## Knowledge Progression in Fractions, decimals and percentages

|  | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
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| Recognising Fractions Counting in fraction steps | -To be able to recognise and name a half as one of two equal parts of an object, shape or quantity and a quarter as 4 equal parts of an object, shape or quantity | - To be able to recognise, name and write fractions $1 / 3,1 / 4,2 / 4$ and $3 / 4$ of a length, shape, set of objects or quantity <br> - To be able to count in halves and quarters up to 10 | - To recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 -To be able to count up and down in tenths; | -To recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. <br> -To be able to count up and down in hundredths; <br> -To be able to count forwards and backwards in quarters and steps of 0.25 | - To be able to recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number <br> To be able to count in decimals and fractions (halves, tenths, quarters, three quarters) | - To be able to order fractions with different denominators, simplifying and converting to decimals where necessary |
| Year 1 examples | Working at <br> Colour half of each whole shape: <br> Check that pupils do not think that just dividing a shape into any two pieces is halving but understand that they need to be equal pieces. |  |  | Greater depth <br> What fraction of the whole shape is shaded? <br> Explain your reasoning. |  |  |



|  |  |  |  | ? is greater than ?$?<?$? > ? |  |  |
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| Year 3 example | Shade in 0.7 of this | ectangle. |  | This is $2 / 5$ or 0.4 of a bag of marbles. How many marbles are in a full bag? |  |  |
| Finding fractions of quantities | - To be able to find a half of an object, shape or quantity and a quarter of an object, shape or quantity | - To be able to write simple fractions for example, $1 / 2$ of $6=$ 3 and <br> - To be able to find fractions $1 / 3,1 / 4$, $2 / 4$ and $3 / 4$ of a length, shape, set of objects or quantity | - To be able to recognise, find and write fractions of quantities, shapes and lengths including tenths <br> -To be able to find $2 / 3$ of an object or shape | -To be able to solve problems involving increasingly harder fractions to calculate quantities such as $2 / 5$ of a number or $5 / 8$ | To be able to find a fraction of a quantity using known number facts e.g. $\begin{aligned} & \underline{5 / 12 \text { of } 60=60 \div 12 \times 5} \\ & \underline{1 / 20 \text { of } 80=1 / 10 \text { of } 80} \\ & \dot{\div 2} \end{aligned}$ | To be able to use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction to find the whole quantity (for example, if $1 / 4$ of a length is 36 cm , then the whole length is 36 $\times 4=144 \mathrm{~cm})$. |
| Year 1 examples | Shade to show half | he whole shape. |  | Shade each whole sh | e to show half in four | ifferent ways. |



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| Year 2 examples | Half of 12 is <br> 2/ 4 of 12 is <br> 1/4 of $20=$ <br> $3 / 4$ of $20=$ <br> If you count in steps of starting from 0 , how many steps will it take to reach: <br> 2,4 or 6 <br> What do you notice? | Half of is 6 <br> 2/4 of ? is 6 <br> $1 / 4$ of ? $=5$ <br> $3 / 4$ of $?=15$ <br> 20 children are in a class and $1 / 4$ are girls. How many are boys? <br> $1 / 3$ of $3=1$ <br> $1 / 3$ of $6=2$ <br> $1 / 3$ of $9=3$ <br> $1 / 3$ of $12=$ <br> Continue the pattern. <br> What do you notice? |
| Year 4 examples | Find: <br> $1 / 10$ of 10 <br> $1 / 10$ of 20 <br> $1 / 10$ of 30 <br> $1 / 10$ of 40 <br> $1 / 10$ of 50 <br> What do you notice? | 'To find a tenth of a number I divide by 10 and to find a fifth of a number I divide by 5 .' <br> Do you agree? <br> Explain your reasoning. |


| Comparing fractions |  | -To be able to recognise and show, using diagrams, families of common equivalent fractions -To be able to simplify fractions to find equivalences $6 / 9=2 / 3$, $1 / 4=2 / 8$. | -To be able to compare and order fractions whose denominators are all multiples of the same number <br> - Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths | - To be able to use common factors to simplify fractions <br> -To be able to use common multiples to express fractions in the same denomination <br> -To be able to compare and order fractions, including fractions > 1 |
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| Year 2 examples | Which of these diagrams have $1 / 4$ of the whole shaded? | Colour in $1 / 4$ of each of these grids in a different way. Try to think of an unusual way. |  |  |
|  | Explain your reasoning. | How many squares did | you colour each tim |  |
|  | Jayne says that the shaded part of the whole square below does not show a half because there are three pieces, not two. Do you agree? <br> Explain your reasoning. | What fraction is the <br> Explain your reasonin | d part of the whole | e? |

