MoreToMaths

Curriculum Pack 1-2

Preview of selected pages

MoreToMaths

- Problem Solving
- Reasoning
- Perseverance
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- Apply knowledge
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MoreToMaths Curriculum Pack 1-2

LEGO education

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Introduction

LEGO® Education is pleased to bring you the MoreToMaths Curriculum Pack 1-2.

Who is the material for?

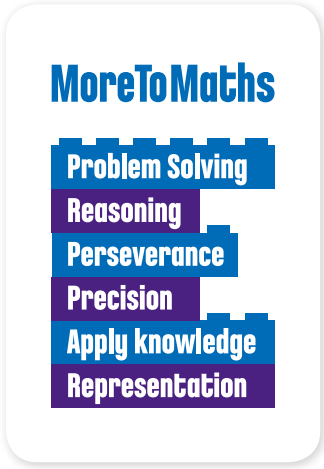
MoreToMaths 1-2 is designed for teachers of Key Stage 1 pupils, targeting the mathematics National Curriculum. The MoreToMaths 1-2 solution is designed to develop pupils' problem-solving abilities as well as their vocabulary, reading, thinking, listening, and speaking skills related to mathematical topics.

What is it for?

MoreToMaths 1-2 is a hands-on educational tool for teaching mathematical problem solving using core skills. The tool introduces and provides practice in core mathematical competencies such as reasoning, perseverance, precision, applying knowledge, and representation through individual and team problem-solving experiences. By using the familiar LEGO® brick and real-life understanding pupils will feel encouraged and motivated to think, write, and speak freely about mathematics.

Just as there is much more to mathematics than adding and subtracting, there is much more to mathematics with LEGO bricks than using them solely as a manipulative for adding and subtracting. LEGO bricks provide a learning environment for modelling a wide range of mathematical problems. Pupils can model solutions for

- solving word problems;
- understanding number operations;
- building and dividing shapes;
- measuring and representing data;
- understanding place value; and
- developing competency with all the mathematical problem solving competencies.



MoreToMaths Core Set 1-2 delivers teaching material for at least 48 mathematical lessons. Each of the 48 lessons focuses on mathematical problem solving competencies and identifies specific requirements from the National Curriculum for Mathematics.

The LEGO Education learning experience centres on the pupils. The goal is to create learning experiences characterised by structured, hands-on play activities that engender motivation and engagement with the mathematical concepts. Half of the lessons are for individual pupils and half are for teams of two. Using the LEGO materials, including the MathsBuilder software as a discussion tool, fosters collaboration and communication with the pupils in their teams and among the other pupils in the wider classroom.

What is in the teaching solution?

The MoreToMaths Core Set 1-2 is designed to be used by two pupils. The sets are delivered in a sturdy plastic storage with a sorting tray for classroom management. Each set includes 520 LEGO® bricks (including four 8x8 plates; two minifigures, Mia and Max; and two LEGO brick separators) and a label sheet for marking the compartments in the sorting tray. All building instructions are one-step-only models and are integrated into each pupil worksheet.

The MoreToMaths 1-2 Curriculum Pack includes

- 48 lessons in total (16 activity sets with 3 lessons each)
  - For each lesson there is one pupil worksheet.
  - Each lesson is designed for a 45-minute class period.
  - There are 24 lessons for year 1 pupils and 24 lessons for year 2 pupils.
- Building instructions are integrated into the pupil worksheets.
- The MathsBuilder software tool is used to build on the fly or present your or your pupils' model solutions to the class, manage discussions, and allow pupils to share their thinking while building and presenting to the class.

Preparation

Before using the MoreToMaths Core Set 1-2 in class, it is a good idea to attach the labels from the label sheet in the relevant compartments of the sorting tray as shown.

Sorting the bricks can be done together with pupils as a warm-up activity in sorting and counting and will, from an educational point of view, greatly benefit the learning situation in the classroom.

Curriculum

Mathematical Problem Solving Competencies

Mathematical problem solving competencies are essential to everyday life and to the ability to become fluent in the fundamentals of mathematics. They allow pupils to reason mathematically and to solve problems with increasing sophistication and perseverance. They are identical throughout Key Stage 1. However, the level of expertise with which pupils and teachers utilise these processes is year/age dependent. Understanding and using the mathematical problem solving competencies throughout the curriculum ensures that these skills become inherent within the concepts of mathematics.

Mathematical Problem Solving Competencies and MoreToMaths Curriculum Pack 1-2

MoreToMaths 1-2 is a set of teaching materials designed to enhance pupil proficiency with the mathematical problem solving competencies. The focus of the curriculum pack is to provide concrete but challenging problem-solving activities for pupils using the LEGO® brick as the manipulative process through which mathematical exploration takes place. The LEGO brick is the perfect manipulative for the tactile/kinaesthetic needs of young learners because the visual and hands-on approach to problem solving presented in the activities helps pupils creatively see first hand the "how" behind the mathematics involved. Manipulation and modelling are imperative if pupils in year 1 and 2 are to formulate a basis for understanding how mathematics works. Application of knowledge appears throughout the MoreToMaths Core Set 1-2: as a mathematical problem solving competency. Applying knowledge is the basis for using the LEGO brick to instil mathematical understanding. This allows teachers to better assess children's ability to apply mathematical knowledge.

Mathematical problem solving competences can be drawn from the aims of the National Curriculum for Mathematics for Key Stage 1. The National Curriculum for Mathematics states: "The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning, and competence in solving increasingly sophisticated problems."
While the academic definition of each process is important, it is imperative that teachers who work with year 1 and 2 pupils be able to verbalise the practices in a way that is understandable to pupils at that level. The chart below identifies and broadly addresses the aims of the National Curriculum, and indicates how mathematical problem solving competencies address these aims.

The Curriculum section has been written by Stuart Swann and Lynn Hannay, to align with the new National Curriculum for Mathematics, and adapted from the original text by Dr. Shirley Disseler, Assistant Professor in the School of Education at High Point University. Stuart is a primary teacher and Computing consultant with 20 years classroom experience. He is also a LEGO Education Academy Certified Trainer. Lynn is a Curriculum consultant and former Head Teacher with 37 years teaching experience. She was headteacher of a primary school which she co founded 17 years ago.

The following is taken from the Aims of the National Curriculum for Mathematics:

The national curriculum for mathematics aims to ensure that all pupils:

- Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils 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.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The chart below identifies mathematical problem solving competencies and shows how working in conjunction with the aims of the National Curriculum, and by harnessing the MoreToMaths curriculum pack, they can be used to develop children's mathematical problem solving and reasoning skills.

Mathematical Problem Solving Competency	**What does this practice mean?**
1. Problem Solving	Pupils can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication. Pupils should be exposed to and be able to use a variety of tools and strategies to solve problems, including estimation, graph paper, rulers and number lines. Choosing the most appropriate tool and being able to use it are of vital importance. Problem solving also involves looking for patterns in mathematical problems to solve them.
2. Reasoning	Pupils should be able to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. If there is a repeating action occurring when solving a problem, students should be able to notice this and relate it to the appropriate skill. Pupils should be able to connect mathematical symbols to the meaning of the numbers in a problem using reasoning. Pupils should begin to utilise these skills to add and subtract using symbols and whole numbers.
3. Perseverance	Pupils should be able to break down problems into a series of simpler steps and persevere in seeking solutions. Looking at the problem and using available tools needed to solve the problem and make sense of what it is asking. In years 1 and 2, students should begin to solve problems through independent thinking, applying a variety of strategies and sharing strategies with others. They should be able to investigate using concrete objects and pictures to determine what makes sense in terms of problem solving. Pupils should also begin to form an understanding of what it means to add and subtract in terms of the concrete action and how the symbol represents that action.
4. Precision	Pupils should develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. Pupils should be able to use clear and exact vocabulary related to the mathematics they are doing in discussion and explanation.
5. Representation and Application of knowledge	Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. They should also apply their mathematical knowledge to science and other subjects. Pupils in years 1 and 2 should experiment with numbers in writing/drawing problems in various ways using objects, pictures, charts, lists, and graphs to model the problems. Using different representations of the same problem is an important skill here.

The activities in the MoreToMaths Curriculum Pack 1-2 are well developed with the mathematical problem solving competencies in mind. The Curriculum Grid, the verbal and visual overview of the activities on the following pages, demonstrates which of the practices are addressed within each of the 16 activities and provides an overview of how the activity addresses the practices listed.

National Curriculum for Mathematics numbering

The National Curriculum for mathematics does not have a numbered system. We created our own for MoreToMaths for ease of use when referencing the curriculum grid and assessment tools.

- **N** refers to number e.g.
  NA = Number and Place Value.
  NB = Addition and Subtraction.
  NC = Multiplication and Division.
  ND = Fractions.
- **M** refers to Measurement.
- **G** refers to Geometry.
- **S** refers to Statutory Requirements.
- **NS** refers to Non-Statutory Requirements.

