Cranbrook Primary School- Progression in Maths – Fractions including Decimals and Percentages

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.

Intent

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.

FRACTIONS

Area of Study		1	2	3	4	5	6
COUNTING IN FRACTIONAL STEPS			*Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line (Non Statutory Guidance)*	Count up and down in tenths	Count up and down in hundredths		
			Spot the mistake 7, 7 ½ , 8, 9, 10	Spot the mistake six	Spot the mistake	Spot the mistake	Spot the mistake

			8 ½, 8, 7, 6 ½, … and correct it **What comes next?** 5 ½, 6 ½ , 7 ½ , …., …. 9 ½, 9, 8 ½, ……, …..	tenths, seven tenths, eight tenths, nine tenths, eleven tenths … and correct it. **What comes next?** 6/10, 7/10, 8/10, ….., …. 12/10, 11/10, ….., ….., …..	sixty tenths, seventy tenths, eighty tenths, ninety tenths, twenty tenths … and correct it. **What comes next?** 83/100, 82/100, 81/100, ….., ….., ….. 31/100, 41/100, 51/100, ….., …..,	0.088, 0.089, 1.0 **What comes next?** 1.173, 1.183, 1.193	Identify and explain mistakes when counting in more complex fractional steps
Area of Study		1	2	3	4	5	6
RECOGNISING FRACTIONS		Recognise, find and name a half as one of two equal parts of an object, shape or quantity	Recognise, find, name and write fractions 1/3, ¼, 2/4 and ¾ of a length, shape, set of objects or quantity.	Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators	Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten	Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents (appears also in Equivalence)	

				Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10.			
		What do you notice? Choose a number of counters. Place them onto 2 plates so that there is the same number on each half. When can you do this	What do you notice? ¼ of 4 = 1 ¼ of 8 = 2 ¼ of 12 = 3 Continue the pattern What do you notice?	What do you notice? 1/10 of 10 = 1 2/10 of 10 = 2 3/10 of 10 = 3 Continue the pattern. What do you notice? What about 1/10 of 20? Use this to work out 2/10 of 20, etc.	What do you notice? 1/10 of 100 = 10 1/100 of 100 = 1 2/10 of 100 = 20 2/100 of 100 = 2 How can you use this to work out 6/10 of 200? 6/100 of 200?	What do you notice? One tenth of £41 One hundredth of £41 One thousandth of £41 Continue the pattern What do you notice? 0.085 + 0.015 = 0.1 0.075 + 0.025 = 0.1	What do you notice? One thousandth of my money is 31p. How much do I have?

		and when can't you? What do you notice?				0.065 + 0.035 = 0.1 Continue the pattern for the next five number sentences.	
		Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.		Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators.			
		True or false? Sharing 8 apples between 4 children means each child has 1 apple.	True or false? Half of 20cm = 5cm ¾ of 12cm = 9cm	True or false? 2/10 of 20cm = 2cm 4/10 of 40cm = 4cm 3/5 of 20cm = 12cm	True or false? 1/20 of a metre= 20cm 4/100 of 2 metres = 40cm	True or false? 0.1 of a kilometre is 1m. 0.2 of 2 kilometres is 2m. 0.3 of 3 Kilometres is 3m 0.25 of 3m is 500cm. 2/5 of £2 is 20p	True or false? 25% of 23km is longer than 0.2 of 20km. Convince me.

