Spring Block 3

Fractions A

Small steps

Step 1	Understand the denominators of unit fractions
Step 2	Compare and order unit fractions
Step 3	Understand the numerators of non-unit fractions
Step 4	Understand the whole
Step 5	Compare and order non-unit fractions
Step 6	Fractions and scales
Step 7	Fractions on a number line
Step 8	Count in fractions on a number line

Small steps

Step 9	Equivalent fractions on a number line
Step 10	Equivalent fractions as bar models

Understand the denominators of unit fractions

Notes and guidance

Children begin this block by exploring the denominators of unit fractions. From Year 2, they know about halves, quarters and thirds and they now look at fractions with other denominators.

Children understand that a fraction can be seen as part of a whole and that to find a unit fraction, they divide the whole into equal parts. They then identify the role of the denominator, appreciating that this shows how many equal parts the whole has been divided into. This step explores unit fractions only, with the focus being on the denominator. Non-unit fractions are covered later in the block.

It is important that children are exposed to non-standard representations that they may be less familiar with, for example a square split into four equal parts by diagonal lines from the vertices.

Things to look out for

- Children may count only the shaded or non-shaded areas of diagrams to find the denominator.
- Children may not realise the importance of equal parts.
- Children may not realise that different diagrams can be used to represent the same fraction.

Key questions

- Is the diagram split into equal parts? How many equal parts are there?
- How many parts are shaded?
- What is the denominator of the fraction? How do you know?
- Why is the denominator of this fraction _____?
- Can you draw a different diagram to show the same fraction?
- If the shape has not been divided equally, can you find a fraction?

Possible sentence stems

- The shape is split into _____ equal parts.

  The denominator is _____

  The fraction that is shaded is $\frac{1}{\square}$

National Curriculum links

- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

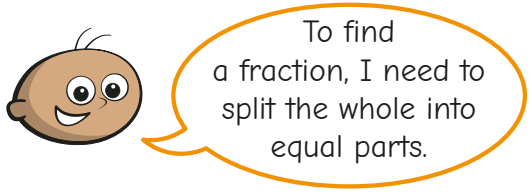
Understand the denominators of unit fractions

Key learning

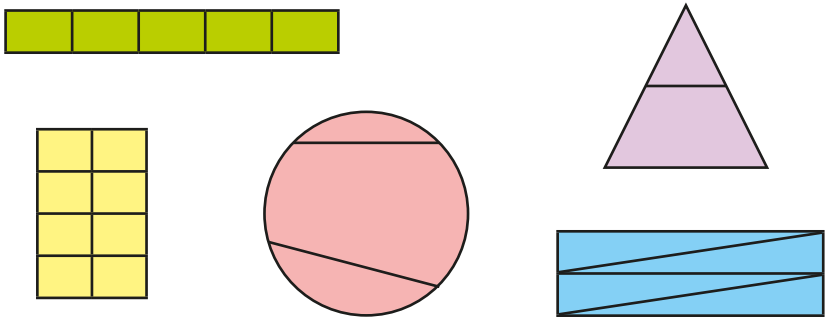
Give children a map of Europe. Tell them that Europe is the whole. Ask children to identify the parts and get them to answer using the stem sentence.

Europe is the whole. _____ is a part of the whole.

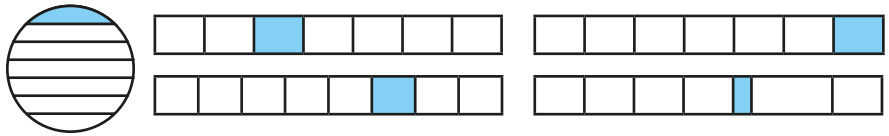
- Tommy is identifying fractions.



Which shapes have been split into equal parts?



- Which shapes have $\frac{1}{7}$ shaded?

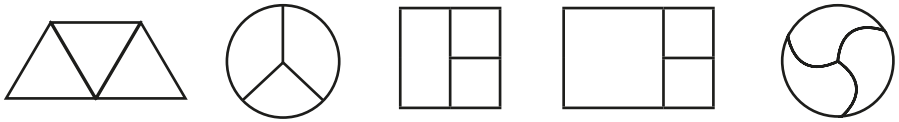


- Complete the sentences for each shape.

The denominator is _____ because the whole is divided into _____ equal parts.

The fraction shaded is _____

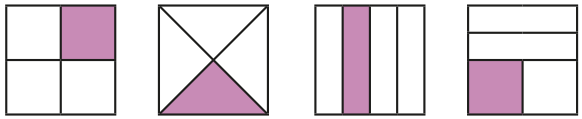
- Which shapes have been split into thirds?



Understand the denominators of unit fractions

Reasoning and problem solving

Which shapes show $\frac{1}{4}$?

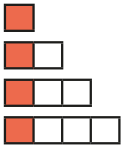


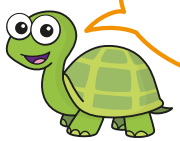
How do you know?

Find another way to show $\frac{1}{4}$

All the diagrams represent $\frac{1}{4}$ as all the shapes have been split into 4 equal parts.

Tiny is looking at these bar models.





Do you agree with Tiny?

Explain your answer.

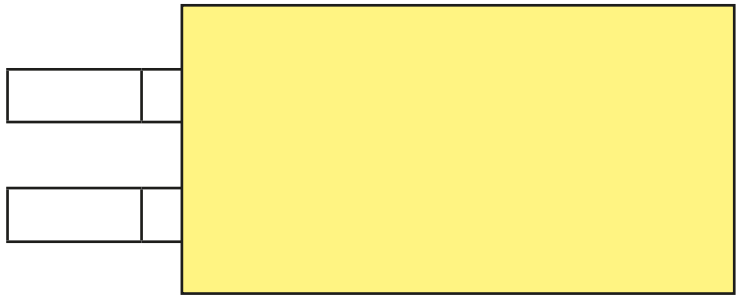
No

Aisha and Scott have folded two pieces of ribbon.

Aisha has folded her ribbon into 2 equal parts.

Scott has folded his ribbon into 5 equal parts.

Parts of their ribbons are hidden.



Whose ribbon is longer?

How do you know?

Scott's ribbon is longer.

Compare and order unit fractions

Notes and guidance

In this small step, children use their understanding of denominators developed in the previous step to compare and order unit fractions. They compare and order non-unit fractions later in the block.

Children compare fractions by observing the part-whole relationship. For example, if they split the whole into 4 equal parts, the parts will be bigger than if they had split the whole into 10 equal parts meaning $\frac{1}{4}$ is a bigger part of the whole than $\frac{1}{10}$ is. They use diagrams and bar models to illustrate this before moving on to understanding that when the numerators are the same then the greater the denominator, the smaller the fraction. Once this understanding is secure, children order unit fractions without pictorial support.

Things to look out for

- Children may believe that $\frac{1}{2}$ is smaller than $\frac{1}{3}$ because 2 is less than 3
- Children need to be secure in the meanings of the symbols for greater than and less than (> and <).
- The correct relationship will not be seen if the wholes are different sizes or if they are not split into equal parts.

Key questions

- What is the same and what is different about comparing fractions and comparing whole numbers?
- What is the denominator of the fraction? What is the numerator?
- Which is the greater/smaller denominator? Which is the greater/smaller fraction?
- What do you notice about the denominators and the order of the fractions? Why does this happen?
- Is $\frac{1}{4}$ greater than $\frac{1}{10}$? Can you draw a diagram to show this?

