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National Centre for Excellence in the Teaching of Mathematics

White Rose Maths

Fractions, Decimals and Percentages

Counting Fractionally					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Count in halves up to 10, starting with any number, on a number line.	Count up and down in tenths.	Count up and down in hundredths.		
	Spot the mistake 7, 7 ½, 8, 9, 10 Correct it. ***What comes next?*** *6 ½, 7 ½, 8 ½, …. , …..*	**Spot the mistake** six tenths, seven tenths, eight tenths, nine tenths, elven tenths. Correct it. ***What comes next?*** *6/10, 7/10, 8/10, …. , …..* *12/10, 11/10, …, …..*	**Spot the mistake** sixty tenths, seventy tenths, eighty tenths, ninety tenths, twenty tenths. Correct it. ***What comes next?*** *83/100, 82/100, 81/100, …., ……,* *31/100, 41/100, 51/100, … .., …..,*	**Spot the mistake** 0.088, 0.089, 1.0 Correct it. ***What comes next?*** *1.173, 1.183, 1.193*	

Recognising Fractions					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recognise, find and name a half as one of two	Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$	Recognise, find and write fractions of a set of objects: unit	Recognise that hundredths arise when dividing an	Recognise and use thousandths and relate them to tenths,	

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equal parts of an object, shape or quantity.	and $\frac{3}{4}$ of a set of objects of a quantity.	fractions and non-unit fractions with small denominators.	object by one hundred and dividing tenths by ten.	hundredths and decimal equivalents.	
Recognise, find and make a quarter as one of four equal parts of an object, shape or quantity.		Recognise that tenths arise from dividing an object into 10 parts and numbers by 10.			
		Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators.			
What do you notice? Choose a number of counters. Place them onto 2 plates so that there is the same number on each plate. When can you do this and when can't you?	**What do you notice?** ¼ of 4 = 1 ¼ of 8 = 2 ¼ of 12 = 3 Continue the pattern. What do you notice? ***True or False?***	**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? ***True or False?*** *2/10 of 20cm = 2cm*	**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 patter to work out 6/10 of 100? 6/100?	**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 0.065 + 0.035 = 0.1	**What do you notice?** One thousandth of my money is 31p. How much do I have? ***True or False?*** *25% of 23km is longer than 0.2 of 20km.*

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What do you notice?	*Half of 20cm = 5cm* $\frac{3}{4}$ *of 12cm = 9cm*	*4/10 of 40cm = 4cm* *3/5 of 20cm = 12cm*	***True or False?*** *1/20 of 1m = 20cm* *4/100 of 2m = 40cm*	Continue the patterns for the next 5 number sentences. ***True or False?*** *0.1 of a km is 1m* *0.2 of 2km is 2m* *0.3 of 3km is 3m* *0.25 of 3m is 500cm*	

Comparing Fractions					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		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 with different denominators, including fractions bigger than 1.
		Give an example of a fraction that is less than half. Now think of another example and explain how it is less than half by using a picture. Ben put these fractions in order starting with the	Give an example of a fraction that is a more than a half but less than a whole. Now think of another example and explain how it is less than half by using a picture.	Give an example of a fraction that is a more than three quarters. Now think of another example and explain how it is less than half by using a picture. Imran put these fractions in order starting with the	Give an example of a fraction than 1.1 and less than 1.5. Now think of another example and explain how it is less than half by using a picture. Sam put these fractions in order

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		smallest. Is he correct? One fifth, one seventh, one sixth		smallest. Are they in the correct order? Two fifths, three tenths, four twentieths. How do you know?	starting with the smallest. Are they in the correct order? Thirty three fifths Twenty three thirds Forty five sevenths How do you know?

Comparing Decimals					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			Compare numbers with the same number of decimal places, up to 2 dp.	Read, write, order and compare numbers with up to three decimal places.	Identify the value of each digit in numbers given to 3dp.
			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?	**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 taken away from 4.652 to give 4.1?	**True or false?** In all of the numbers below, the digit 6 is worth more than 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.

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			What needs to be added to 3.16 to give 3.2?		What needs to be added to 6.543 to give 7? What needs to be added to 3.582 to give 5?