Area of Study		1	2	3	4	5	6
COMPARING FRACTIONS				Compare and order unit fractions, and fractions with the same denominators		Compare and order fractions whose denominators are all multiples of the same number	Compare and order fractions, including fractions >1
				Give an example of a fraction that is less than a half. Now another example that no one else will think of. Explain how you know the fraction is less than a half. (draw an image)	Give an example of a fraction that is more than a half but less than a whole. Now another example that no one else will think of. Explain how you know the fraction	Give an example of a fraction that is more than three quarters. Now another example that no one else will think of. Explain how you know the fraction is more than three quarters. Imran put these fractions in order starting with the	Give an example of a **fraction** that is greater than 1.1 and less than 1.5. Now another example that no one will think of. Explain how you know. Sam put these fractions in order starting with the smallest. Are they in the correct order? Thirty three fifths

				Ben put these fractions in order starting with the smallest. Are they in the correct order? One fifth, one seventh, one sixth	is more than a half but less than a whole. (draw an image)	smallest. Are they in the correct order? Two fifths, three tenths, four twentieths How do you know?	Twenty three thirds Forty five sevenths How do you know?
Area of Study		1	2	3	4	5	6
COMPARING DECIMALS					Compare numbers with the same number of decimal places up to two decimal places.	Read, write, order and compare numbers with up to three decimal places.	Identify the value of each digit in numbers given to three decimal places.

					Missing symbol Put the correct symbol < or > in each box 3.03 ☐ 3.33 0.37 ☐ 0.32 What needs to be added to 3.23 to give 3.53? What needs to be added to 3.16 to give 3.2?	**Missing symbol** Put the correct symbol < or > in each box 4.627 ▯ 4.06 12.317 ▯ 12.31 What needs to be added to 3.63 to give 3.13? What needs to be added to 4.652 to give 4.1?	**True or false?** In all of the numbers below, the digit 6 is worth <u>more than</u> 6 hundredths. 3.6 3.063 3.006 6.23 7.761 3.076 Is this true or false? Change some numbers so that it is true. What needs to be added to 6.543 to give 7? What needs to be added to 3.582 to give 5? Circle the two decimals which are closest in value to each other. 0.9 0.09 0.99 0.1 0.01
Area of Study		1	2	3	4	5	6

ROUNDING INCLUDING DECIMALS					Round decimals with one decimal place to the nearest whole number	Round decimals with two decimal places to the nearest whole number and to one decimal place	Solve problems which require answers to be rounded to specified degrees of accuracy
					Do, then explain Circle each decimal which when rounded to the nearest whole number is 5. 5.3 5.7 5.2 5.8 Explain your reasoning **Top tips** Explain how to round numbers to one decimal place? *Also see rounding in place value*	**Do, then explain** Circle each decimal which when rounded to one decimal place is 6.2. 6.32 6.23 6.27 6.17 Explain your reasoning **Top tips** Explain how to round decimal numbers to one decimal place? *Also see rounding in place value*	**Do, then explain** Write the answer of each calculation rounded to the nearest whole number 75.7 × 59 7734 ÷ 60 772.4 × 9.7 20.34 × (7.9 – 5.4) **What's the same, what's different?** … when you round numbers to one decimal place and two decimal places? *Also see rounding in place value*

Area of Study		1	2	3	4	5	6
EQUIVALENCE INCLUDING FRACTIONS, DECIMALS AND PERCENTAGES			Write simple fractions e.g. 1/2 of 6 = 3 and recognise the equivalence of 2/4 and ½.	Recognise and show, using diagrams, equivalent fractions with small denominators	Recognise and show, using diagrams, families of common equivalent fractions	Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination
			Odd one out. Which is the odd one out in this trio: ½ 2/4 ¼ Why? **What do you notice?** Find ½ of 8. Find 2/4 of 8 What do you notice?	**Odd one out.** Which is the odd one out in each of these trios ½ 3/6 5/8 3/9 2/6 4/9 Why? **What do you notice?** Find 2/5 of 10 Find 4/10 of 10.	**Odd one out.** Which is the odd one out in each of these trio s¾ 9/12 4/6 9/12 10/15 2/3 Why? **What do you notice?** Find 4/6 of 24 Find 2/3 of 24	**Odd one out.** Which is the odd one out in each of these collections of 4 fractions 6/10 3/5 18/20 9/15 30/100 3/10 6/20 3/9 Why? **What do you notice?** Find 30/100 of 200 Find 3/10 of 200 What do you notice? Can you write any	**Odd one out.** Which is the odd one out in each of these collections of 4 fraction s¾ 9/12 26/36 18/24 4/20 1/5 6/25 6/30 Why? **What do you notice?** 8/5 of 25 = 40 5/4 of 16 = 20 7/6 of 36 - 42 Can you write similar statements?

