



Maths Curriculum

	Place Value	Calculation	Number	Fractions, decimals and percentages
Intro	Place Value is the conceptual understanding that underpins our number system. The key idea is that each digit in a number represents an amount depending upon the position it occupies.	This is arguably the most important topic in our maths curriculum. Pupils follow a carefully planned calculation journey across their time at Cranborne which is supported by tailored intervention to help meet every individual need.	Number is a vast and incredibly important strand within our curriculum (it includes algebra). Below, we have chosen to select one strand of number (<i>types of number</i>) to show how the progression of skills and knowledge at Cranborne can be traced.	The concept of a fraction needs to be natural in all aspects of Mathematics. Maths lessons focusing on FDP at Cranborne often involve cakes, pizzas and chocolate bars (healthier alternatives also available!)
Year 5	In this first topic at Cranborne, pupils will be looking at numbers and their place value to 1,000,000. We begin by learning how to read and write numbers to 1,000,000. Time is spent using concrete materials to represent numbers to 1,000,000, including number discs and place-value charts. Pupils then compare numbers to 1,000,000 and complete the topic by making number patterns and rounding numbers to the nearest 10, 1000, 10,000 and 100,000.	In this phase of learning, pupils will start by exploring addition and subtraction of numbers to 1,000,000. Following this, pupils will be multiplying and dividing 3 and 4-digit numbers by single and double-digit numbers. Pupils will use multiple key methods, such as the column method and number bonds. Pupils will have access to concrete materials throughout the topic, improving their visualisation and mental skills.	Pupils learn how to find and define multiples and factors. Pupils begin to work with prime numbers and determine what makes a number prime or composite. After this, they focus on learning about and working with square and cube numbers.	To start our fraction learning at Cranborne, pupils discover how fractions arise. Pupils then show improper fractions and mixed numbers using pictures. As they progress, they find equivalent fractions, compare and order fractions. Pupils then begin to multiply fractions by whole numbers and multiply mixed numbers by whole numbers. Within decimal learning, pupils learn to read, write and compare decimals before turning decimals into fractions.
Year 6	This first topic in year 6 reinforces an important foundation for pupils to be confident in working with whole numbers of any size. Pupils learn to read, write, order and compare whole numbers to at least 10,000,000 and determine the value of each digit. Pupils learn to round any whole number to any required degree of accuracy.	Pupils secure their understanding and use of the column methods for written calculation in all four operations (+, -, x and ÷). Pupils regularly practice their calculation skills including a series of daily calculation starters that are accompanied by additional support at lunchtime for anyone who could benefit.	Pupils refresh and extend their understanding of different types of number and start applying this knowledge to skills such as using common factors to simplify fractions. Pupils also develop their understanding of the order of operations.	In year 6, conceptual understanding of fractions leads into learning how to calculate with fractions. Pupils learn to add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. Pupils also learn to multiply simple pairs of proper fractions and divide proper fractions by whole numbers. Pupils are also expected to recall and use equivalences between simple fractions, decimals and percentages.
Year 7	In year 7, our initial aims are for pupils to consolidate their numerical and mathematical capability from KS2 and extend their understanding of the number system and place value to include decimals. We expect pupils to understand and use place value for decimals and whole numbers of any size.	Calculation fluency in year 7 aims to secure and extend arithmetic skills into decimals. Mental methods of calculation remain crucial skills to work on alongside the formal written methods.	Pupils learn to use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor and lowest common multiple. This learning is completed largely through games, puzzles and investigations.	Pupils build upon their FDP learning by experiencing working with them in different contexts and becoming fluent in the four operations, applied to proper/improper fractions and mixed numbers. Pupils are expected to be able to recall FDP equivalents for $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{20}$ and $\frac{1}{100}$.



Year 8	Pupils refresh and deepen their understanding of place value throughout all number and calculation work. Pupils are expected to use this learning to solve complex problems and form better and more proficient mental calculation skills.	In year 8, the pupils keep developing better fluency in calculation (mental and written). Time is given to studying negative numbers in more depth with the focus here on conceptual understanding before pupils calculate with them.	Order of operations, powers and roots are all key objectives that are explored in depth during year 8 number learning. A special emphasis is given on pupils learning the correct conventional notation to be used in their work.	Pupils continue to build upon prior knowledge and skills as well as learning to interpret fractions and percentages as operators e.g. 25% as $\div 4$ and $\frac{3}{2}$ of as $\times 1.5$. Pupils also learn to solve proportion problems by expressing quantities as fractions and/or percentages.
---------------	--	---	---	---

