Belton Primary School

Progression in Fractions

To be reviewed – August 2024

Progression in Fractions

Notes: 1. The specific objectives concerned with fractions contained within the National Curriculum are listed; the connections to other areas of the curriculum are made explicit through the suggested activities / progression within fractions. There are some examples of the application to problem solving and reasoning using fractions, however application to real-life problems should form the focus of teaching strategies.

2. Many of the skills / knowledge are heavily interlinked and therefore could be placed within more than one column on the grid. Connections should be made between the aspects of fractions identified.

Reception Objectives:

- Solve problems including doubling and halving

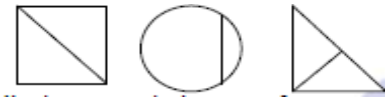
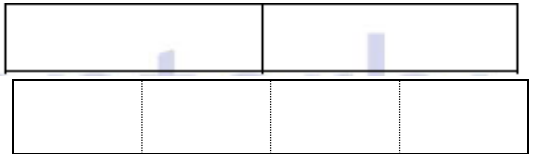
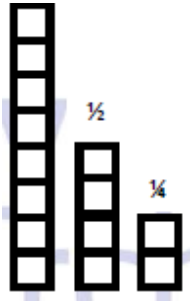
Part of a whole (item or quantity or set of items)	**Result of a division (including where the numerator is smaller than the denominator)**	**Fraction as a number**	**Ratio (one object is a fraction of another)**

• Water and sand play: language of half empty and half full.
• Cut a cake in half – how many pieces?
• Fill half the tarts with strawberry jam and half with lemon curd.
• How many cakes in the box. Take half of them out. How many did you take out? How many are left?
• Put half of the sheep in the field ... cars in the garage ... dinosaurs in the forest ... .
• Find a partner. How many children are there? How many pairs are there?
• Find halves of paper shapes by folding them.
• Use pairs of gloves: how many gloves make up a pair? How many gloves in half a pair?
• How many slices of bread do we need to make 4 whole sandwiches for the cafe?
	• Break one thing into half and recombine to make a whole:
	  ○ apple
	  ○ cake/s
	  ○ tower of multilink
	  ○ class fruit
	  ○ groups of toys
	  ○ children
	• Sharing sweets between two people or between two toys.
	• Arrange ladybirds between two leaves so that it is fair.
	• How should we plant the daffodil bulbs in three pots? Is there a way of doing it so the same are in each pot?
		• Placing whole numbers on a number line with spaces in between. Talk informally about where to place 4 ½ on a number line made up of birthday cards showing numerals to represent someone's age.	• The big teddy has 2 sweets every time the little teddy has one.
			• Finding half an amount and double an amount.
			 
			• Carry on the pattern. What is the colour of the seventh car?
			• Recreate patterns: thumb print, palm, palm, thumb print, palm, palm ... If we had 10 prints, how many are palm prints?

• In PE activities: talk about and move to face the front and back of the room. • Explore things that turn: hands on a clock, wheels, taps			

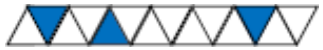
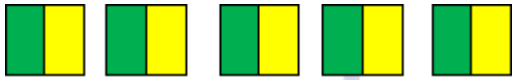
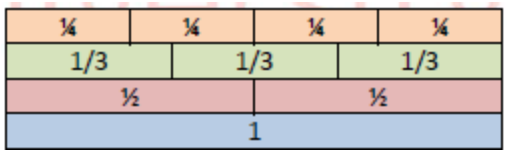
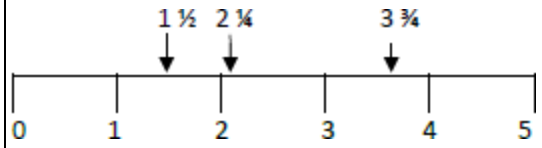
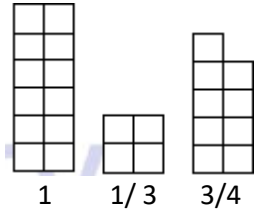
Year 1 Objectives:

- Recognise, find and name ½ as one of two equal parts of an object, shape or quantity.
- Recognise, find and name ¼ as one of four equal parts of an object, shape or quantity.

