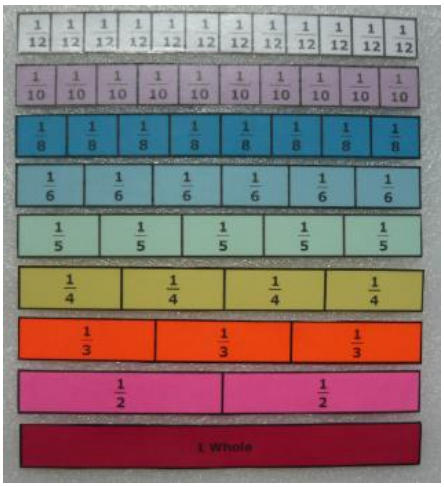
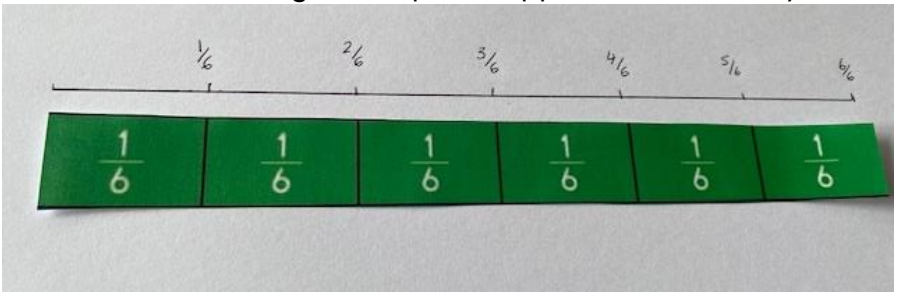
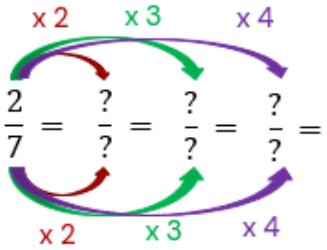
Planning Overview
Year 5 Fractions

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
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

5F–2 Find equivalent fractions and understand that they have the same value and the same position in the linear number system
5F–1 Find non-unit fractions of quantities.

	Teaching and Learning
Introduction – recap language and images around fractions	Assess and Consolidate learning from Year 4 using a fraction wall cut into strips or ask children make their own fraction wall out of strips of different coloured paper (possibly have some sections for harder to measure/create pieces ready-made of them)  What will one full strip represent? One whole. What about when we fold the strip into 2 sections – we will have 2 halves. What about when we fold it into 4 sections? We will have quarters. Throughout this activity encourage children to talk about different concepts within fractions. How many quarters to make a whole/half? How would we write one quarter as a fraction? Three quarters? What does each part of that fraction that you have written down represent? How would you use your fraction strips to support you with finding fractions of amounts? How would this look in a bar model? Ask children questions around comparing parts of the fraction wall. Which is larger $\frac{1}{4}$ or $\frac{1}{3}$? Would you rather have $\frac{3}{4}$ or $\frac{2}{4}$? Can you draw this fractions on a number line $\frac{1}{2}, \frac{3}{4}, \frac{2}{5}, \frac{1}{8}$?

Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	**Using the position on a number line to identify equivalent fractions** Use the fraction wall strips to find equivalent fractions. Position sixths on a number line using the strips to support with accuracy.  Now use the thirds strip to position the thirds. Can the children identify which other strips will allow them to find more equivalent fractions? Try ninths and twelfths. What do you notice? **3 is a factor of all of these denominators.** Can the children find another set of strips that will give them a large range of equivalents? E.g. Twelfths, eighths, quarters. **4 is a factor of all of these denominators.** Which fraction strips on our walls do not allow us to find any equivalent fractions? **Sevenths, eleventhsn**. They are both Prime Numbers. We could multiply up to find an equivalent e.g. $\frac{2}{7} = \frac{4}{14}$ but we haven't got fourteenths on our fraction wall. Why can we get an equivalent for fifths when 5 is a Prime Number? **Because 5 is a factor of 10**. **Links to Multiplication** Children should compare pairs of equivalent fractions by comparing the relationship between the two numerators and two denominators. $\frac{2}{3} = \frac{6}{9}$ What relationship does 2 have to 6 and is this the same relationship as 3 to 9? Each digit in the first fraction has been multiplied by 3. Children to come up with the rule that what happens to the bottom number happens to the top number. 