Possible sentence stems

- The denominator is _____ because ...
- The numerator is _____ because ...
- When the numerators are the same, then the _____ the denominator, the _____ the fraction.

National Curriculum links

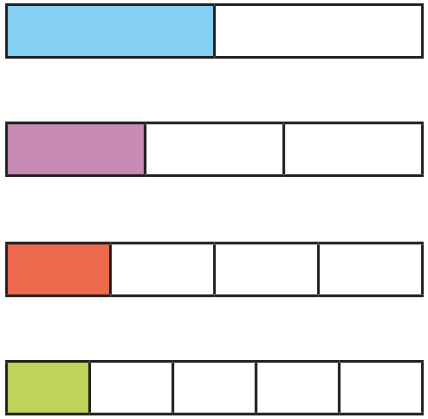
- Compare and order unit fractions, and fractions with the same denominators

Compare and order unit fractions

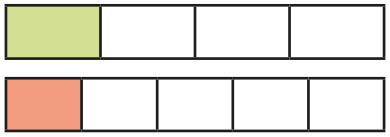
Key learning

- Match the fractions to the bar models.

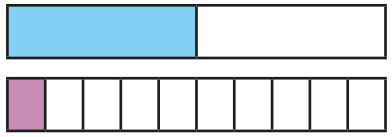
$\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{5}$ $\frac{1}{3}$



- Write <, > or = to compare the fractions.



$\frac{1}{4}$ ◯ $\frac{1}{5}$

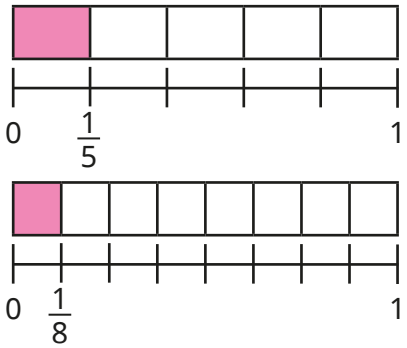


$\frac{1}{2}$ ◯ $\frac{1}{10}$

Complete the sentence.

When the numerators are the same, then the _____ the denominator, the _____ the fraction.

- Write < or > to compare the fractions.



$\frac{1}{5}$ ◯ $\frac{1}{8}$

- Annie is comparing fractions.

$\frac{1}{3} > \frac{1}{12}$

If the numerators are the same, then the smaller the denominator, the greater the fraction.

Use Annie's method to compare the fractions.

$\frac{1}{10}$ ◯ $\frac{1}{4}$ $\frac{1}{6}$ ◯ $\frac{1}{7}$ $\frac{1}{100}$ ◯ $\frac{1}{2}$

- Write each set of fractions in order, starting with the smallest fraction.

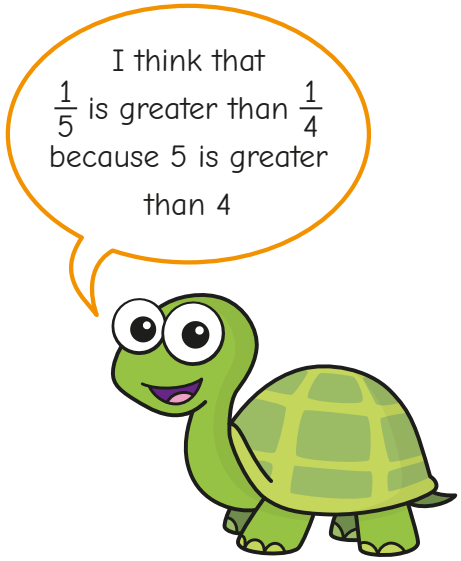
$\frac{1}{6}$ $\frac{1}{8}$ $\frac{1}{2}$ $\frac{1}{5}$ $\frac{1}{7}$

$\frac{1}{5}$ $\frac{1}{50}$ $\frac{1}{10}$ $\frac{1}{2}$ $\frac{1}{100}$

Compare and order unit fractions

Reasoning and problem solving

Tiny is comparing two unit fractions.



Do you agree with Tiny?

Explain your answer.

No

Huan has ordered some fractions, but one of them is in the wrong place.

$\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{10}$ $\frac{1}{15}$

Which fraction is in the wrong place?

How do you know?

$\frac{1}{4}$

Filip and Dani each have the same amount of juice.

Filip drinks $\frac{1}{3}$ of his juice.

Dani drinks $\frac{1}{4}$ of her juice.

Who has more juice left?

How do you know?

Dani

Understand the numerators of non-unit fractions

Notes and guidance

In this small step, children explore and understand the role of the numerator in unit and non-unit fractions.

Children need to be secure in their understanding of unit fractions before moving on to non-unit fractions. Children understand that a non-unit fraction is made up of a quantity of unit fractions, for example $\frac{3}{4}$ is the same as three single quarters or $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$

A range of representations, including shaded shapes, number lines and bar models, can be used to help children identify fractions. Concrete and pictorial resources are useful for demonstrating the role of the numerator as well as reinforcing the role of the denominator.

Things to look out for

- Children may not recognise that non-unit fractions are made up of quantities of unit fractions.
- When using diagrams, children may count the shaded parts as the numerator and the unshaded parts as the denominator, for example $\frac{2}{3}$ rather than $\frac{2}{5}$ 

Key questions

- How many equal parts is the whole split into?
- How many equal parts are shaded/circled?
- How do you know what the denominator/numerator is?
- Where can you see the denominator in the diagram? Where can you see the numerator?
- Can you draw a diagram/bar model to represent the fraction?
- What is the difference between a unit fraction and a non-unit fraction?

Possible sentence stems

- There are _____ equal parts.

  So the denominator is _____

  _____ of the equal parts are shaded.

  So the numerator is _____

  The fraction shaded is $\frac{\square}{\square}$

National Curriculum links

- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

Understand the numerators of non-unit fractions

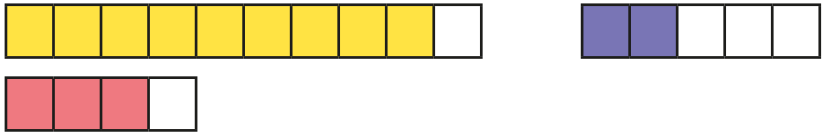
Key learning

- 
  - How many equal parts has the bar model been split into?
  - How many equal parts of the bar model are shaded?
  - What is the numerator?

    What is the denominator?

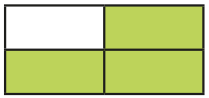
    How do you know?
  - What fraction of the bar model is shaded?

- What fraction of each bar model is shaded?



How do you know?

- The shape has been split into quarters.



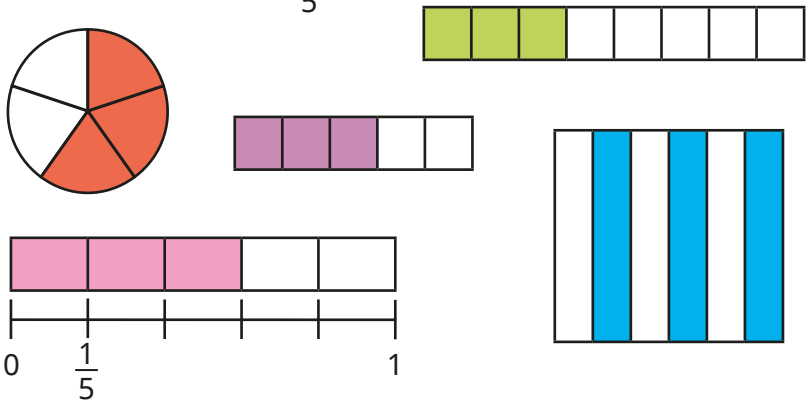
  - What fraction of the shape is shaded?
  - How many lots of one quarter are shaded?

