Spring Block 3

Fractions

White Rose MATHS

Small steps

Step 1	Understand the whole
Step 2	Count beyond 1
Step 3	Partition a mixed number
Step 4	Number lines with mixed numbers
Step 5	Compare and order mixed numbers
Step 6	Understand improper fractions
Step 7	Convert mixed numbers to improper fractions
Step 8	Convert improper fractions to mixed numbers

Small steps

Step 9	Equivalent fractions on a number line
Step 10	Equivalent fraction families
Step 11	Add two or more fractions
Step 12	Add fractions and mixed numbers
Step 13	Subtract two fractions
Step 14	Subtract from whole amounts
Step 15	Subtract from mixed numbers

Understand the whole

Notes and guidance

Children begin this block by understanding the whole. They covered this in Year 3, but may need to recap the part-whole relationship of fractions.

Children use diagrams to identify how many equal parts a shape has been split into and move on to thinking about how many more parts are needed to make the whole. They use the denominator to identify how many equal parts a whole has been divided into. For example, for the fraction $\frac{3}{7}$, the whole has been split into 7 equal parts because the denominator is 7. Children explain whether a fraction is a small (for example, $\frac{1}{10}$) or large (for example, $\frac{9}{10}$) part of the whole.

The learning from this step will be built upon when looking at fractions greater than 1 and also decimals later in the year.

Things to look out for

- Children may not be able to identify or explain whether a fraction is a large or small part of the whole.
- When trying to identify how many equal parts the whole has been divided into, some children may be reliant on diagrams rather than using the denominator.

Key questions

- Has the whole been divided into equal parts? How do you know?
- In this diagram, how many equal parts has the whole been divided into?
- How many equal parts has the whole been divided into for $\frac{1}{5}$?
- Is this a large or small part of the whole? How do you know?
- How many more parts are needed to make the whole? What fraction would this be?

Possible sentence stems

- The whole has been divided into _____ equal parts.
- _____ has been shaded.

  To make 1 whole, I need to shade _____ equal parts.

  This is _____

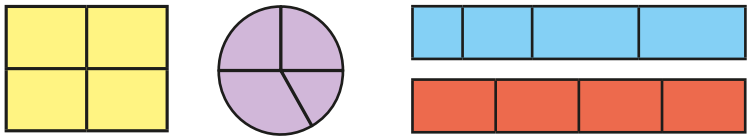
National Curriculum links

- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators (Y3)

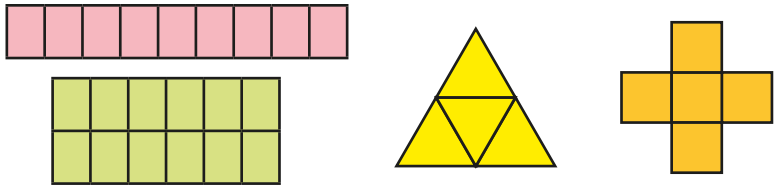
Understand the whole

Key learning

- Which shapes have been split into equal parts?



- Complete the sentences for each shape.



The whole is divided into _____ equal parts.

Each part is worth $\frac{1}{\square}$

- What fraction of each diagram is shaded in each colour?

▸

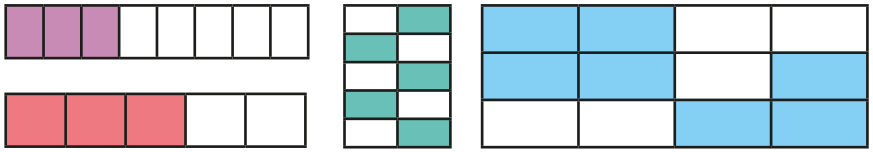
Y	Y	B	B	B	B	G

▸

Y	Y	Y	B	G	G	G	G	G

What fraction of each diagram represents the whole?

- Shade the shapes to make one whole.



Complete the sentences for each diagram.

To make 1 whole, I shaded _____ equal parts.

The fraction I shaded was _____

- Complete the additions.

▸ $\frac{3}{4} + \frac{\square}{\square} = 1$ ▸ $\frac{3}{7} + \frac{\square}{\square} = 1$ ▸ $1 = \frac{\square}{\square} + \frac{3}{10}$

- Use the information in the table to draw each whole.

1 part	Number of parts in the whole
	5
	4
	3

Is there more than one answer?

Understand the whole

Reasoning and problem solving

Sort the fractions into the table.

$\frac{3}{100}$ $\frac{3}{4}$ $\frac{3}{5}$

$\frac{3}{50}$ $\frac{17}{20}$ $\frac{7}{20}$

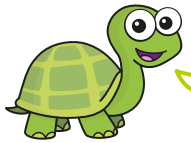
Fractions that are a small part of the whole	Fractions that are a large part of the whole

Explain your choices.

What do you notice about the fractions?

small: $\frac{3}{100}$, $\frac{3}{50}$, $\frac{7}{20}$

large: $\frac{3}{4}$, $\frac{3}{5}$, $\frac{17}{20}$



If I split a shape into 4 parts, I have split it into quarters.

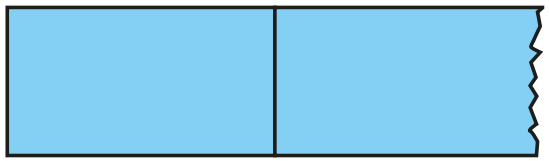
Is Tiny's statement always true, sometimes true or never true?

How do you know?

sometimes true

Filip splits a piece of ribbon into equal parts.

Here is part of his ribbon.



What fraction of the ribbon could the other part be?

multiple possible answers, with the denominator 2 greater than the numerator, e.g.

$\frac{2}{4}$, $\frac{5}{7}$, $\frac{98}{100}$

Count beyond 1

Notes and guidance

In this small step, children build on their knowledge of the whole to explore fractions greater than 1

In Year 3, children counted forwards and backwards in fractions within 1 and this is now extended to fractions greater than 1. Number lines are a useful representation, particularly alongside other pictorial representations such as bar models, to support children in counting in fractions. Children first count in unit fractions, using their knowledge that a fraction with the same numerator and denominator can be written as 1. Once comfortable counting forwards and backwards in unit fractions across whole number boundaries, they count in non-unit fractions.

In this step, children count in mixed numbers only, as improper fractions are covered later in the block. It is vital, therefore, that children are secure with the fact that when the numerator is equal to the denominator then the fraction is equivalent to 1

Things to look out for

- Children may think that fractions must be less than 1
- When crossing a whole number, particularly when counting in non-unit fractions, children may miscount, either stopping at the whole number or ignoring it, for example $\frac{4}{6}, \frac{5}{6}, 1\frac{1}{6}$

Key questions

- What fraction comes next after $\frac{4}{7}, \frac{5}{7}, \frac{6}{7}$? How do you know?
- What fraction comes before _____? How do you know?
- What do you know about a fraction with the same numerator and denominator?
- What is 1 whole plus another $\frac{1}{3}$?
  How could you draw that as a bar model?
- What is 3 and $\frac{5}{5}$ the same as?
- What is the sequence counting forwards/backwards in?

Possible sentence stems

- There are _____ _____s in 1
- The sequence is counting forwards/backwards in _____s.

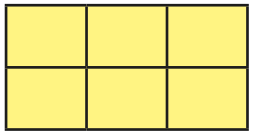
National Curriculum links

- This small step is not taken from the Year 4 National Curriculum. It is included to take into account the non-statutory DfE Ready to Progress guidance.

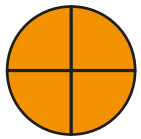
Count beyond 1

Key learning

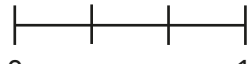
- Fill in the missing numbers.



$\frac{6}{6} =$ _____

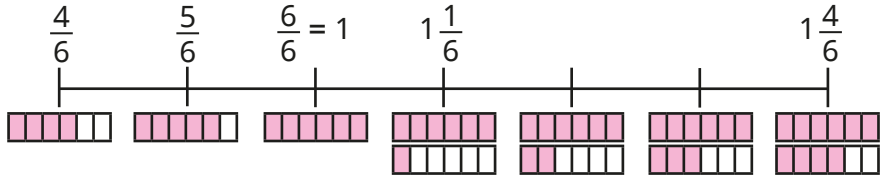


$\frac{\square}{4} = 1$

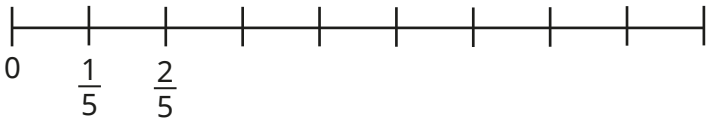


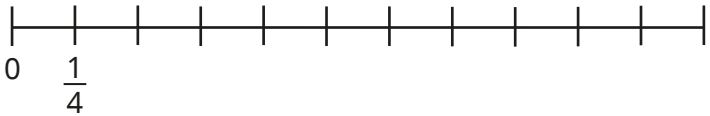
$\frac{3}{\square} = 1$

- Complete the number line, counting in sixths.

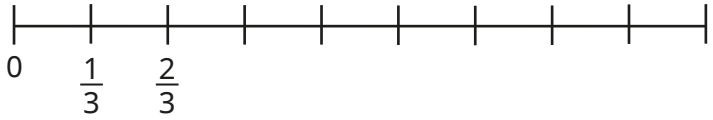


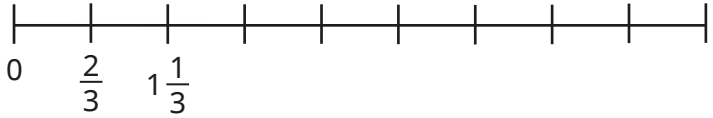
- Complete the number lines.





Complete the number lines.





What is the same about the number lines?

What is different?

- Complete the number tracks.

$\frac{5}{7}$	$\frac{6}{7}$			$1\frac{2}{7}$
$1\frac{3}{5}$	$1\frac{2}{5}$			
$2\frac{2}{4}$	$2\frac{3}{4}$			

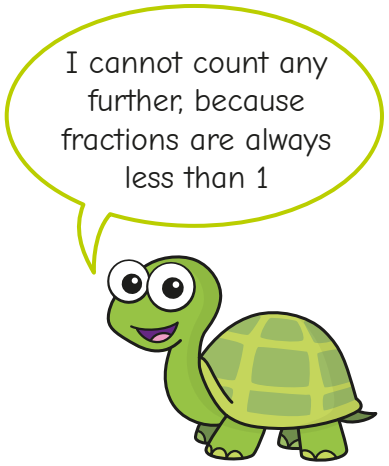
$6\frac{1}{2}$	6			
$2\frac{1}{9}$	$2\frac{4}{9}$			
$1\frac{3}{5}$	$1\frac{1}{5}$			

Count beyond 1

Reasoning and problem solving

Tiny is counting in fifths.