So, **NA - S1** refers to Number and Place value, Statutory Requirements, statement 1.
And, **MN - S2** refers to Measurement, Non-Statutory Requirements, statement 2.

Our advice to teachers would be to write these numbers next to the statements in your copy of the National Curriculum to enable easy reference.

National Curriculum Requirements: Year 1

Year 1 Number - Number and Place Value (1NA)		
	Code	**National Curriculum Statement**
Statutory Requirements (SR)	1NA - S1	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.
	1NA - S2	Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens.
	1NA - S3	Given a number, identify one more and one less.
	1NA - S4	Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least.
	1NA - S5	Read and write numbers from 1 to 20 in numerals and words.
Non-Statutory Requirements (NSR)	1NA - NS1	Pupils practise counting (1, 2, 3...), ordering (for example, first, second, third...), and to indicate a quantity (for example, 3 apples, 2 centimetres), including solving simple concrete problems, until they are fluent.
	1NA - NS2	Pupils begin to recognise place value in numbers beyond 20 by reading, writing, counting and comparing numbers up to 100, supported by objects and pictorial representations.
	1NA - NS3	They practise counting as reciting numbers and counting as enumerating objects, and counting in twos, fives and tens from different multiples to develop their recognition of patterns in the number system (for example, odd and even numbers), including varied and frequent practice through increasingly complex questions.
	1NA - NS4	They recognise and create repeating patterns with objects and with shapes.
Year 1 Number - Addition and Subtraction (1NB)		
	Code	**National Curriculum Statement**
SR	1NB - S1	Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs.
	1NB - S2	Represent and use number bonds and related subtraction facts within 20.
	1NB - S3	Add and subtract one-digit and two-digit numbers to 20, including zero.
	1NB - S4	Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = – 9.
NSR	1NB - NS1	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.
	1NB - NS2	Pupils combine and increase numbers, counting forwards and backwards.
	1NB - NS3	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 1 Number - Multiplication and Division (1NC)		
	Code	**National Curriculum Statement**
SR	1NC - S1	Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
NSR	1NC - NS1	Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.
	1NC - NS2	They make connections between arrays, number patterns, and counting in twos, fives and tens.
Year 1 Number - Fractions (1ND)		
	Code	**National Curriculum Statement**
SR	1ND - S1	Recognise, find and name a half as one of two equal parts of an object, shape or quantity.
	1ND - S2	Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.
NSR	1ND - NS1	Pupils are taught half and quarter as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. For example, they could recognise and find half a length, quantity, set of objects or shape. Pupils connect halves and quarters to the equal sharing and grouping of sets of objects and to measures, as well as recognising and combining halves and quarters as parts of a whole.

National Curriculum Requirements: Year 1

Year 1 Measurement (1M)		
	Code	**National Curriculum Statement**
SR	1M - S1	Compare, describe and solve practical problems for:
	1M - S1a	Lengths and heights (for example, long/short, longer/shorter, tall/short, double/half).
	1M - S1b	Mass/weight (for example, heavy/light, heavier than, lighter than).
	1M - S1c	Capacity and volume (for example, full/empty, more than, less than, half, half full, quarter).
	1M - S1d	Time (for example, quicker, slower, earlier, later).
	1M - S2	Measure and begin to record the following:
	1M - S2a	Lengths and heights.
	1M - S2b	Mass/weight.
	1M - S2c	Capacity and volume.
	1M - S2d	Time (hours, minutes, seconds).
	1M - S3	Recognise and know the value of different denominations of coins and notes.
	1M - S4	Sequence events in chronological order using language (for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening).
	1M - S5	Recognise and use language relating to dates, including days of the week, weeks, months and years.
	1M - S6	Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.
NSR	1M - NS1	The pairs of terms: mass and weight, volume and capacity, are used interchangeably at this stage.
	1M - NS2	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.
	1M - NS3	In order to become familiar with standard measures, pupils begin to use measuring tools such as a ruler, weighing scales and containers.
	1M - NS4	Pupils use the language of time, including telling the time throughout the day, first using o'clock and then half past.
Year 1 Geometry - Properties of Shapes (1GA)		
	Code	**National Curriculum Statement**
SR	1GA - S1	Recognise and name common 2-D and 3-D shapes, including:
	1GA - S1a	2-D shapes [for example, rectangles (including squares), circles and triangles.
	1GA - S1b	3-D shapes [for example, cuboids (including cubes), pyramids and spheres].
NSR	1GA - NS1	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 1 Geometry - Position and Direction (1GB)		
	Code	**National Curriculum Statement**
SR	1GB - S1	Describe position, direction and movement, including whole, half, quarter and three- quarter turns.
NSR	1GB - NS1	Pupils use the language of position, direction and motion, including: left and right, top, middle and bottom, on top of, in front of, above, between, around, near, close and far, up and down, forwards and backwards, inside and outside.
	1GB - NS2	Pupils make whole, half, quarter and three-quarter turns in both directions and connect turning clockwise with movement on a clock face.

National Curriculum Requirements: Year 2

Year 2 Number - Number and Place Value (2NA)		
	Code	**National Curriculum Statement**
Statutory Requirements (SR)	2NA - S1	Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward.
	2NA - S2	Recognise the place value of each digit in a two-digit number (tens, ones).
	2NA - S3	Identify, represent and estimate numbers using different representations, including the number line.
	2NA - S4	Compare and order numbers from 0 up to 100; use <, > and = signs.
	2NA - S5	Read and write numbers to at least 100 in numerals and in words.
	2NA - S6	Use place value and number facts to solve problems.
Non-Statutory Requirements (NSR)	2NA - NS1	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.
	2NA - NS2	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.
	2NA - NS3	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 2 Number - Addition and Subtraction (2NB)		
	Code	**National Curriculum Statement**
SR	2NB - S1	Solve problems with addition and subtraction:
	2NB - S1a	Using concrete objects and pictorial representations, including those involving numbers, quantities and measures.
	2NB - S1b	Applying their increasing knowledge of mental and written methods.
	2NB - S2	Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.
	2NB - S3	Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
	2NB - S3a	A two-digit number and ones.
	2NB - S3b	A two-digit number and tens.
	2NB - S3c	Two two-digit numbers.
	2NB - S3d	Adding three one-digit numbers.
	2NB - S4	Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.
	2NB - S5	Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
NSR	2NB - NS1	Pupils extend their understanding of the language of addition and subtraction to include sum and difference.
	2NB - NS2	Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 – 7 = 3 and 7 = 10 – 3 to calculate 30 + 70 = 100; 100 – 70 = 30 and 70 = 100 – 30. They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition.
	2NB - NS3	Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

National Curriculum Requirements: Year 2

Year 2 Number - Multiplication and Division (2NC)		
	Code	**National Curriculum Statement**
SR	2NC - S1	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
	2NC - S2	Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.
	2NC - S3	Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
	2NC - S4	Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
NSR	2NC - NS1	Pupils use a variety of language to describe multiplication and division.
	2NC - NS2	Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.
	2NC - NS3	Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).
Year 2 Number - Fractions (2ND)		
	Code	**National Curriculum Statement**
SR	2ND - S1	Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity.
	2ND - S2	Write simple fractions for example, 1/2 of 6 = 3 and recognise the equivalence of 2/4 and 1/2.
NSR	1ND - NS1	Pupils use fractions as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. They connect unit fractions to equal sharing and grouping, to numbers when they can be calculated, and to measures, finding fractions of lengths, quantities, sets of objects or shapes. They meet 3/4 as the first example of a non-unit fraction.
	1ND - NS2	Pupils should count in fractions up to 10, starting from any number and using the 1/2 and 2/4 equivalence on the number line (for example, 11/4, 12/4 (or 11/2), 13/4, 2). This reinforces the concept of fractions as numbers and that they can add up to more than one.
Year 2 Measurement (2M)		
	Code	**National Curriculum Statement**
SR	2M - S1	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.
	2M - S2	Compare and order lengths, mass, volume/capacity and record the results using >, < and =.
	2M - S3	Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value.
	2M - S4	Find different combinations of coins that equal the same amounts of money.
	2M - S5	Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.
	2M - S6	Compare and sequence intervals of time.
	2M - S7	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.
	2M - S8	Know the number of minutes in an hour and the number of hours in a day.
NSR	2M - NS1	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.
	2M - NS2	Comparing measures includes simple multiples such as 'half as high'; 'twice as wide'.
	2M - NS3	They become fluent in telling the time on analogue clocks and recording it.
	2M - NS4	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.