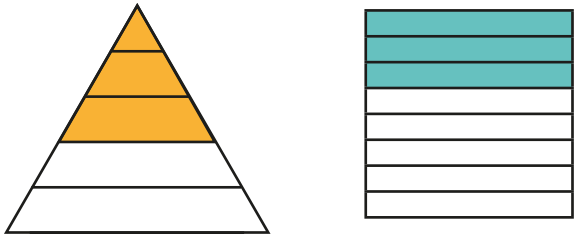
What do you notice?

- Draw bar models to show each fraction.

$\frac{2}{3}$ $\frac{4}{5}$ $\frac{7}{10}$

- Which diagrams show $\frac{3}{5}$?



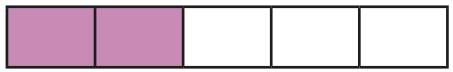


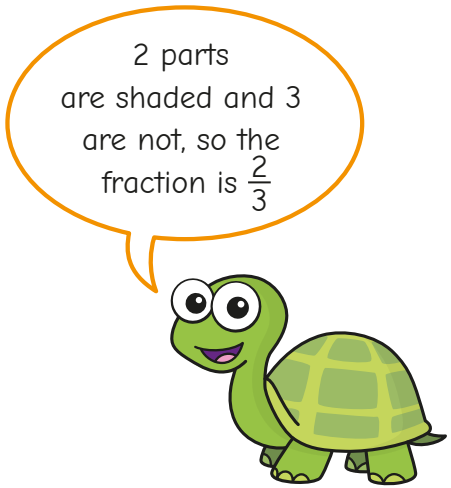
  - Draw another diagram that shows $\frac{3}{5}$
  - Draw another diagram that does not show $\frac{3}{5}$

Understand the numerators of non-unit fractions

Reasoning and problem solving

Tiny is working out the fraction shown in the bar model.



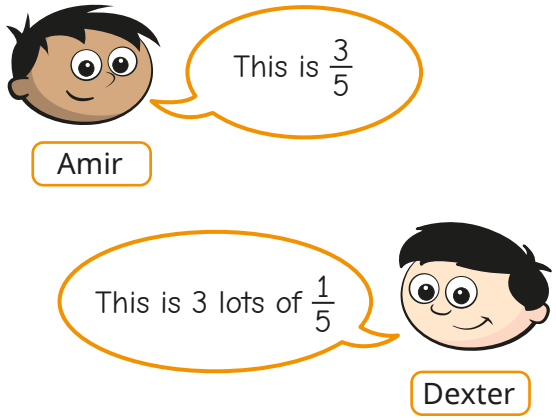


Do you agree with Tiny?

Why?

No

Amir and Dexter are looking at a bar model.



Who is correct?

Explain your answer.

Both are correct.

$\frac{3}{5}$ is the same as 3 one-fifths or

$\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$

Understand the whole

Notes and guidance

In this small step, children explore the whole in relation to fractions. They use diagrams and other representations to develop their understanding that when the numerator of a fraction is equal to its denominator, then the fraction is equivalent to 1 whole.

Once this understanding is secure, children move on to "making the whole". Children start by using diagrams to identify how many equal parts a shape has been split into and how many are shaded, before thinking about how many more parts need shading to make the whole. This will be investigated further when adding and subtracting fractions is covered later in Year 3

Things to look out for

- Children may think that the numerator of a fraction is not allowed to be equal to the denominator.
- Children may not recognise when a whole has not been split into equal parts.
- Children may not utilise their knowledge of number bonds because they do not recognise the connection. For example, they may know that 3 + 4 = 7, but not use this knowledge to support them when working out $\frac{3}{7} + \frac{?}{7} = 1$

Key questions

- Is the whole split into equal parts?
- How many equal parts has the whole been split into?
- What fraction is shaded?
- How many more parts do you need to shade to make 1 whole?
- What do you notice about the two numerators?
- What do you notice about the numerator and the denominator when the whole is shaded?

Possible sentence stems

- The whole is split into _____ equal parts.

  _____ of the parts are shaded.

  I need to shade _____ more parts to make the whole.

- When the numerator is equal to the denominator, the fraction is equal to _____

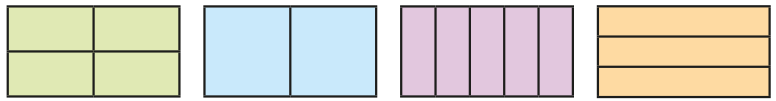
National Curriculum links

- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

Understand the whole

Key learning

- Complete the sentences for each shape.

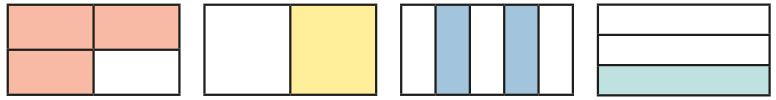


The whole is split into _____ equal parts.

_____ parts are shaded.

$\frac{\square}{\square}$ of the shape is shaded.

- What fraction of each shape is shaded?



  - Shade each shape to complete the whole.
  - What fraction of each shape did you need to shade?
  - Complete the sentences for each shape.

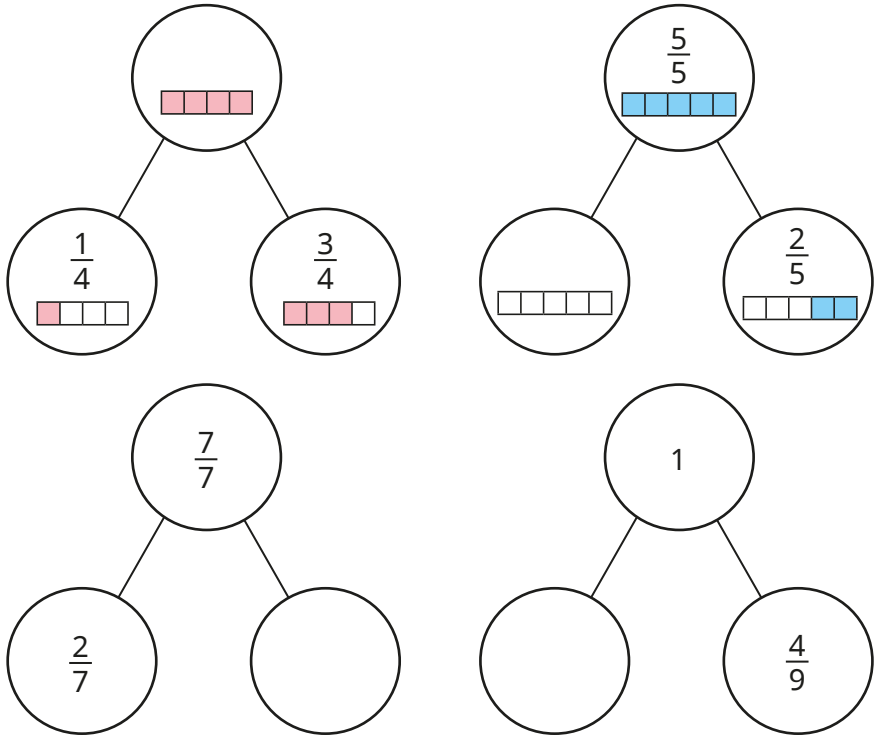
$\frac{\square}{\square}$ of the shape is shaded.

