeter and calculate the perimeter of simple shapes; find areas by counting squares and volumes by counting cubes; calculate areas and volumes of simple shapes in two and three dimensions
- Understand and use scale in the context of simple maps and drawings, *for example, draw a simple plan of the classroom where 1 $cm^2$ represents 1 $m^2$; calculate the actual distance as the crow flies between two places on a map using the scale of 1 cm to 1 km*
- Know the units of measurement of time and the relationship between them
- Recognise times on the analogue clock, including the hour, half and quarter hours, five minute intervals and one minute intervals; understand the relationship between the twelve and twenty-four hour clocks, including am and pm; read analogue and digital displays and understand the relationship between them; use timetables involving the twenty-four clock and perform simple calculations related to the timetables

## Statistics

**Students should be given opportunities to:**

- Use data drawn from a range of meaningful situations, *for example, those arising in other subjects*
- Collect, classify, record, represent and interpret discrete numerical data, using graphs, tables and diagrams, including Venn, Decision tree and Carroll diagrams, pictograms, block graphs, bar charts, bar-line graphs and line graphs with the axis starting at zero; explain their work orally or through writing and draw conclusions
- Interpret tables and lists used in everyday life, *for example, those found in a catalogue or road safety accident report;* interpret a wide range of graphs and diagrams including a pie chart; create and interpret frequency tables, including those for grouped discrete data, *for example birthdays;* use tallying methods

- Design an observation sheet and use it to record a set of data

  leading to a frequency table; collate and analyse the results; progress to designing and using a data collection sheet, interpreting the results
- Enter information in a database and interrogate it, using at least two criteria; use an appropriate computer package to produce a variety of graphical representations of data
- Understand, calculate and use the mean and range of a set of discrete data, *for example, calculating the mean score of two teams that have played different numbers of games in order to compare their performance*
- Become familiar with and use the language of probability including certain, uncertain, likely, unlikely, impossible and fair, by participating in games and other practical activities
- Understand possible outcomes of simple random events, *for example, that buttered toast will fall with either the buttered side up or the buttered side down;* understand that there is a degree of uncertainty about the outcome of some events, while others are certain or impossible, *for example, it is certain to get dark tonight; impossible for a person to turn into a fish; uncertain whether or not it will rain tomorrow*
- Place events in order of 'likelihood'; understand and use the idea of 'fifty-fifty' or 'evens' and know whether events are more or less likely than this, *for example, know that if a dice is thrown there is an equal chance of an odd or even number but the chance of getting a 5 is less than an even chance*

## Appendix 1 Attainment targets

The learning outcomes or attainment targets are expressed at eight levels of increasing difficulty. These levels are the same for all key stages and are not age or year-group-dependent, which will make it easier to see how a student progresses as he/she moves up the year groups and from primary to secondary school.

Students learn at different rates and, therefore, individual students or groups of students of the same age could be working towards different levels within and across the key stage boundaries. By the end of a key stage, **most** students should be performing at the **'expected'** level, but some will be above this level and others will be below.

The range of levels covered by the key stage and the 'expected' levels **for the end** of each key stage are given in the table below:

| Key Stage | Year Groups | Range of levels covered by the programme of study | Expected level at end of the Key Stage |
|---|---|---|---|
| 1 | 1 - 3 | 1- 3 | 2 |
| 2 | 4 - 6 | 2 - 5 | 4 |
| 3 | 7 - 9 | 3 - 7 | 5 or 6 |

Teachers will be expected to make judgements about the levels attained by each of their students, particularly at the end of a key stage. In deciding on a student's level of attainment, teachers should judge which description in the attainment targets best fits the student's performance. When doing so, each description should be considered alongside those for adjacent levels. It is not necessary for a student to have satisfied the entire range of a particular level to be awarded it.

It can be helpful to divide levels into **three sub-levels** to support tracking of progress and target setting.

For example:

- 3a – Represents a performance that demonstrates a good understanding of all the descriptors in level 3
- 3b – Represents understanding of the majority of level 3 descriptors
- 3c – Represents understanding at level 2a (ie the full understanding of the previous level) plus an understanding of some of the descriptors at level 3

## Appendix 2 Attainment targets for Key Stages 1 and 2 mathematics

### Strand i Using and applying mathematics

| Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|
| •Students use mathematics as an integral part of classroom activities.<br><br>•They represent their work with objects or pictures and discuss it.<br><br>•They recognise and use a simple pattern or relationship. | •Students select the mathematics they use in some classroom activities.<br><br>•They discuss their work using mathematical language.<br><br>•They are beginning to represent their work using symbols and simple diagrams.<br><br>•They explain why an answer is correct. | •Students try different approaches and find ways of overcoming difficulties that arise when they are solving problems.<br><br>•They are beginning to organize their work and check results.<br><br>•They discuss their work using mathematical language and are beginning to explain their thinking.<br><br>•They use and interpret mathematical symbols and diagrams.<br><br>•They show that they understand a general statement by finding particular examples that match it. | •Students are developing their own strategies for solving problems and use these strategies both in working within mathematics and in applying mathematics to practical contexts.<br><br>•They check their results are reasonable by considering the context or the size of the numbers when solving problems, with or without a calculator.<br><br>•They look for patterns and relationships, presenting information and results in a clear and organised way.<br><br>•They search for a solution by trying out ideas of their own. | •Students identify the mathematical aspects and obtain the necessary information in order to explore mathematical situations, carry through tasks or tackle problems.<br><br>•They calculate accurately, using ICT when appropriate.<br><br>•They check their working and results, considering whether these are sensible.<br><br>•They show understanding of situations by describing them mathematically using symbols, words and diagrams.<br><br>•They draw simple conclusions of their own and give an explanation of their reasoning. |