4. Use the numbers 3, 24, 8 and 1 to complete this chain of equivalent fractions.

$\frac{2}{6} = \frac{\square}{\square} = \frac{\square}{\square}$

5. Fill in the missing digits.

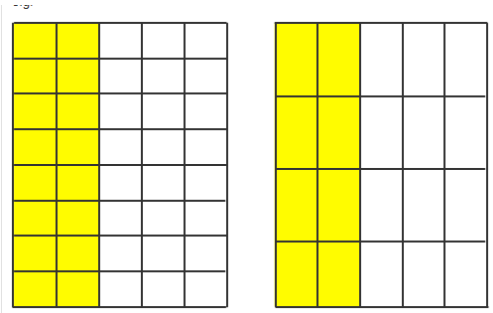
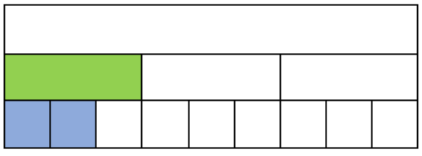
$\frac{4}{8} = \frac{12}{\square}$ $\quad \frac{3}{5} = \frac{\square}{40}$ $\quad \frac{3}{\square} = \frac{21}{63}$ $\quad \frac{20}{30} = \frac{\square}{15}$

Questions taken from Ready to Progress

Use multiplication tables to further explore patterns in equivalent fractions

Here, the 2 and 5 times table make rows of equivalent fractions to $\frac{2}{5}$. Why does this work? Can you see any other families of equivalent fractions?

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

	Ask children to discuss what's the same, What's different about the image below.  Children will have covered hundredths in the Decimals unit in Year 4. Use this knowledge to find equivalents to hundredths. $\frac{3}{10} = \frac{}{100}$ $\frac{4}{25} = \frac{}{100}$ What have we done to the denominator to get to hundredths?
Compare and order fractions whose denominators are all multiples of the same number – less than 1	In Year 3 and 4, children have positioned fractions on a number line in order to compare them. They have looked at comparing fractions with the same denominator and they have also looked at the size of the denominator in unit fractions to identify the larger fraction. Assess and track back as needed. **Comparing fractions whose denominators are related** Ask children why we can't instantly compare the fractions of $\frac{2}{3}$ and $\frac{5}{6}$? What do we need to consider in order to compare the fractions? The denominators and the numerators are different so we need to convert one of the fractions to make it easier to work out which is the larger fraction. Following on from the section on equivalent fractions, children should be able to use their multiplication skills to convert $\frac{2}{3}$ to $\frac{4}{6}$. You may want to encourage the children to use their fraction strips if needed. Give children chance to explore other similar pairs of fractions e.g. $\frac{1}{3}$ and $\frac{2}{9}$. If children struggle to use their multiplication facts they could draw a bar model or use a known fact to support their reasoning. E.g. How many ninths are equivalent to $\frac{1}{3}$? $\frac{1}{3} = \frac{3}{9}$ so $\frac{1}{3}$ is greater than $\frac{2}{9}$. 

What knowledge would you need to place the correct symbol < > = in the statement below?

$\frac{1}{5} \square \frac{4}{10}$

I know that $\frac{1}{5} = \frac{2}{10}$ so $\frac{1}{5}$ is smaller than $\frac{4}{10}$

Complete a range of statements e.g.

$\frac{2}{3} > \frac{\quad}{9}$ $\qquad$ $\frac{\quad}{15} < \frac{\quad}{15}$

$\frac{\quad}{5} < \frac{7}{20}$ $\qquad$ $\frac{\quad}{5} < \frac{\quad}{15}$

$\frac{7}{12} > \frac{\quad}{4}$

Mastery

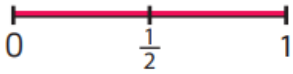
Choose numbers for each numerator to make this number sentence true.

$\frac{\square}{15} > \frac{\square}{10}$

Can children compare fractions on a number line?

Mastery

Mark and label on this number line where you estimate that $\frac{3}{4}$ and $\frac{3}{8}$ are positioned.



Use these digit cards to make two pairs of fractions. Write a number sentence to show which one is bigger.
2 3 4 5 6 7 8 9
How many pairs can you make?
Can you position these on a number line?

