Equivalent Fractions, Ordering and Comparing

Key NC Statement

Recognise and show, using diagrams, families of common equivalent fractions

Related NC Statements

- · recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to $\frac{1}{4}$; $\frac{1}{2}$; $\frac{3}{4}$
- recall multiplication and division facts for multiplication tables up to 12 x 12

Key Concepts

This sequence builds upon learning from years 2 and 3 in which pupils started by finding fractions equal to one half and then other equivalent fractions with small denominators. The first step focuses on using benchmarks of familiar fractions and pupils' reasoning skills, about the magnitude of the fractions, to order and compare them. In all examples included, it is be possible to order the fractions using reasoning skills without converting them to a common denominator.

A focus upon equivalence starts with pupils creating their own accurate diagrams to show families of common equivalent fractions. Learning then continues onto exploring the relationship between the numerator and denominators within equivalent fractions. Pupils discover that if the numerator and denominator is multiplied or divided by the same number, the fractions will remain equivalent. Further examples are then explored to ensure pupils understand that the multiplier / divisor can be any whole number rather than just 2.

Steps within the Learning Sequence

- Step 1: Compare and order a range of fractions
- Step 2: Showing equivalence with accurate diagrams
- Step 3: Exploring families of common equivalent fractions
- Step 4: Create equivalent fractions by multiplying and dividing



Destination Questions





Place these fractions on the number line:

$$\frac{1}{3}$$
, $\frac{4}{9}$, $\frac{7}{10}$, $\frac{4}{8}$

Explain which benchmarks you used to help you.

Draw a diagram to represent a

fraction that is equivalent to $\frac{3}{4}$



True or false? Explain why.

$$\frac{5}{6} < \frac{5}{9}$$
 because 6 is smaller than 9.



Order these fractions from smallest to largest:

$$\frac{5}{6}$$
, 1 $\frac{4}{5}$, 1 $\frac{1}{3}$, $\frac{3}{6}$, $\frac{2}{9}$





Draw a rectilinear diagram to show that these two fractions are equal.







Complete the fractions below to make each number sentence true.

$$\frac{3}{4} = \frac{12}{\Box}$$

$$\frac{6}{9} = \frac{\square}{3}$$

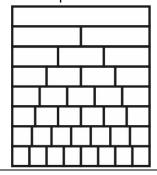
$$\frac{2}{5} = \frac{\square}{10}$$

Choose one and draw a diagram to prove it.



Use the fraction wall to find equivalents to $\frac{2}{4}$.

Shade them to prove they are equivalent.



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Explain how you can multiply and divide the numerators and denominators to find fractions

equivalent to $\frac{3}{9}$.

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Find a fraction equivalent to $\frac{1}{4}$ in which the sum of the numerator and denominator is 25.

Step one

Compare and order a range of fractions

Introduce the task of ordering these fractions from smallest to largest: $1\frac{2}{5}$, $1\frac{6}{8}$, $\frac{7}{8}$, $\frac{3}{6}$.

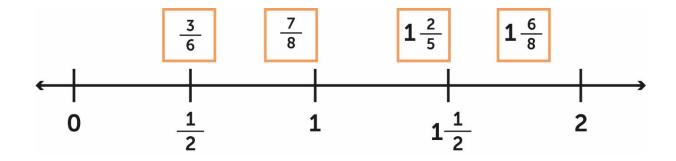
Highlight that this is a range of mixed fractions and proper fractions with a range of denominators. Use questioning to build up what can be deduced and start using this information to order step by step. Encourage pupils to use familiar benchmarks to help compare the fractions and estimate where they would be positioned on a number line.

What do you notice about these fractions?

I have noticed all the fractions sit between 0 and 2.

 $\frac{3}{6}$ is equal as $\frac{1}{2}$. This is the smallest fraction.

I know $\frac{2}{5}$ is less than $\frac{1}{2}$ so I know $1\frac{2}{5}$ is less than $1\frac{1}{2}$. I know $\frac{6}{8}$ is equal to $\frac{3}{4}$ so I know 1 $\frac{6}{8}$ is equal to 1 $\frac{3}{4}$. This is the largest fraction.



Pupils order fractions as part of handout_4LS23_step1_order_fractions_game and articulate how they have identified a larger fraction. Pupils should be encouraged to build or draw models (as used in 3LS22) to support their understanding and explain their thinking.