	Ratio and proportion	Measures	Geometry	Statistics and probability
Intro	Whilst year 6 is the first official time that ratio and proportion are mentioned in the national curriculum, this strand of mathematical learning has close connections to fractions, multiplication and division. Proportional working is a major theme that runs through our year 7 and 8 scheme of work.	The primary aim for learning about measurement is for pupils to develop a reasonable sense of measure – knowing real-life approximate amounts for key units of measure. This is something that can be reinforced consistently at home as measures occur in frequently in everyday life.	Many geometric skills are focused on during a pupil's time at CMS but the key topics we learn about every year are: 2-D shapes, 3-D shapes, angles and transformations. Investigative learning is at the heart of our geometric learning with many hands on resources being used at every opportunity (sets of 2-D and 3-D shapes, Geoboards, polydron).	Throughout the primary stage of learning (up to year 6), pupils learn how to present and interpret data. Probability is not taught in the national curriculum until pupils reach KS3 (from year 7 onwards). Competency at working with statistics is a key life skill and one which is applied across all subjects and areas of our curriculum at Cranborne.
Year 5	Ratio and proportion is not formally taught to pupils in year 5 but they are expected to solve problems involving multiplication and division. These problems can involve scaling by simple fractions and harder correspondence problems such as those where n objects are connected to m objects.	Pupils work on their knowledge and skills of converting between units of mass, length and time. They are then given time to explore the concepts of area and perimeter – focusing on rectangles and shapes that are rectilinear (made from rectangles).	Pupils are given the most time to develop understanding of angles. This begins with knowing how angles are measured and the names of different types of angles. This then extends into drawing and measuring angles. Finally pupils are given the opportunity to identify angles at that are multiples of 90° .	The focused time spend looking at data is limited to working with data presented in tables and line graphs. Equipping pupils with the confidence to interpret this form of data is the key aim as well as solving problems that can be asked of the tables and graphs.
Year 6	A problem solving context is the basis for pupils to grow in understanding ratio and proportion in year 6. Pupils are challenged to appreciate the proportional nature of two quantities and learn how to compare quantities that are directly proportional (using multiplication and division facts).	Pupils learn to solve problems involving the calculation and conversion of units of measure. Pupils also extend their understanding of area to appreciate that shapes with the same areas can have different perimeters and vice versa.	We reinforce the year 5 learning on geometry in year but we spend our greatest amount of time focusing on comparing and classifying geometric shapes. This includes all aspects of triangles, quadrilaterals and regular polygons and even extends into earning the parts of a circle.	Year 6 statistical learning advances pupils skills with interpreting and constructing graphs and charts. Time is taken to investigate pie charts and apply earlier proportional work (fractions and percentages). Pupils are also expected to interpret and calculate the mean average.
Year 7	As pupils enter KS3 (year 7), their understanding of ratio and proportional becomes more formal and also extends into rates of change. This means they learn how to use ratio notation (a:b) in their work and solve harder problems that contain a multiplicative relationship.	At KS3, we consider measures and geometry as part of the same extended topic. In year 7, pupils are introduced more formally to 2-D space and learn the notations and conventions of geometry. They explore angles within polygons and solve harder missing angle problems. In learning about transformations – reflection, rotation and translation are explored in more depth and an opportunity is given to experience 'dynamic geometric software' on the computers (Geogebra).		Pupils are given more time to develop their statistical skills and knowledge in year 7. This includes completing the data handling cycle of: problem and plan; collect and select; process and present; interpret and evaluate. In probability, pupils complete experimental probability investigations and solve problems that require the inference that all possible outcomes sum to 1.



<p>Year 8 In year 8, pupils deepen their understanding of proportional reasoning by solving harder problems and making more connections to other topics. Pupils spend significant time solving problems that involve percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics.</p>	<p>In year 8, pupils study the same key geometric themes as in year 7 but extend them into new areas of learning. For angles, pupils learn about the angle properties created through parallel lines (alternate and corresponding angles). They solve even harder problems involving missing angles and develop a more formative and improved approach to geometric reasoning. In area and perimeter work, pupils' understanding is extended into new shapes including all types of special quadrilateral and circles. Learning about transformations extends into combinations of transformations and those connecting learning to other topics such as coordinates.</p>	<p>In year 8, pupils' understanding of statistics is extended into new areas e.g. bivariate data. Pupils learn how to construct and interpret a scatter diagram. With probability, pupils focus on theoretical probability and learn how to represent the probabilities of events in a systematic way. They also learn how to create sample spaces for single and combined events and how to calculate probabilities from these.</p>
---	---	--

This page details how the three core aims of the 2014 maths national curriculum are woven into our curriculum at Cranborne and are at the heart of all the maths teaching and learning that takes place in the school.