$\frac{\square}{\square}$ more needs to be shaded to complete the whole.

- Complete each fraction so that it is equal to 1 whole.

$\frac{6}{\square}$ $\frac{\square}{7}$ $\frac{10}{\square}$ $\frac{\square}{11}$ $\frac{100}{\square}$

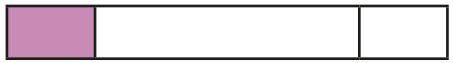
- Complete the part-whole models.

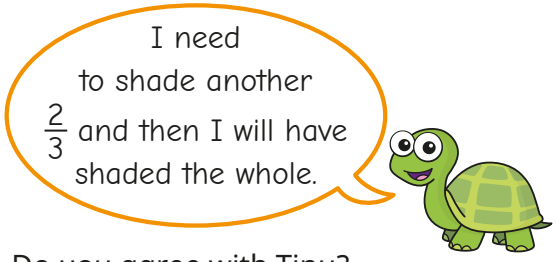


Understand the whole

Reasoning and problem solving

Tiny is drawing a bar model.





Do you agree with Tiny?

Explain your answer.

No

Jo and Max are running in the same race.

Jo has run $\frac{3}{4}$ of the race.

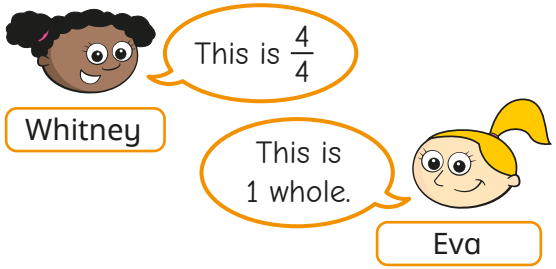
Max has run $\frac{5}{6}$ of the race.

Who has further left to run?

How do you know?

Jo

Whitney and Eva are looking at this bar model.



Who do you agree with?

Explain your answer.

Both

Dexter is thinking of a fraction.

$\frac{3}{8}$ more than Dexter's fraction is 1 whole.

What fraction is Dexter thinking of?

How do you know?

$\frac{5}{8}$

Compare and order non-unit fractions

Notes and guidance

In this small step, children use their knowledge of comparing and ordering unit fractions from Step 2 as they start to compare and order non-unit fractions. The focus is on comparing and ordering fractions with the same denominator.

Bar models and other representations, such as strips of paper, can be used to support children's understanding of fractions. They should recognise that if the denominator is the same, then the greater the numerator, the greater the fraction or the smaller the numerator, the smaller the fraction.

Children could be encouraged to make links between the two types of comparing and ordering they have explored so far: unit fractions with different denominators, and non-unit fractions with the same denominator.

Things to look out for

- As children have previously compared and ordered fractions with the same numerator, they may believe that the fractions they encounter in this step are equal because the denominators are equal.
- Children may be over-reliant on diagrams rather than thinking about the numbers in the fractions.

Key questions

- Are the numerators the same?
- Are the denominators the same?
- If the denominators are the same, how can you compare the fractions?
- Which fraction is greater? How do you know?
- Which fraction is smaller? How do you know?
- What patterns did you spot when you ordered the fractions?

Possible sentence stems

- When fractions have the same denominator, the _____ the numerator, the _____ the fraction.
- _____ is greater than _____ because ...
- _____ is less than _____ because ...

National Curriculum links

- Compare and order unit fractions, and fractions with the same denominators

Compare and order non-unit fractions

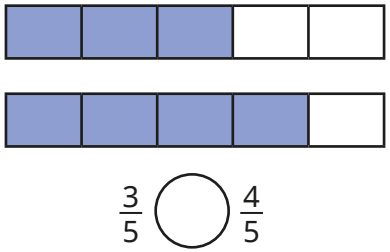
Key learning

- Write **greater** or **less** to complete the sentences.

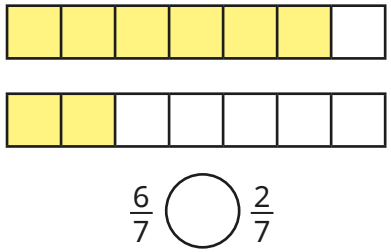
$\frac{1}{4}$ is _____ than $\frac{3}{4}$

$\frac{3}{4}$ is _____ than $\frac{1}{4}$

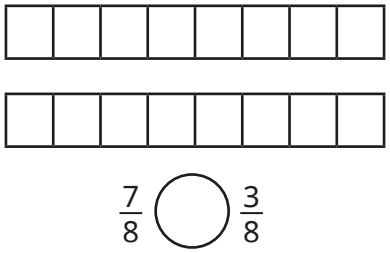
- Write <, > or = to compare the fractions.



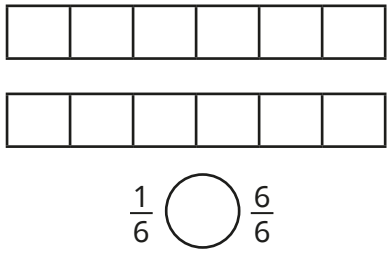
$\frac{3}{5}$ ◯ $\frac{4}{5}$



$\frac{6}{7}$ ◯ $\frac{2}{7}$



$\frac{7}{8}$ ◯ $\frac{3}{8}$



$\frac{1}{6}$ ◯ $\frac{6}{6}$

- Write < or > to compare the fractions.

$\frac{3}{10}$ ◯ $\frac{7}{10}$ $\quad$ $\frac{5}{6}$ ◯ $\frac{4}{6}$ $\quad$ $\frac{0}{5}$ ◯ $\frac{3}{5}$

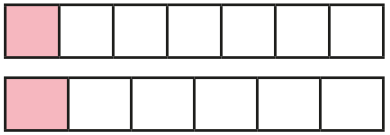
$\frac{8}{9}$ ◯ $\frac{1}{9}$ $\quad$ $\frac{5}{23}$ ◯ $\frac{1}{23}$ $\quad$ $\frac{5}{7}$ ◯ 1

- Write each set of fractions in order, starting with the smallest.

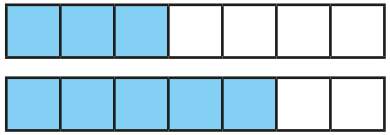
$\frac{7}{7}$ $\quad$ $\frac{6}{7}$ $\quad$ $\frac{1}{7}$ $\quad$ $\frac{5}{7}$ $\quad$ $\frac{4}{7}$

$\frac{4}{9}$ $\quad$ $\frac{7}{9}$ $\quad$ $\frac{2}{9}$ $\quad$ 1 $\quad$ $\frac{8}{9}$

- Use the bar models to compare the fractions.



$\frac{1}{7}$ ◯ $\frac{1}{6}$



$\frac{3}{7}$ ◯ $\frac{5}{7}$

What is the same? What is different?

Compare and order non-unit fractions

Reasoning and problem solving

Alex is ordering fractions.

She has spilt ink on her work.

$$\frac{2}{7} < \frac{\square}{7} < 1$$

What could the missing numerator be?

What could the missing numerator **not** be?

Explain your answers.

3, 4, 5, 6

1, 7

Write <, > or = to compare the fractions.

$$\frac{4}{4} \bigcirc \frac{10}{10}$$

Explain your answer.

=

Write the fractions in order, starting with the smallest fraction.

$\frac{1}{7}$ $\frac{2}{3}$ $\frac{1}{3}$

Explain your answer.

