

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

Purpose of study –Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history’s most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims

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 expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils’ understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

Intent								
<p>We want our children to become confident and articulate communicators by enriching their mathematical vocabulary. We aim to enrich our pupils learning with a deep and confident understanding in fluency and reasoning. We aspire for our children to appreciate the power of mathematics and build a life-long passion for maths by exploring their curiosity through memorable learning experiences. As the children progress we aim to build confidence, widen their horizons and attain a positive growth mind set. Through our enterprise scheme we will provide children with an opportunity to develop their global identity through working with the local community. We want them to know that mathematics is essential to succeed in life and necessary for financial responsibilities and most forms of employment.</p>								
Addition and Subtraction								
Area of Study	N	Rec	1	2	3	4	5	6
CARDINALITY NUMBER BONDS	Count up to 5 objects (one at a time)	Count up to 10 objects (one at a time)	Represent and use number bonds and related subtraction facts within 20	Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100				
	Count out up to 5 objects from a larger group	Count out up to 10 objects from a larger group.						

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

	Subitise a small group of 1-3 objects instantly without counting	Subitise a small group of up to 5 objects (for 5 they may see them as 4 and 1 or 3 and 2 but recognise there are 5 without counting)					
	Link numerals with amounts up to 5.	Link numerals to amounts up to 10.					
			Continue the pattern $10 + 8 = 18$ $11 + 7 = 18$	Continue the pattern $90 = 100 - 10$ $80 = 100 - 20$			

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

			<p>Can you make up a similar pattern for the number 17? How would this pattern look if it included subtraction?</p> <p>Missing numbers $9 + \square = 10$ $10 - \square = 9$</p> <p>What number goes in the missing box?</p>	<p>Can you make up a similar pattern starting with the numbers 74, 26 and 100?</p> <p>Missing numbers $91 + \square = 100$ $100 - \square = 89$</p> <p>What number goes in the missing box?</p>				
Area of Study			1	2	3	4	5	6
MENTAL CALCULATION			Add and subtract one digit and two-digit numbers to 20, including zero	Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones	Add and subtract numbers mentally, including: a three-digit number and ones		Add and subtract numbers mentally with increasingly large numbers	Perform mental calculations, including with mixed operations and large numbers

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

				<p>a two-digit number and tens</p> <p>two two-digit numbers</p> <p>adding three one-digit numbers</p>	<p>a three-digit number and tens</p> <p>a three-digit number and hundreds</p>			
REASONING			<p>Working backwards</p> <p>Through practical games on number tracks and lines ask questions such as “Where have you landed?” and “What numbers would you need to throw to land on other</p>	<p>True or false?</p> <p>Are these number sentences true or false?</p> <p>$73 + 40 = 113$</p> <p>$98 - 18 = 70$</p> <p>$46 + 77 = 123$</p> <p>$92 - 67 = 35$</p> <p>Give your reasons.</p> <p>Hard and easy questions Which questions are easy / hard?</p> <p>$23 + 10 =$</p> <p>$93 + 10 =$</p> <p>$54 + 9 =$</p>	<p>True or false?</p> <p>Are these number sentences true or false?</p> <p>$59 + 7 = 7$</p> <p>$614 - 804 - 70 =$</p> <p>$744 - 768 + 140 =$</p> <p>908 Give your reasons.</p>	<p>True or false?</p> <p>Are these number sentences true or false?</p> <p>$6.7 + 0.4 = 6.11$</p> <p>$8.1 - 0.9 = 7.2$</p> <p>Give your reasons.</p>	<p>True or false?</p> <p>Are these number sentences true or false?</p> <p>$6.17 + 0.4 = 6.57$</p> <p>$8.12 - 0.9 = 8.3$</p> <p>Give your reasons.</p>	<p>True or false?</p> <p>Are these number sentences true or false?</p> <p>$6.32 + \square = 8$</p> <p>$\square = 1.68$</p> <p>Give your reasons.</p> <p>Hard and easy questions</p> <p>Which</p>

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

			<p>given numbers?"</p> <p>What do you notice?</p> <p>$11 - 1 = 10$ $11 - 10 = 1$</p> <p>Can you make up some other number sentences like this involving 3 different numbers?</p>	<p>$54 + 1 =$</p> <p>Explain why you think the hard questions are hard?</p> <p>Other possibilities</p> <p>$\square + \square + \square = 14$</p> <p>What single digit numbers could go in the boxes? How many different ways can you do this?</p>	<p>Hard and easy questions</p> <p>Which questions are easy / hard? $323 + 10 =$ $393 + 10 =$ $454 - 100 =$ $954 - 120 =$</p> <p>Explain why you think the hard questions are hard?</p>	<p>Hard and easy questions</p> <p>Which questions are easy / hard? $13323 - 70 =$ $12893 + 300 =$ $19354 - 500 =$ $19954 + 100 =$</p> <p>Explain why you think the hard questions are hard?</p>	<p>Hard and easy questions</p> <p>Which questions are easy / hard? $213323 - 70 =$ $512893 + 300 =$ $819354 - 500 =$ $319954 + 100 =$</p> <p>Explain why you think the hard questions are hard?</p>	<p>questions are easy / hard?</p> <p>$213323 - 70 =$ $512893 + 37 =$ $8193.54 - 5.9 =$</p> <p>Explain why you think the hard questions are hard?</p>
Area of Study		1	2	3	4	5	6	
MENTAL CALCULATION		Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs	Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				Use their knowledge of the order of operations to carry out calculations involving the	