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

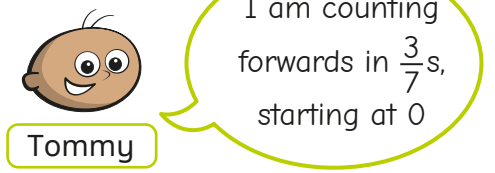


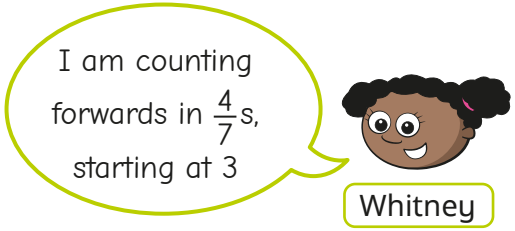
Do you agree with Tiny?

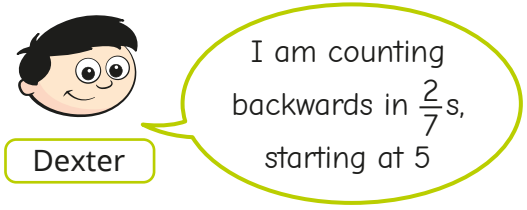
Explain your answer.

No

Tommy, Whitney and Dexter are counting forwards and backwards.







What number will all three children say?

$4\frac{5}{7}$

Partition a mixed number

Notes and guidance

In this small step, children further develop their understanding of mixed numbers.

Children explore partitioning mixed numbers in different ways – a skill that will be vital for later steps in this block. The key focus is to ensure that children can confidently partition a mixed number into its whole and fractional parts. Part-whole models and bar models are key representations that allow children to see how a mixed number is being partitioned. Once confident with this form of partitioning, children partition a mixed number into a whole number and a mixed number (for example, $3\frac{1}{4} = 2 + 1\frac{1}{4}$) or a mixed number and a fraction (for example, $2\frac{3}{4} = 2\frac{1}{4} + \frac{2}{4}$).

Things to look out for

- Children may mistake mixed numbers for improper fractions, particularly if their presentation is not clear, for example mistaking $2\frac{3}{4}$ for $\frac{23}{4}$
- Children need to be secure in the fact that all whole numbers can be made up of fractions, for example 1 whole = $\frac{3}{3}$
- Children may be less confident with non-standard partitions, for example $2\frac{3}{4} = 2\frac{1}{4} + \frac{2}{4}$

Key questions

- What is a mixed number?
- What does each part of a mixed number represent?
- How many wholes are there in the mixed number _____?
- What is the fractional part of _____?
- How can you partition the mixed number into wholes and a fraction?
- How many other ways could you partition the mixed number?

Possible sentence stems

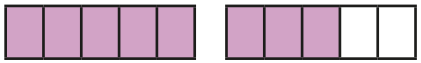
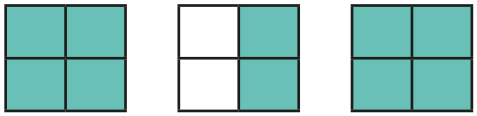
- There are _____ wholes.
- There are $\frac{\square}{\square}$
- The mixed number is _____ $\frac{\square}{\square}$
- _____ can be partitioned into _____ wholes and $\frac{\square}{\square}$

National Curriculum links

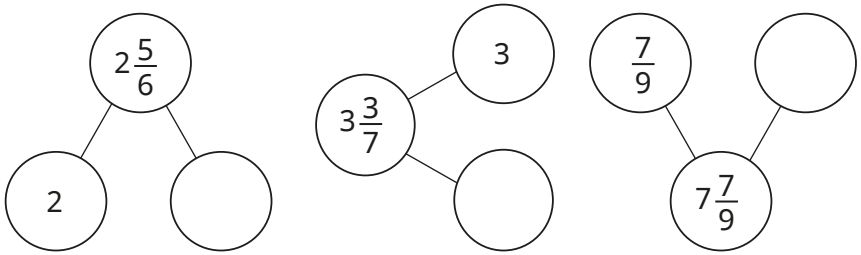
- This small step is not taken from the Year 4 National Curriculum. It is included to take into account the non-statutory DfE Ready to Progress guidance.

Partition a mixed number

Key learning

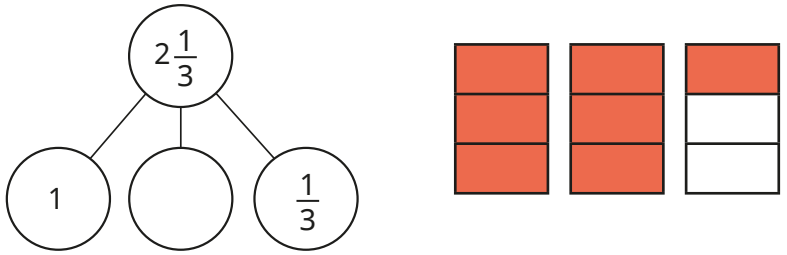
- What mixed number is shown in each diagram?
  - 
  - 
  - 

- Complete the part-whole models to show the wholes and fractions in the mixed numbers.

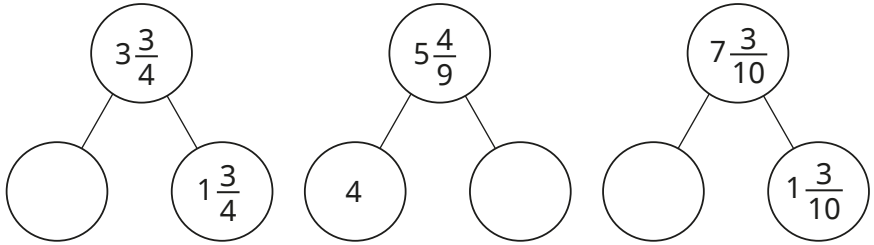


- Fill in the missing wholes and fractions.
  - $4\frac{4}{5} = 4 + \frac{\square}{\square}$
  - $9\frac{5}{6} = \_\_\_\_ + \frac{5}{6}$
  - $6\frac{3}{10} = \_\_\_\_ + \frac{\square}{\square}$

- Use the diagram to help you complete the part-whole model.



- Complete the part-whole models.



- Fill in the missing numbers.
  - $4\frac{4}{5} = 4\frac{1}{5} + \frac{\square}{\square}$
  - $4\frac{4}{5} = 4\frac{2}{5} + \frac{\square}{\square}$
  - $4\frac{4}{5} = 4\frac{\square}{5} + \frac{1}{5}$
  - $2\frac{6}{7} = 2\frac{1}{7} + \frac{\square}{\square}$
  - $2\frac{6}{7} = 2\frac{3}{7} + \frac{\square}{\square}$
  - $2\frac{6}{7} = \_\_\_\_\frac{4}{7} + \frac{\square}{\square}$

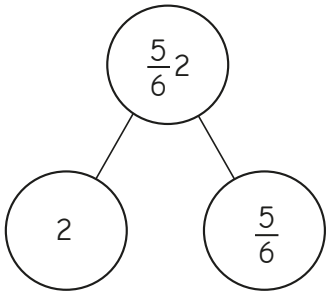
- Partition $3\frac{2}{3}$ in as many different ways as you can.

Partition a mixed number

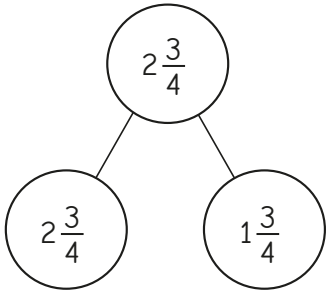
Reasoning and problem solving

Tiny has drawn some part-whole models of mixed numbers.

A



B



What mistakes has Tiny made?

Correct the mistakes.

A: $2\frac{5}{6}$ in whole

B: either

2 and $\frac{3}{4}$

or

1 and $1\frac{3}{4}$

in the parts

Use the digit cards to complete the statements.

You can use each card once only.

1	2	3	4
5	6	7	8

A $6\frac{7}{9} = \square + \frac{\square}{9}$

B $6\frac{7}{9} = \square\frac{\square}{9} + \frac{\square}{9}$

Find all the possible solutions.

four possible solutions for each:

A: 1, 5 and 7

5, 1 and 7

4, 2 and 7

2, 4 and 7

B: 6, 3 and 4

6, 4 and 3

6, 5 and 2

6, 2 and 5

Number lines with mixed numbers

Notes and guidance

In this small step, children build on their learning from Step 2 in this block, developing a deeper understanding of how mixed numbers are represented on a number line.

Children label the fractions on any given number line by identifying the number of intervals between each of the whole numbers. A common mistake is counting the number of divisions between consecutive integers. For example, a number line split into quarters has three dividing lines between each integer, so children may conclude that the number line is counting in thirds.

Children estimate the positions of mixed numbers on blank number lines. To support this, it is important that children understand which integer a mixed number is closer to, and the mixed number's relationship to the point halfway between the two wholes either side of it.

Things to look out for

- Children may incorrectly count the number of intervals when working out what fraction the number line is counting in.
- Children may struggle to estimate on a number line if they are not secure in their knowledge of which whole a fraction is closer to.

Key questions

- On the number line, how many intervals are there between these two consecutive whole numbers, _____ and _____?
- What is each interval worth on the number line?
- Is it more efficient to count on from the previous whole number or back from the next whole number when labelling _____?
- What is the whole number before and after _____?
- Is _____ closer to the previous or the next whole number? How do you know?

Possible sentence stems

- The difference between the start and end of the number line is _____

  There are _____ intervals.

  Each interval is worth _____
- _____ $\frac{\square}{\square}$ is closer to _____ than _____

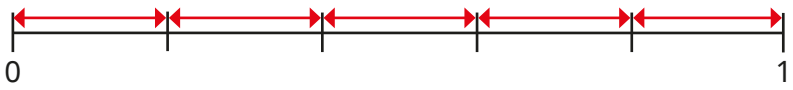
National Curriculum links

- This small step is not taken from the Year 4 National Curriculum. It is included to take into account the non-statutory DfE Ready to Progress guidance.