National Curriculum Requirements: Year 2

Year 2 Geometry - Properties of Shapes (2GA)		
	Code	**National Curriculum Statement**
SR	2GA - S1	Identify and describe the properties of 2-d shapes, including the number of sides and line symmetry in a vertical line.
	2GA - S2	Identify and describe the properties of 3-d shapes, including the number of edges, vertices and faces.
	2GA - S3	Identify 2-d shapes on the surface of 3-d shapes, (for example, a circle on a cylinder and a triangle on a pyramid).
	2GA - S4	Compare and sort common 2-d and 3-d shapes and everyday objects.
NSR	2GA - NS1	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.
	2GA - NS2	Pupils read and write names for shapes that are appropriate for their word reading and spelling.
	2GA - NS3	Pupils draw lines and shapes using a straight edge.
Year 2 Geometry - Position and Direction (2GB)		
	Code	**National Curriculum Statement**
SR	2GB - S1	Order and arrange combinations of mathematical objects in patterns and sequences.
	2GB - S2	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 (clockwise and anti- clockwise).
NSR	2GB - NS1	Pupils should work with patterns of shapes, including those in different orientations.
	2GB - NS2	Pupils use the concept and language of angles to describe 'turn' by applying rotations, including in practical contexts (for example, pupils themselves moving in turns, giving instructions to other pupils to do so, and programming robots using instructions given in right angles).
Year 2 Statistics (2S)		
	Code	**National Curriculum Statement**
SR	2S - S1	Interpret and construct simple pictograms, tally charts, block diagrams and simple tables.
	2S - S2	Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity.
	2S - S3	Ask and answer questions about totalling and comparing categorical data.
NSR	2S - NS1	Pupils record, interpret, collate, organise and compare information (for example, using many-to-one correspondence in pictograms with simple ratios 2, 5, 10).

Curriculum Grid

Year 1 - Animals and Insects								
Title	Mathematical Problem Solving Competencies ✖ = Focus ✖ = Supporting					National Curriculum Requirements		Key Vocabulary
	Problem Solving (MPSC 1)	Reasoning (MPSC 2)	Perseverance (MPSC 3)	Precision (MPSC 4)	Representation and Application of Knowledge (MPSC 5)	Statutory Requirements	Non-Statutory Requirements	
Snake	✖		✖	✖		1NA - S1 1NA - S2 1NA - S4 1NA - S5 1NC - S1	1NA - NS3	• Make a plan • Problem solving • Solution • Persevere • Precision • Apply knowledge • How long • Count • Longer than • Add • Groups of • Commutative law • Length • Shape
Hens	✖	✖			✖	1NB - S1 1NB - S2 1NB - S3 1NB - S4	1NB - NS1 1NB - NS3	• Reason • Proof • Collaborate • Persevere • Problem Solving • How many • Same number • Twice as many • Alltogether • Remaining / remainder • Groups of • Some
Butterfly	✖		✖		✖	1M - S1		• Apply knowledge • Problem Solving • Length, width, height • Compare • Longer than • Wider than • Twice as high • Bar graph • How many • Symmetry • Mirror • Patterns
Lion	✖	✖			✖	1NC - S1 1GB - S1 1M - S1a	1NC - NS1 1GB - NS1 1M - NS2	• Look for structure • Look for similarities • Reason • Collaborate • How many • A share • Half / Halves • Twice as • Long • Wide • High • Larger • Whole • Quarter

Curriculum Grid

Year 1 - Outdoors								
Title	Mathematical Problem Solving Competencies ✖ = Focus ✖ = Supporting					National Curriculum Requirements		Key Vocabulary
	Problem Solving (MPSC 1)	Reasoning (MPSC 2)	Perseverance (MPSC 3)	Precision (MPSC 4)	Representation and Application of Knowledge (MPSC 5)	Statutory Requirements	Non-Statutory Requirements	
Flowers	✖		✖	✖		1NA - S1 1NA - S2 1NA - S4 1NA - S5 1NB - S2 1NB - S3	1NA - NS1 1NA - NS2	• Problem solving • Persevere • Make a plan • Precision • Altogether • Add • Subtract • More than • Same number • Twice as many • Have left • Half of • Altogether
Berries	✖	✖	✖	✖	✖	1NB - S1 1NB - S2 1NB - S3 1NB - S4	1NB - NS1 1NB - NS2 1NB - NS3	• Reason • Proof • Collaborate • Persevere • Problem solving • Altogether • Count • Subtract • How many • More than • Less than • Half of • Quarter of • Remaining
Train	✖		✖	✖	✖	1M - S1a		• Apply knowlegde • Problem solving • Reason • Proof • Bar graph • How long • Half of • How many • More than • At least • Length • Pattern
Pond	✖	✖		✖	✖	1ND - S1 1ND - S2	1ND - NS1	• Look for structure • Look for similarities • Reason • Collaborate • Apply knowledge • Problem solving • Same amount • How much • Whole • Half • Quarter • How many • Remaining • Larger • Twice as • Long • Wide • Length • Width • Height

Curriculum Grid

Year 2 - Sports								
Title	Mathematical Problem Solving Competencies ✖ = Focus ✖ = Supporting					National Curriculum Requirements		Key Vocabulary
	Problem Solving (MPSC 1)	Reasoning (MPSC 2)	Perseverance (MPSC 3)	Precision (MPSC 4)	Representation and Application of Knowledge (MPSC 5)	Statutory Requirements	Non-Statutory Requirements	
Running	✖	✖	✖	✖		2NA - S1 2NB - S1a 2NC - S1	2NA - NS1 2NA - NS2 2M - NS2	• Problem solving • Make a plan • Persevere • Precision • Count • Add • Subtract • Longer than • Shorter than • Length • One and a half • Twice • Rectangular • Multiple
Long Jump	✖	✖	✖	✖	✖	2NA - S1	2NA - NS5 2NB - NS1a 2NB - NS2 2NB - NS3a	• Reason • Proof • Persevere • Problem solving • Count • Add • Unknown numbers • Each • At least • Twice • Both • More than • Between
Shot Put	✖		✖	✖	✖	2NB - S1a 2S - S1	2NB - NS1 2M - NS2	• Apply knowledge • Problem solving • Persevere • Precision • Use appropriate tools • Difference • Sum • Shorter • Longer • Same length • Measure length • Chart • Compare length • Total • Ordinal numbers (1st, 2nd, 3rd etc)
Swimming Pool	✖	✖		✖	✖		2ND - NS1 2S - NS1	• Look for structure • Look for similarities • Reason • Collaborate • Length, width, height • Compare • Inside • Shape • Atrribute • Area • Rectangle • Square

Curriculum Grid

Year 2 - Food								
Title	Mathematical Problem Solving Competencies ✖ = Focus ✖ = Supporting					National Curriculum Requirements		Key Vocabulary
	Problem Solving (MPSC 1)	Reasoning (MPSC 2)	Perseverance (MPSC 3)	Precision (MPSC 4)	Representation and Application of Knowledge (MPSC 5)	Statutory Requirements	Non-Statutory Requirements	
Shop	✖	✖	✖	✖		2NA - S2 2NA - S5 2NA - S6	2NA - NS1 2NA - NS2 2NA - NS3	• Persevere • Reason • Proof • Problem solving • Precision • How much • Altogether • Count • Add
Baking Day	✖	✖	✖		✖	2NB - S1 2NB - S1a 2NB - S3a 2NB - S3c		• Reason • Proof • Problem solving • Persevere • How many • Estimate • Count • Add • Subtract • First • Second • Twice as much • How many • Each • Same amount
Gardening	✖	✖		✖	✖	2NB - S1 2NB - S1a	2NA - NS1 2M - NS2	• Make a plan • Precision • Reason • Problem solving • Shorter than • How long • Longer than • Add • Count • 1st, 2nd, 3rd • Of each • Proof • Pattern • At least • Measure • How many
Party Cake	✖	✖		✖	✖	ND - S1	ND - NS1 GB - NS1	• Look for structure • Look for similarities • Side, front, top view • Half / halves • Each • Compare • Exact • Attribute • Whole • A quarter of • Thirds • How many

Verbal overview of activities

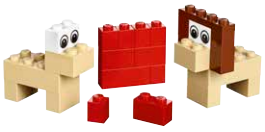
Year 1

Snake
The snake activity focuses on extending counting and grouping 3s, 5s and 7s as well as copying shape and length. Mathematical problem-solving competences key to this activity are perseverance, precision and problem solving.

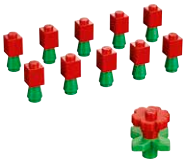
Hens
The hens activity focuses on addition and word problems with unknowns. Mathematical problem-solving competences utilised in this activity include using both abstract and quantitative reasoning skills, as well as collaborative learning and verbalising their understanding.

Butterfly
The butterfly activity focuses on measurement and comparisons of measured objects. It also includes ordering of objects. The mathematical problem-solving competences utilised include applying knowledge with mathematics and using appropriate tools strategically.

Lion
The lion activity focuses on partitioning of rectangular objects, division into equal shares, and positioning/directionality. The mathematical problem-solving competences utilised include seeking repeated reasoning and structure in problem solving.



Flowers
The flowers activity focuses on place value, addition and subtraction within 100, and multiples of ten. The mathematical problem-solving competences utilised include making sense of problems and using perseverance in solving them while attending to precision.