Part of a whole (item or quantity or set of items)	**Result of a division (including where the numerator is smaller than the denominator)**	**Fraction as a number**	**Ratio (one object is a fraction of another)**
• Which of these shapes is split into halves?  • Talk about two halves = 1, four quarters = one. • Show and talk about halves and quarters of objects using equal sharing and grouping such as: ○ Sandwiches ○ Shapes ○ Continuous quantities – liquids, string etc. • Solve problems involving halves and quarters, e.g. planning a picnic for 2 or 4 people. • On a clock face, show half-past 7. • Half, quarter and three-quarter turn when telling the time. • Solve problems when telling the time: ○ *"Sue got on a bus at 9 o'clock. The journey took half an hour. What time did she get off the bus?"* ○ *"Mary went into a shop at half past 10 and came out at 11 o'clock. How long was she in the shop for?"* • In PE, use everyday language to describe a movement – whole / half / quarter turns. • Use a floor robot to reach a particular place. • Show half and quarter of shapes in different ways.	• Ring half the set of buttons:  • Solve problems by sharing one thing between two people, and four people: ○ Biscuits ○ Bars of chocolate ○ Jar of sweets • String / ribbon • Solve problems by sharing two things between two and four people. • Solve problems such as: ○ Find ¼ of 12 biscuits ... 8 pencils ... ○ Find ½ of these 14 pennies ... 9 biscuits ... 30 children in the class. • Focus on equal sharing	• Fold strips of paper / string / ribbon into halves and quarters.  • Identify on a number line halves and quarters up to and beyond 1.	• Make a tower half /quarter the size of this one, using multilink.  • Make and talk about patterns, e.g. patterns in train carriages, for one red carriage put on 3 blue carriages. • Solve problems such as: ○ Tom is half as old as Roy. How old could Tom and Roy be? ○ Jill and Bob collect coins. Jill collects 1p coins and Bob collects 5p coins. If they both had 4 coins, how much would each have? (How much would they have altogether?)

Year 2 Objectives:

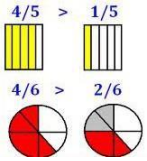
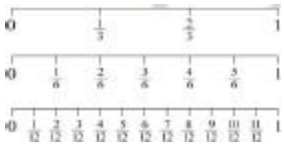
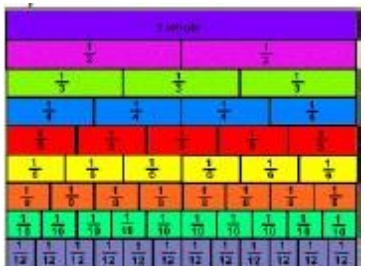
- Recognise, find, name and write fractions 1/3, ¼, 2/4 and ¾ of a length, shape, set of objects orquantity.
- Write simple fractions, e.g. ½ of 6 = 3 and recognise the equivalence of 2/4 and ½.