Number lines with mixed numbers

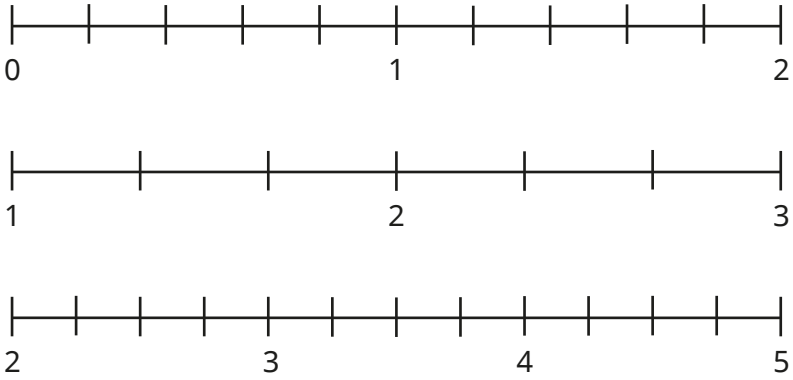
Key learning

- What is the number line counting up in?



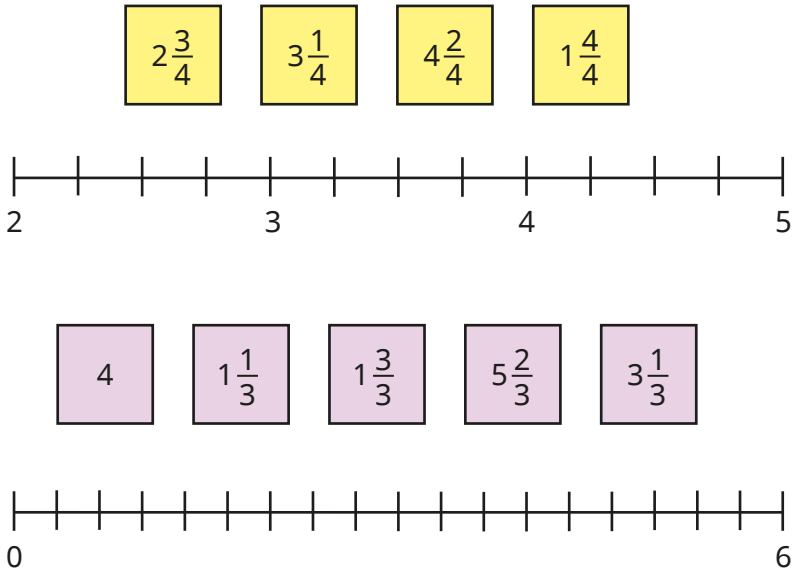
How do you know?

- Complete the number lines.

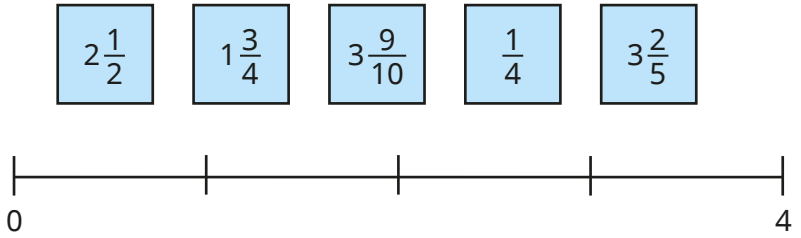


- What number is each arrow pointing to?

- Label the numbers on the number lines.



- Draw arrows to estimate the positions of the numbers on the number line.

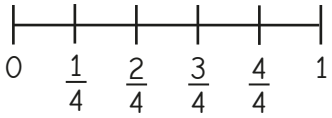


Number lines with mixed numbers

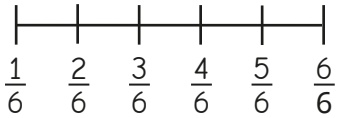
Reasoning and problem solving

Four children are labelling a blank number line that starts at zero.

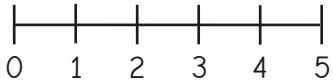
Aisha



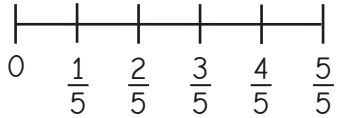
Scott



Tom



Esther



Who could be correct?

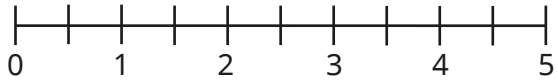
Who **cannot** be correct?

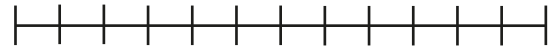
Talk about it with a partner.

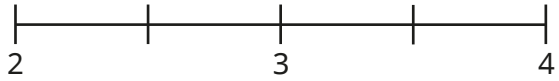
Tom and Esther could be correct.

Aisha and Scott cannot be correct.

Draw arrows to estimate the position of $2\frac{5}{6}$ on each number line.







Which number line did you find easiest/hardest to estimate on?

Why?

arrow in the correct place on each number line

Compare and order mixed numbers

Notes and guidance

In this small step, children compare and order mixed numbers.

Before comparing mixed numbers, it may be appropriate to compare proper fractions to revise the understanding that, when the denominators are the same, the greater the numerator, the greater the fraction. Diagrams, bar models and number lines are effective tools when comparing fractions and mixed numbers.

Children compare mixed numbers where the whole number is different, recognising that the greater the whole number, the greater the mixed number. They then compare mixed numbers where the whole number is the same.

Once children are secure in comparing mixed numbers, they can move on to putting them in order.

Things to look out for

- Children may not be secure in their understanding of how to compare proper fractions.
- Some children may compare the fraction first rather than the whole number, for example $2\frac{4}{5} > 3\frac{1}{5}$ because $\frac{4}{5} > \frac{1}{5}$
- If children are not confident in counting in fractions on a number line, they may find it difficult to place and compare fractions using this representation.

Key questions

- How is comparing mixed numbers similar to comparing proper fractions? How is it different?
- Are the whole numbers the same?
- Which is the greater whole number?
- If the whole numbers are the same, what do you need to compare?
- Which is the greater fraction? How do you know?
- How do you know the mixed numbers are in order?

Possible sentence stems

- First, I will compare the _____

  If they are the same, I will compare the _____
- If the denominator is the same, the _____ the numerator, the _____ the fraction.

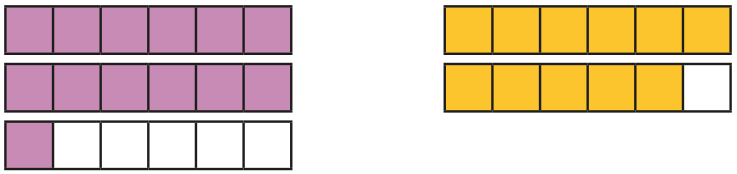
National Curriculum links

- This small step is not taken from the Year 4 National Curriculum. It is included to take into account the non-statutory DfE Ready to Progress guidance.

Compare and order mixed numbers

Key learning

- Which fraction is greater, $2\frac{1}{6}$ or $1\frac{5}{6}$?

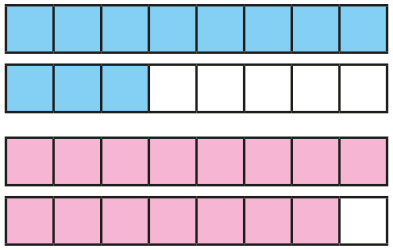


How do you know?

- Draw bar models to help you compare the mixed numbers.

$1\frac{3}{4}$ ◯ $2\frac{1}{4}$ $4\frac{1}{2}$ ◯ $2\frac{1}{2}$ $3\frac{3}{8}$ ◯ $1\frac{7}{9}$

- Write < or > to compare the mixed numbers.



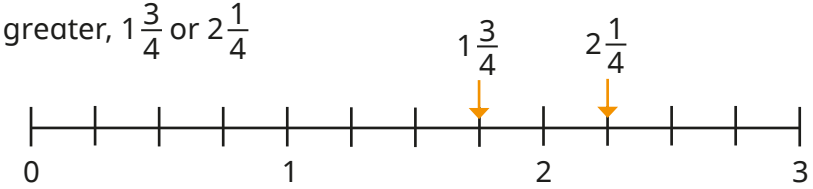
$1\frac{3}{8}$ ◯ $1\frac{7}{8}$

- Write < or > to compare the mixed numbers.

You can draw bar models to help you.

$2\frac{1}{3}$ ◯ $2\frac{2}{3}$ $2\frac{7}{10}$ ◯ $2\frac{1}{10}$

- Use the number line to decide which mixed number is greater, $1\frac{3}{4}$ or $2\frac{1}{4}$



- Draw a number line to help compare the mixed numbers.

$2\frac{2}{5}$ ◯ $2\frac{4}{5}$ $1\frac{5}{7}$ ◯ $1\frac{2}{7}$

- Mo is comparing mixed numbers.

I compare the wholes and then the fractions.

$1 = 1$

$\frac{3}{8} < \frac{5}{8}$

So $1\frac{3}{8} < 1\frac{5}{8}$

Use Mo's method to compare the mixed numbers.

$2\frac{3}{5}$ ◯ $2\frac{4}{5}$ $1\frac{3}{5}$ ◯ $2\frac{3}{5}$ $5\frac{7}{10}$ ◯ $5\frac{1}{10}$

- Put the mixed numbers in order, starting with the smallest.

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

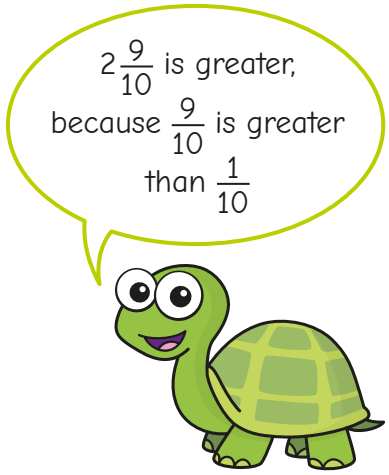
$15\frac{4}{7}$, $15\frac{6}{7}$, $15\frac{3}{7}$, $16\frac{1}{7}$, $15\frac{1}{7}$

Compare and order mixed numbers

Reasoning and problem solving

Tiny is comparing mixed numbers.