Mastery with Greater Depth

Write down two fractions where the denominator of one is a multiple of the denominator of the other.

Which is the larger fraction?

Explain your reasoning.

Which is closer to 1?

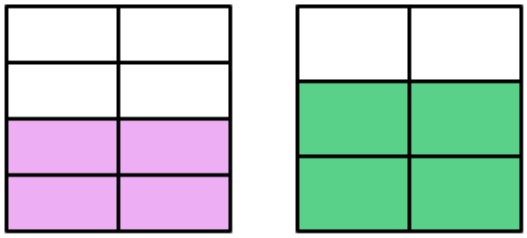
$\frac{7}{8}$ or $\frac{23}{24}$

Explain how you know.

Additional Challenge – Comparing Fractions by Numerators

In Year 3 we looked at comparing unit-fractions by looking at the denominators. E.g. $\frac{1}{3}$ is greater than $\frac{1}{8}$. We can also use the same process to compare fractions when the we have non-unit fractions with the same numerator. E.g.

Would you rather have 4/8 of a cake or 4/6 of a cake? Ask the children to discuss with a partner. Can they reason that the pieces of cake that has been split into sixths will be bigger than the pieces of cake that have been split into eighths?

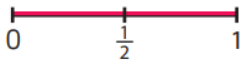


Give children a range of fractions to compare where the numerators are the same. Can they reason that when the numerators are the same, the fraction with the smaller denominator will be the larger fraction.

*This question has been used earlier in the objective but can children now use their knowledge of the numerator to explain which is the larger fraction?

Mastery

Mark and label on this number line where you estimate that $\frac{3}{4}$ and $\frac{3}{8}$ are positioned.



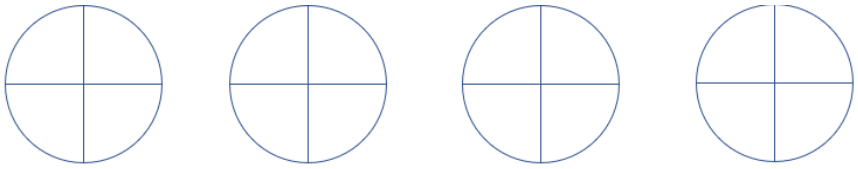
Greater Depth

Mastery with Greater Depth

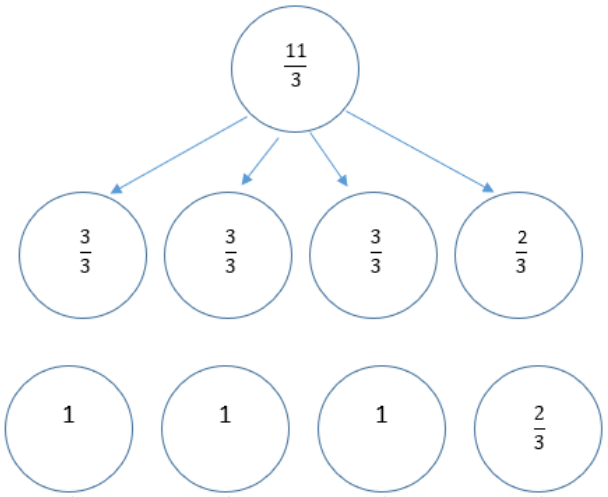
Russell says $\frac{3}{8} > \frac{3}{4}$ because $8 > 4$.

Do you agree?

Explain your reasoning.

Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number **Compare and order fractions whose denominators are all multiples of the same number – greater than 1**	Although converting mixed numbers and improper fractions is not a National Curriculum objective in Year 4, it is included in the Ready to Progress statements for Year 4 so children may come into Year 5 with an understanding of how to convert and compare mixed and improper fractions with the same denominator. Assess and track back if needed. Recap - Ask children to place their fraction wall next to their partners so that they can continue the count across 1. Count in fractions beyond 1 one third, 2 thirds, 3 thirds, 4 thirds, 5 thirds) Ask children to then count acknowledging 1 whole as part of the count (one third, two thirds, one whole, one whole and one third, one whole and 2 thirds) Look at how fractions continue beyond one whole on a number line. How do we record this? Show as an improper fraction and a mixed number. 0 $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{5}{4}$ $\frac{6}{4}$ $\frac{7}{4}$ $\frac{8}{4}$ 0 $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ 1 $1\frac{1}{4}$ $1\frac{2}{4}$ $1\frac{3}{4}$ 2 Position improper fractions on a number line, consider how to record this fraction as a mixed fraction and vice versa. Link improper fractions and mixed fractions together. Show how they mean the same but look different. Model how to prove equivalence using diagrams.  $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{5}{4}$ $\frac{6}{4}$ $\frac{7}{4}$ $\frac{8}{4}$ $\frac{9}{4}$ $\frac{10}{4}$ $\frac{11}{4}$ $\frac{12}{4}$ $\frac{13}{4}$ $\frac{14}{4}$ $\frac{15}{4}$ $\frac{16}{4}$ What do they notice about the numerators whenever a whole number is formed? How are they related to the denominators? $\frac{4}{4}$ = 1 $\frac{8}{8}$ = 2 Can they complete the pattern? Will $\frac{24}{4}$ be in the pattern? How do you know?

The part – part whole model can also support children to see the relationship.



Once they associate multiples of the denominator with an equivalent whole, children can move towards the abstract rule for converting an improper fraction to a mixed number: Numerator divide denominator gives the whole number. The remainder is the fractional part

e.g. $\frac{23}{5}$

23 ÷ 5 = 4 r 3

so $\frac{23}{5} = 4\frac{3}{5}$

Another and Another – Can you write down an improper fraction between 1 ½ and 3. And another and another…

Convince me $\frac{34}{5}$ = 6 and $\frac{4}{5}$

Compare Mixed Numbers and Improper Fractions

To be able to compare mixed numbers and improper fractions they need to both be in the same form.

E.g. to compare $1\frac{3}{6}$ to $\frac{8}{6}$ both need to either be improper fractions or both mixed numbers.

Draw what both fractions are representing using their fraction walls to support understanding.

Can children see that $1\frac{3}{6}$ is equal to $\frac{9}{6}$?

Can children see that $\frac{8}{6}$ is equal to $1\frac{2}{6}$?

Ask the children if they prefer converting the mixed number to an improper fraction or vice versa? Can they explain why?

To be able to compare mixed numbers and improper fractions with different denominators both must have the same denominator (applying understanding of equivalence) and both must be in the same form

E.g. To compare $2\frac{3}{4}$ to $\frac{19}{8}$ children need to convert $2\frac{3}{4}$ to $\frac{11}{4}$ and then to $\frac{22}{8}$. Again, use diagrams, part whole models or real objects to support children's understanding.

Can children explain, since each whole is made of 4 quarters, there are 4 x 2 + 3 = 11 quarters in $2\frac{3}{4}$.

Mastery

Make each number sentence correct using =, > or <.

$\frac{3}{4}$ ◯ $\frac{1}{2}$	$1\frac{3}{4}$ ◯ $2\frac{1}{2}$	$\frac{2}{4}$ ◯ $\frac{1}{2}$
$\frac{3}{8}$ ◯ $\frac{1}{2}$	$\frac{3}{2}$ ◯ $1\frac{1}{2}$	$\frac{2}{5}$ ◯ $\frac{4}{10}$
$\frac{3}{4}$ ◯ $\frac{3}{8}$	$3\frac{3}{4}$ ◯ $3\frac{3}{8}$	$\frac{2}{5}$ ◯ $\frac{5}{10}$

Mastery

Chiz and Caroline each had two sandwiches of the same size.

Chiz ate $1\frac{1}{2}$ of his sandwiches.

Caroline ate $\frac{5}{4}$ of her sandwiches.

Draw diagrams to show how much Chiz and Caroline each ate.

Who ate more? How much more?

Greater Depth

Chiz and Caroline each had two sandwiches of the same size.

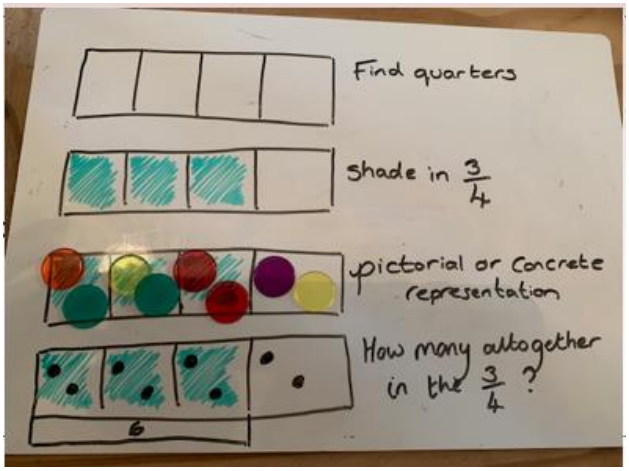
Chiz ate $1\frac{1}{4}$ of his sandwiches.