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

			(appears also in Written Methods)					four operations
REASONING			<p>Fact families Which four number sentences link these numbers? 12, 15, 3</p> <p>What else do you know? If you know this: $12 - 9 = 3$ what other facts do you know?</p> <p>Missing symbols Write the missing symbols (+ - =) in number sentences</p> <p>17 <input type="checkbox"/> 3 <input type="checkbox"/> 20 18 <input type="checkbox"/> 20 <input type="checkbox"/> 2</p>	<p>Fact families Which four number sentences link these numbers? 100, 67, 33</p> <p>What else do you know? If you know this: $87 = 100 - 13$ What other facts do you know?</p> <p>Missing symbols Write the missing symbols (+ - =) in these number sentences:</p>		:	<p>Missing symbols Write the missing signs (+ - x ÷) in this number sentence</p> <p>6 <input type="checkbox"/> 12.3 = 61.9 <input type="checkbox"/> 11.9</p> <p>What else do you know? If you know this: $86.7 + 13.3 = 100$ what other facts do you know?</p>	

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

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Area of Study			1	2	3	4	5	6
WRITTEN METHODS			Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)		Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	
REASONING			Convince me In my head I have two odd numbers with a difference of 2. What	Convince me What digits could go in the boxes? $7 \square - 2 \square = 46$	Convince me $\square + \square + \square + \square$ The total is 201	Convince me $\square - 666 = 8 \square 5$ What is the largest possible number	Convince me $\square + 1475 = 6 \square 24$	Convince me Three four-digit numbers total 12435. What could they be? Convince me

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

			<p>could they be? Convince me</p> <p>Missing numbers Fill in the missing numbers (using a range of practical resources to support)</p> <p>12 + = 19 20 - = 3</p>	<p>Try to find all of the possible answers. How do you know you have got them all? Convince me</p>	<p>Each missing digit is either a 9 or a 1. Write in the missing digits. Is there only one way of doing this or lots of ways? Convince me</p>	<p>that will go in the rectangular box? What is the smallest? Convince me</p>	<p>What numbers go in the boxes? What different answers are there? Convince me</p>	
Area of Study			1	2	3	4	5	6
INVERSE OPERATION S, ESTIMATIN				Recognise and use the inverse relationship between addition	Estimate the answer to a calculation and use	Estimate and use inverse operations to check	Use rounding to check answers to calculations	Use estimation to check answers to calculations

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

G AND CHECKING ANSWERS				and subtraction and use this to check calculations and solve missing number problems	inverse operations to check answers	answers to a calculation	and determine, in the context of a problem, levels of accuracy	and determine, in the context of a problem, levels of accuracy
REASONING			<p>Making an estimate</p> <p>Pick (from a selection of number sentences) the ones where the answer is 8 or 9.</p> <p>Is it true that?</p> <p>Is it true that $3+4 = 4 + 3$?</p>	<p>Making an estimate</p> <p>Which of these number sentences have the answer that is between 50 and 60</p> <p>$74 - 13$ $55 + 17$ $87 - 34$</p> <p>Always, sometimes, never</p> <p>Is it always, sometimes or never true that if you add three numbers less than 10 the answer will be an odd number</p>	<p>Making an estimate</p> <p>Which of these number sentences have the answer that is between 50 and 60</p> <p>$174 - 119$ $333 - 276$ $932 - 871$</p> <p>Always, sometimes, never</p> <p>Is it always, sometimes or never true that if you subtract a</p>	<p>Making an estimate</p> <p>Which of these number sentences have the answer that is between 550 and 600</p> <p>$1174 - 611$ $3330 - 2779$ $9326 - 8777$</p> <p>Always, sometimes, never</p> <p>Is it always sometimes or never true that the difference between two</p>	<p>Making an estimate</p> <p>Which of these number sentences have the answer that is between 0.5 and 0.6</p> <p>$11.74 - 11.18$ $33.3 - 32.71$</p> <p>Always, sometimes, never</p> <p>Is it always, sometimes or never true that the sum of four even</p>	<p>Making an estimate</p> <p>Circle the number that is the best estimate to $932.6 - 931.05$</p> <p>1.3 1.5 1.7 1.9</p> <p>Always, sometimes, never</p> <p>Is it always, sometimes or never true that the sum of two</p>