Berries
The berries activity focuses on subtraction with one-step word problems in which the result and start are unknowns. The mathematical problem-solving competences utilised include using both abstract and quantitative reasoning skills, as well as collaborative learning and verbalising their understanding.

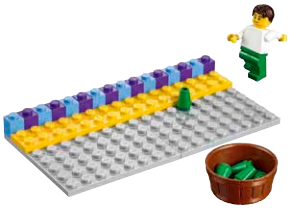
Train
The train activity focuses on gathering, organising, and interpreting data. The mathematical problem-solving competences utilised include applying knowledge with mathematics and using appropriate tools strategically.

Pond
The pond activity looks at decomposing numbers and spatial skills. Mathematical problem-solving competences utilised include seeking structure and repeated reasoning within problem solving.

Year 2

Running
The running activity asks pupils to bundle 100 into groups of 10, as well as to count within 1000. The mathematical problem-solving competences utilised include attention to precision and making sense of problems.

Long Jump
The long jump activity includes the skills of composing and decomposing numbers, as well as one and two-step word problems with unknowns. The mathematical problem-solving competences involved include using reasoning skills, application of knowledge and collaborative learning.



Shot Put
The shot put activity involves the use of measurement tools and looks at the skills of measuring and estimating and comparing objects of differing lengths. The mathematical problem-solving competences utilised include applying knowledge with mathematics and problem solving.

Swimming Pool
The swimming pool activity involves partitioning into halves, thirds, and quarters. It asks pupils to describe positioning within the shape. The mathematical problem-solving competences utilised include problem solving and reasoning.

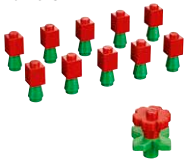
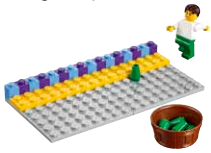
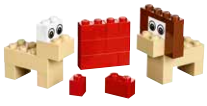
Shop
The shopping activity involves pupils in a real-world shopping experience. The skills involved include addition and subtraction within 100 and 1000, as well as the comparison of three-digit numbers. The mathematical problem-solving competences utilised include problem solving, perseverance and precision.

Baking Day
The baking day activity includes the skills of number comparisons, one and two-step word problems, and finding differences within numbers. The mathematical problem solving competences utilised include reasoning, application of knowledge and problem solving.

Gardening
The gardening activity involves data representation and solving problems involving length. The mathematical problem-solving competences involved include applying knowledge and problem solving.

Party Cake
The party cake activity is the introduction to fractional parts and partitioning into equal shares. It also exposes pupils to the side view, top view, and front view of shapes. The mathematical problem-solving competences involved include application of knowledge and problem solving.

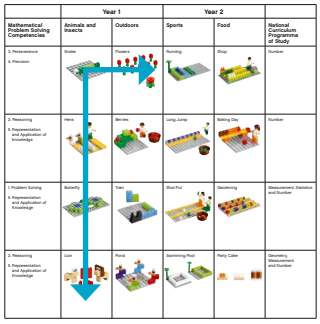
Visual overview of activities

	Year 1		Year 2		
Mathematical Problem Solving Competencies	**Animals and Insects**	**Outdoors**	**Sports**	**Food**	**National Curriculum Programme of Study**
3. Perseverance 4. Precision	Snake 	Flowers 	Running 	Shop 	Number
2. Reasoning 5. Representation and Application of knowledge	Hens 	Berries 	Long Jump 	Baking Day 	Number
1. Problem Solving 5. Representation and Application of Knowledge	Butterfly 	Train 	Shot Put 	Gardening 	Measurement, Statistics and Number
2. Reasoning 5. Representation and Application of Knowledge	Lion 	Pond 	Swimming Pool 	Party Cake 	Geometry, Measurement and Number

How to use the MoreToMaths Curriculum Pack 1-2

Lesson-Planning Routes

As mathematical problem solving competencies can be quite complex, we address them two by two in the activity sets as shown in the Visual overview of activities.



In planning lessons for your classes, consider one of two routes through the MoreToMaths 1-2 materials:

1. Organise lessons by MATHEMATICAL FACT CONCEPTS: within each lesson pupils learn the mathematical problem solving competencies and content objectives.
2. Organise lessons by THEMES: within each theme, pupils learn the mathematical problem solving competencies and content objectives. The Animals and Insects and Outdoors themes are for year 1 pupils, while the Sports and Food themes are for year 2 pupils.

Choosing the route organised by mathematical facts allows for addressing the mathematical problem solving competencies through activities within the fact area that the pupils are working with during that period of the school year.

As the chart shows, the Animals and Insects and Outdoors themes are designed for year 1 pupils and the Sports and Food themes for year 2 pupils.

Each activity set consists of material for three lessons of 45 minutes each, including an integrated assessment.

There is a progression in the level of difficulty from Lesson 1 to Lesson 3 within each activity set (e.g., in year 1, Snake Lesson 1 to Snake Lesson 3). There is also a progression in the level of difficulty from the start of the concept or theme throughout until the last activity (e.g., from Snake Lessons 1 to 3 to Flowers Lessons 1 to 3, or from Snake to Hens to Butterfly and finally to Lion). It is therefore suggested that teachers progress through the activities from Lessons 1–3. However, it is not required.

Note that the activity sets and pupil worksheets are not dependent upon one another; you can choose the lessons according to your preferred order and your pupils' needs. When working in this way please consider the skill levels of your pupils.

Assessment

Why use assessment?

Assessment supports learning. Most of the assessment tools and techniques emphasised in the MoreToMaths Curriculum Pack 1-2 are for formative use. Formative assessment helps you find out how much pupils have learned at any point in their learning. Using these tools with a formative assessment approach shows you what pupils know and can help you to identify areas that may require you and your pupils to spend more time. An explicit Summative Assessment tool is included as well. In addition, you can use the Anecdotal Record Sheet to write either a formative evaluation of the pupils' progress or a summative one.

Assessment is a positive experience for you and all of the children in your class. It helps you direct future teaching so that it is much more effective. It also helps pupils deepen their self-awareness, building an understanding of their own learning strengths and needs.

Using assessment in the classroom

The MoreToMaths Curriculum Pack 1-2 is designed around a series of curriculum objectives that include content objectives focused on gaining proficiency in mathematical problem-solving practices, processes, and procedures. The specific curriculum objectives are identified in the Teacher's Guide for each activity.

With these curriculum objectives in mind, several tools are used throughout the materials to help teachers and pupils monitor their learning and their level of understanding.

Assessment opportunities in the activity sets

You can use the first task of Lesson 1 in any activity set as a pre-assessment tool. Print and hand out Lesson 1 to each pupil. Provide initial directions but then allow the pupils to try the task on their own, or as a team if it is a team task, before you provide additional help. Make a point of observing the pupils to see who is moving along confidently and who is hesitating. Record your key findings as you make your way around the classroom.
For Lesson 2 and subsequent lessons, you will see who can work independently and might require additional challenges. For these pupils, you can add more complexity by increasing the quantities they use in a lesson, such as the number of eggs or flowers. Other pupils will need step-by-step instructions and other types of support. These tasks are formative assessment opportunities. See the Observation Checklist and other tools below.
The last task in an activity set can be used as a summative or a post-assessment tool.

Teacher-Led Assessment

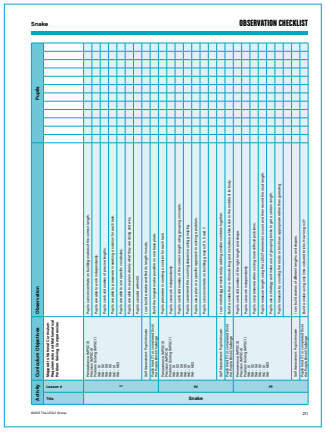
Ideas for discussion are included in the Teacher's Guide notes for each lesson. Asking these questions will allow you to gauge understanding.

The MathsBuilder software tool can be used in various ways to uncover what pupils know:

- inspiring ideas for discussion throughout all lessons
- presenting pupils' built solution examples for the tasks
- on-the-fly building tool for pupils to show their problem solutions
- documentation tool for pupils' models and answers to discussion questions

Observation Checklist

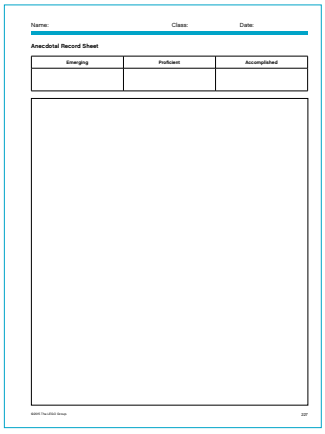
The Observation Checklist summarises the observation points for each pupil worksheet, which corresponds to each set of tasks for each lesson. Use the Observation Checklist each day pupils are working on their lessons.


Snake OBSERVATION CHECKLIST

See Appendix

Anecdotal Record Sheet

Use this page for periodic summaries of a pupil's learning progress as needed.