$\frac{1}{7}, \frac{1}{3}, \frac{2}{3}$

$\frac{3}{8}$ 1 $\frac{1}{8}$

Which is the greatest fraction?

Which is the smallest fraction?

Explain your answer.

1

$\frac{1}{8}$

Fractions and scales

Notes and guidance

In this small step, children apply the learning from previous steps to explore real-life contexts of measure by interpreting scales.

Children use their understanding of numerators and denominators to determine how many equal parts a scale has been split into, and then what fraction is shown. This is covered in contexts such as mass, volume and length. A small range of fractions is explored, focusing on quarters, halves and thirds, and the whole is always 1, for example 1 metre, 1 litre, 1 kilogram. Children do not need to convert between units, and should record all amounts as fractions, for example $\frac{1}{2}$ metre rather than 50 cm.

Things to look out for

- Children may count the number of lines on a scale rather than thinking about the number of equal sections, resulting in incorrect denominators.
- The size of scales or a container can confuse children. For example, they may think that the capacity of a taller jug must be greater than that of a shorter jug.
- Children may only be familiar with seeing whole parts shaded, so may find some scales challenging, as they often involve an arrow pointing to a specific point on a scale.

Key questions

- Where does the scale start/end?
- How many equal parts are there? What is the denominator of the fraction?
- How far along the scale is the arrow/water? What is the numerator of the fraction?
- What are you measuring? What unit is it measured in?
- Does the height of the container/scale matter?

Possible sentence stems

- The scale has been split into _____ equal parts.
- The arrow is pointing to/water is at the _____ mark.
- The fraction shown is $\frac{\square}{\square}$

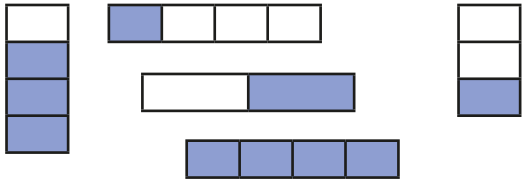
National Curriculum links

- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

Fractions and scales

Key learning

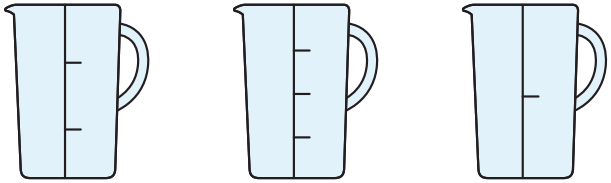
- What fraction of each shape is shaded?



- Whitney is using different metre sticks to measure the lengths of lines.

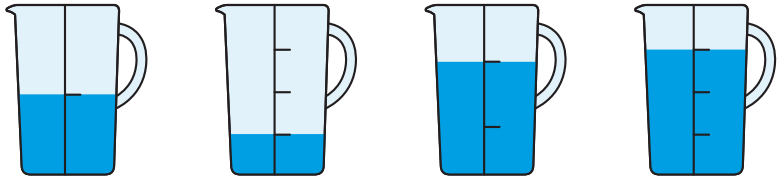
  What fraction of a metre is each line?

- How many equal parts has each jug's scale been split into?



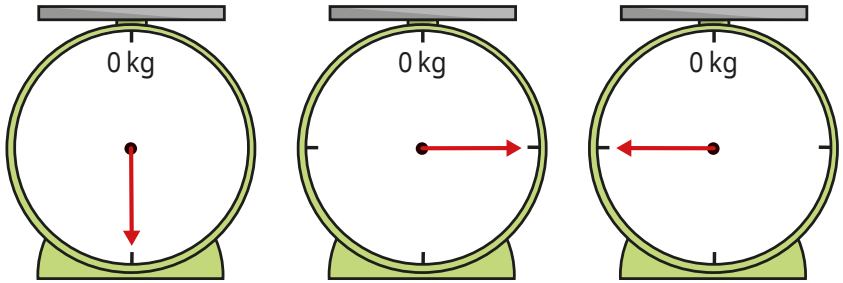
- Each jug has a capacity of 1 litre.

  What fraction of a litre of water is in each jug?



- The weighing scales measure up to 1 kg.

  What fraction of a kilogram is shown on each scale?



- Write the masses in order, starting with the greatest mass.

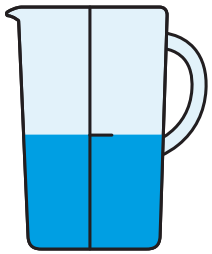
$\frac{1}{3}$ kg	$\frac{3}{3}$ kg	$\frac{1}{2}$ kg	$\frac{1}{4}$ kg

Fractions and scales

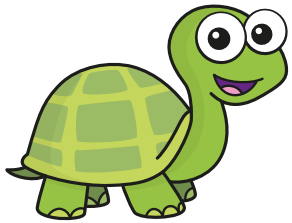
Reasoning and problem solving

The capacity of each jug is 1 litre.

jug A



jug B



Do you agree with Tiny?

Explain your answer.

No

Some children are measuring the mass of different objects.

Ron

The mass of a box is $\frac{1}{2}$ kg.

The mass of a bag is $\frac{1}{4}$ kg.

Jo

Mo

A bucket is heavier than the bag, but lighter than the box.

What could the mass of the bucket be?

multiple possible answers, e.g. $\frac{1}{3}$ kg

Fractions on a number line

Notes and guidance

Building on the work on scales, in this small step children explore how fractions can be represented on a number line. They have seen some examples of this earlier in the block, where bar models were used above number lines for support, but here they focus on number lines explicitly.

Children identify how many equal parts a number line has been split into. A common error here is counting the number of dividing lines rather than the number of intervals. Once children are confident identifying the number of intervals, they label each one with a fraction. For example, on a number line split into five equal parts, each interval is worth one fifth. At this point, children do not need to count up in fractions (for example, $\frac{1}{5}, \frac{2}{5}, \frac{3}{5}$ ...), as this comes in the next step; they just need to label each interval as a unit fraction.

Things to look out for

- Children may count the number of divisions on the number line, rather than the number of intervals.
- Children may struggle to draw number lines with accurate intervals, so it is important to allow plenty of practice on this key skill.

Key questions

- What is an interval?
- Are all the intervals equal?
- How do you count the number of intervals?
- Why can you not just count the markers on the number line?
- What is the same and what is different about the number lines?
- What fraction of the whole number line is each interval worth?
- When marking intervals on a number line, where is a helpful place to start?

Possible sentence stems

- The number line has been split into _____ equal parts.
- Each interval is worth $\frac{1}{\square}$

National Curriculum links

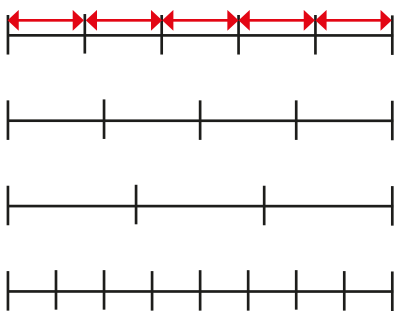
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators

Fractions on a number line

Key learning

- How many equal parts are shown on each number line?

  Kim has completed the first example.



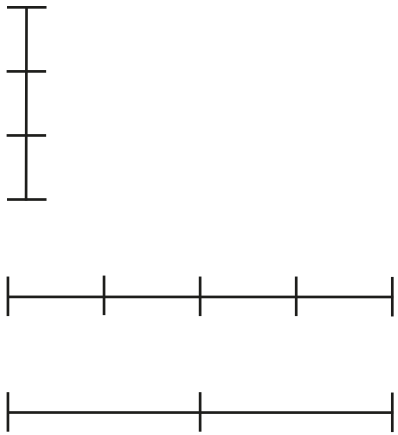
5 parts

_____ parts

_____ parts

_____ parts

- Match the number lines to the number of intervals.