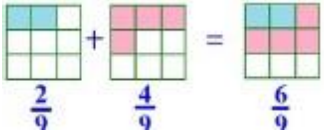
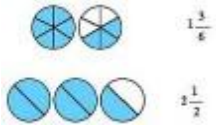
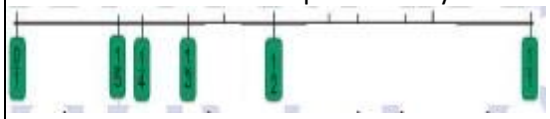
Part of a whole (item or quantity or set of items)	Result of a division (including where the numerator is smaller than the denominator)	Fraction as a number	Ratio (one object is a fraction of another)
• Find 1/3, ¼, 2/4, ¾ of shapes, groups of items and continuous quantities, e.g. lengths, sand and water. • Complete the shading on this diagram so that one half is shaded:  • Solve problems such as finding 1/2 ofnumbers as groups of items, first practically then recorded as number sentences. • Show that 2/4 = ½, 3/3 = 1 practically to understand a whole group / item split into	• Say half of every whole number up to 20. • What fraction of the dots has a ring around them?  • Share 1, 2, 3 or 4 things such as pizzas, and chocolate bars between 3 and then 4 people to solve problems. • Use equal grouping and sharing to find unit fractions. • Plan a picnic and explore dividing different sorts of food and drinks between people using equal sharing and grouping. • Test statements to confirm whether they are always, sometimes, never true: *"There are 4 numbers less than 10 that divide exactly in half to give a whole number."* • Word problems: *"Think of a number and then halve it. The answer is 9. What could the number be?"*	• Count in halves up to 10, showing this on a number line and visually, e.g. as halves of a rectangular model.  • Count in quarters up to 10 showing this on a number line and visually. (Use fact that 2/4 = ½ when counting in quarters.) • Fold card / string / ribbon into thirds or quarters.  • Use / create a fraction wall with halves, thirds and quarters. Link to the number line.  • Position ½s and ¼s on a number line:  	• Make a tower 1/3 or 3/4 of the size of this one.  ○ Make the tower ½ as tall. ○ Make the tower twice / half as wide. • Make and talk about patterns for example with beads or multilink such as: ○ Using 20 cubes, make a shape that is ½ red and ¼ blue. What fraction is left? ○ In an array for 12, ½ of the cubes are blue, ¼ are red and the rest are green. How many are there of each colour? If there were 10 identical arrays, how many cubes of each colour would there be?
• On a clock face, show ¼ to/past the hour. How far round the clock face is ¾ of the hour? • Use time and a clock face to support understanding of ½ and ¼ by solving problems such as: *"Mary went into a shop at 10:30 and came out at 10:45. What fraction of the hour was she in the shop?"* • PE lesson: turn ½, ¼, ¾ turns clockwise and anti-clockwise. • Program robots to travel around a maze. • Understand a right angle as a quarter-turn. • Use two geo-strips to make and draw half and quarter turns from the same starting point. • Describe what is happening in repeating patterns:			

Year 3 Objectives:

- Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities.
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators.
- Recognise and show, using diagrams, equivalent fractions with small denominators.
- Add and subtract fractions with the same denominator within one whole [e.g. 5/7 + 1/7 = 6/7].
- Compare and order unit fractions and fractions with the same denominator.
- Solve problems that involve all of the above.

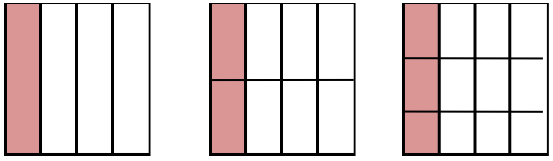
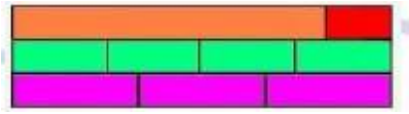
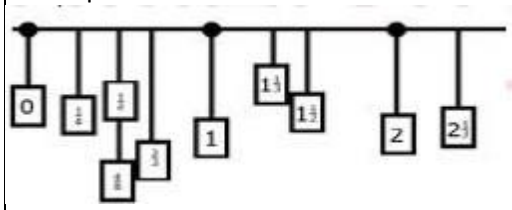
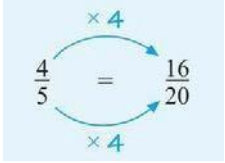
Part of a whole (item or quantity or set of items)	**Result of a division (including where the numerator is smaller than the denominator)**	**Fraction as a number**	**Ratio (one object is a fraction of another)**

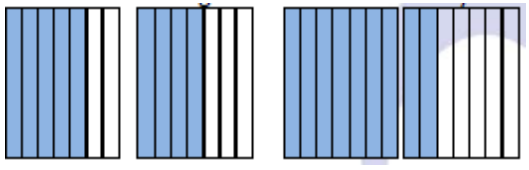
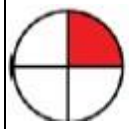
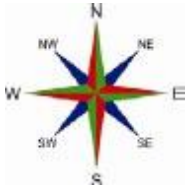
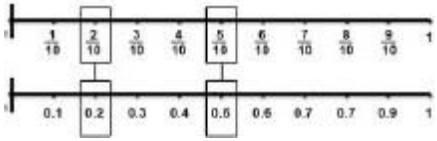
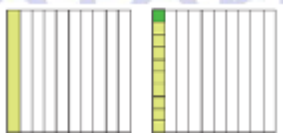
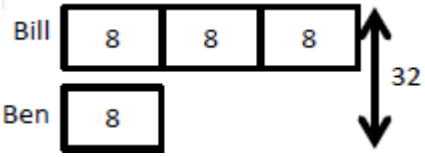
• Show a unit fraction of any denominator of a whole shape, set of objects, and continuous quantity to solve problems.
  ○ *What fraction of the jug is full? How much water is in it?*
  ○ *A jar holds 100 sweets when it is full. Some have been eaten. About how many are left?*
 
• Show any non-unit fractions with small denominator of sets of objects and shapes and quantities. Link this to division problems.
• Use shapes such as a rectangular model to order unit fractions and non-unit fractions with the same denominator.
 