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

					<p>multiple of 10 from any number the ones digit of that number stays the same. Is it always, sometimes or never true that when you add two numbers together you will get an even number?</p>	<p>odd numbers is odd.</p>	<p>numbers is divisible by 4.</p>	<p>consecutive triangular numbers is a square number</p>
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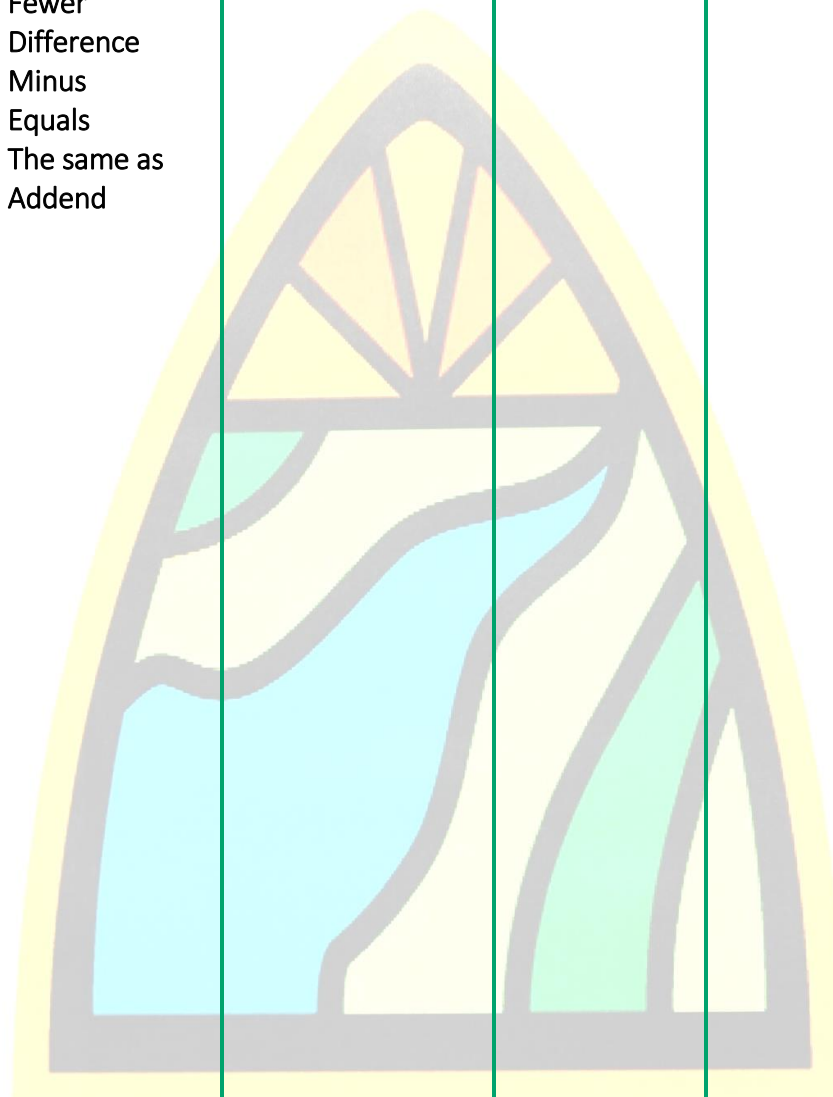
Cranbrook Primary School- Progression in Maths – Addition and Subtraction

Area of Study			1	2	3	4	5	6
PROBLEM SOLVING			Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$	Solve problems with addition and subtraction: <ul style="list-style-type: none"> * using concrete objects and pictorial representation including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods 	Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

				<p><i>Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change</i></p> <p>(copied from Measurement)</p>				<p>Solve problems involving addition, subtraction, multiplication and division</p>
Key Vocabulary								
Areas	EYFS	Y1	Y2	Y3	Y4	Y5	Y6	
Addition and subtraction	<p>Add More Make Sum Total Altogether Double One more, two</p>	<p>Add Addition Sum Total Altogether How many more? How much more? Subtract Take away</p>	<p>Commutative Crossing the (tens) Boundary or bridging Exchange Regrouping</p>	<p>Addend Sum Minuend Subtrahend Difference Exchange</p>	Inverse	<p>Additive Estimation Approximate</p>	<p>See previous</p>	

Cranbrook Primary School- Progression in Maths – Addition and Subtraction

		<p>more, ten more How many more to make..? How many more is...than? How much more is? Take away How many are left/ left over? How many have gone? One less, two less, ten less How many fewer is...than..?</p>	<p>Left (left over) Fewer Difference Minus Equals The same as Addend</p>				
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Cranbrook Primary School- Progression in Maths – Addition and Subtraction

		How much less is ...? Difference Between						