**Strand ii Number and algebra**

| Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|
| •Students count, order, add and subtract numbers when solving problems involving up to 10 objects.<br><br>•They continue a sequential pattern. | •Students count sets of objects reliably and use mental recall of addition and subtraction facts to 10.<br><br>•They begin to understand the place value of each digit in a number and use this to order numbers up to 100.<br><br>•They understand that subtraction is the inverse of addition and use this knowledge in solving problems.<br><br>•They choose the appropriate operation when solving addition and subtraction problems.<br><br>•They use mental calculation strategies to solve problems involving money and measures.<br><br>•They recognise sequences of numbers, including odd and even numbers. | •Students show understanding of place value in numbers up to 1000 and use this to make approximations.<br><br>•They begin to use decimal notation and recognise negative numbers, in contexts such as money and temperature.<br><br>•They use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers.<br><br>•They add and subtract numbers with two digits mentally and with three digits using appropriate written methods.<br><br>•They use mental recall of the 2, 3, 4, 5 and 10 multiplication tables and derive the associated division facts.<br><br>•They solve whole number problems involving multiplication and division including those that give rise to remainders.<br><br>•They use simple fractions that are several parts of a whole and begin to recognise when | •Students use their understanding of place value to multiply and divide whole numbers by 10 and 100.<br><br>•In solving number problems, students use a range of mental methods of computation with the four operations, including mental recall of multiplication facts up to 12 x 12.<br><br>•They use efficient written methods of addition and subtraction and of multiplication and division.<br><br>•They recognize approximate proportions of a whole and use simple fractions and percentages to describe these.<br><br>•They begin to use simple formulae expressed in words.<br><br>•They use and interpret coordinates.<br><br>•They recognize and describe relationships including multiple, factor, | •Students use their understanding of place value to multiply and divide whole numbers and decimals.<br><br>•They order, add and subtract negative numbers in context.<br><br>•They use all four operations with decimals to two places.<br><br>•They solve simple problems involving ratio and direct proportion.<br><br>•They calculate fractional or percentage parts of quantities and measurements, using a calculator where appropriate.<br><br>•They construct, express in symbolic form and use simple formulae involving one or two operations.<br><br>•They use brackets appropriately. |

| | | | | |
|---|---|---|---|---|
| | | two simple fractions are equivalent . | prime and square. | |

**Strand iii Measurement and geometry**

| Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|
| •Students measure and order objects by direct comparison and order events.<br><br>•They use everyday language to describe properties and positions when working with 2D and 3D shapes. | •Students use mathematical names for common 3D and 2D shapes and describe their properties, including numbers of sides and corners.<br><br>•They distinguish between straight and turning movements, understand angle as a measurement of turn, and recognise right angles in turns.<br><br>•They begin to use everyday standard and non-standard units to measure length and mass. | •Students classify 3D and 2D shapes in various ways using mathematical properties such as reflective symmetry for 2D shapes.<br><br>•They use non-standard units and standard metric units of length, capacity and mass, in a range of contexts.<br><br>•They know and use standard units of time and their equivalents in a range of contexts. | •Students make 3D mathematical models by linking given faces or edges.<br><br>•They draw common 2D shapes in different orientations on grids.<br><br>They reflect simple shapes in a mirror line.<br><br>•They choose and use appropriate units and tools, interpreting numbers on a range of measuring instruments with appropriate accuracy.<br><br>•They find perimeters of simple shapes and find areas by counting squares. | •Students measure and draw angles to the nearest degree, and use language associated with angle when constructing models and when drawing or using shapes.<br><br>•They know the angle sum of a triangle and that of angles at a point and use this knowledge to solve problems and derive other facts.<br><br>•They convert one metric unit to another.<br><br>•They make sensible estimates of a range of measures in relation to everyday situations.<br><br>•They understand and use the formula for the area of a rectangle.<br><br>•They identify all the symmetries of 2D shapes. |

**Strand iv Statistics**

| Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|
| •Students sort objects and classify them, demonstrating the criterion they have used. | •Students sort and classify objects using more than one criterion.<br><br>•They gather information and record results in simple lists, tables, pictograms and bar charts, in order to communicate their findings. | •Students extract and interpret information presented in simple tables and lists.<br><br>•They construct bar charts and pictograms, where the symbol represents a group of units, to communicate information they have gathered and they interpret information presented in these forms. | •Students collect discrete data and record them using a tally chart and frequency table.<br><br>•They understand and use the mode and range to describe sets of discrete data.<br><br>•They group data, where appropriate, in equal class intervals, represent collected data in frequency diagrams and interpret such diagrams.<br><br>•They construct and interpret simple line graphs. | •Students understand and use the mean of discrete data.<br><br>•They compare two simple distributions, using the range and one of the mode, median or mean.<br><br>•They interpret graphs and diagrams, including pie charts and frequency polygons, and draw conclusions.<br><br>•They understand and use the probability scale from 0 to 1.<br><br>•They find and justify probabilities and approximations to these by selecting and using methods based on equally likely outcomes and experimental evidence, as appropriate.<br><br>•Students understand that different outcomes may result from repeating an experiment. |