$3\frac{1}{10} < 2\frac{9}{10}$



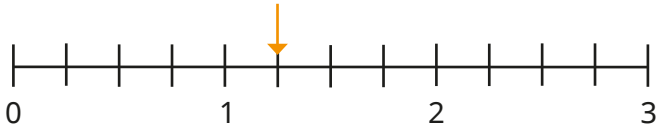
Do you agree with Tiny?

Explain your answer.

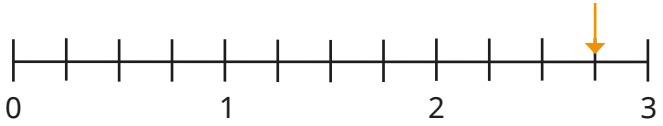
No

Brett and Nijah are counting in fractions on a number line.

Brett starts at the arrow and counts forwards in quarters four times.



Nijah starts at the arrow and counts backwards in quarters four times.



Who finishes on the greater number?

Brett

Understand improper fractions

Notes and guidance

Children should now be confident with the idea that fractions can be greater than 1 and have experienced these as mixed numbers. In this small step, they write them as improper fractions – a fraction where the numerator is greater than or equal to the denominator.

From previous learning, children know that when the numerator is equal to the denominator, the fraction is equal to 1 whole. That knowledge is extended to exploring other integers using knowledge of times-tables. For example, if children know that $\frac{3}{3}$ is equal to 1, they can repeat groups of $\frac{3}{3}$ to see that $\frac{6}{3} = 2$ and $\frac{9}{3} = 3$. They then explore the improper fractions that lie between whole numbers. Bar models and number lines support this understanding.

At this point, children do not need to formally convert between improper fractions and mixed numbers, but they may begin to explore the relationships between them by plotting both on a number line.

Things to look out for

- Children may not have seen fractions where the numerator is greater than the denominator before, which may have led to misconceptions about this not being possible.

Key questions

- How many _____ (for example, thirds) are there in 1 whole?
- So how many _____ (for example, thirds) will there be in 2/3/4 wholes?
- What do you think comes next in this count: 3 fifths, 4 fifths, 5 fifths?
- What is the same about mixed numbers and improper fractions? What is different?
- If there are 10 tenths in 1 whole, how many tenths are there in $1\frac{1}{10}$?
- Which of these are improper fractions? How do you know?

Possible sentence stems

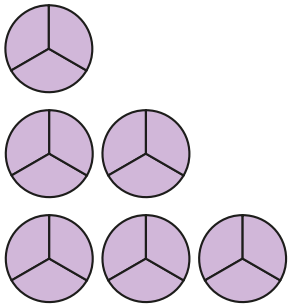
- An improper fraction is a fraction where the numerator is _____ the denominator.
- There are _____ _____ in 1 whole, so there are _____ _____ in 2/3/4 wholes.

National Curriculum links

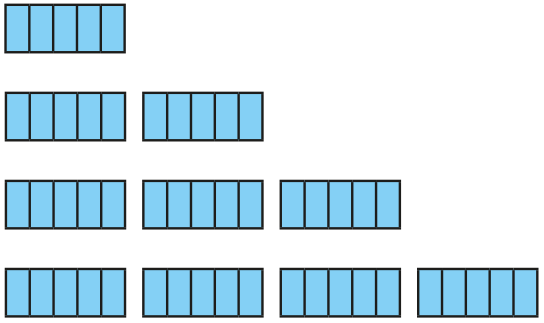
- This small step is not taken from the Year 4 National Curriculum. It is included to take into account the non-statutory DfE Ready to Progress guidance.

Understand improper fractions

Key learning

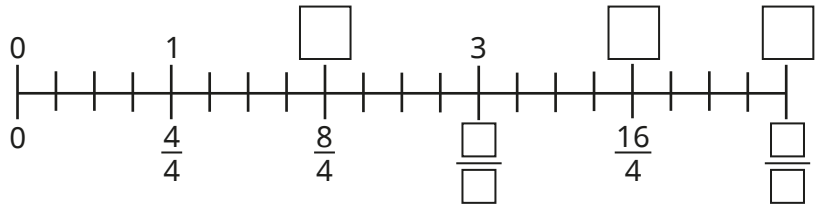
- Fill in the missing numbers.
  - 
    $\frac{3}{3}$ = _____ whole

    $\frac{6}{3}$ = _____ wholes

    $\frac{9}{3}$ = _____ wholes
  - 
    $\frac{5}{5}$ = _____ whole

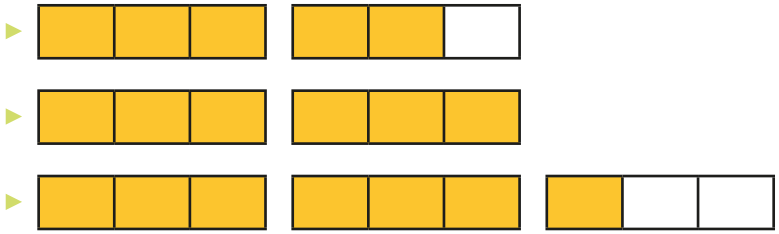
    $\frac{10}{5}$ = _____ wholes

    $\frac{\square}{5}$ = 3 wholes

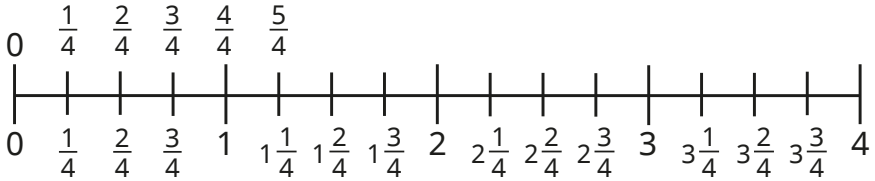
    $\frac{\square}{\square}$ = _____ wholes
  - 

    What do you notice?

- Fill in the missing numbers.
  - $\frac{4}{2}$ = _____
  - $\frac{10}{2}$ = _____
  - $\frac{\square}{2} = 10$
  - $\frac{30}{10}$ = _____
  - $6 = \frac{\square}{10}$
  - $\frac{110}{10}$ = _____

- What improper fractions are shown in the diagrams?
  - 

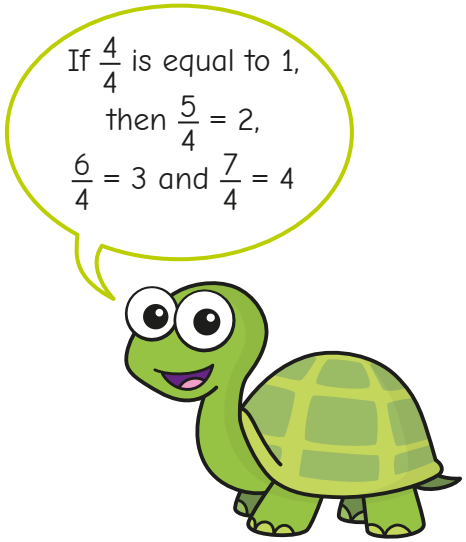
- Complete the number line by counting in improper fractions.



Understand improper fractions

Reasoning and problem solving

Tiny is talking about improper fractions.



Do you agree with Tiny?

Explain your reasons.

No

Use the digit cards to make as many improper fractions as you can.

2	3	4	5	6	7	8

$\frac{\square}{\square}$

Which of the improper fractions are greater than 1 and less than 2?

Which of the improper fractions are greater than 2 and less than 3?

$\frac{3}{2}, \frac{4}{3}, \frac{5}{3}, \frac{5}{4}, \frac{6}{4}, \frac{7}{4}, \frac{6}{5}, \frac{7}{5}, \frac{8}{5}, \frac{7}{6}, \frac{8}{6}, \frac{8}{7}$

$\frac{5}{2}, \frac{7}{3}, \frac{8}{3}$

Convert mixed numbers to improper fractions

Notes and guidance

Having now been introduced to both mixed numbers and improper fractions, in this small step children convert a mixed number into an improper fraction.

At this stage, children explore this concept predominantly through the use of pictorial representations and concrete manipulatives such as interlocking cubes. Bar models and number lines are useful representations to allow children to see the links between mixed numbers and improper fractions.

Children use their times-tables knowledge to find the improper fraction equivalent to the integer part of a mixed number before adding on any remaining fractional parts.

Things to look out for

- Fluent knowledge of times-tables will greatly support children in this step. Times-table grids could support children who are not yet fluent, allowing them to focus on the key learning of this step.
- Children may forget to add on the fractional part of the mixed number.
- Children may add the integer and the fractional part together, for example $3\frac{4}{5} = \frac{7}{5}$

Key questions

- What is the integer in the mixed number _____?
- What is the fractional part of the mixed number _____?
- How do you know if a fraction is improper?
- How many fifths are there in 2/3/4 wholes? What do you notice?
- If there are 8 quarters in 2, how many more quarters do you need to add for the mixed number $2\frac{3}{4}$?
- What do you notice about the improper fraction equivalences of $2\frac{2}{9}, 2\frac{3}{9}, 2\frac{4}{9}$ / $2\frac{2}{9}, 3\frac{2}{9}, 4\frac{2}{9}$?

Possible sentence stems

- Each whole is worth _____ _____

  All the wholes are worth _____ _____

  Adding the fractional part means that altogether there are _____ _____

National Curriculum links

- This small step is not taken from the Year 4 National Curriculum. It is included to take into account the non-statutory DfE Ready to Progress guidance.

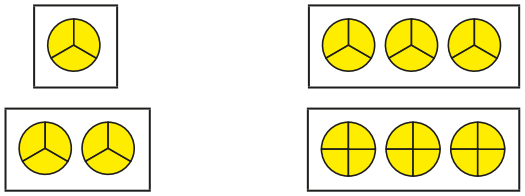
Convert mixed numbers to improper fractions

Key learning

- Each circle represents 1 whole.

  What do the diagrams show?

  Give your answers as an integer and as an improper fraction.



- Complete the sentences for each mixed number.

  The integer in the mixed number is _____

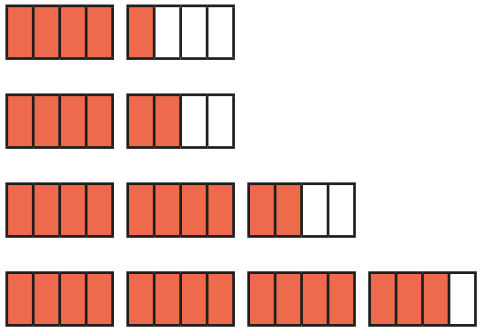
  This is equivalent to _____ quarters.