Name: Class: Date:

Anecdotal Record Sheet

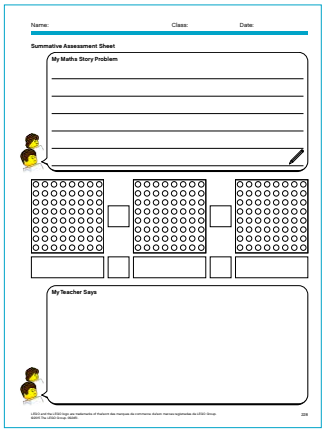
Emerging	Proficient	Accomplished

See Appendix

Summative Assessment Sheet

Use this page as a performance evaluation: once the pupils are secure in their knowledge, present them with a challenge to create their own mathematical word problem or story and write it down. Then let them model the story using LEGO® elements. Finally, let them write the mathematical problem as an equation.

Teachers can summarise each pupil's performance based on their own criteria or by choosing to use their school-approved sources.


Name: Class: Date:

Summative Assessment Sheet

My Maths Story Problem

My Teacher Says

See Appendix

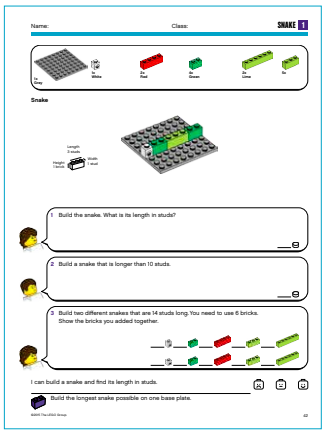
If you have access to a digital camera or a tablet, take photographs or record the explanations of the pupils and their models periodically to show their developing skills and knowledge.

Pupil Assessment Tools

Pupil Profile Pages

Pupil worksheets are also designed to serve as pupil profile pages. Pupils can build the models and record responses to the questions about the models on the pages inside the Max and Mia speech bubbles. Keeping pupils' worksheets will illustrate their increasing knowledge and skills. Pupils can also choose certain worksheets to illustrate their best work as part of their self assessment.

Building instructions are integrated as one-step building instructions into the pupil worksheets.



Self-Assessment statements

For activity sets that are completed by individual pupils, the pages include a self-assessment question to encourage reflection on the main concept or mathematical problem solving competencies that are the focus of the activity.

For year 1.

For year 2.

Purple Brick Challenges

The Purple Brick Challenges can be used as a performance evaluation; however, you may not wish to have everyone try one each day. In a Purple Brick Challenge, pupils are asked to solve a problem using the LEGO® bricks.

The Purple Brick Challenges can be used for pupils who finish quickly and need extension activities. If pupils are working as a team, you can also make these team challenges. You might also use them as a whole-class challenge.

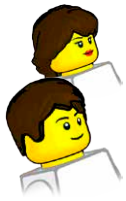
Classroom Management Tips

How much time do I need?

In MoreToMaths 1-2 a pupil worksheet is called a lesson. Each lesson is designed for a typical 45-minute class period with opportunities for differentiation and assessment built in.

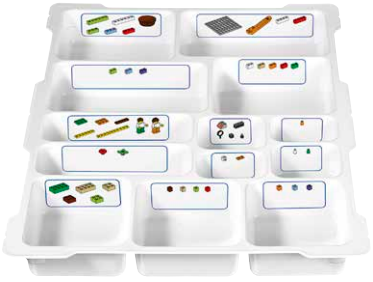
There are 8 activity sets with 3 lessons each for 24 lessons for year 1 pupils. There are another 8 activity sets with 3 lessons each for 24 lessons for year 2 pupils.

Pupils need to be able to work in pairs in half of the activities, facing each other or side by side. These are indicated by having both Max and Mia in front of each speech bubble. From teachers and classrooms we have learned that canteen-type trays are ideal to build on, and to prevent elements from rolling onto the floor.



How to handle bricks in the classroom

1. Attach the labels from the label sheet in the relevant compartments in the sorting tray.

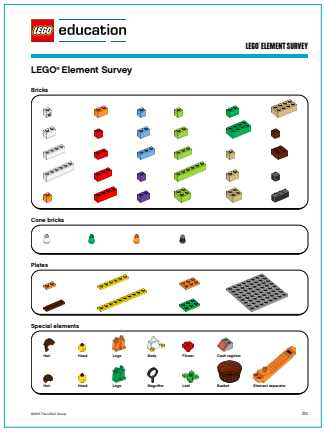


2. Review the vocabulary of the bricks, plates, and studs with the pupils.

3. Make sure that pupils find all the bricks needed for the activity in focus.

4. After finding the bricks needed, pupils should put the lid back on and keep only the worksheet and the bricks to use with it on the table.

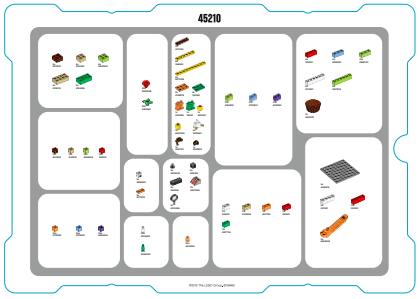
5. Keep a small plastic cup on the teacher's desk or resource table for any LEGO® elements that may fall on the floor and be found later in the day.



6. At the end of each term, have the pupils put the sets away and check them according to the storage top card.

7. Hold up an element every few days and ask the class to inventory just that element. That way, not all the pieces must be inventoried at the same time.

8. Every week, elect two LEGO monitors to help look after the sets.



Warm-Up Activities

Here are some quick activities to get all the pupils focused and familiar with the LEGO® materials.

Name the Bricks
Name the bricks and other elements (see the Element survey).

Sort and Count
Sort and count the bricks and other elements into the relevant compartments in the tray.

Talk It Up
Talk about attributes of an element (e.g., How many of each are in the tray)? What is the colour? How many studs does it have?

Five-Minute Build
Take five minutes and build whatever you like. Put it on the corner of your desk for the day. Write down one word and one number that tell something about the model you made.

Count the Bricks and Studs
Choose a specific number of bricks. Count the studs. Count the number of bricks.

Pick, Sort, and Graph
Pick all 1x2 bricks. Sort the bricks by colour and make a bar graph.

Sort by Size
Sort the bricks by size.

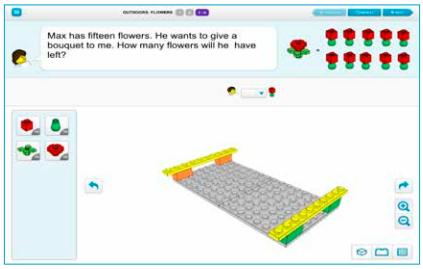
Find and Count the Colour
Find five lime bricks. Count the studs on the bricks.

Add Two Colours Together
Use one of each of these size bricks for this activity in any colour: 1x1, 1x2, 1x3, and 1x4. Lay the bricks out on the table or desk so all can see. Play in pairs. Each person from the team chooses one of the bricks and puts it in his or her right hand. The other pupil estimates the sum total of the studs for all the bricks in everyone's hands.

MathsBuilder Software

MoreToMaths software in the classroom

When used in a teaching situation MathsBuilder can enhance the learning in classrooms. It supplements the physical building and enables the pupils to show how they think with their hands.



System requirements

Below are the minimum system requirements needed on your computer to run the MathsBuilder software as intended. It might be possible to run the software on computers with lower specifications than written below, but this is not supported.

Windows

- 2.33GHz or faster x86-compatible processor
- 512MB of RAM available
- 128MB of graphics memory
- Microsoft® Windows® XP (32-bit), Windows Vista® (32-bit), Windows 7 (32-bit and 64-bit), or Windows 8 (Desktop Mode, Metrostyle not supported)
- Broadband Internet connection (for downloading software)
- Minimum Screen Resolution: 1024 x 768 pixels

Mac OS

- Intel Core™ Duo 1.33GHz or faster processor
- 512MB of RAM available
- 128MB of graphics memory
- Mac OSX 10.6 or later
- Broadband Internet connection (for downloading software)
- Minimum Screen Resolution: 1024 x 768 pixels

How to install and run the MathsBuilder software

After you have downloaded the software you can run the application directly from the download folder, but we recommend that you move the folder to your regular applications folder for easy access.

To run the application, double-click on the MathsBuilder icon in the folder you specified.

USB Memory Stick

Note that the MathsBuilder software can run directly from a USB memory stick. This is a convenient way that allows you to bring the application from computer to computer without losing any settings or custom-created content.

Windows and Mac OSX

The MathsBuilder software can be used on both the Windows and Mac OSX platform. The features and functionalities are identical between the two versions and future updates will be added to both versions.