Year 3 examples

|  | Hamsa says the diagrams below show that $1 / 4>1 / 2$ Do you agree? <br> Explain why. | What fraction of the square is shaded? <br> Explain your reasoning. |
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| Year 4 example | Put these fractions on the number line: $2 / 3,1 / 2,3 / 6,4 / 9$ <br> Put these fractions on the number line: $4 / 5,7 / 10,5 / 10,2 / 5$ <br> What's the same? What's different? | Insert the symbol >, < or = to make each statement correct. <br> $2 / 5$ of 5 of 4 <br> $1 / 7$ of $72 / 7$ of 14 <br> $2 / 3$ of $9 \quad 1 / 3$ of 18 <br> Make up three similar statements using >, < or $=$. |




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| $\text { Year } 5$ <br> examples | $/ 15+/ 10=$ <br> Using the numbers 5 and 6 only once, make this sum have the smallest possible answer | Using the numbers $3,4,5$ and 6 only once, make this sum have the smallest possible answer: $\square$ $\square$ $\square$ $\square$ |
| Year 6 examples | Sam added two fractions together and got $7 / 8$ as the answer. Write down two fractions that Sam could have added. <br> Tom wrote down two fractions. He subtracted the smaller fraction from the larger <br> and got $1 / 5$ as the answer. <br> Write down two fractions that Tom could have subtracted. <br> Tom and Sam shared equally one third of a chocolate bar. <br> What fraction of the chocolate bar did each child get? <br> What's the same, and what's different about these number statements? <br> Double one third of 15 <br> One third of 30 $\begin{aligned} & 2 \times 5 \\ & 15 \times 2 \div 3 \\ & 15 \div 3 \times 2 \\ & 15 \times 2 / 3 \end{aligned}$ | Roland cuts a sandwich into two pieces. First, Roland gives one piece to Ayat and the other piece to Claire. Then Claire gives Ayat half of her piece. Now Ayat has 7 /8 of the original sandwich. <br> Did Roland cut the sandwich into two equal pieces? If not, how did he cut the sandwich? <br> Amira says, 'To work out a fraction of a number, you multiply the number by the numerator of the fraction and then divide the answer by the denominator of the fraction.' Do you think that this is always, sometimes or never true? Explain your reasoning. |

\begin{tabular}{|c|c|c|c|c|c|c|}

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In each number sentence, replace the boxes with different whole numbers less than 20 so that the number sentence is true. <br>
$\frac{\square}{\square} \times \frac{\square}{\square}=\frac{8}{15}$ <br>
$\underline{2} \times \frac{\underline{5}}{\square}<\frac{10}{\square}$
$\div 3=\underline{1}$

$\square$

$\div 3>\frac{1}{4}$

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True or false?
The sum of two fractions is always greater than their product.
If I divide a fraction by a whole number, the quotient is always smaller than the dividend. <br>
Explain your reasoning.
\end{tabular}} <br>

\hline Fraction problems \& - To be able to solve fraction problems involving $1 / 2$ \& - To be able to solve fraction problems involving $1 / 2,1 / 4,3 / 4$, 1/3 \& - To be able to solve fraction problems including using tenths and thirds \& - To be able to solve simple measure and money problems involving fractions and decimals to two decimal places \& | -To be able to solve problems involving number up to three decimal places and fractions of amounts |
| :--- |
| - To be able to solve problems which require knowing , fraction and decimal equivalents of $1 / 2,1 / 4$, $3 / 4,1 / 5,2 / 5,4 / 5$ | \& -To be able to solve problems which require answers to be rounded to specified degrees of accuracy -To be able to recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. <br>