				What do you notice? Can you write any other similar statements?	What do you notice? Can you write any other similar statements?	other similar statements?	
					Recognise and write decimal equivalents of any number of tenths or hundredths	Read and write decimal numbers as fractions (e.g. 0.71 = 71/100) Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8).
					Recognise and write decimal equivalents to ¼, ½, 3/4	Recognise the per cent symbol (%) and understand that per cent relates to "number of parts per hundred", and write percentages as a fraction with	Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

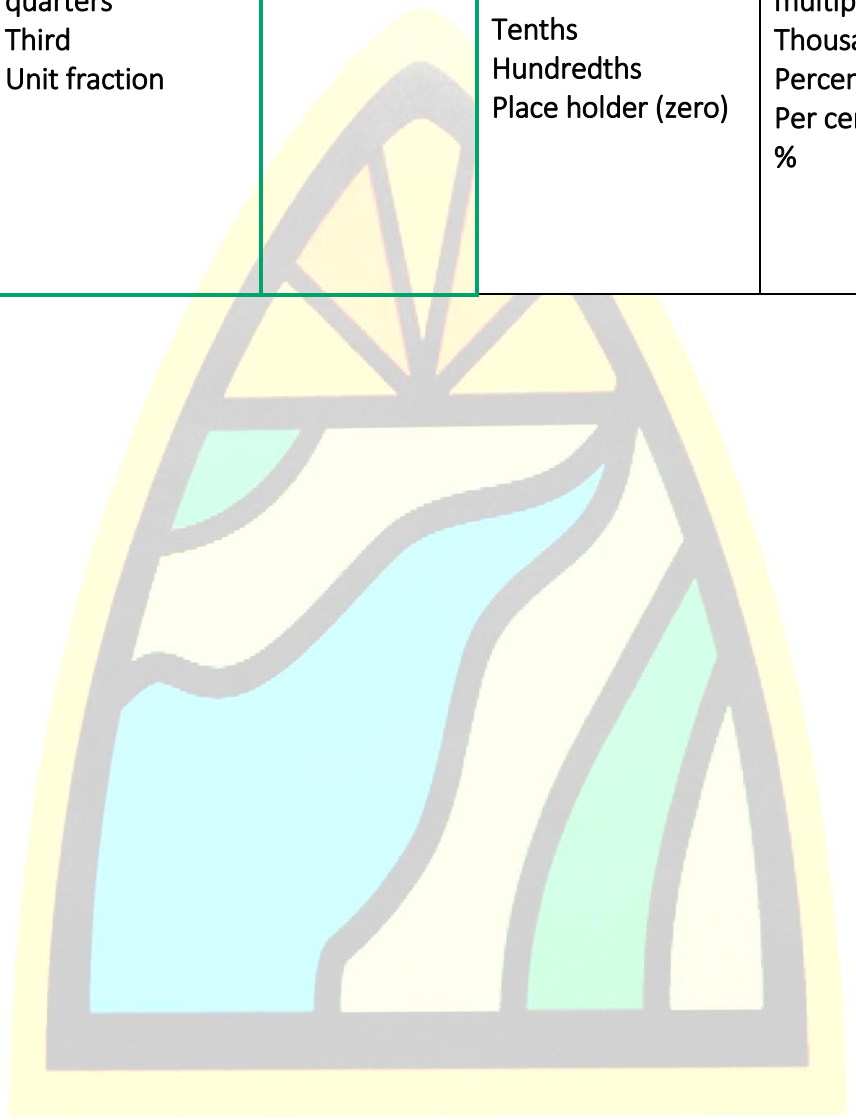
						denominator 100 as a decimal fraction.	
Area of Study	EYFS	1	2	3	4	5	6
ADDITION AND SUBTRACTION OF FRACTIONS				Add and subtract fractions with the same denominator within one whole (e.g 5/7 + 1/7 = 6/7)	Add and subtract fractions with the same denominator	Add and subtract fractions with the same denominator and multiples of the same number Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. 2/5 + 4/5 =6/5 =	Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent Fractions