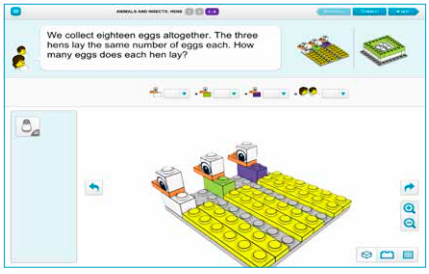
How to Change Language

To change language in the software, go to the Settings page and click the flag of the language you want the software to be in. Then restart the software for the change to take effect.

MoreToMaths software user guide

All activities provided in MoreToMaths Curriculum Pack 1-2 as pupil worksheets (lessons), to be printed as hand-outs, are included in the MathsBuilder software. This means that all tasks in the speech bubbles can be displayed and you can build and solve all the tasks in the software on an Interactive Whiteboard in the classroom.

Note that none of the "Purple Brick Challenges" are included as tasks that can be displayed in MathsBuilder; these are pupil specific and meant as an extra task for pupils who might finish before others. However, they can still be solved and built on the whiteboard. Bricks for each Purple Brick Challenge can be made active by choosing the lesson that the specific Purple Challenge is featured on.



The MoreToMaths software consists of the following:

1. Lobby
2. Introduction
3. Lessons
4. Builder
5. Create lesson
6. Resources
7. Guide
8. Settings

Activities in the classroom

Lobby

The lobby is the heart of the MathsBuilder software. This is where you access all the different features available in the software. In the lobby you can see all the different themes and activities that are available for you to use in the classroom.

Introduction

When you start the MathsBuilder software the first time you will be greeted by a short animation showcasing the two minifigures, Max and Mia, doing mathematical problem solving. This introduction can be shown to the classroom again whenever you like from the main menu by clicking on “Introduction.”

Start an activity

To start an activity you simply select the theme in the lobby, click on the theme, and then click on the lesson you want to start. If you want to go to a specific lesson, you can access all the individual lessons directly from the lobby. All lessons within a theme can be completed in succession without going back to the lobby. Simply select NEXT in the top right corner within the lesson to move to the next.

Restart an activity

If you need to restart an activity/lesson, click on the RESTART button between PREVIOUS and NEXT in the top right corner of the activity.

Finish an activity

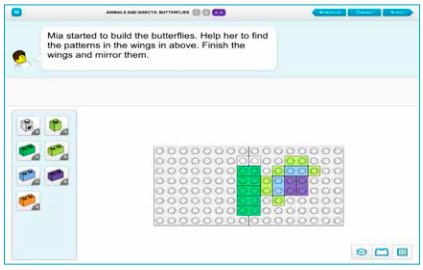
To finish an activity you can choose to either go to the (if available) PREVIOUS or NEXT activity, or you can return to the lobby by bringing down the menu in the top left corner and selecting LESSONS from the menu.

Change activity or theme

You can change the activity you are in by going back to the lobby, bringing down the menu in the top left corner, and selecting LESSONS from the menu. When back in the lobby, you can select the desired activity from the overview (see Start an activity).

Building in MathsBuilder

Building in the activities in MathsBuilder is as easy as building with LEGO® bricks. Things that are possible in the physical world are possible in the digital software, and the same laws apply in the software (e.g. gravity, etc.).

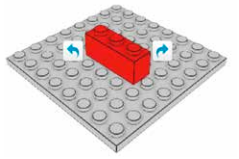


Dragging elements to the board

When you first open up an activity from the lobby you will be met with a more or less empty building area (depending on the type of activity).
To start building, you simply drag elements from the palette on the left of the screen by clicking on the desired element and — while holding your finger down, or the mouse down — drag the element onto the building area and place it wherever you want.

Rotating elements

If you need to rotate an element that is already placed in the building area, you select the element and perform a "long click" — you click and hold on the element in question. After a brief pause the element will "pop" up and two arrows will be superimposed on the element — rotate left and rotate right. Select the rotation needed: afterwards you can move the element around and place it again.



Rotating and zooming the view

If you want to rotate the entire view instead of a single element (for better view angles) you click on the "rotate left" and "rotate right" buttons on either side of the building area.
Right next to the "rotate right" button are "zoom in" and "zoom out" buttons that can be used for focusing on a specific part of the building experience. In many cases the default zoom is sufficient.

Removing elements

If you want to remove an element in your building activity, you drag the element in question outside the building area and let go of it. You will then see the element fall to the bottom of the screen, and the number of available elements in the palette of this specific element will be incremented.

Notes on pre-built models

In MoreToMaths there are two kinds of pre-built models in the activities.

1. In some activities the pupils are presented with pre-built models that they need to take apart. These are easily taken apart piece by piece (see the section on "Removing elements") and the model will appear whole again when the activity is restarted.
2. In some activities the pre-built models are locked as they serve a purpose as a whole model. You can continue to build onto these pre-built models. They can be moved around on the stage, but cannot be taken apart or removed from the stage.

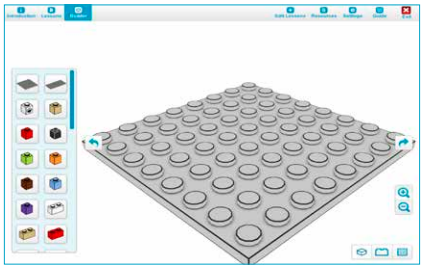
Notes on the viewing angle

In some activities the viewing angle is fixed to better provide an overview of the problem needing to be solved in the activity — this cannot be changed.

Free build in the Builder section

Built into the MathsBuilder software is an option to use a "free build" area for more free-form teaching activities or to just have fun.

The Builder section works exactly the same as all the other regular activities, with one exception: the users are now presented with an empty baseplate and all the different bricks available to use.



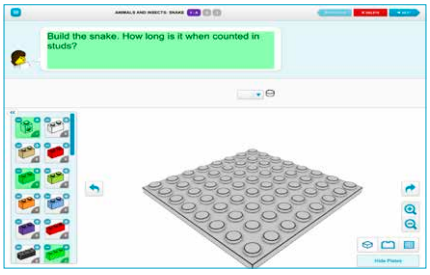
Create more activities in the Content Editor

In MathsBuilder it is possible for you as a teacher to create your own activities for extending or complementing the activities provided in the software from the start. You can use this option in your general preparation to extend the learning or for more differentiation. It can be used to enhance one or more specific areas that are crucial for your classroom.

Creating your own activity is almost as easy as building in the default activities that come with the software. To build your own activity or to edit one that you previously built, click on the "Create lesson" icon in the top menu in the lobby.

Overview of the Content Editor

When you start building an activity you are met with a blank screen — fear not, it is merely waiting for you to enter content for your own activity.
Right-click on any area in the activity you are creating in the Content Editor and you will be able to add content to that specific area. The content you are able to add depends on what area you are editing. Some areas are text only, but most areas can contain images, text, and even models that you have created yourself in the Builder section of the software.



How to create an activity

You are able to create everything you can see in the built-in activities provided with the software.

Speech bubble
First you add either Max or Mia with a speech bubble telling the pupils what the activity is all about. Right-click on the uppermost area in the left and select either Max or Mia or both. Next, right-click on the areas to the right of them and type in the text you want to display within the speech bubble.

Selecting the palette
In the building area of the activity the full palette of building materials is shown. These are all the available bricks in the MoreToMaths Core Set 1-2. Select the bricks you want to use in the activity by increasing or decreasing the number of the specific brick by clicking on the + and – button next to the brick.

Locking the viewing angle
If you want the activity to be viewed from a specific angle (e.g., from the top or from the side), this can be selected and locked in the camera options on the right of the building area.

Adding additional images
Next to the speech bubbles is an area that is reserved for additional content you might want to add. This can be images giving the pupils additional information about the activity at hand or helpful guidelines that you want to provide.
To add an image, right-click on the area to the right of the speech bubble and select the image you want. If you want to add your own image you can add them to the MathsBuilder "resource folder" (located in the folder where you installed the software). If your images are located in this folder you are able to add the images to the activity.

Making a pre-built model
If you right-click on the building area — the large area between the palette and the camera options — you can choose to have either a regular baseplate or something pre-built for the pupils. The pre-built elements can be locked so that the pupils, when performing the activity, will not be able to remove or take apart these specific elements.

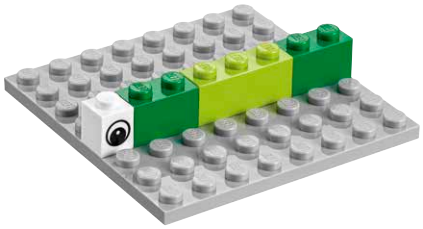
To create a pre-built model of your own, right-click on the building area and select the "build new model" option. You are then taken to the "free build" area of the software (see the section about "Builder") where you can create the model you want. When you have created your model, click save and return to be taken back to the activity you were creating with your newly created model already in place.

Saving the new activity
If you select one of the options that would return you to the lobby your content is automatically saved. The content is also automatically saved when you close down the entire application.