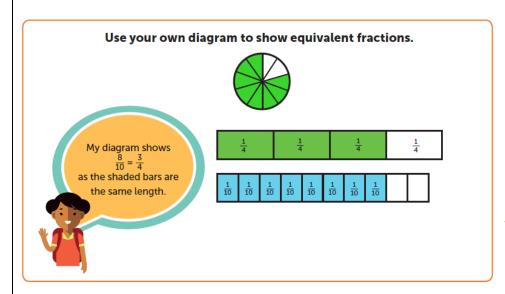




Step two 👫 🌛

Showing equivalence with accurate diagrams

Provide cut up cards from handout_4LS23_step2_matching_equivalents. Ask pairs of pupils to match the fraction to the equivalent. Pupils use the representation to prove the fractions are equivalent. They lay the cards one above another to show that the shaded parts are equal. This helps pupils notice that even though the equal parts are smaller they are equivalent.



Do you agree or disagree? Explain why.

The two bars are different lengths to it is not fair to use this diagram.

The two bars must be the same length so the fractions can be compared.

Model that when drawn correctly, with the whole bars the same length, we can see that $\frac{8}{10}$ is not equal to $\frac{3}{4}$.



Pupils explore further by drawing their own diagrams to offer proof of equivalence for fractions, such as:

$$\frac{2}{8} = \frac{1}{4}$$

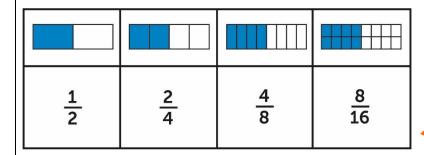
$$\frac{2}{8} = \frac{1}{4}$$
 $\frac{4}{10} = \frac{2}{5}$

$$\frac{1}{5} = \frac{2}{10}$$

Step three 🧀 💰 🗥

Exploring families of common equivalent fractions

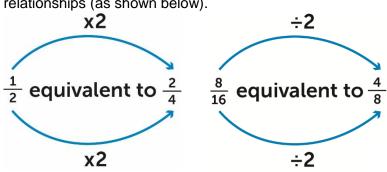
Use images on handout_4LS23_step2_equivalent_family to start discussions that draw attention to the relationship between the numerator and denominators. Clarify that there are twice as many parts per part from $\frac{1}{2}$ to $\frac{2}{4}$ and 4 times as many parts per part for $\frac{1}{2}$ to $\frac{4}{8}$.



What do you notice about the equivalent fractions?

I have noticed that there are twice as many parts as there were at the start. Every part has twice as many parts.

Model how to annotate fractions to show the equivalent relationships (as shown below).



We can multiply by 2. $2 \times 2 = 4$ $4 \times 2 = 8$ The numerator and denominator in $\frac{2}{4}$ were both multiplied by 2 to make $\frac{4}{8}$.

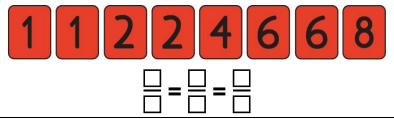
Allow pupils to find other fractions equivalent to $\frac{1}{2}$ by multiplying the numerator and denominator by other numbers such as 3, 5, 6, 10 and 20 and demonstrating on bar models.

Pupils create equivalent fraction families by multiplying the numerators and denominators by the same number. These could include fractions equivalent to $\frac{1}{4}$, $\frac{1}{3}$ and $\frac{2}{5}$. Pupils use pictorial images to prove the equivalence alongside the written fractions.



Activities for exploring ideas at greater depth

Using the following digit cards, complete the equivalent fractions. You may only use each digit card once. Some of the numerators and denominators may be two-digit numbers.





Step four 🧖 🛂 👫 💰

Create equivalent fractions by multiplying and dividing

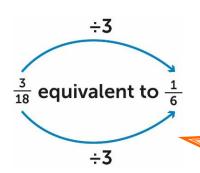
Share the example: $\frac{3}{18} = \frac{1}{\square}$.

How many parts are equivalent to the 3 eighteenths?

Just one part.

?

There are 3 times fewer parts for every part. How many parts are there in the whole altogether?



For every three eighteenths there is now 1 part. So divide 18 by 3. That's 6 parts in the whole.

To find the missing denominator, the 18 must be divided by 3. This is the same as the numerator. $18 \div 3 = 6$.

Reinforce that if the numerator and denominator has been multiplied or divided by the same number the fraction remains equivalent. Ensure that pupils realise that the multiplier / divisor can be any whole number rather than just 2.

Pupils practise finding equivalent fractions by multiplying and dividing the numerator and denominators by completing handout_4LS23_step4_calculating_equivalent_fractions.

They use finding equivalences to order fractions on a numberline. For example, ordering $\frac{3}{4}$ and $\frac{5}{8}$.



Activities for exploring ideas at greater depth

- Find a fraction equivalent to $\frac{5}{7}$ in which the product of the numerator and denominator is 315.
- Find a fraction equivalent to $\frac{3}{9}$ in which the sum of the numerator and denominator is 55.

Write your own similar questions.