\hline Year 1 examples \& | There are 12 childre Sammy says half of the class is 7. Do you agree? |
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| Explain your reason | \& | in a class. |
| :--- |
| g. | \& \& Half the children at How many children the party? Give fou answers. \& | party are girls. |
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| uld be at fferent | \& <br>

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|  |  | Explain your reasoning. |
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| Year 2 examples | Jo bought a bag of 12 cherries. <br> Jo ate half the number of cherries in the bag. How many cherries did Jo eat? <br> Sam bought a bag of 18 cherries. <br> Sam ate 6 cherries. <br> What fraction of the bag of cherries did Sam eat? | Jo bought a bag of cherries. <br> Jo ate half the number of cherries in the bag. <br> Jo had 7 cherries left. How many cherries did Jo buy? <br> Sam bought a bag of cherries. <br> Sam ate 9 cherries and had 3 left over. <br> What fraction of the bag of cherries did Sam eat? |
| Year 3 examples | Six girls share three bars of chocolate equally. <br> Four boys share two bars of chocolate equally. <br> Does each girl get more chocolate, less chocolate or the same amount of chocolate as each boy? <br> Draw a picture to show that your reasoning is correct. | Jo ate $1 / 4$ of a pizza and Sam ate $1 / 2$ of what was left. Mike ate the rest of the pizza. Draw a diagram to show how much pizza Jo, Sam and Mike each ate. |
| Year 4 examples | 8 girls share 6 bars of chocolate equally. <br> 12 boys share 9 bars of chocolate equally. <br> Who gets more chocolate to eat, each boy or each girl? How do you know? <br> Draw a diagram to explain your reasoning. <br> A soup recipe uses 3 / 4 as many onions as carrots. Jo is making the soup and has 8 <br> carrots. <br> How many onions does Jo use? | 8 girls share 6 bars of chocolate equally. <br> 12 boys share 9 bars of chocolate equally. <br> Clare says each girl got more to eat as there were fewer of them. Rob says each boy got more to eat as they had more chocolate to share. <br> Explain why Clare and Rob are both wrong. <br> A soup recipe uses $3 / 4$ as many onions as carrots. Complete the table below. |



|  | 1/5 off. She saw the same coat on sale in another shop at 25\% off. <br> Which shop has the coat at a cheaper price? <br> Explain your reasoning. | Frank says Jack spent more because 1 / 4 is greater than $20 \%$. Alice says you cannot tell who spent more. Who do you agree with, Frank or Alice? Explain why. |  |  |
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| Year 6 examples | On Monday I ran 1 and $2 / 3 \mathrm{~km}$ and on Tuesday I ran 2 and 2/ 5 km . <br> How far did I run altogether on these two days? <br> On Wednesday I ran 1 and $2 / 3 \mathrm{~km}$ and my sister ran 2 and $2 / 5$ km. <br> How much further did my sister run than I did? <br> Curtis used 1 / 3 of a can of paint to cover 3.5 square metres of wall. <br> How much wall will one whole can of paint cover? | Altogether on Monday day did I run a whole nu Suggest how far I ran on On Wednesday I ran so further than I did. Altogether we ran 4 and How far did I run on W <br> Puja shares 6 apples be an apple. <br> How many friends doe | and Tuesday I ran 3 and umber of km. <br> n Monday and how far me km and my sister r <br> d $1 / 2 \mathrm{~km}$. <br> ednesday? <br> tween some friends. <br> she share the apples | $1 / 2 \mathrm{~km}$. On neither <br> on Tuesday. <br> n 1 and $1 / 6 \mathrm{~km}$ <br> ch friend gets 0.75 of ith? |
| Decimals as fractional amounts |  | - To recognise and write decimal <br> equivalents of any number of tenths or hundredths <br> - To recognise and write decimal equivalents to $1 / 4,1 / 2$ and $3 / 4,1 / 10,1 / 5$ <br> -To be able to find the effect of dividing a one- or two-digit number by 10 and 100 , identifying the value of the digits in | - To be able to read and write decimal numbers as fractions for tenths, hundredths and thousandths | -To be able to associate a fraction with division and calculate decimal fraction equivalents e.g. know that 7 divided by 21 is the same as $7 / 21$ which is equivalent to $1 / 3$ and that 0.375 is equivalent to $3 / 8$ <br> -To identify the value of each digit in numbers given to three decimal places |