Accessing the new activity/using the new activity in the classroom
All the activities you have created yourself are available in the same structure as all the built-in activities. For example, if you have created an activity under the theme Food your activity will be shown alongside all the others for easy access and reference. Your activities act exactly as the built-in activities and are started the same way.

Snake

Individual Activity



Mathematical Problem Solving Competencies (MPSC) in Focus

- Perseverance (MPSC 3)
- Precision (MPSC 4)

Supporting Mathematical Problem Solving Competencies

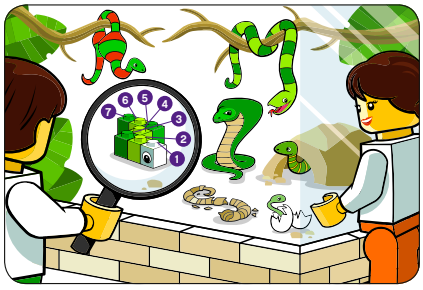
- Problem Solving (MPSC 1)

Vocabulary

- Make a plan
- Problem solving
- Solution
- Persevere
- Precision
- Apply knowledge

Connect (10 min.)

Max and Mia visit a zoo that has a terrarium with many different snakes. Some snakes are long, others are short. Some are on the ground, while others are hanging from branches in a tree. The snakes have similarities and differences.



Ideas for Discussion

Use the image for setting the scene and connecting (introducing) pupils to the task.
Here are some ideas to support discussion in your classroom.

- What do Max and Mia see when they look through the Mathnifier?
- How many snakes are there?
- How long is the shortest/longest snake, and how do you know?
- How can you compare snakes which look different from each other?

Lesson Start Sequence

Ask the pupils to find the bricks needed for the activity. Let the pupils build the model shown on the worksheet. Read each task out loud or let the pupils read it on their own. Ask the pupils to underline key words before solving the problem. Optional: Use the first task of a lesson as a pre-assessment tool. Observe how well the pupils work alone and together. This might help you to plan the level of differentiation required to support the learning needs of each pupil.

National Curriculum Requirements:

1NA - S1
1NA - S2
1NA - S4
1NA - S5
1NC - S1
1NA - NS3
For details see the Curriculum Grid.

Snake Lesson 1

Sequence Task 1 (5 min.)

In this problem the pupils construct a snake from the image on the worksheet. They also need to work out its length. Let them count the number of studs on their model and write their answer. The solution to this problem is 8 studs.
Suggested key words to underline in the task are build, how long, and studs.

Let the pupils take the model apart before advancing to the next task.

Sequence Task 2 (10 min.)

In this problem the pupils construct a snake that is longer than 10 studs. Any snake with more than 10 studs is the correct answer. The snakes need to turn to fit on the plate. Let the pupils count the studs on their snake and write their answer. You might want to make your pupils aware that there are several solutions to this problem.
Suggested key words to underline in the task are longer than, and 10 studs.

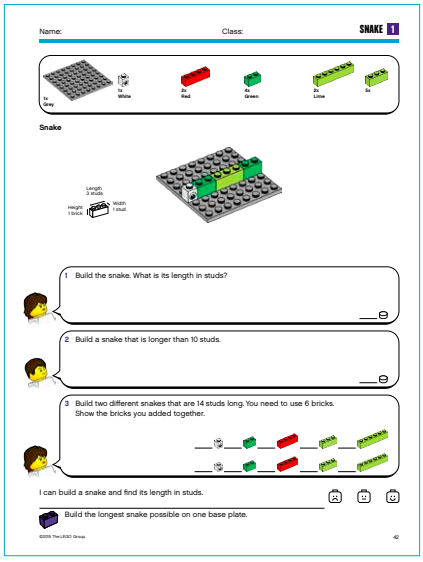
Let the pupils take the model apart before advancing to the next task.

Sequence Task 3 (15 min.)

In this problem the pupils construct snakes with a length of 14 studs using only 6 bricks. The pupils will have different approaches and will build various solutions. Snakes fulfilling both constraints will be the correct solutions. You might want to make your pupils aware that there are several solutions to this problem.
Suggested key words to underline in the task are two different, 14 studs long, and 6 bricks.

Individual Activity

45 min.


Name: Class: SNAKE 1

1x Grey 2x White 2x Red 1x Green 2x Lime 2x

Snake

Length: 3 studs. Height: 1 brick. Width: 1 stud.

1 Build the snake. What is its length in studs?

2 Build a snake that is longer than 10 studs.

3 Build two different snakes that are 14 studs long. You need to use 6 bricks. Show the bricks you added together.

I can build a snake and find its length in studs.

Build the longest snake possible on one base plate.

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Key Vocabulary

- Make a plan
- Problem solving
- Solution
- Persevere
- Precision
- Apply knowledge
- How long
- Count
- Longer than
- Add

Assessment

Make use of the available assessment tools (e.g., the Observation Checklist for evaluating pupils' work and recording their progression).

Key points to observe during this lesson:
Pupils can concentrate on building snakes of the correct length.
Pupils are able to work independently.
Pupils can build snakes of precise lengths.
Pupils can add within 20.
Pupils are able to use specific vocabulary.
Pupils are able to explain clearly what they are doing and why.
Pupils are able to persevere in seeking a solution for each task.

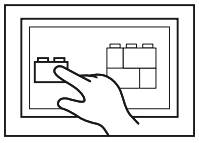
Note whether pupils use specific vocabulary and how precise their explanations are. Also note how well they persevere in seeking a solution for each task.

Self-Assessment: (5 min.)
Draw your pupils' attention to the assessment statement, read it out loud, and ask the pupils to mark their answer according to their experience on their worksheet. You might want to refer their answer to a specific task from the lesson.

I can build a snake and find its length in studs.

Using MathsBuilder

Let the pupils explain how they built the model, their approach, and the reasoning behind it. Help them become aware of the process by asking questions (e.g., What did they do to solve the problem? How did they start? What did they do next?). Let the pupils present their solution to the class.



Extension Activities and Differentiation

Here are some ideas to support the pupils at different levels of learning.

Ideas for discussion and extension:
- Which bricks did you use? Which numbers did you put together?
- How can you build the snake even longer?
- Build a snake that is longer than 20 studs.
- Let the pupils write a sentence that describes their snake.

Ideas for differentiation:
- Change the number of bricks in use.
- Put a constraint on the task (e.g., include a certain brick or set a time limit).

Sequence Purple Brick (5 min.)

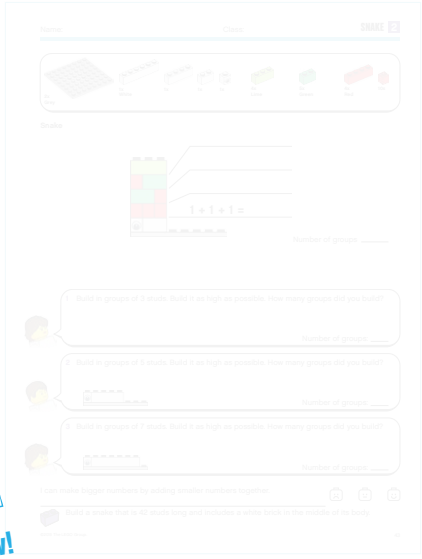
By building the longest snake possible defined by studs, pupils can get a variety of solutions depending on their creativity. The pupils can explain their reasoning. All bricks put in a line will give a snake that is 44 studs long.

Build the longest snake possible on one base plate.

Snake Lesson 2

Individual Activity

45 min.



Sequence Task 1 (5 min.)

In this problem the pupils are asked to represent the number 3 in different ways. Introduce the task by talking about how to represent the number 3 by using bricks. Make use of the displayed snake. You might want to make your pupils aware that the snake's head is included when counting the studs. Let the pupils build the snake shown to strengthen their understanding. Fill in the lines with the different groups of 3 during the discussion. Then let the pupils build as many groups of 3 as possible using all available bricks. Finally, record how many groups they built. The solution to this problem is up to ten groups of 3 on top of the defining snake.
Suggested key words to underline in the task are groups of 3, and as high as possible.

Let the pupils take the model apart before advancing to the next task.

Sequence Task 2 (10 min.)

In this problem the pupils are asked to represent the number 5 in different ways. The pupils are asked to follow the sequence from the previous task. Let them build as many groups of 5 as possible using all available bricks. The solution to this problem is up to ten groups of 5 on top of the defining snake.
Suggested key words to underline in the task are groups of 5, and as high as possible.

Let the pupils take the model apart before advancing to the next task.