  There are _____ more quarters.

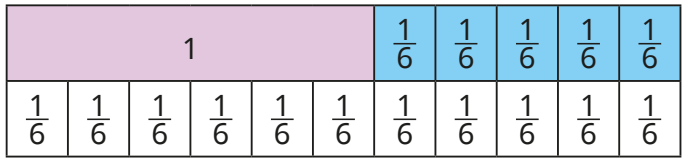
  _____ + _____ = _____

  So the improper fraction is $\frac{\square}{4}$

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



- Use the bar model to convert the mixed number to an improper fraction.

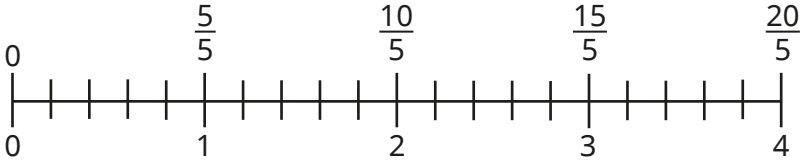


$1\frac{5}{6} = \frac{\square}{6}$

Draw a bar model to convert $3\frac{2}{3}$ to an improper fraction.

- Use the number line to convert the mixed numbers to improper fractions.

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



- Convert the mixed numbers to improper fractions.

$1\frac{3}{7}$ $2\frac{4}{7}$ $2\frac{5}{7}$ $5\frac{6}{7}$

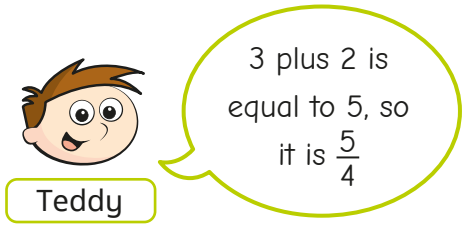
$1\frac{7}{8}$ $2\frac{7}{8}$ $3\frac{7}{8}$ $5\frac{7}{8}$

What do you notice?

Convert mixed numbers to improper fractions

Reasoning and problem solving

Teddy and Alex are converting $3\frac{2}{4}$ into an improper fraction.

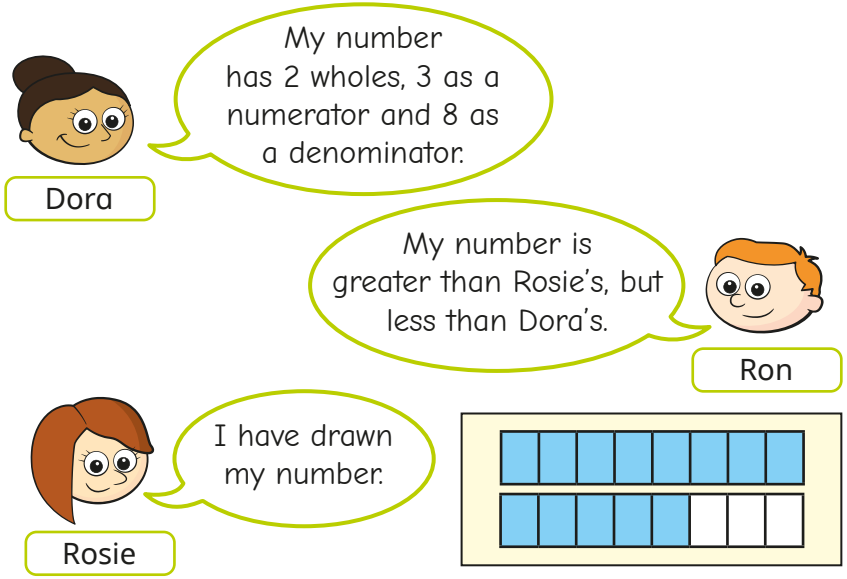


What mistake has each child made?

What is the correct answer?

$\frac{14}{4}$

Dora, Ron and Rosie each think of a different number.



What number could Ron be thinking of?

Write each possible answer as both a mixed number and an improper fraction.

multiple possible answers e.g. $1\frac{6}{8}$, $\frac{14}{8}$

Convert improper fractions to mixed numbers

Notes and guidance

In the previous step, children converted mixed numbers to improper fractions. In this small step, they convert the other way, from improper fractions to mixed numbers.

At this stage, children explore this concept predominantly through the use of pictorial representations and concrete manipulatives, for example counters and bar models, linking back to work done on division with remainders in Spring Block 1. Children use their times-tables knowledge to find the integer part of a mixed number, with the remainder as the fractional part.

The learning from this step will be revisited and built on in Year 5.

Things to look out for

- Fluent knowledge of times-tables will greatly support children in this step. Times-table grids could support children who are not yet fluent, allowing them to focus on the key learning of this step.
- Children may partially convert improper fractions, giving an answer as an integer with an improper fraction, for example $\frac{11}{5} = 1\frac{6}{5}$

Key questions

- How do you know _____ is an improper fraction?
- How many quarters are there in $\frac{15}{4}$?
- How many quarters are there in 1/2/3 wholes?
- How many groups of 4 are there in 15? What is the remainder?

  So how many groups of $\frac{4}{4}$ are there in $\frac{15}{4}$? What is the remainder?

  How can you write that as a mixed number?

Possible sentence stems

- There are _____ _____ in 1 whole.

  There are _____ groups of _____ and _____ remaining.

  so $\frac{\square}{\square}$ as a mixed number is _____

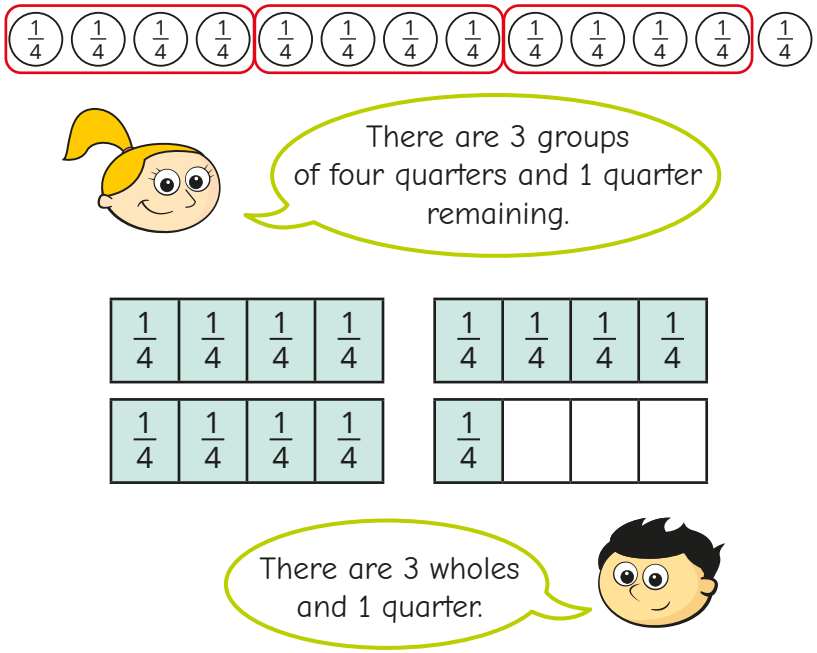
National Curriculum links

- This small step is not taken from the Year 4 National Curriculum. It is included to take into account the non-statutory DfE Ready to Progress guidance.

Convert improper fractions to mixed numbers

Key learning

- Eva and Jack are converting $\frac{13}{4}$ to a mixed number.



Write $\frac{13}{4}$ as a mixed number.

- Convert the improper fractions to mixed numbers.

$\frac{17}{4}$ $\frac{17}{3}$ $\frac{13}{5}$ $\frac{15}{6}$

- Whitney is converting $\frac{17}{5}$ to a mixed number.

Here are her workings.

$15 \div 5 = 3$
$17 \div 5 = 3$ r2
$\frac{17}{5} = 3\frac{2}{5}$

Use Whitney's method to convert the improper fractions to mixed numbers.

$\frac{19}{6}$ $\frac{23}{4}$ $\frac{39}{9}$

- Which of these improper fractions are equivalent to an integer?

$\frac{20}{5}$ $\frac{17}{4}$ $\frac{13}{6}$ $\frac{20}{8}$ $\frac{40}{8}$ $\frac{210}{2}$

How do you know?

Convert the other improper fractions to mixed numbers.

- Convert the improper fractions to mixed numbers.

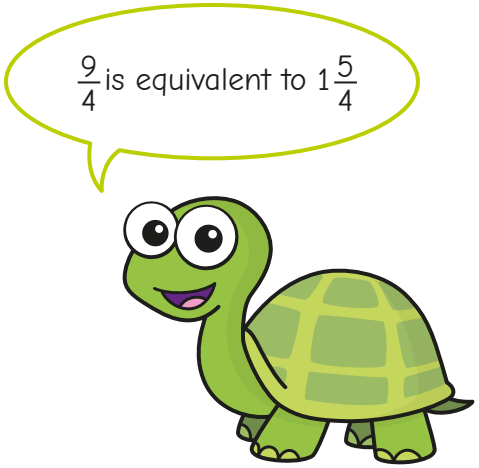
$\frac{12}{3}$ $\frac{13}{3}$ $\frac{14}{3}$ $\frac{15}{3}$ $\frac{16}{3}$ $\frac{17}{3}$

What do you notice?

Convert improper fractions to mixed numbers

Reasoning and problem solving

Tiny is converting $\frac{9}{4}$ to a mixed number.



What mistake has Tiny made?

What is the correct answer?

$2\frac{1}{4}$

$\frac{1617}{7}$ is equivalent to 231

Use this fact to convert $231\frac{1}{7}$ to an improper fraction.

What improper fraction is equivalent to 232?

How do you know?

$\frac{1618}{7}$ | $\frac{1624}{7}$

Use the digit cards to complete the statement in as many ways as possible.

You may use each digit card only once each time.

0	1	2	3	4
5	6	7	8	9

$2 < \frac{\square\square}{5} < 4\frac{3}{5}$

10 solutions from $\frac{12}{5}$ to $\frac{21}{5}$

Equivalent fractions on a number line

Notes and guidance

In Year 3, children used number lines to find equivalent fractions within 1 and this knowledge is now extended to numbers beyond 1

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 using more abstract methods of multiplicative reasoning. Drawing bars of unequal length or lining them up incorrectly are common mistakes with this method, so it is vital to highlight that integer values should always be in line with each other. Children look at multiple number lines, double number lines and splitting up existing number lines into smaller parts. They may explore equivalence of both mixed numbers and improper fractions.