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Rounding Including Decimals					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			Round decimals with 1dp to the nearest whole number.	Round decimals with two 2dp to the nearest whole number and to one decimal place.	Solve problems which require answers to be rounded to a specific degree 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 you round numbers to 1 dp.*	**Do, then explain:** Circle each decimal which when rounded to the nearest whole number is 6.2. 6.32 6.23 6.27 6.17 Explain your reasoning. ***Top tips:*** *Explain how you round decimals numbers to 1 dp.*	**Do, then explain:** Write the answer of each calculation rounded to the nearest whole number. 75.7 x 59 = 7734 ÷ 60 = 772.4 x 9.7 = 20.34 x (7.9 – 5.4) =

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Equivalence (inc. Fractions, Decimals, Percentages)					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Write simple fractions (e.g. ½ of 6 = 3) and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.	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.
			Recognise and write decimal equivalents of any number of tenths and hundredths.	Read and write decimal numbers as fractions (e.g. 0.71 = $\frac{71}{100}$).	Associate fractions with division and calculate decimal fraction equivalents (e.g. 0.375 = $\frac{3}{8}$)
			Recognise and write the decimal equivalent for ½ , ¼ , ¾ and use these in real life contexts	Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.	Associate percentages with their fraction and decimal equivalents.
			Simplify fractions to their lowest common denominator.	Write percentages as a fraction with denominator of 100 and as a decimal fraction.	
				Solve problems which require knowing percentage and	

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				decimal equivalents of 1/2 , 1/4 , 1/5, 2/5 and 4/5 and those fractions with a denominator of a multiple of 10 or 25.	
	Odd one out: Which is the odd one out in this trio: $\frac{1}{2}$ $\frac{2}{4}$ $\frac{1}{4}$ Why? ***What do you notice?*** *Find $\frac{2}{4}$ of 8.* *Find $\frac{1}{2}$ of 8.* *What do you notice?* **Ordering:** Put these fractions in the correct order, starting with the smallest.	**Odd one out:** Which is the odd one out in this trio: $\frac{1}{2}$ $\frac{3}{6}$ $\frac{5}{8}$ $\frac{3}{9}$ $\frac{2}{6}$ $\frac{4}{9}$ Why? **What do you notice?** Find $\frac{2}{5}$ of 10. Find $\frac{4}{10}$ of 10. What do you notice? Can you write any other similar statements? **Ordering:**	**Odd one out:** Which is the odd one out in this trio: $\frac{3}{4}$ $\frac{9}{12}$ $\frac{4}{6}$ $\frac{9}{12}$ $\frac{10}{15}$ $\frac{2}{3}$ Why? ***What do you notice?*** *Find $\frac{4}{6}$ of 24.* *Find $\frac{2}{3}$ of 24.* *What do you notice? Can you write any other similar statements?* **Another and another:**	**Odd one out:** Which is the odd one out in each of these collections of 4 fractions: $\frac{3}{5}$ $\frac{6}{10}$ $\frac{18}{20}$ $\frac{9}{15}$ $\frac{30}{100}$ $\frac{3}{10}$ $\frac{6}{20}$ $\frac{3}{9}$ Why? ***What do you notice?*** *Find $\frac{30}{100}$ of 200.* *Find $\frac{3}{10}$ of 200.* *What do you notice? Can you write any other similar statements?*	**Odd one out:** Which is the odd one out in each of these collections of 4 fractions: $\frac{3}{4}$ $\frac{9}{12}$ $\frac{26}{36}$ $\frac{18}{24}$ $\frac{4}{20}$ $\frac{1}{5}$ $\frac{6}{25}$ $\frac{6}{30}$ Why? ***What do you notice?*** *$\frac{8}{5}$ of 25 = 40.* *$\frac{5}{4}$ of 16 = 20.* *$\frac{7}{6}$ of 36 = 42.* *Can you write any similar statements?*

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	$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$	Put these fractions in the correct order, starting with the smallest. $\frac{4}{8}$ $\frac{3}{4}$ $\frac{1}{4}$	Write a decimal number which lies between a half and three quarters… and another… and another. **Ordering:** Put these numbers in the correct order, starting with the smallest. $\frac{5}{10}$ $\frac{1}{4}$ 0.74	**Another and another:** Write a fraction with a denominator of one hundred which has a value of more than 0.75…. and another… and another. **Ordering:** Put these numbers in the correct order, starting with the smallest. $\frac{7}{10}$ $\frac{7}{100}$ 0.73 0.073 71%	**Another and another:** Write a unit fraction which has a value of less than 0.5…. and another… and another. **Ordering:** Put these numbers in the correct order, starting with the smallest. $\frac{5}{8}$ $\frac{3}{5}$ 0.8 23%