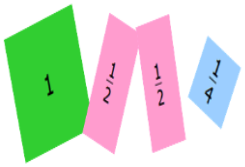
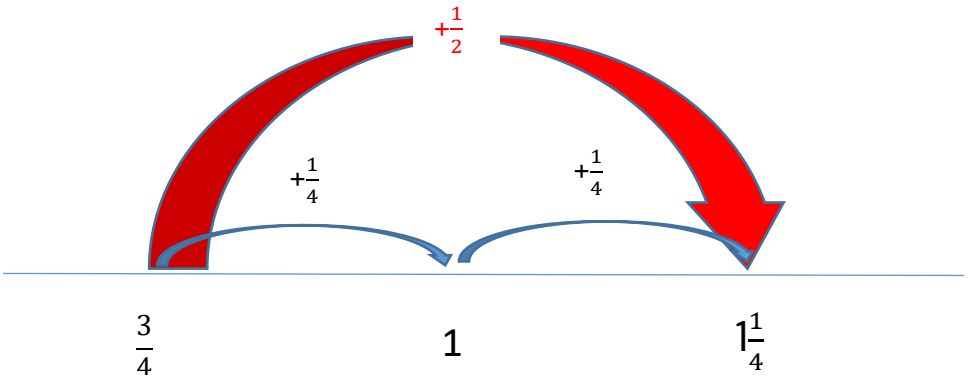
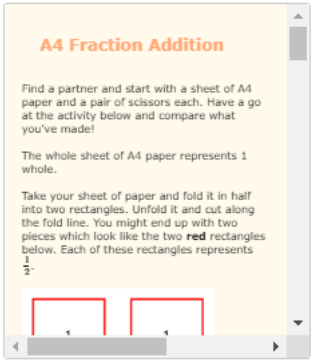
Caroline ate $\frac{5}{4}$ of her sandwiches.

Fred said Caroline ate more because 5 is the biggest number.

Tammy said Chiz ate more because she ate a whole sandwich.

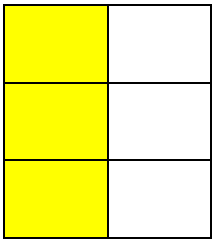
Explain why Fred and Tammy are both wrong.

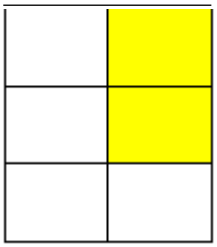
Find non-unit fractions of quantities	Use the bar model to help find non-unit fraction of a quantity using the concrete or known multiplication and division facts e.g. $\frac{3}{4}$ of 8 = 6  Through using the model and image children to realise that they are dividing by the denominator and multiplying by the numerator. This becomes an abstract mental strategy. Children extend their calculations to numbers outside of known multiplication and division facts to include related facts, e.g. $\frac{2}{6}$ of 3,600 Apply to word problems – **given whole and fraction, find a fraction** 2. Stan bought 15 litres of paint and used $\frac{2}{3}$ of it decorating his house. How much paint has he used? 3. My granny lives 120km from us. We are driving to see her and are $\frac{5}{6}$ of the way there. How far have we driven so far? Mathematics guidance: Key stages 1 and 2 - Non-statutory guidance for the National Curriculum in England Apply to word problems – **given a fraction and the amount of the fraction, find the whole or other part.** $\frac{4}{5}$ of the runners in a race have finished the race so far. If 92 people have finished, how many runners were in the race altogether? I am $\frac{3}{4}$ of the way through my holiday. I have 3 days of holiday left. How many days have I already been on holiday for? Mathematics guidance: Key stages 1 and 2 - Non-statutory guidance for the National Curriculum in England