Things to look out for

- If number lines are not drawn to the same length or lined up correctly, then equivalent fractions will not be easy to see.
- Children may need support drawing and labelling number lines accurately.
- Children may use incorrect "rules" for finding equivalent fractions that can lead to incorrect equivalences such as $2\frac{1}{3} = 4\frac{2}{6}$

Key questions

- What are equivalent fractions?
- What unit fraction is the number line counting in?
- How do you know that _____ is equivalent to _____?
- Why do the integers have to be in line with each other?
- How do you know that $2\frac{1}{3}$ cannot be equivalent to $4\frac{2}{6}$?
- What is _____ as a mixed number/improper fraction?

Possible sentence stems

- There are _____ equal intervals between consecutive integers, so the number line is counting in _____s.
- I know that _____ is equivalent to _____ because ...
- To split the number line into _____, I need to split each interval into _____ equal sections.

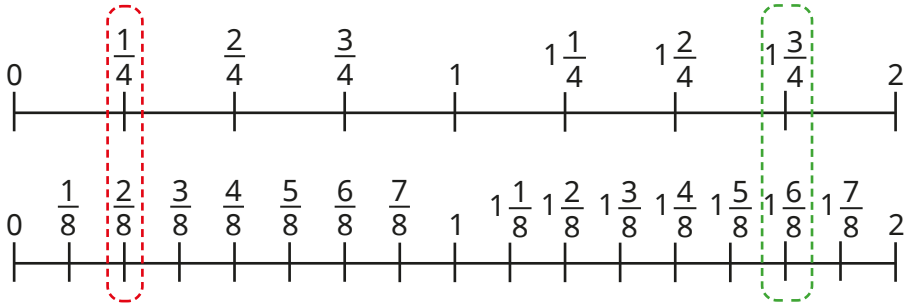
National Curriculum links

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

Equivalent fractions on a number line

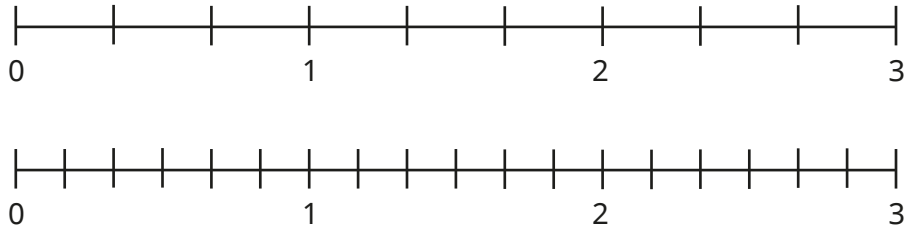
Key learning

- The number lines show two pairs of equivalent fractions.



Use the number lines to find two other pairs of equivalent fractions.

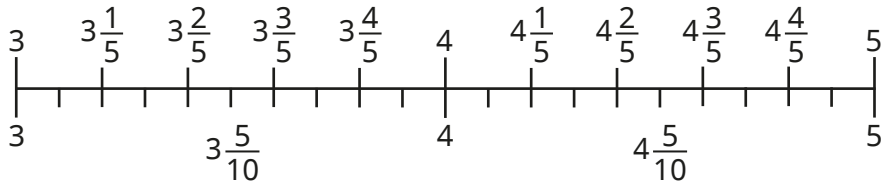
- Label the number lines.



Use the number lines to complete the equivalent fractions.

▶ $\frac{\square}{3} = \frac{2}{6}$ ▶ $1\frac{1}{3} = \frac{\square}{6}$ ▶ $1\frac{4}{6} = \frac{\square}{\square}$

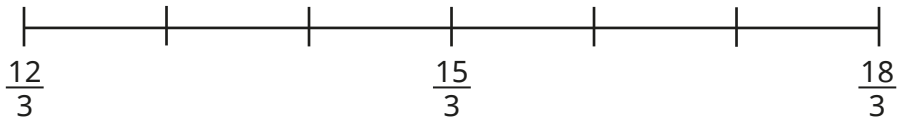
- Use the double number line to complete the equivalent fractions.



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

Write the equivalent mixed numbers as improper fractions.

- Split each section of the number line into 4 equal parts.



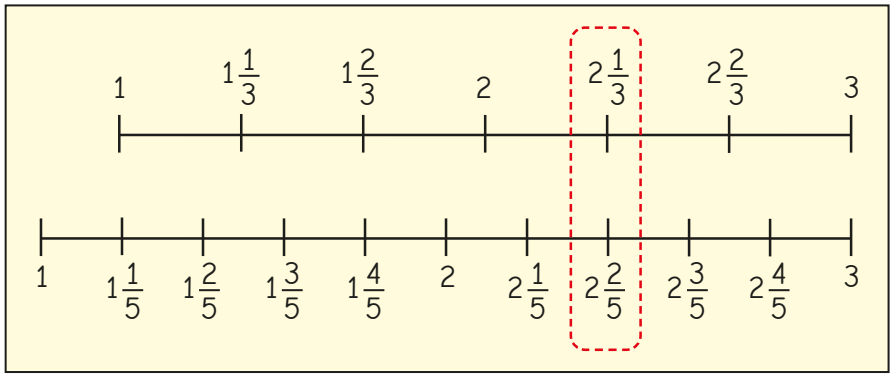
Use the number line to find two pairs of equivalent improper fractions.

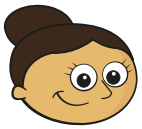
Write each pair of improper fractions as mixed numbers.

Equivalent fractions on a number line

Reasoning and problem solving

Dora is drawing number lines to find equivalent fractions.



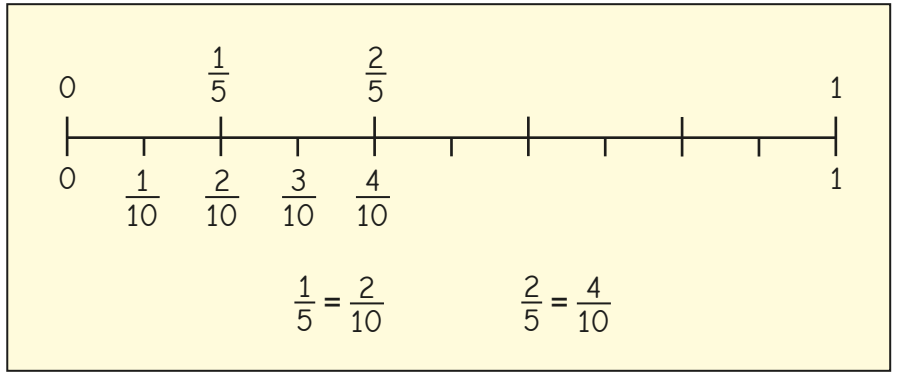


$2\frac{1}{3}$ is equivalent to $2\frac{2}{5}$

Do you agree with Dora?

Explain your answer.

No



I think that $1\frac{2}{5}$ is equivalent to $2\frac{4}{10}$ because I can just double everything.

Do you agree with Dexter?

Explain your answer.

No

Equivalent fraction families

Notes and guidance

In this small step, children develop their understanding of equivalent fractions, both within 1 and greater than 1, mainly through exploring bar models.

Building on learning from Year 3, children begin by finding equivalent fractions by splitting up models into smaller parts in a range of different ways. The key learning point is that as long as each of the existing parts are split equally into the same number of smaller parts, then the fractions will be equivalent. A common misconception is that children believe they can only split up existing parts into two equal sections, which limits the number of equivalent fractions that they will find. Children begin to use fraction walls to help create equivalent fraction families.

Although not the key focus, once children are comfortable finding equivalent fractions within 1, they may begin to find equivalent fractions greater than 1

Things to look out for

- Children may not draw accurate diagrams, so their equivalent fractions will be incorrect.
- Children may only split existing parts into two smaller sections.

Key questions

- How can you split each section into 2/3/4 equal smaller parts? How many other ways could you split each part?
- If you split each part into _____ equal smaller parts, what fraction does each part now represent?
- Why do you need to split all of the existing parts? Why do they need to be equal in size?
- Are there any fractions on the fraction wall that do not have any equivalent fractions shown? Does this mean they do not have any equivalent fractions?

Possible sentence stems

- If I divide each part into _____ equal parts, then they will each represent $\frac{\square}{\square}$
- I can divide each part into _____ equal parts to show that _____ is equivalent to _____

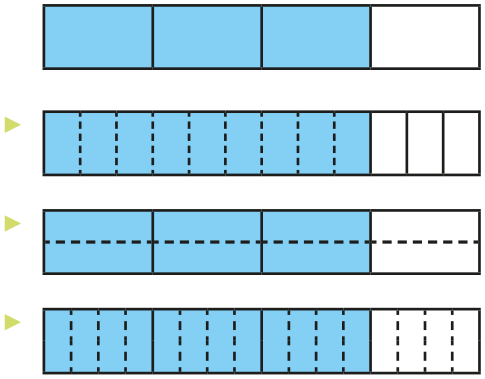
National Curriculum links

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

Equivalent fraction families

Key learning

- Use the bar models to find the equivalent fractions.



- ▸ $\frac{3}{4} = \frac{\square}{\square}$
- ▸ $\frac{3}{4} = \frac{\square}{\square}$
- ▸ $\frac{3}{4} = \frac{\square}{\square}$

Which bar model method do you prefer for finding equivalent fractions?

Complete the fraction family.

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

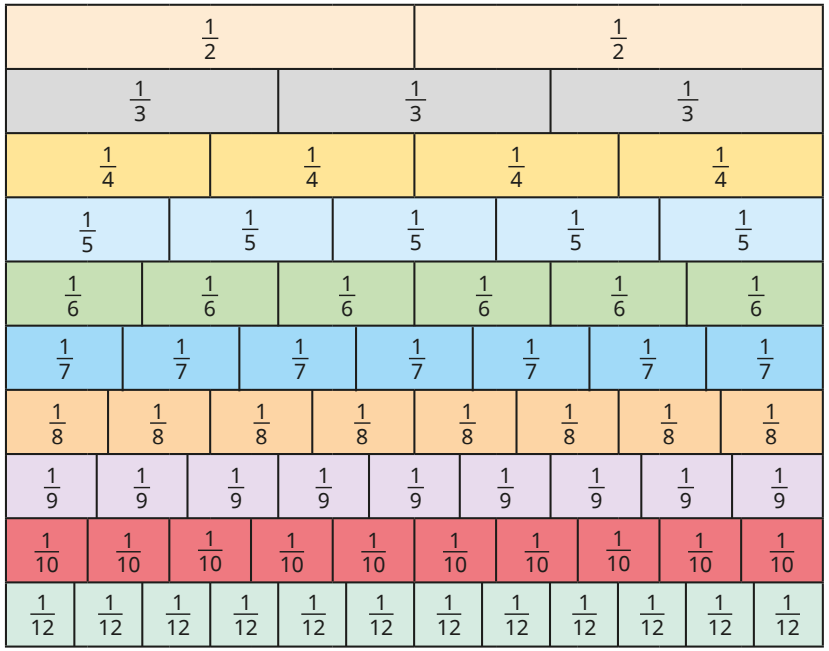
- Draw bar models to help you write a fraction family for each fraction.