	• Use division to compare and order unit fractions (e.g. of pieces of string) to solve problems.
	  ○ *Find ½, ¼, 1/10 of 1 metre, kilometre, kilogram ....*
	• Divide pieces of string or strips of paper to order fractions of the same denominator.
	• Understand the equivalence of finding ½ and dividing by 2 where the faction is used as an operator.
		• Count in unit and non-unit fractions, forwards and backwards, showing this visually with for example a rectangular model and on a number line.
		 
		• Make fraction walls to show equivalence on squared paper or with Cuisenaire rods. Start with families of fractions with small denominators (e.g. eighths, quarters, halves).
		 
			• Link to multiplication: scaling e.g. *A bar is four times as long or a quarter of the length.*
			 
			• Compare two small Cuisenaire rods and say what fraction one rod is of the other another.
			 
			• Take 20 cubes. Make a shape which is ½ red and 1/10 blue.
			• Solve simple ratio problems:
			  ○ *A pink roll of tape is 50cm long. A yellow one is ½ as long. How long are they altogether?*
			  ○ *Two cakes are shared equally between six people. How much each?*

Part of a whole (item or quantity or set of items)	Result of a division (including where the numerator is smaller than the denominator)	Fraction as a number	Ratio (one object is a fraction of another)
• Show fractions on a rectangular model and use this to add and subtract fractions with the same denominator within one whole.  $\frac{2}{9} + \frac{4}{9} = \frac{6}{9}$ • Explore mixed numbers in practical contexts e.g. 1 ½ cakes 		• Use a fraction wall to support ordering fractions on a number line. • Show fractions on a number line starting with unit fractions up to and beyond 1. 	*each?* ○ *12 sweets are shared equally between 4 children; how much each?* ○ *William has made a pattern using 12 tiles. One tile in every four is red. How many tiles are red?* ○ *The distance to the park is ¼km. If I went and came back every day of the week. How far will I have travelled?* ○ *To get to school, it takes 1 hour. To get back home takes ¾ of the time. How long will it take to get back home?* ○ *The width of a pond is 1/3 of its length. If it is 6m long, how wide is it?*
• Understanding that quarter turns are right angles. Recognise that two right angles total a ½-turn and three right angles total a ¾ turn.  • Understanding of compass points and the link to ¼, ½, ¾ turns to face different directions. Link to using directional vocabulary both clockwise and anti-clockwise. 		• Choose a number on a number line – where would ½, ¼, 1/5 of this be? • What number is ½ way between: ○ 3 and 4? ○ 2½ and 3? Etc. • Relate positioning fractions on a number line to measures problems (e.g. of length in m and cm). 	

Year 4 Objectives:

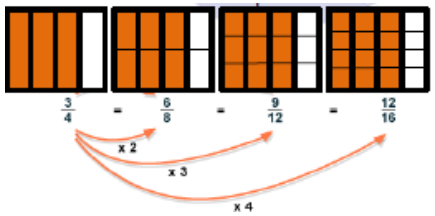
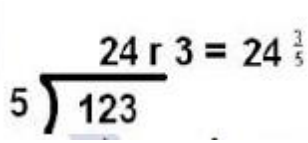
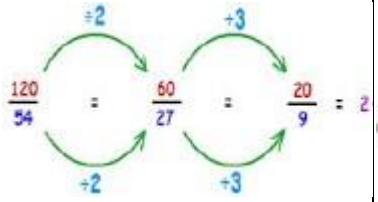
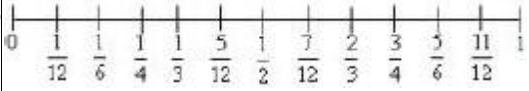
- Recognise and show, using diagrams, families of common equivalent fractions.
- Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths byten.
- Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number.
- Add and subtract fractions with the same denominator.
- Solve simple measure and money problems involving fractions.