Add fractions with the same denominator and denominators that are multiples of the same number	Children have added fractions with the same denominator in Year 4. They focused on the understanding of the denominator not changing. Look at a simple addition calculation $\frac{1}{2}+\frac{1}{4}$. Discuss how we can make each fraction have the same denominator to help use add the fractions together.  Use the NCETM resource to model changing $\frac{1}{2}$ into $\frac{2}{4}$ by putting 2 x $\frac{1}{4}$ pieces of paper over the $\frac{1}{2}$. Ask the children if we could change the $\frac{1}{4}$ piece into a $\frac{1}{2}$? Why not? What if it was $\frac{1}{2}+\frac{2}{4}$? We could change either of the fractions to show that it would be $\frac{1}{2}+\frac{1}{2}$ or $\frac{2}{4}+\frac{2}{4}$ Look at calculations where we will need to bridge through 1. E.g. $\frac{3}{4}+\frac{1}{2}$. Can children partition the half into $\frac{1}{4}+\frac{1}{4}$ to bridge through 1. Use a number line to support if needed.  NRICH- Fraction Addition **Why do this activity** This activity enables pupils to help to develop their concept of fractions and begin to add fractions with the same denominator and denominators that are multiples of the same number. It provides a context within which pupils can explore and reason about properties of fractions.  A4 Fraction Addition Find a partner and start with a sheet of A4 paper and a pair of scissors each. Have a go at the activity below and compare what you've made! The whole sheet of A4 paper represents 1 whole. Take your sheet of paper and fold it in half into two rectangles. Unfold it and cut along the fold line. You might end up with two pieces which look like the two **red** rectangles below. Each of these rectangles represents $\frac{1}{2}$. **Possible approach** Begin with a large piece of paper and split this into fractions by repeated halving (as in the first part of the activity). Discuss with pupils the size of the pieces that you're making. Ask children to suggest how you could split the paper in half into two rectangles - there are two ways of doing this at each stage! Stick some of the parts to a fresh piece of paper (as in the second part of the activity) and ask them to describe what each is ($1\frac{1}{2}$, $1\frac{1}{4}$, $1\frac{1}{8}$ and $1\frac{1}{16}$). Working in pairs, pupils can then repeat the activity with their own pieces of paper. Then set them the task of doing the additions using their fractions, and recording as many number sentences as they can.

Look at examples using a grid to help show how we use equilavent fractions to help us add fractions. E.g. $\frac{1}{2} + \frac{1}{3}$

2 and 3 are factors of 6 so we can change both fractions into sixths and then add them together. Can the children see a $\frac{1}{2}$ and $\frac{1}{3}$ shaded?





Now look at fractions that are more complex. Use the model above to show how to change both denominators. Tackle a range of questions e.g. $\frac{2}{3} + \frac{3}{4} =$

Discuss whether it's Sometimes/Always or Never true that when you add fractions the answer will always be bigger.

Solve a range of word problems e.g.
Tom and David had a block of butter to make cakes and cookies with. They needed $\frac{1}{5}$ a block for cookies and $\frac{2}{3}$ of a block for the cakes. What fraction of the butter was left after they made their cakes and cookies?

Solve the problem below.
A bottle contains 568ml of milk. Jack drinks $\frac{1}{2}$ of the bottle and Sarah drinks $\frac{1}{3}$ of the bottle. What fraction is left in the bottle?

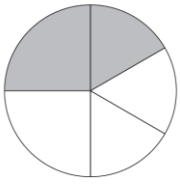
Mastery

Using the numbers 5 and 6 only once, make this sum have the smallest possible answer:

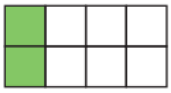
$\frac{\square}{15} + \frac{\square}{10} =$