▸ $\frac{4}{5}$ ▸ $\frac{2}{3}$ ▸ $\frac{1}{6}$

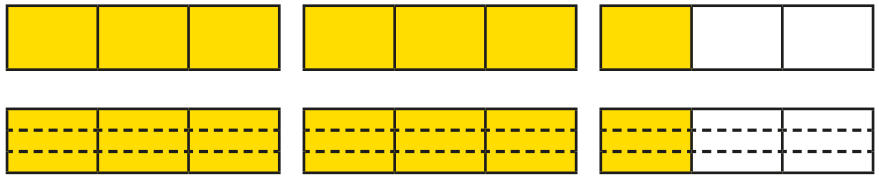
Compare answers with a partner.

Are your fraction families the same?

- Use the fraction wall to create equivalent fraction families.



- What equivalent fractions can you see from the bar models?

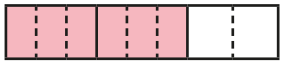


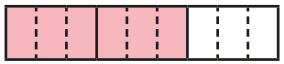
Equivalent fraction families

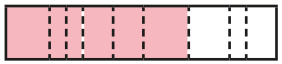
Reasoning and problem solving

Kim is finding equivalent fractions to $\frac{2}{3}$

A  $\frac{2}{3} = \frac{3}{5}$

B  $\frac{2}{3} = \frac{6}{8}$

C  $\frac{2}{3} = \frac{6}{9}$

D  $\frac{2}{3} = \frac{6}{9}$

Which of Kim's bar models is correct?

Which of Kim's equivalent fractions are correct?

What mistakes has she made?

C

C, D

Amir is finding equivalent fractions.

If I just keep splitting each section in half, I can find all the equivalent fractions in the family.

 $\frac{1}{2}$

 $\frac{2}{4}$

 $\frac{4}{8}$

Do you agree with Amir?

Explain your reasons.

No

Add two or more fractions

Notes and guidance

Building from Year 3, in this small step children add two or more fractions with the same denominator. They add proper fractions in this step and then add fractions and mixed numbers in the next step.

Children start by folding strips of paper and shading the equal parts. They transfer this knowledge to using diagrams and bar models to add two fractions, before progressing to adding more than two fractions. Children also explore adding by using a number line and counting on.

Addition with totals greater than 1 is covered in this step, but first ensure that children are secure in adding fractions within 1. Encourage children to convert improper fractions to mixed numbers, although this is not essential in this step.

Things to look out for

- If using two bar models to add two fractions, children may think the two bar models together make 1 whole and will be unable to find the correct denominator.
- Children may add both the numerators and denominators, for example $\frac{1}{3} + \frac{1}{3} = \frac{2}{6}$

Key questions

- Are the denominators the same? Why is this important?
- How can you show the addition in a diagram/bar model?
- How could a number line help you?
- Is your answer greater or smaller than 1? How do you know?
- How do you convert an improper fraction to a mixed number?
- How is adding three fractions different from adding two fractions?
- How would you explain how to add fractions to someone who does not understand?

Possible sentence stems

- When the denominators are the same, to add the fractions add the _____
- $\frac{\square}{\square}$ is the same as _____ (for example, $\frac{5}{4}$ is the same as $1\frac{1}{4}$)

National Curriculum links

- Add and subtract fractions with the same denominator

Add two or more fractions

Key learning

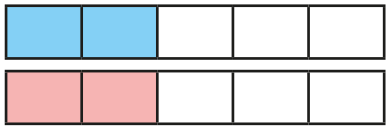
- Take two identical strips of paper.

  Fold each strip in half and then in half again to make quarters.

  Use the strips to work out $\frac{1}{4} + \frac{1}{4}$

- Huan and Scott use bar models to represent $\frac{2}{5} + \frac{2}{5} = \frac{4}{5}$

Huan



Scott

Are their methods the same or different?

Use your preferred method to work out the additions.

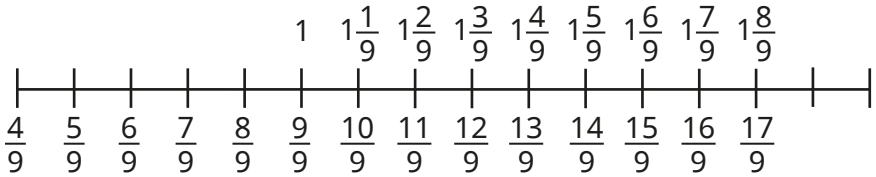
$\frac{3}{8} + \frac{1}{8}$ $\quad$ $\frac{2}{7} + \frac{4}{7}$ $\quad$ $\frac{3}{10} + \frac{7}{10}$

- Dani uses bar models to show that $\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$

Use Dani's method to work out the additions.

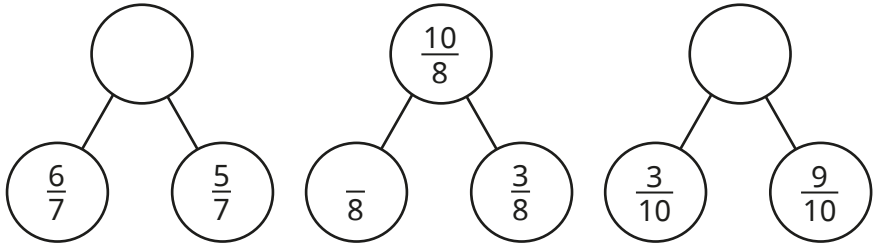
$\frac{2}{5} + \frac{4}{5}$ $\quad$ $\frac{4}{5} + \frac{4}{5}$ $\quad$ $\frac{3}{10} + \frac{9}{10}$ $\quad$ $\frac{7}{10} + \frac{9}{10}$

- Use the number line to add the fractions.



$\frac{4}{9} + \frac{8}{9}$ $\quad$ $\frac{5}{9} + \frac{6}{9}$ $\quad$ $\frac{8}{9} + \frac{8}{9}$

- Complete the part-whole models.



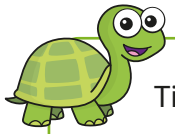
- Filip walks $\frac{7}{10}$ km to school.

  After school, he walks $\frac{9}{10}$ km to Aisha's house.

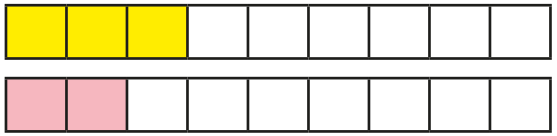
  How far has Filip walked in total?

Add two or more fractions

Reasoning and problem solving



Tiny is adding fractions.



$$\frac{3}{9} + \frac{2}{9} = \frac{5}{18}$$

Is Tiny correct?

How do you know?

No

Find as many ways as possible to complete the calculation.

$$\frac{\square}{\square} + \frac{\square}{\square} = \frac{11}{9}$$

multiple possible answers, e.g. $\frac{3}{9} + \frac{8}{9}$

Jo and Max are working out the addition.

$$\frac{6}{13} + \frac{5}{13} + \frac{7}{13}$$

Jo

The answer is 1 and $\frac{5}{13}$

The answer is $\frac{18}{13}$

Max

Who do you agree with?

Explain your answer.

Both are correct.

Add fractions and mixed numbers

Notes and guidance

In this small step, children combine knowledge of adding two or more fractions with their understanding of mixed numbers to add fractions and mixed numbers.

Children start by adding fractions to whole numbers and, when this is secure, add mixed numbers and fractions. Bar models and number lines are useful tools to illustrate this process. Number lines are especially helpful when crossing a whole. Children look at two methods: partitioning the fraction to add to the next whole number, then adding the remaining fraction to the whole number, and adding the fractions separately, then adding the total to the whole number.

Things to look out for

- Children may add the whole number to the numerator, for example $1\frac{3}{10} + \frac{1}{10} = \frac{4}{10} + \frac{1}{10} = \frac{5}{10}$
- Children should be encouraged to start with the mixed number, especially when using a number line.
- Children may not convert improper fractions to mixed numbers when crossing a whole, for example writing $1\frac{6}{5}$

Key questions

- Are the denominators the same? Why is this important?
- How is adding two fractions different from adding a fraction and a whole number? How is it different from adding a fraction and a mixed number?
- Do you prefer to use a bar model or a number line? Why?
- How could you partition the fraction to help you work out the answer?
- Do you have an improper fraction in your answer? How should you write the mixed number?

Possible sentence stems

- If the denominators are the same, to add the fractions I need to add the _____
- I can partition _____ into _____ and _____

National Curriculum links

- Add and subtract fractions with the same denominator

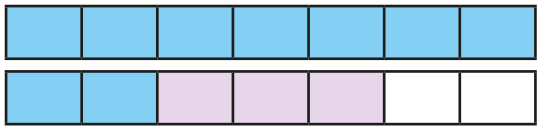
Add fractions and mixed numbers

Key learning

- Draw bar models to show the calculations.

$\frac{2}{5}+\frac{2}{5}=\frac{4}{5}$ $1+\frac{2}{5}=1\frac{2}{5}$ $\frac{2}{5}+2=2\frac{2}{5}$

- Tommy uses a bar model to work out this addition.

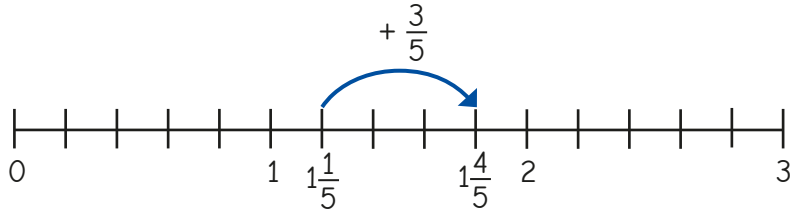


$1\frac{2}{7}+\frac{3}{7}=1\frac{5}{7}$

Use bar models to work out the additions.