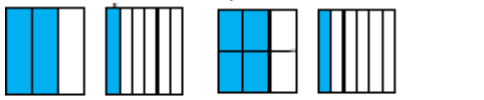
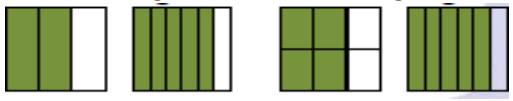
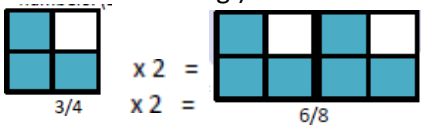
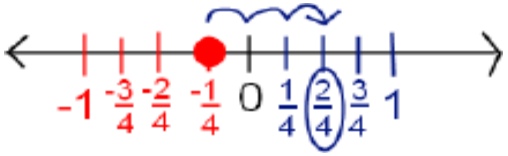
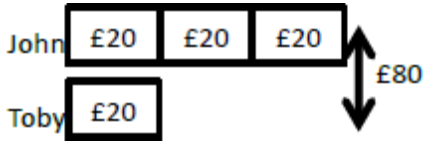
Part of a whole (item or quantity or set of items)	**Result of a division (including where the numerator is smaller than the denominator)**	**Fraction as a number**	**Ratio (one object is a fraction of another)**
• Find non-unit fractions of a number where the answer is a whole number. E.g. Find 2/3 of 12 = 4. • Find any fraction of a number practically and then recording as a number sentence. Include find tenths and hundredths of numbers. • Show any fraction of measures, shapes, or sets of items to solve problems, e.g.: ○ *A bottle of lemonade holds approximately ¼l or 1¼l?* ○ *There are 36 children in a class. Half of them have flavoured crisps. One third of them have plain crisps. How many children have crisps?* ○ *Gran gave me £8 of my £10 birthday money. What fraction of my birthday money did Gran give me?* • Use a rectangular model marking it with horizontal lines to show a fraction and show equivalent fractions by splitting the rectangle up into smaller fractions with horizontal lines.  1/4 = 2/8 = 3/12	• Understand a fraction as an operator, particularly for 1/10 (as ÷ 10) and 1/100 (as ÷ 100). • Link division to showing tenths as fractions and decimals. • Divide measures, shapes and sets of objects to show any fraction and solve problems. ○ *What is 1/10, 1/5, 1/4 of £1?* ○ *What is 1/10, 1/5, 1/4 of 100g?*	• Draw or make fraction walls with squared paper or Cuisenaire rods. Use this to identify families of common equivalent fractions.  • Link fractions to the number line and measurement, and then to factors and multiples to support the understanding of equivalent fractions.  • Use factors and multiples to recognise and simplify equivalent fractions.  	• Link to multiplication scaling problems. ○ *Three cakes to be shared between nine people. Everyone then gets 1/3 of a cake.* ○ *For every black square there are 2 white in a pattern. In 20 squares, how many squares will be black?*  ○ *To cook rice, you need 5 cups of water for every cup of rice. In the saucepan, you put in 3 cups of rice. How much water needs to go in the mix?* ○ *A potato weighs about ¼kg. Roughly how much do 10 potatoes weigh? How many times heavier is a 1kg potato?* • Compare any two Cuisenaire rods and say what fraction one rod is of the other another. (E.g. 4/6 of the total is yellow, 2/6 of the total is red.) 

Part of a whole (item or quantity or set of items)	Result of a division (including where the numerator is smaller than the denominator)	Fraction as a number	Ratio (one object is a fraction of another)
• Show mixed numbers practically and with a rectangular model: e.g. 4/3 = 1 1/3  • Use a rectangular model to add and subtract fractions with the same denominator, using fractions with larger denominators and beyond 1.  5/7 + 4/7 = 1 2/7 • Link fractions to an understanding of proportion: e.g.¼ is the same as 1 in every 4.   The proportion of a shape or groups of objects which is red is ¼. • Equate the eight compass directions to eighths of a complete turn and use this to turn. E.g. Starting at N, then turn 3/8 of the way around. What way are you now facing? 		• Link fractions to place value. E.g. Show tenths and hundredths as fractions and decimals.  • Show that ten hundredths makes a tenth.  • Show tenths and hundredths on a number line and when measuring. (E.g. 1/10 of a metre is 10cm.) • Use number lines to make connections between any fraction and measures: mark fractions on a number line. • Count in fractions including tenths and hundredths, forwards and backwards. E.g. counting on in tenths from 3.5: 	• Comparison of two quantities and use of these to solve problems: ○ *What fraction of the larger bag of flour is the smaller bag?*  9kg 3kg • Use the bar model to support the solving of word problems: ○ *Ben has a third as many sweets as Bill. If Ben has 8 sweets, how many sweets do they have altogether?* 