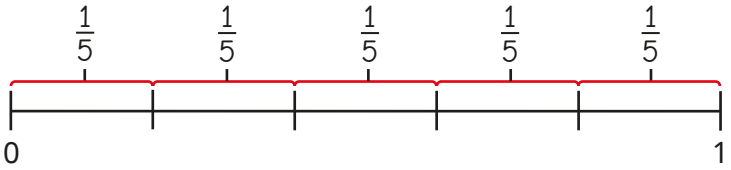
5

3

2

4

- Brett labels a number line to show fractions.

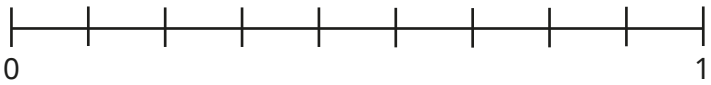


Complete the sentences.

The number line has been split into _____ equal parts.

Each interval is worth $\frac{\square}{\square}$

- Complete the number line and sentences.



The number line has been split into _____ equal parts.

Each interval is worth $\frac{\square}{\square}$

- Draw number lines split into the number of equal parts.
  - 2 parts
  - 4 parts
  - 3 parts
  - 8 parts

Which number lines were easiest to draw? Which were hardest?

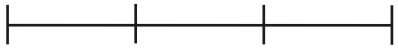
What fraction is each interval worth? Label your number lines.

Fractions on a number line

Reasoning and problem solving

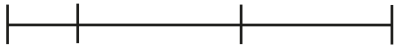
Which number line is the odd one out?

A



B

C



D

E

Explain your reasons.

multiple possible answers, e.g.

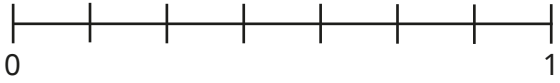
E is the only vertical number line.

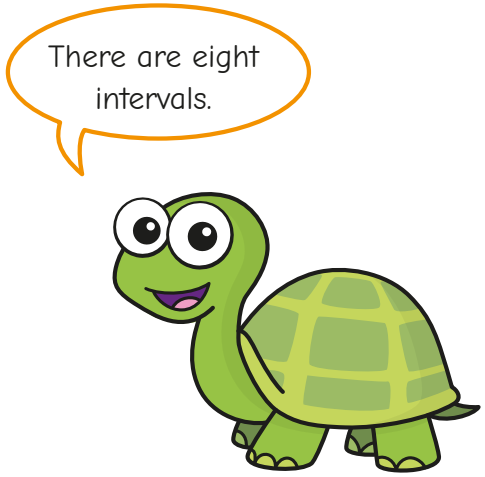
B is shorter than the other lines.

D has 4 intervals.

C has unequal parts.

Tiny is working out how many intervals there are on the number line.





Do you agree with Tiny?

Explain your reasons.

No

Count in fractions on a number line

Notes and guidance

In this small step, children build on their understanding from the previous two steps to count fractions on a number line.

Children count both forwards and backwards in fractions and use this to support them in labelling missing fractions on a number line. None of the fractions that children see in this step exceed 1 whole. Particular attention should be drawn to the fact that these number lines always begin at zero, as a common error is to begin the count at $\frac{1}{\square}$ on the first division. It is important to explore with children how they can label the end point of the number lines in two ways: as 1 or as a fraction where the numerator is equal to the denominator. When confident with labelling number lines, children may begin to estimate the positions of fractions on a blank number line.

Things to look out for

- Children may count the number of divisions rather than the number of intervals, resulting in an incorrect denominator.
- Children may struggle to recognise fractions on a number line, even if they are confident showing fractions as part of a whole in other representations.

Key questions

- What fraction comes next in the count? How do you know?
- What fraction comes before _____? How do you know?
- What do you notice about the start of each number line?
- What do you notice about the end of each number line?
- What is the denominator going to be? How do you know?
- Which fraction is easiest/hardest to estimate? Why?

Possible sentence stems

- The number line starts at _____ and ends at _____
- The number line has been split into _____ equal parts.

  This means that the number line is counting in $\frac{\square}{\square}$s.
- $\frac{\square}{\square}$ is greater/less than $\frac{1}{2}$ so $\frac{\square}{\square}$ will be to the right/left of halfway on the number line.

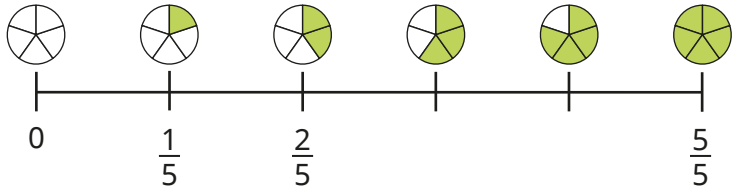
National Curriculum links

- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators

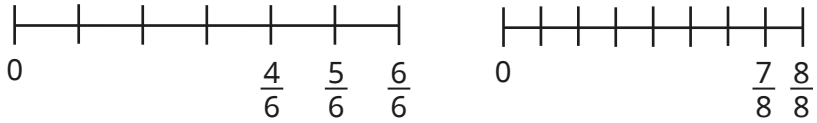
Count in fractions on a number line

Key learning

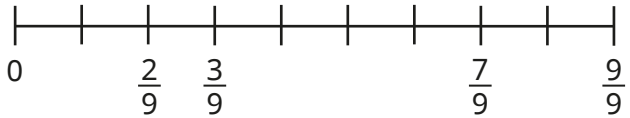
- Count forwards to complete the number lines.



- Count backwards to complete the number lines.

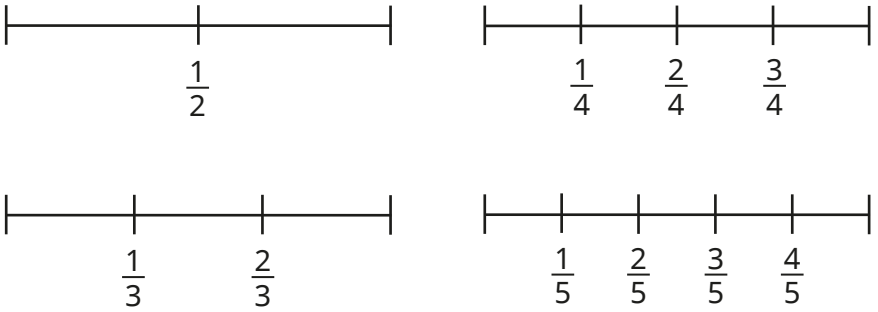


- Fill in the missing fractions.



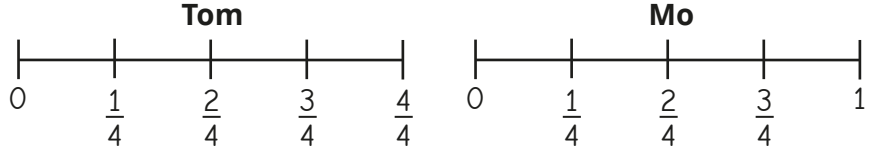
How did you work out each missing fraction?

- Complete the number lines.



What do you notice?

- Tom and Mo have both correctly labelled the same number line.



What is the same about their number lines? What is different?