Adding and Subtracting Decimals					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		Add and subtract fractions with the same denominator within one whole (e.g. $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$).	Add and subtract fractions with the same denominator.	Add and subtract fractions with the same denominator, multiples of the same number and difference denominators.	Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

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				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. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$).	
		What is the question? The answer is $\frac{5}{10}$, what is the question?	**What is the question?** The answer is $\frac{3}{5}$, what is the question?	**What is the question?** The answer is $1\frac{2}{5}$, what is the question?	**Another and another:** Write down two fractions which have a difference of $\frac{3}{6}$…. and another… and another. Write down two fractions with a total of $3\frac{3}{5}$….and another….and another.

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Multiplication and Division of Fractions					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
				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 (e.g. $\frac{1}{4}$ x $\frac{1}{2}$ =$\frac{1}{8}$).
					Divide proper fractions by whole numbers (e.g. $\frac{1}{3}$ ÷ 2 = $\frac{1}{6}$).
					Multiply fractions by whole numbers (e.g. 2 x $\frac{3}{8}$).
					Multiply mixed number fractions by whole numbers (e.g. $3\frac{3}{4}$ x 4)
				Continue the pattern: $\frac{1}{4}$ x 3 =	**Continue the pattern:** $\frac{1}{4}$ x 3 =

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				$\frac{1}{4}$ x 4 = $\frac{1}{4}$ x 5 = Continue the patter for five more number sentences. How many steps will it take you to reach 3? ***This is the answer, what is the question*** *questions to also be used.*	$\frac{1}{4}$ x 4 = $\frac{1}{4}$ x 5 = Continue the patter for five more number sentences. How many steps will it take you to reach 3? ***This is the answer, what is the question*** *questions to also be used.*

Multiplication and Division of Decimals					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			Find the effect of dividing a one or two digit numbers by 10 and 100, identifying the value of the digits in the answers as ones, tenths and hundredths.	Multiply and divide numbers by 10, 100 and 1000 where the answers are up to 2dp.	Multiple one-digit numbers with up to two decimal places by whole numbers.
					Multiply and divide numbers by 10,100 and 1000 where the

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					answers are up to 3dp.
					Use written division methods in cases where the answer has up to 2dp.
			Undoing: I divide a number by 100 and the answer is 0.3. What number did I start with?	**Undoing:** I divide a number by 100 and the answer is 0.33. What number did I start with?	**Undoing:** I multiply a number with 3dp by a multiple of 10. My answer is approx. 3.21. What was my number and what did I multiply by?

Calculating Percentages					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
				Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred'.	Calculate any given percentage of amounts.
				Calculate multiples of 10% and 1% of a number, including where the answer will be a decimal.	

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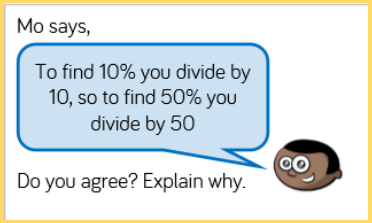
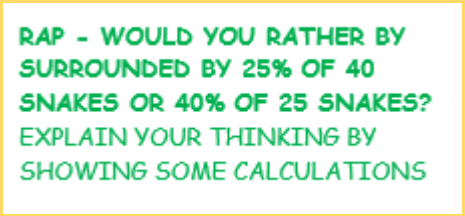
				To use known equivalences to calculate 25%, 50% and 75%.	
				Spot the mistake: 	**Would you rather?** 

Problem Solving					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			Solve problems involving numbers up to three decimal places.	Solve problems involving numbers up to 3 dp.	
			Solve simple measure and money problems involving fractions and decimals to two decimal places.	Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}, \frac{1}{4}, \frac{2}{4}, \frac{1}{5}, \frac{4}{5}$.	

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Vocabulary					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
fraction half halve quarter whole	part equal parts two halves one quarter two quarters three quarters four quarters one third	two thirds three thirds one tenth tenths denominator numerator left over equivalent bar model simplify	eighth sixth fifth twentieth hundredth proportion in every for every decimal decimal fraction decimal point decimal place	common fraction simple fraction mixed number mixed fraction thousandth reduced to cancel ninth twelfth percentage per cent %	proper fraction improper fraction common denominator rational number