Year 5 Objectives:

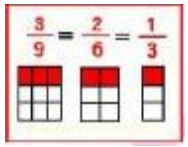
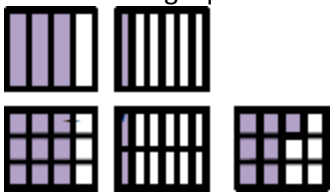
- Compare and order fractions whose denominators are all multiples of the same number.
- Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.
- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. 2/5+2/5= 6/5= 11/5).
- Add and subtract fractions with the same denominator and denominators that are multiples of the same number.
- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.
- 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.

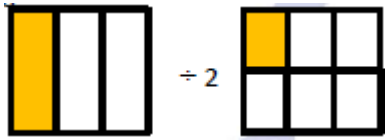
Part of a whole (item or quantity or set of items)	**Result of a division (including where the numerator is smaller than the denominator)**	**Fraction as a number**	**Ratio (one object is a fraction of another)**
• Represent mixed numbers, e.g. using a rectangular model and convert to improper fractions and record formally.  1 2/7 = 9/7 • Use a rectangular model to identify and name and write equivalent fractions by splitting the rectangle into small fractions. Link to factors and multiples.  • Compare and order fractions by using a rectangular model where denominators are all multiples of the same number.	• Express remainders resulting from division as a fraction  • Convert between fractions and decimals including thousandths. • Explore which fractions simplify to whole numbers and which do not, recording as mixed numbers and improper fractions  	• Draw or make fraction walls with squared paper or Cuisenaire rods. Use this to compare fractions and show families of any equivalent fractions; decide which rod or length of whole to start with to show families of fractions. Link to factors and multiples. E.g. decide to use a 12 rod or length to show thirds and twelfths. (The pairs of factors of 12 are 3 and 4, 2 and 6.)  • Link fraction walls to the number line and measurement scales and place fractions on the line to order them  • Link to measurements such as scales on tape measures and dial scales.	• Link to scaling in multiplication, i.e. scaling by a fraction: ○ *If the length of a child's foot is 1/3 of the size of an adults and the adult's foot is 48cm, how long is the child's foot?* ○ *This is the list of ingredients to make 20 gingerbread biscuits. If I wanted to make only 5, how much of each ingredient would I need?* 

Part of a whole (item or quantity or set of items)	Result of a division (including where the numerator is smaller than the denominator)	Fraction as a number	Ratio (one object is a fraction of another)
• Add and subtract fractions with the same denominator, or denominators that are multiples of the same number  2/3 + 1/6 = 4/6 + 1/6 = 5/6 • Add and subtract fractions with the same denominator and denominators which are multiples of the same number using a rectangular model, totalling over 1.  2/3 + 5/6 = 4/6 + 5/6 = 9/6 = 1 3/6 • Using a rectangular model multiply proper fractions and mixed numbers by whole numbers. (Link this to scaling.)  3/4 x 2 = x 2 = 6/8 Solve problems involving fractions: ○ *Estimate a record halves, quarters or tenths of 1km, 1kg, 1l … .* ○ *I work for 8 hours and sleep for 10 hours.* *What fraction of the day do I work /sleep?* ○ *What fraction of 1km is 250m?*	• Solve problems involving fractions such as: ○ *Which would you rather win? 1/100 of £1,000,000 or 2/10 of £100,000?* ○ *Put three mars bars on one chair, two on another one on another. Take it in turns to stand behind the chair with the most mars bars but you must share them equally with the people already standing there.*	• Link mixed numbers to the number line. • Count in mixed numbers and in fractions, forwards and backwards, including bridging zero. E.g. Counting up in quarters from -¼.  -1 -3/4 -2/4 -1/4 0 1/4 2/4 3/4 1 • Make connections between fractions and percentages: e.g. finding 1/100 = 1%; 50/100 = 50%; 25/100 = 25%.	• Solve problems with ratio: ○ *Cut up a piece of rope in the ratio of 1:6.* ○ *At the gym, there are 2 boys for every 3 girls. There were 15 girls at the gym, how many boys were there? There were 35 people altogether, how many girls were there?* ○ *A mother seal is fed 5 fish for every 2 fish for its baby. If the mother seal is fed 15 fish, how many fish are used altogether?* • Use the bar model to support the solving of problems: ○ *The total prize money from a competition is £80. John and Toby share the prize money. John receives ¾ of the money. How much does Toby receive?*  John £20 £20 £20 Toby £20 £80