						1 1/5)	
				What do you notice? 1/10 + 9/10 = 1 2/10 + 8/10 = 1 3/10 + 7/10 = 1	What do you notice? 5/5 – 1/5 = 4/5 4/5 – 1/5 = 3/5	What do you notice? ¾ and ¼ = 4/4 = 1 4/4 and ¼ = 5/4 = 1 ¼ 5/4 and ¼ = 6/4 = 1 ½	
MULTIPLICATION AND DIVISION OF FRACTIONS						Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	Multiply simple pairs of proper fractions, writing the answer in its simplest form ¼ x ½ = 1/8 Multiply one-digit numbers with up to two decimal places by whole numbers Divide proper fractions by whole numbers e.g 1/3 ÷2 = 1/6

						Continue the pattern ¼ x 3 = ¼ x 4 = ¼ x 5 = Continue the pattern for five more number sentences. How many steps will it take to get to 3? 5/3 of 24 = 40 Write a similar sentence where the answer is 56. The answer is 2 ¼ , what is the question Give your top tips for multiplying fractions.	Continue the pattern 1/3 ÷ 2 = 1/6 1/6 ÷ 2 = 1/12 1/12 ÷ 2 = 1/24 What do you notice? ½ x ¼ = The answer is 1/8 , what is the question (involving fractions / operations) Give your top tips for dividing fractions.
Areas		Y1	Y2	Y3	Y4	Y5	Y6
MULTIPLICATION AND							Multiply one-digit numbers with up to

DIVISION OF DECIMALS							two decimal places by whole numbers
					Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths		Multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places
							Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places
							Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)
							Use written division methods in cases where the answer has

							up to two decimal places
					Undoing I divide a number by 100 and the answer is 0.3. What number did I start with? **Another and another** Write down a number with one decimal place which when multiplied by 10 gives an answer between 120 and 130. ... and another, … and another, …	**Undoing** I divide a number by 100 and the answer is 0.33 What number did I start with? **Another and another** Write down a number with two decimal places which when multiplied by 100 gives an answer between 33 and 38. ... and another, … and another, …	**Undoing** I multiply a number with three decimal places by a multiple of 10. The answer is approximately 3.21 What was my number and what did I multiply by? When I divide a number by 1000 the resulting number has the digit 6 in the units and tenths and the other digits are 3 and 2 in the tens and hundreds columns. What could my number have been?

PROBLEM SOLVING				Solve problems that involve all of the above	Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number	Solve problems involving numbers up to three decimal places	
					Solve simple measure and money problems involving fractions and decimals to two decimal places.	Solve problems which require knowing percentage and decimal equivalents of ½, ¼, 1/5, 2/5, 4/5 and those with a denominator of a multiple of 10 or 25.	
Key vocabulary							
	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions	parts of a whole half	Fraction Whole Equal part	Equivalent Numerator Denominator	Tenths Sixths Sevenths	Hundredths Decimal Decimal point	Mixed number Improper fraction Thousandths	Enlarged Enlargement For every

	quarter	Equal grouping Equal sharing Parts of a whole Half Quarter	Two halves/ quarters Third Unit fraction	Eights	Decimal place Tenths Hundredths Place holder (zero)	Lowest common multiple Thousandths Percentage Per cent %	Highest common factor Proportion Ratio Scale factor Scale factor of Similar Simplify