Problem solving		Reasoning		Fluency	
Intro	<p>Problem solving is a fundamental maths skill. It is seeking solutions and not just memorising procedures. It is exploring patterns and not just memorising formulas. It is formulating conjectures and not just doing exercises. At Cranborne we teach strategies for problem solving which include: creating an organised list, using simpler numbers and looking for a pattern.</p>	<p>To reason mathematically means to be able to: follow a line of enquiry; conjecture about relationships and generalisations; develop an argument; justify or prove statements using mathematical language. Asking the question 'why?' is a simple way to develop somebody's reasoning as well as not focusing on just the 'final answers'.</p>	<p>The aim with this aspect of our curriculum is for pupils to become fluent in the fundamentals of mathematics. This happens 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.*</p>		
Year 5	<p>Problem solving is at the centre of every maths lesson in the 'Maths no problem' textbooks. Each lesson starts with an 'In focus' activity which always encourages more than one approach to solving the problem. A whole chapter is given over to solving word problems and pupils are introduced to the 'bar model' method for problem solving.</p>	<p>Pupils are regularly asked the question "what is the same and what is different?" about numbers, representations, statements and solutions. Teachers give opportunities to pupils to develop and communicate their reasoning through regular journaling. Discussion is also a key principle behind every Singapore maths lesson and this obviously improves a pupil's ability to reason!</p>	<p>Pupils are given daily opportunities in lessons for guided practice which forms one strong aspect of building fluency. This usually comprises of well constructed questions that offer consolidation of key ideas. Fluency in calculation is also monitored and advanced in the spring term through the use of 'Big Maths Beat That' weekly challenges.</p>		
Year 6	<p>In year 6, problem solving opportunities exist throughout all topics. Teachers focus on presenting mathematical concepts in a variety of contexts to help widen pupils' strategies that they then have available to use. Key mathematical skills are often embedded through problem solving tasks and the requirement of pupils to apply secure knowledge.</p>	<p>The names of the new SATs tests are arithmetic paper 1 (see fluency) and reasoning papers 2 and 3. Papers 2 and 3 account for 70 out of the 110 marks available and show just how important reasoning is. Lots of time is given to pupils in year 6 to feel confident in how they reason and what exactly is required from them. Pupils will constantly be asked how they can be sure and what connections they can make to other areas of the curriculum.</p>	<p>Fluency in core number skills is a crucial focus of year 6 learning. Significant time is given to learning and practising skills of calculation and arithmetic. Successful daily starters take place throughout the year with immediate follow-up offered at lunchtime to those pupils who need it. Pupil performance on arithmetic is closely monitored by each pupil's class teacher and the leader of maths. Intervention is provided in these key skills and offered to those who most require it.</p>		
Year 7	<p>We start year 7 with a topic that focuses exclusively on problem solving. The main objective is to expose pupils to a variety of problems that can promote enjoyment and boost confidence. Pupils build up a selection of problem solving strategies and begin to learn how to model problems mathematically.</p>	<p>In KS3, pupils are challenged to: make connections between number relationships; extend and formalise their knowledge of ratio and proportion in working with measures and geometry; make and test conjectures about patterns and relationships; and look for proofs or counterexamples. It would be rare to find a lesson without pupils spending time investigating and conjecturing.</p>	<p>Fluency in year 7 reinforces calculation and builds into more advanced skills (including decimals and fractions). It also extends into pupils use of mathematical language and communication. Pupils are expected to show their understanding of mathematical concepts in more than one representation (e.g. fractions as number symbols and diagrams). They also work hard at learning and using a greater range of mathematical vocabulary.</p>		



Year 8	In year 8, pupils further develop their methods of problem solving and apply these to unfamiliar and non-routine problems. They also learn to evaluate the process they have followed in their problem solving and how this can lead to improvements the next time. Emphasis is also placed on the communication of solutions which includes greater use of formal mathematical notation.	Reasoning is extended in year 8 by raising the expectation and standards of how work is recorded. More formal mathematical notation is introduced and all solutions are required to be accompanied by clear written reasoning.	Calculation fluency extends into year 8 with arithmetic that involves negative numbers and multiplicative reasoning the new focus. Pupils are also expected to show fluency in how they use new skills and concepts. For example, pupils learn to work confidently with letter symbols, by rearranging and simplifying expressions and by starting to use algebra as a tool for generalising during investigations.
---------------	---	--	---

*Recall of multiplication facts up to 12x12 is a prerequisite of fluency and should be achieved by the end of year 4!