Application to SATs questions

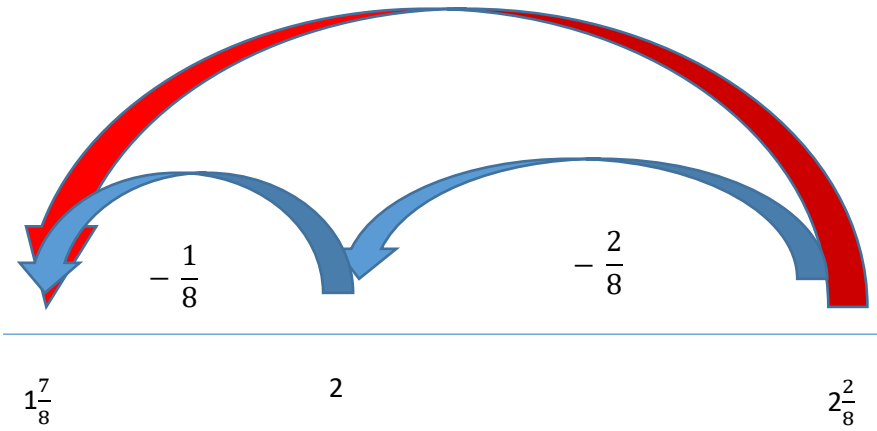
In this circle, $\frac{1}{4}$ and $\frac{1}{6}$ are shaded.



What fraction of the whole circle is **not** shaded?

<table>
<tr><td></td><td>Greater Depth
Using the numbers 3, 4, 5 and 6 only once, make this sum have the smallest possible answer:
$\square\frac{\square}{\square} + \square\frac{\square}{\square} =$
Mastery with Greater Depth
Each bar of toffee is the same. On Monday, Sam ate the amount of toffee shown shaded in A. On Tuesday, Sam ate the amount of toffee shown shaded in B.
A  B 
Sam says he ate $\frac{7}{8}$ of a bar of toffee.
Jo says Sam ate $\frac{7}{16}$ of the toffee.
Explain why Sam and Jo are both correct.</td></tr>
<tr><td>Subtract fractions with the same denominator and denominators that are multiples of the same number</td><td>Subtract within 1 when a change in denominator is needed.
e.g. $\frac{3}{4} - \frac{4}{8} =$
Ask the children, “How can we create a common denominator?”
$\frac{6}{8} - \frac{4}{8} = \frac{2}{8}$

In Year 6 children will simplify fractions and will have the option to complete this calculation as $\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$ or they may complete it by converting to eighths and simplifying $\frac{2}{8}$ to $\frac{1}{4}$ after they have completed the calculation.

Move onto calculations where the children need to bridge back through a whole number e.g. $2\frac{1}{4} - \frac{3}{8} =$
Children will need to convert $2\frac{1}{4}$ to $2\frac{2}{8}$ and then bridge back through 2 when subtracting $\frac{3}{8}$
$-\frac{3}{8}$
 
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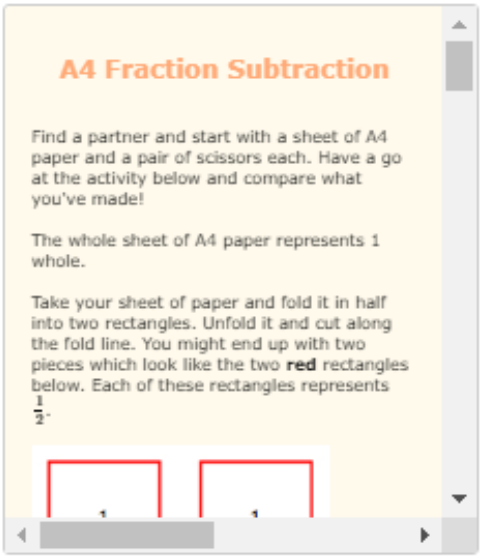
A4 Fraction Subtraction

Age 7 to 11
Challenge Level ★

Why do this activity

This activity enables pupils to help to develop their concept of fractions and begin to subtract fractions with the same denominator and denominators that are multiples of the same number. It provides a context within which pupils can explore and reason about properties of fractions.



Possible approach

Begin with a large piece of paper and split this into fractions by repeated halving (as in the first part of the activity). Discuss with pupils the size of the pieces that you're making. Ask children to suggest how you could split the paper in half into two rectangles - there are two ways of doing this at each stage! Stick some of the parts to a fresh piece of paper (as in the second part of the activity) and ask them to describe what each is ($1\frac{1}{2}$, $1\frac{1}{4}$, $1\frac{1}{8}$ and $1\frac{1}{16}$).

Working in pairs, pupils can then repeat the activity with their own pieces of paper. Then set them the task of doing the additions using their fractions, and recording as many number sentences as they can.

Solve worded problems and SATs questions linked to subtraction of fractions.