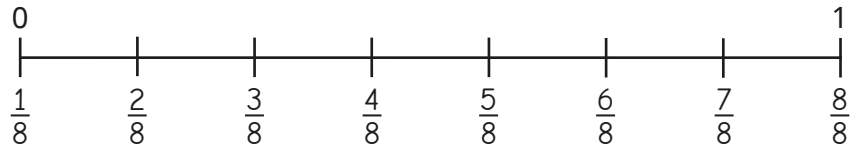
- Draw a number line counting in sixths.

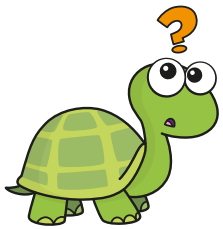
Label each interval.

Count in fractions on a number line

Reasoning and problem solving

Tiny is labelling fractions on a number line from 0 to 1



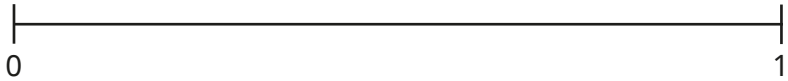


What mistake has Tiny made?

What should the labels be?

Estimate where the fractions belong on the number line.

$\frac{1}{3}$ $\frac{3}{4}$ $\frac{1}{2}$ $\frac{8}{9}$ $\frac{13}{13}$

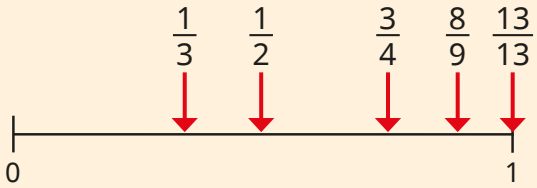


How did you decide?

Talk about it with a partner.

Tiny has counted the number of divisions rather than the number of intervals.

0, $\frac{1}{7}$, $\frac{2}{7}$, $\frac{3}{7}$, $\frac{4}{7}$, $\frac{5}{7}$, $\frac{6}{7}$, $\frac{7}{7}$ (or 1)



Equivalent fractions on a number line

Notes and guidance

In this small step, children explore finding equivalent fractions by comparing multiple number lines and using double number lines.

The focus of this step is on using number lines to find equivalent fractions by looking at fractions that are in line with each other (equal in value), rather than more abstract methods using multiplicative reasoning. A common mistake with this method is drawing bars of unequal length. To avoid this potential error, it can be useful to reinforce one of the key learning points from previous steps: when the numerator and denominator are equal, the fraction can also be shown as 1. Therefore, when drawing multiple number lines to find equivalent fractions, the start and end points (0 and 1) must always be in line with each other.

Children also compare multiple number lines to find families of equivalent fractions, looking for patterns and relationships.

Things to look out for

- If number lines are not drawn so that they are equal in length, then equivalent fractions will not be easy to see.
- Children may need support drawing and labelling number lines accurately.

Key questions

- What other word does "equivalent" remind you of?
- What are equivalent fractions?
- What are the start and end numbers of each number line?
- Which fractions are in line with _____?
- How do you know _____ is equivalent to _____?
- When drawing number lines to show equivalent fractions, why is it important that your number lines are equal in length?
- What do you notice about the numerators and denominators of the fractions that are equivalent to $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ ...?

Possible sentence stems

- The number lines start at _____ and end at _____
- I know _____ is equivalent to _____ because ...

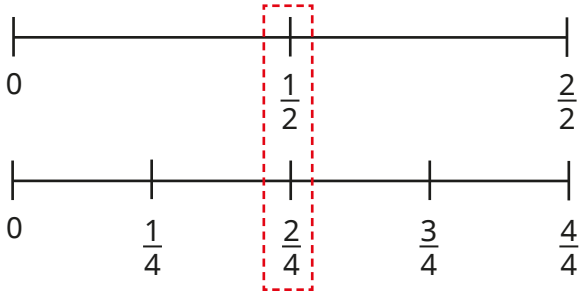
National Curriculum links

- 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

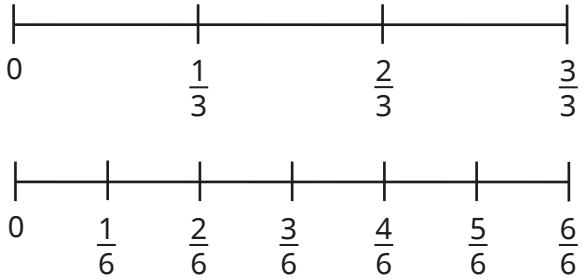
Equivalent fractions on a number line

Key learning

- The number lines show that $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions.



Use these number lines to find a pair of equivalent fractions.

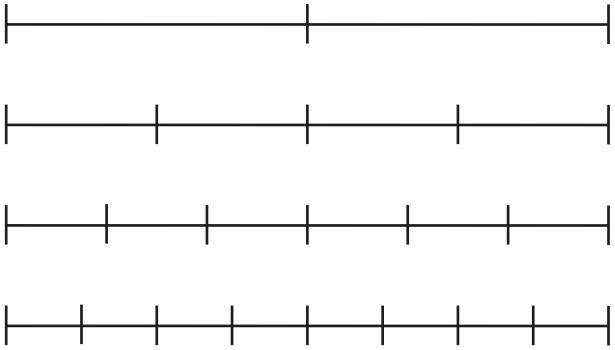


Have you got the same pair of fractions as your partner?

- Draw number lines to complete the equivalent fractions.

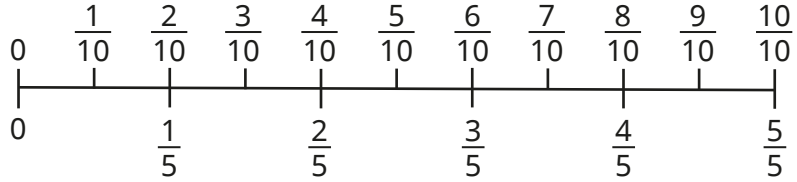
▶ $\frac{\square}{4} = \frac{2}{8}$ ▶ $\frac{2}{4} = \frac{\square}{8}$ ▶ $\frac{\square}{\square} = \frac{6}{8}$ ▶ $\frac{4}{4} = \frac{\square}{\square} = 1$

- Label the number lines with the correct fractions.



What equivalent fractions can you find?

- Use the double number line to complete the equivalent fractions.



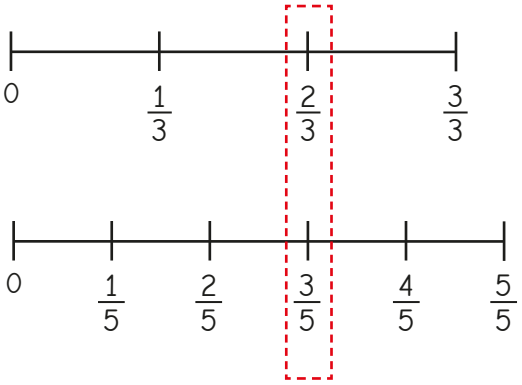
▶ $\frac{3}{5} = \frac{\square}{10}$ ▶ $\frac{\square}{5} = \frac{4}{10}$ ▶ $\frac{1}{5} = \frac{\square}{\square}$

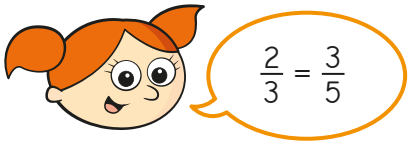
▶ $\frac{8}{\square} = \frac{4}{\square}$ ▶ $\frac{\square}{5} = \frac{\square}{10} = 1$

Equivalent fractions on a number line

Reasoning and problem solving

Alex is drawing number lines to find equivalent fractions.