Year 6 Objectives:

- Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.
- Compare and order fractions, including fractions > 1.
- 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. ¼ x ½ = 1/8].
- Divide proper fractions by whole numbers [e.g. 1/3 divided by 2 = 1/6].
- Associate a fraction with division and calculate decimal fraction equivalents [e.g. 0.375] for a simple fraction [e.g.3/8]

Part of a whole (item or quantity or set of items)	**Result of a division (including where the numerator is smaller than the denominator)**	**Fraction as a number**	**Ratio (one object is a fraction of another)**
• Explore simplifying fractions first with a rectangular model and then using common factors.  • Explore equivalent fractions first with a rectangular model and then using common multiples to express fractions with the same denominators. • Compare and order fractions using equivalence including fractions above 1. • Add and subtract fractions with different denominators and mixed numbers using equivalence 	Change any fraction to a decimal by division. • Interpret whether to record a remainder as a fraction according to the context of the problem. • Solve problems involving fractions of amounts: ○ What fraction of 2m is 64cm? ○ What fraction of 1km is 253m? ○ What fraction of 1 year is a week? • Solve problems including working backwards from knowing a fraction of an amount to calculating the whole amount, such as: ○ ¼ = 36cm, what is the whole length?	• Place any fractions on a number line and use this to compare and order fractions, including beyond 1. • Answer questions and solve problems involving fractions as numbers such as: ○ What number is half way between 5⅓ and 5⅔? • Count in fractions and decimals forwards and backwards including across zero. • Recall equivalences between fractions, decimals and percentages: e.g. 1/100 = 0.01 = 1%; ½ = 0.5 = 50%; ¼ = 0.25 = 25%; ¾ = 0.75 = 75%; 1/10 = 0.1 = 10% etc.	• Simple scales in geography and scaling shapes • Solve problems including unequal sharing and grouping in ratio, such as: ○ *For every egg you need three spoonfuls of flour, how many eggs will be needed for 21 spoonfuls of flour?* ○ *3/5 of the class are girls. If there are 10 boys, how many girls are there?* ○ *An agent's fee for selling a house is 1/20. Calculate the fee for selling a house for £80,000?* • Use the bar model to support the solving of problems ○ *In a class there are 18 boys. 3/5 of the class are boys. How many children are in the class?*

Part of a whole (item or quantity or set of items)	Result of a division (including where the numerator is smaller than the denominator)	Fraction as a number	Ratio (one object is a fraction of another)
• Explore multiplying pairs of fractions with a rectangular model and then writing the answer in its simplest form.  1/3 ½ 1/6 1/3 x 1/2 = 1/6 • Divide fractions by whole numbers using a rectangular model.  1/3 ÷ 2 = 1/6 • Understand and use the link between multiplying by a fraction and dividing a fraction by a whole number: 1/2 x 1/2 = 1/4 1/2 ÷ 2 = 1/4 1/2 x 1/3 = 1/6 1/2 ÷ 3 = 1/6 1/2 x 1/4 = 1/8 1/2 ÷ 4 = 1/8 1/2 x 1/5 = 1/10 1/2 ÷ 5 = 1/10 • Solve problems such as: ○ *Amy scored 60 out of 80. Kim scored 148 out of 200. Who did better: Amy or Kim?*			• Use ratio notation to solve problems, such as: ○ *Dee mixes 1 tin of red paint with 2 tins of white. She needs 9 tins of paint altogether. How many tins of white paint does she need?* ○ *Of the 96 children in Y6, ¼ have no pets. 45 children have a dog, 21 children have a cat. How many Y6 children have other kinds of pets?*