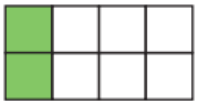
$$1\frac{1}{4} - \frac{1}{3} =$$

$$\frac{3}{10} - \frac{1}{20} =$$

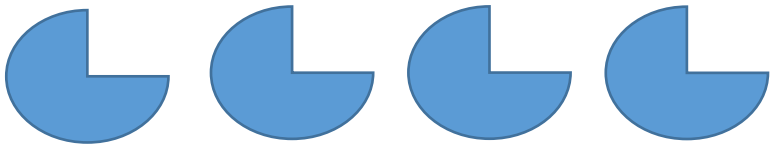
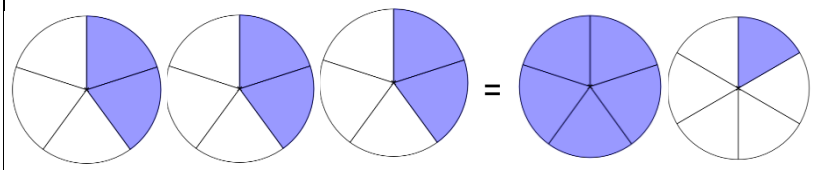
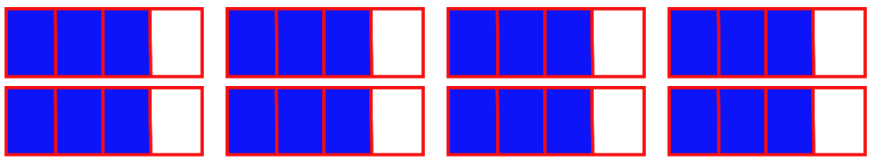
Mastery

Each bar of toffee is the same. On Monday, Sam ate the amount of toffee shown shaded in A. On Tuesday, Sam ate the amount of toffee shown shaded in B.

How much more, as a fraction of a bar of toffee, did Sam eat on Tuesday?

A 

B 

Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	**Multiplying mixed numbers by a whole number** Where possible, use real life contexts to make the learning more meaningful. Ask the children what this image shows?  We can see 4 lots of 3 apples, which we write as 3 x 4 = 12 Ask the children what this diagram represents?  We can see 4 lots of $\frac{3}{4}$ You may wish to show this in a real-life contexts e.g. cake. Ask children how many quarters in total? $\frac{12}{4}$ What do they notice about the answer? Draw from them that the numerators have multiplied but the pieces are still quarters. Ask how many whole cakes $\frac{12}{4}$ is equivalent to? Can they rearrange the pieces to make 3 whole circles? Explain that when multiplying, x means "of" In whole numbers, 2 x 3 means "3 lots of 2" In fractions $\frac{2}{5}$ x 3 means 3 lots of $\frac{2}{5} = \frac{6}{5}$ or $1\frac{1}{5}$  8 lots of $\frac{3}{4} = \frac{24}{4} = 6$ 

Mastery

Graham is serving pizzas at a party. Each person is given $\frac{3}{4}$ of a pizza. Graham has six pizzas.

How many people can he serve? Draw on the pizzas to show your thinking.

Write your answer as a multiplication sentence.

Greater Depth

Graham is serving pizzas at a party. Each person is given $\frac{3}{4}$ of a pizza.

Fill in the table below to show how many pizzas he must buy for each number of guests.

Guests	Pizzas
4	
6	
8	
10	

When will he have pizza left over?

Multiplying mixed numbers by a whole number

Children can now use partitioning to multiply a mixed number by a whole number, e.g. $1\frac{3}{4} \times 5$

$1 \times 5 = 5$

$\frac{3}{4} \times 5 = \frac{15}{4}$

$\frac{15}{4} = 3\frac{3}{4}$

$5 + 3\frac{3}{4} = 8\frac{3}{4}$

Solve worded problems and SATs questions linked to multiplication of fractions.

36 $\frac{4}{5} \times 400 =$

1 mark

	Ask children to tackle this question. What answer did they get? *'400 lots of $\frac{4}{5}$ would be $\frac{1600}{5}$ = 320'* Now ask the children to apply their knowledge of fractions of amounts and find $\frac{4}{5}$ of 400. What answer do they get? *'I divide 400 by my denominator to get 80 and I multiply that 80 by my numerator to get the final answer 320'* Ask the children to look for what is the same and what is different. Which method do they find the most efficient and why?