|  |  |  |  | the answer as ones, tenths and hundredths |  |  |
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| Year 4 examples | Match each fraction to its decimal equivalent $1 / 24 / 103 / 41 / 4$ <br> Circle the equivalent fraction to 0.25 <br> 2/5 5/2 1/2 25/100, 100/25 <br> Round to the nearest whole number. <br> $83 / 8,8.38,8.83$ |  |  | What is the smallest number you can make using all four cards? What is the largest number you can make using all four cards? |  |  |
| Ordering decimals |  |  |  |  |  |  |
| Calculating with decimals |  |  | -To be able to muktiply and divide a multiple of 10 by 10 |  |  | -To be able to multiply and divide numbers by 10,100 and 1000 up to three decimal places |


|  |  | whole numbers and -To be able to multiply <br> decimals, decimals <br> with different numbers <br> of decimal places, and <br> complements of 1 e.g. <br> numbers <br> nume-dith up to <br> two decimal places by <br> whole numbers  <br>  -To be able to use <br> written division <br> methods in cases <br> where the answer has <br> up to <br> two decimal places |
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| Percentages |  | -To be able to -To be able to solve <br> recognise the per cent problems involving the <br> symbol (\%) and calculation of <br> understand that per percentages [for <br> cent example, of measures, <br> relates to 'number of such as $15 \%$ of 360 ] <br> parts per hundred', and the use of <br> and write percentages percentages for <br> as a fraction with comparison <br> denominator 100 , and  <br> as a decimal  <br> - To be able to solve  <br> problems which  <br> require knowing  <br> percentage and  <br> decimal equivalents of  <br> $1 / 2,1,4,1 / 5,2 / 5,4 / 5$ and  <br> those fractions with a  <br> denominator or a  <br> multiple of 10 or 25  |
| Year 5 example | Express the yellow section of the grid in hundredths, tenths, as a decimal and as a percentage of the whole grid. | Suggest another way to colour the grid to show clearly each fraction that is shaded. What fraction of the grid is shaded in total? <br> How many different ways can you express the fraction of the grid that is shaded? |



| New vocabulary for each year group is <br> in bold | Progression in vocabulary - Fractions, decimals and percentages |
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| Year 1 | Fraction, equal, part, equal, grouping, equal, sharing, parts of a whole, half, one of two equal parts, quarter one of four equal <br> parts |
| Year 2 | Fraction, equivalent fraction, mixed number, numerator, denominator, equal part, equal grouping, equal sharing, parts of a <br> whole, half, two halves, one of two equal parts, quarter, two quarters, three quarters one of four equal parts, one third, two <br> thirds one of three equal parts, |
| Year 3 Year 4 | Fraction, equivalent fraction, mixed number, numerator, denominator, equal part, equal grouping, equal , parts of a whole, <br> half, two halves, one of two equal parts, quarter, two quarters, three quarters, one of four equal parts, one third, two thirds <br> one of three equal parts sixths, sevenths, eighths, tenths ... |
| Year 5 | Fraction, equivalent fraction, mixed number, numerator, denominator, equal part, equal grouping, equal sharing, parts of a <br> whole, half, two halves, one of two equal parts, quarter, two quarters, three quarters one of four equal parts one third, two <br> thirds one of three equal parts sixths, sevenths, eighths, tenths ...simplify, hundredths, decimal, decimal fraction, decimal <br> point, decimal place, decimal equivalent proportion |
| fraction, proper/improper fraction equivalent fraction mixed number numerator, denominator equivalent, reduced to, |  |
| cancel, simplify equal part, equal grouping, equal sharing, parts of a whole half, two halves, one of two equal parts, quarter, |  |
| two quarters, three quarters, one of four equal parts, one third, two thirds, one of three equal parts, sixths, sevenths, |  |
| eighths, tenths ... hundredths, thousandths, decimal, decimal fraction, decimal point, decimal place, decimal equivalent |  |
| proportion, in every, for every, percentage, per cent, \% |  |,