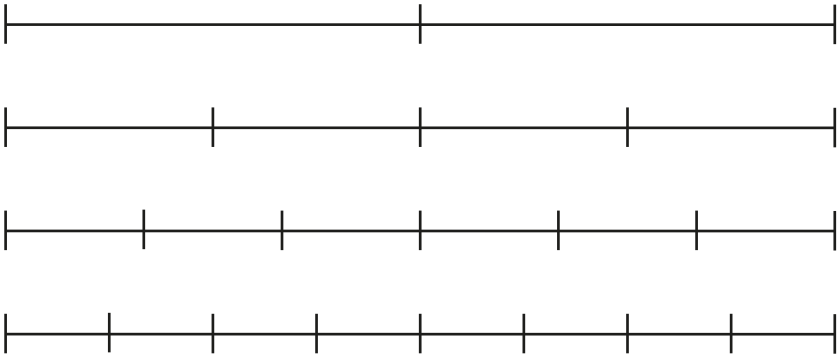


Do you agree with Alex?

Explain your reasons.

No

Use the number lines to complete the equivalent fractions.



$$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{6} = \frac{\square}{8}$$

What do you notice?

Draw a number line or other diagram to help you complete the equivalent fraction.

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

2, 3, 4 | 5

Equivalent fractions as bar models

Notes and guidance

In this small step, children deepen their understanding by exploring bar models as another way of representing equivalent fractions.

Children begin by comparing two bar models of equal length divided into different amounts to identify any equivalent fractions. As with the previous step, a common mistake here is drawing bar models of unequal length. Once confident, children progress to comparing multiple bar models to find families of equivalent fractions, again exploring any patterns.

Another strategy for finding equivalent fractions is to use a single bar model and to break up each of the existing parts into smaller ones. A common error is not splitting the existing parts into the same number of smaller equal parts, so this key point must be stressed.

Children may find folding strips of paper useful in supporting their understanding of bar models.

Things to look out for

- If bar models are not drawn so that they are equal in length, then equivalent fractions will not be easy to see.
- Children may need support drawing bar models accurately.

Key questions

- What are equivalent fractions?
- What does each whole bar model show?
- How many equal parts has the bar model been split into? What fraction does this show?
- How do you know _____ is equivalent to _____?
- When drawing bar models to find equivalent fractions, why do the bar models have to be the same length?
- How can splitting each part of the bar model into the same number of smaller parts help you to find equivalent fractions?

Possible sentence stems

- The bar model is split into _____ equal parts.

  The bar model shows _____
- I know _____ is equivalent to _____ because ...

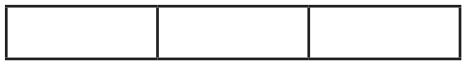
National Curriculum links

- 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

Equivalent fractions as bar models

Key learning

- Shade $\frac{1}{3}$ of the bar model.



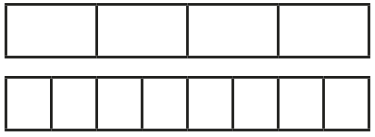
Shade $\frac{2}{6}$ of the bar model.

What do you notice?

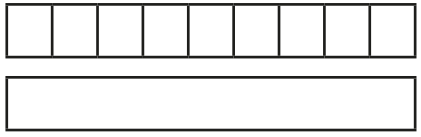
Complete the sentence. $\frac{\square}{\square}$ is equivalent to $\frac{\square}{\square}$

Use the same bar models to find another pair of equivalent fractions.

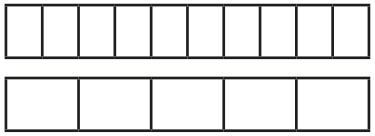
- Use the bar models to find the equivalent fractions.



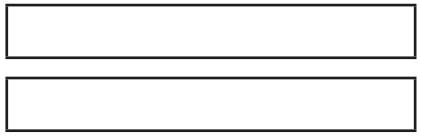
$\frac{1}{4} = \frac{\square}{8}$



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

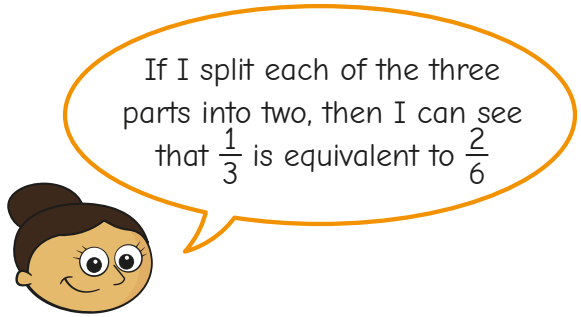


$\frac{8}{10} = \frac{\square}{\square}$

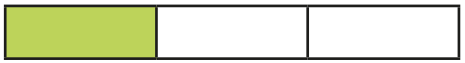


$\frac{3}{4} = \frac{\square}{12}$

- Dora is finding equivalent fractions to $\frac{1}{3}$

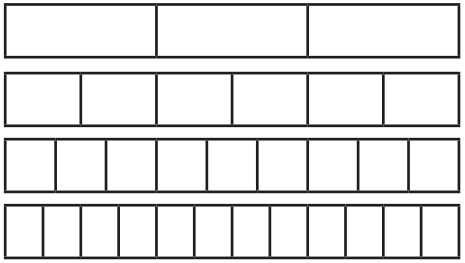


Split each part of this bar model into three equal parts and complete the equivalent fraction.



$\frac{1}{3} = \frac{\square}{9}$

- Use the bar models to find the equivalent fractions.

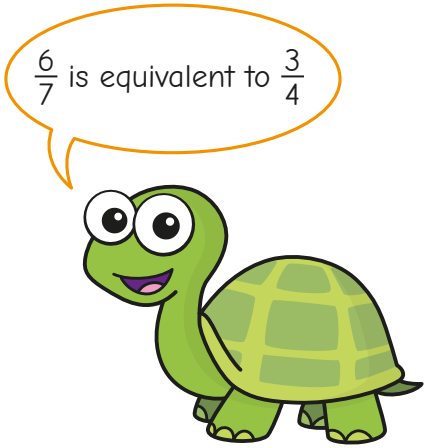


$\frac{2}{3} = \frac{\square}{6} = \frac{6}{\square} = \frac{\square}{\square}$

Equivalent fractions as bar models

Reasoning and problem solving

Tiny is finding equivalent fractions to $\frac{3}{4}$



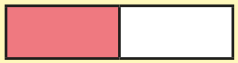
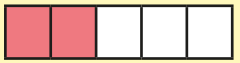
Do you agree with Tiny?

Explain your reasons.

No

Sort the fraction cards into the table.

$\frac{4}{10}$	$\frac{4}{6}$	$\frac{4}{8}$	$\frac{3}{6}$	$\frac{6}{15}$	$\frac{6}{9}$	$\frac{8}{12}$	$\frac{5}{10}$

Equivalent to $\frac{1}{2}$	Equivalent to $\frac{2}{3}$	Equivalent to $\frac{2}{5}$
		

How did you do it?

$\frac{1}{2}$: $\frac{4}{8}$, $\frac{3}{6}$, $\frac{5}{10}$ $\frac{2}{3}$: $\frac{4}{6}$, $\frac{6}{9}$, $\frac{8}{12}$ $\frac{2}{5}$: $\frac{4}{10}$, $\frac{6}{15}$