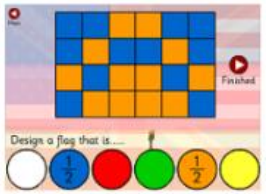
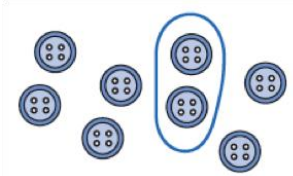
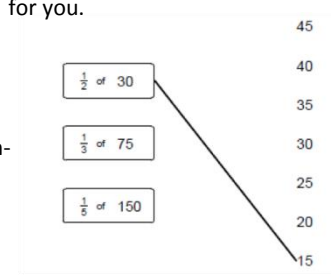
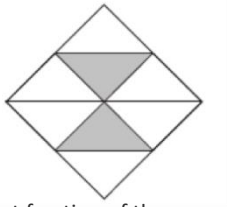
Watcombe Progression in Teaching and Learning Fractions

Year and Notes	Possible misconceptions	Best possible approaches and resources
National Curriculum **Year 4**- • *Understand that a fraction is one whole number divided by another (e.g. $\frac{3}{4}$ can be interpreted as 3 ÷ 4)* • *Recognise, find and write fractions of a discrete set of objects including those with a range of numerators and denominators* • Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten • *Count on and back in steps of unit fractions* • *Compare and order unit fractions and fractions with the same denominators (including on a number line)* • Recognise and show, using diagrams, families of common equivalent fractions • Recognise and write decimal equivalents of any number of tenths or hundredths • Recognise and write decimal equivalents to $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ • Add and subtract fractions with the same denominator *(using diagrams)* • 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 simple measure and money problems involving fractions and decimals to two decimal places	Difficulty understanding the relationship between value and form in equivalent fractions	Recognise that five tenths ($^5/_{10}$) or one half is shaded.   http://www.maths-games.org/fraction-games.html Recognise that two eighths ($^2/_8$) or one quarter (¼) of the set of buttons is ringed  Equal parts: Equal shape Equal area Equal amount  Match each box to the correct number. One has been done for you.  add and subtract fractions with the same denominator For example: ½ + ½, ¼ + ¾, ⅜ + ⅝, ⅗ + ⅘ + ⅕, $^7/_{10} + ^3/_{10} + ^5/_{10} + ^8/_{10}$, ¾ - ⅓, $^6/_7 - ^4/_7$, $^9/_{10} + ^4/_{10}$, $- ^3/_{10}$ Recognise that one whole is equivalent to two halves, three thirds, four quarters… For example, build a fraction 'wall' using a computer program and then estimate parts. Recognise patterns in equivalent patterns, such as: ½ = $^2/_4$ = $^3/_6$ = $^4/_8$ = $^5/_{10}$ = $^6/_{12}$ = $^7/_{14}$ And similar patterns for ⅓, ¼, ⅕, ⅙, $^1/_{10}$. Here is a square.  What fraction of the square is shaded?

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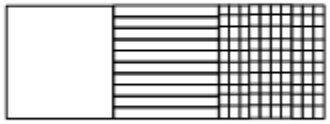
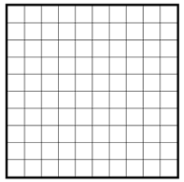
National Curriculum **Year 5**- • Recognise mixed numbers and improper fractions and convert from one form to the other • Read and write decimal numbers as fractions (e.g. 0.71 = $\frac{71}{100}$) • *Count on and back in mixed number steps such as* $1\frac{1}{2}$ • Compare and order fractions whose denominators are all multiples of the same number *(including on a number line)* • Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths • Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents • Add and subtract fractions with denominators that are the same and that are multiples of the same number *(using diagrams)* • Write statements > 1 as a mixed number (e.g. $\frac{2}{5}+\frac{4}{5}=\frac{6}{5}=1\frac{1}{5}$) • Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams • Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal • *Solve problems involving fractions and decimals to three places* • Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and fractions with a denominator of a multiple of 10 or 25	Turning round improper fractions Language of decimals doesn't link to fraction Larger denominator = larger fraction	Decimal cake imagery for relative value, PV charts, PV cards  Recognise that 0.007 is equivalent to $^{7}/_{1000}$ 6.305 is equivalent to $^{6305}/_{100}$ How many halves in: 1 ½ 3 ½ 9 ½ …? How many quarters in 1 ¼ 2 ¼ 5 ¼ ….? Multiply proper fractions and mixed numbers by whole numbers What is $^{3}/_{10}$ of: 50, 20, 100…? What is ⅘ of 50, 35, 100….? $1\frac{1}{7} = \frac{15}{7}$ Lots of visual Images, drawing and converting Children should be able to circle the two fractions that have the same value, or choose which one is the odd one out and justify their decision. $^{6}/_{10}$, $^{3}/_{5}$, $^{18}/_{20}$, $^{9}/_{15}$  Use blank hundred squares to model and explore percentages, tenths and hundredths. Decimals, fractions and percentages can be represented by colouring in blank hundred squares which children can use to support addition and subtraction.

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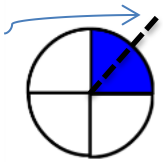
Year and Notes	Possible misconceptions	Best possible approaches and resources
National Curriculum **Year 6**- • Compare and order fractions, including fractions > 1 *(including on a number line)* • Use common factors to simplify fractions; use common multiples to express fractions in the same denomination • Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts • Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375 and $\frac{3}{8}$) • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions • Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$) • Divide proper fractions by whole numbers (e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$) • *Find simple percentages of amounts* • *Solve problems involving fractions* • Solve problems which require answers to be rounded to specified degrees of accuracy • Solve problems involving the calculation of percentages (e.g. of measures and such as 15% of 260) and the use of percentages for comparison	Multiplying produces a larger answer, but not in Fractions	Multiply simple pairs of proper fractions $\frac{1}{2} \times 8$ Investigate x What happens? Multiplication doesn't always make things bigger Why? $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ What is the fraction? What is a denominator?  Add fractions with different denominators $\frac{2}{3} + \frac{2}{3}$ This is easy isn't it? $\frac{2}{3} + \frac{3}{4}$ Use knowledge of equivalent fractions Find common denominators $\frac{8}{12} + \frac{9}{12}$ Will that always work? Actually what we've done is $\frac{2}{3} \times \frac{3}{4}$ Inventing the method Children should be able to solve practical problems such as;  $\frac{2}{3} - \frac{3}{4}$ Inventing the method Here is a chocolate bar. William eats 3 pieces and Amber eats 2 pieces. What fraction of the chocolate bar remains? Joe has some pocket money. He spends three-quarters of it. He has fifty pence left. How much pocket money did he have?