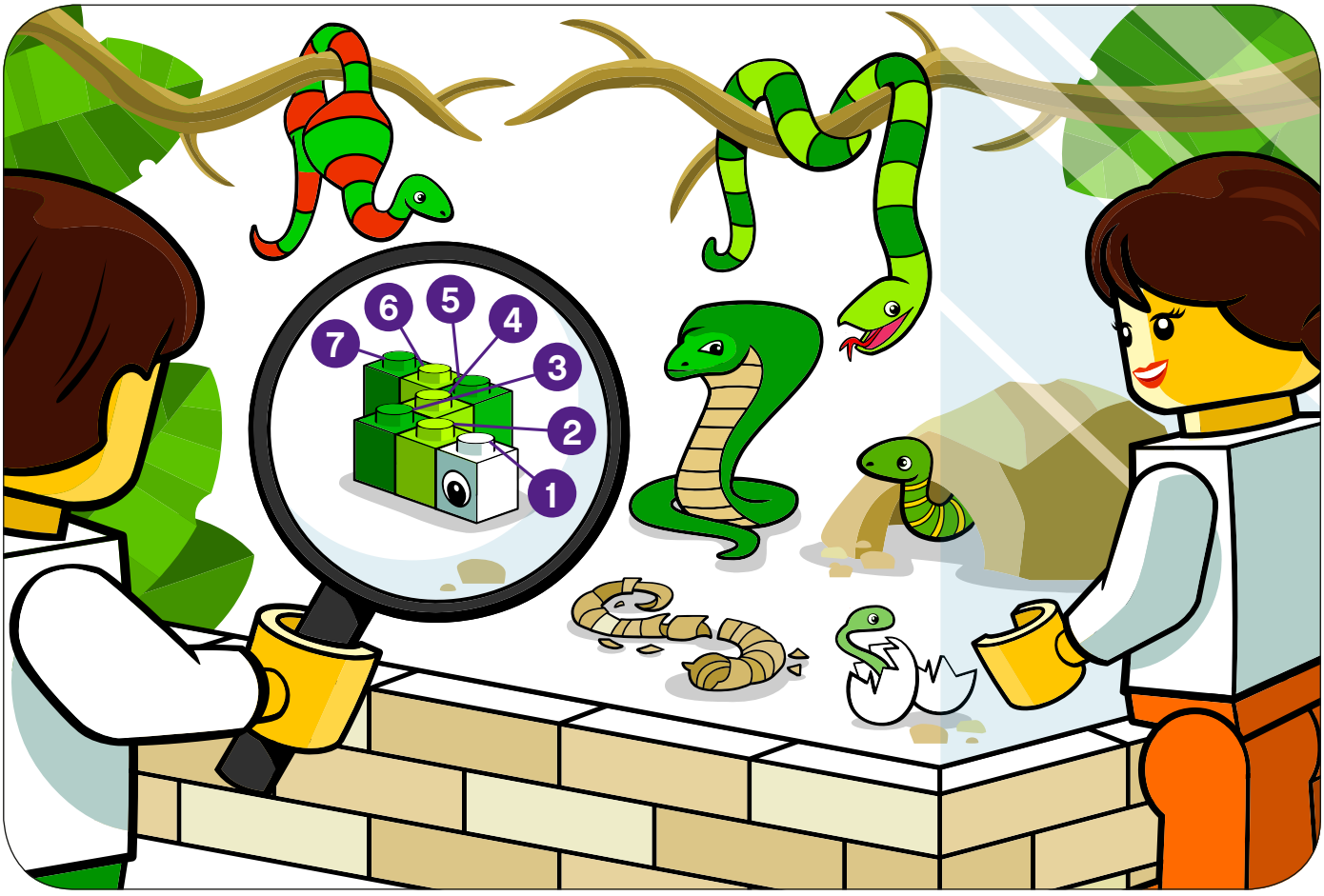
Sequence Task 3 (15 min.)

In this problem the pupils are asked to represent the number 7 in different ways. The pupils are asked to follow the sequence from the previous task. Let them build as many groups of 7 as possible using all available bricks. The solution to this problem is up to seven groups of 7 on top of the defining snake.
Suggested key words to underline in the task are groups of 7, and as high as possible.

Vocabulary

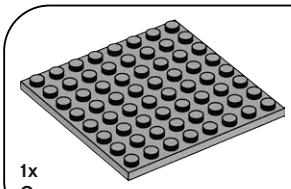
- Make a plan
- Problem solving
- Solution
- Persevere
- Precision
- Apply knowledge

- Groups of
- Count
- Add
- Commutative law

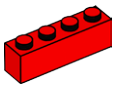


Name: Class:

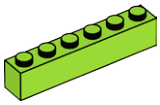
SNAKE 1


1x Grey


1x White

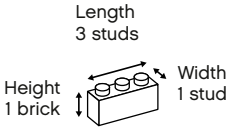

2x Red

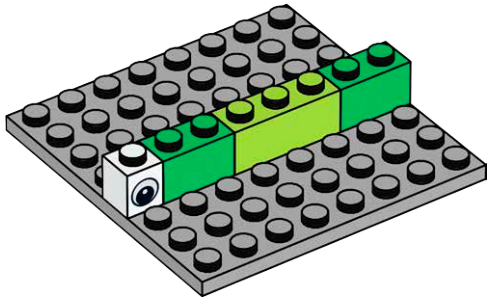

4x Green

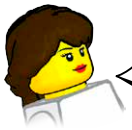

2x Lime


5x

Snake

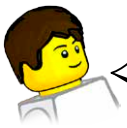






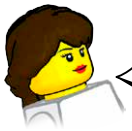
1 Build the snake. What is its length in studs?

____

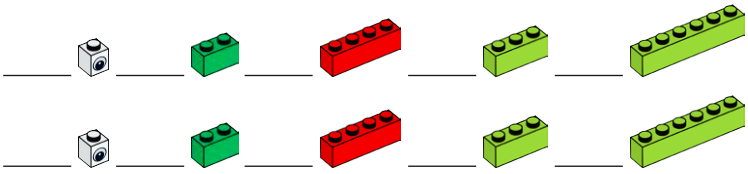


2 Build a snake that is longer than 10 studs.

____



3 Build two different snakes that are 14 studs long. You need to use 6 bricks. Show the bricks you added together.



I can build a snake and find its length in studs.

Build the longest snake possible on one base plate.

Snake

Number of groups _____

1 Build in groups of 3 studs. Build it as high as possible. How many groups did you build?

Number of groups: _____

2 Build in groups of 5 studs. Build it as high as possible. How many groups did you build?

Number of groups: _____

3 Build in groups of 7 studs. Build it as high as possible. How many groups did you build?

Number of groups: _____

I can make bigger numbers by adding smaller numbers together.

Build a snake that is 42 studs long and includes a white brick in the middle of its body.

Activity		Curriculum Objectives	Observation	Pupils											
Title	Lesson #	**Mapped to National Curriculum Requirements and Mathematical Problem Solving Competencies**													
Snake	1	Perseverance (MPSC 3) Precision (MPSC 4) Problem Solving (MPSC 1) 1NA - S1 1NA - S2 1NA - S4 1NA - S5 1NC - S1 1NA - NS3	Pupils can concentrate on building snakes of the correct length.												
			Pupils are able to work independently.												
			Pupils can build snakes of precise lengths.												
			Pupils are able to persevere in seeking a solution for each task.												
			Pupils are able to use specific vocabulary.												
			Pupils are able to explain clearly what they are doing and why.												
			Pupils can add within 20.												
		Self Assessment: Pupils Answer	I can build a snake and find its length in studs.												
		Pupils tried (T) or completed (tick) the Purple Brick Challenge	Build the longest snake possible on one base plate.												
	2	Perseverance (MPSC 3) Precision (MPSC 4) Problem Solving (MPSC 1) 1NA - S1 1NA - S2 1NA - S4 1NA - S5 1NC - S1 1NA - NS3	Pupils persevere in seeking a solution for each task.												
			Pupils can work independently.												
			Pupils can build snakes of the correct length using grouping concepts.												
			Pupils can extend the counting sequence using grouping.												
			Pupils use a plan or a specific approach to solving a problem.												
			Pupils can concentrate on building groups of 3, 5 and 7.												
		Self Assessment: Pupils Answer	I can make bigger numbers by adding smaller numbers together.												
		Pupils tried (T) or completed (tick) the Purple Brick Challenge	Build a snake that is 42 studs long and includes a white brick in the middle of its body.												
	3	Perseverance (MPSC 3) Precision (MPSC 4) Problem Solving (MPSC 1) 1NA - S1 1NA - S2 1NA - S4 1NA - S5 1NC - S1 1NA - NS3	Pupils can build snakes of the right length and shape.												
			Pupils can work independently.												
			Pupils can persevere when solving more difficult problems.												
			Pupils measure length using the LEGO® elements to count and then record the stud length.												
			Pupils use a strategy and make use of grouping bricks to get a certain length.												
			Pupils measure by counting the studs or bricks as appropriate rather than guessing.												
		Self Assessment: Pupils Answer	I can build snakes of different lengths and shapes.												
		Pupils tried (T) or completed (tick) the Purple Brick Challenge	Build a snake using only lime-coloured bricks. How long is it?												

Activity	Curriculum Objectives	Observation	Pupils
Lesson #	Mapped to National Curriculum Requirements and Mathematical Problem Solving Competencies		
Title			