$1\frac{3}{7}+\frac{3}{7}$ $1\frac{1}{5}+\frac{2}{5}$ $2\frac{3}{10}+\frac{6}{10}$ $\frac{7}{10}+3\frac{1}{10}$

- Amir uses a number line to add fractions.



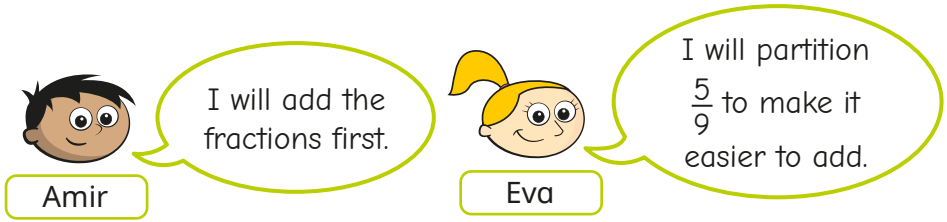
What calculation is Amir working out? What is the answer?

- Use number lines to work out the additions.

$2\frac{2}{5}+\frac{2}{5}$ $2\frac{1}{10}+\frac{6}{10}$ $1\frac{4}{5}+\frac{3}{5}$

$1\frac{1}{5}+\frac{2}{5}$ $2\frac{3}{5}+\frac{2}{5}$ $6\frac{4}{6}+\frac{5}{6}$

- Amir and Eva are working out $1\frac{7}{9}+\frac{5}{9}$



$\frac{7}{9}+\frac{5}{9}=\frac{12}{9}=1\frac{3}{9}$

$1\frac{3}{9}+1=2\frac{3}{9}$

$1\frac{7}{9}+\frac{2}{9}=1\frac{9}{9}=2$

$2+\frac{3}{9}=2\frac{3}{9}$

Use your preferred method to work out the additions.

$1\frac{7}{9}+\frac{8}{9}$ $\frac{3}{9}+1\frac{8}{9}$ $2\frac{4}{5}+\frac{3}{5}$ $\frac{6}{10}+7\frac{7}{10}$

Add fractions and mixed numbers

Reasoning and problem solving

Tommy works out an addition.

$$4\frac{3}{5} + \frac{2}{5} = 4\frac{5}{5}$$

Do you agree with Tommy?

Explain your answer.

No

Whitney is working out $1\frac{2}{5} + \frac{1}{5}$

$$1\frac{2}{5} + \frac{1}{5} = \frac{4}{5}$$

What mistake has she made?

Work out the correct answer.

$1\frac{3}{5}$

A mixed number and two different fractions have a total of $3\frac{3}{8}$

- The mixed number is greater than 1
- All the denominators are 8
- The sum of the two fractions is $\frac{5}{8}$

Complete the number sentence.

$$\_\_\_\_ \frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square} = 3\frac{3}{8}$$

mixed number: $2\frac{6}{8}$

fractions: $\frac{3}{8} + \frac{2}{8}$ or $\frac{4}{8} + \frac{1}{8}$

What is the missing digit?

$$6\frac{3}{10} + \frac{\square}{10} = 7$$

What would change if the answer to the calculation was 8?

7

Subtract two fractions

Notes and guidance

In this small step, children subtract two fractions with the same denominator. They should link this to adding fractions with the same denominator, realising that when the denominators are the same, they need to subtract the numerators.

Children start by folding paper and then link this to diagrams and bar models. Encourage children to explore all the different structures of subtraction: taking away, partitioning and difference.

The questions in this step only explore subtracting from proper and improper fractions. Subtraction from whole numbers and mixed numbers are covered later in the block.

Things to look out for

- Children may subtract both the numerators and the denominators, for example $\frac{5}{8} - \frac{3}{8} = \frac{2}{0}$
- When comparing methods, children may not be aware of the different structures of subtraction.
- Children do not need to give answers as mixed numbers, but some may not recognise that an improper fraction can be converted to a mixed number.

Key questions

- Are the denominators the same? Why is this important?
- How could you represent the subtraction in a diagram/bar model?
- How would a number line help you?
- Is your answer greater or smaller than 1? How do you know?
- What is the same when you are adding or subtracting fractions with the same denominator? What is different?
- How would you explain how to subtract fractions to someone who does not understand?

Possible sentence stems

- If the denominators are the same, to subtract the fractions I need to subtract the _____
- _____ minus _____ is equal to _____

National Curriculum links

- Add and subtract fractions with the same denominator

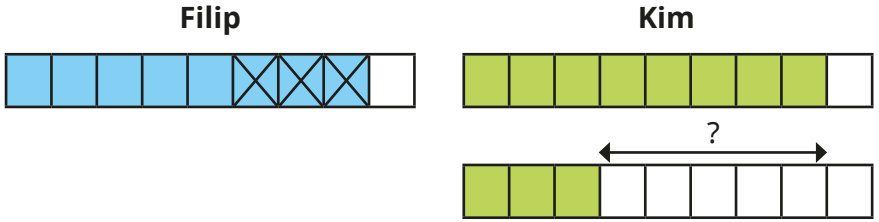
Subtract two fractions

Key learning

- Fold strips of paper into eighths and use them to work out the subtractions.

$\frac{7}{8} - \frac{1}{8}$ $\frac{7}{8} - \frac{3}{8}$ $\frac{6}{8} - \frac{3}{8}$ $\frac{8}{8} - \frac{5}{8}$

- Filip and Kim use bar models to work out $\frac{8}{9} - \frac{3}{9} = \frac{5}{9}$



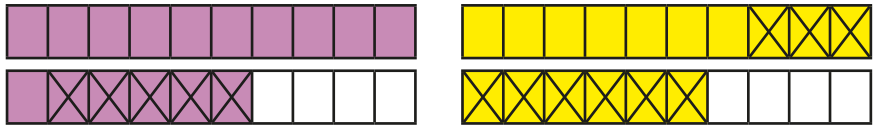
What is the same about their methods? What is different?

- Use bar models to work out the subtractions.

$\frac{7}{9} - \frac{5}{9}$ $\frac{9}{9} - \frac{7}{9}$ $\frac{7}{10} - \frac{6}{10}$ $\frac{9}{10} - \frac{8}{10}$

$\frac{7}{9} - \frac{4}{9}$ $\frac{5}{6} - \frac{2}{6}$ $\frac{6}{6} - \frac{5}{6}$ $\frac{12}{12} - \frac{10}{12}$

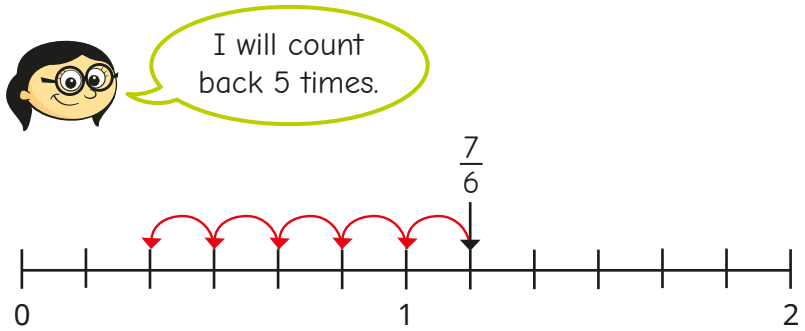
- Use the bar models to complete the calculations.



$\frac{16}{10} - \frac{5}{10}$ $\frac{16}{10} - \frac{9}{10}$

What is the same? What is different?

- Annie is using a number line to show that $\frac{7}{6} - \frac{5}{6} = \frac{2}{6}$



Use Annie's method to work out the subtractions.

$\frac{7}{6} - \frac{4}{6}$ $\frac{9}{6} - \frac{5}{6}$ $\frac{11}{6} - \frac{5}{6}$ $\frac{11}{6} - \frac{8}{6}$

Subtract two fractions

Reasoning and problem solving

Tiny is subtracting fractions.

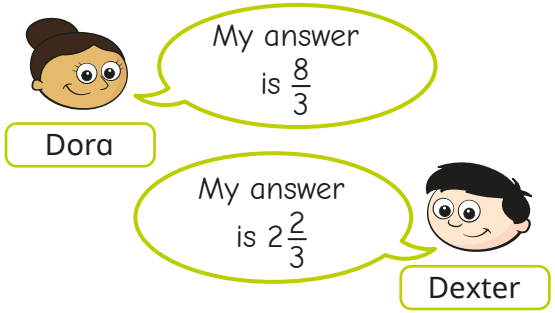
$$\frac{7}{10} - \frac{4}{10} = 3$$

Do you agree with Tiny?

Explain your answer.

No

Dora and Dexter are working out $\frac{13}{3} - \frac{5}{3}$



Who is correct?

How do you know?

Both are correct.

Complete the calculations in as many different ways as you can.

$$\frac{\square}{7} - \frac{3}{7} = \frac{\square}{7} + \frac{\square}{7}$$

$$\frac{\square}{7} - \frac{3}{7} = \frac{\square}{7} - \frac{\square}{7}$$

multiple possible answers, e.g.

$\frac{6}{7} - \frac{3}{7} = \frac{1}{7} + \frac{2}{7}$

$\frac{7}{7} - \frac{3}{7} = \frac{6}{7} - \frac{2}{7}$

A chocolate bar has been split into 10 equal parts.

Rosie eats $\frac{3}{10}$ of the bar.

Dexter eats $\frac{1}{10}$ of the bar more than Rosie.

What fraction of the chocolate bar is left?

$\frac{3}{10}$

Subtract from whole amounts

Notes and guidance

This small step links the previous step and the next step together, helping children to make links between subtracting fractions and subtracting mixed numbers and fractions.

Children need to know how many equal parts are equivalent to the whole and how this relates to whole numbers greater than 1. They use bar models and explore subtracting from the whole, initially when it is written as a fraction, for example $\frac{9}{9}$, rather than 1. They subtract from whole numbers greater than 1, comparing subtracting the fraction from one of the wholes with using improper fractions.

Number lines are also used in this step, and children explore the difference between taking away and finding the difference.

Things to look out for

- Some children may not be efficient when converting whole numbers into fractions.
- Children may know that $1 = \frac{10}{10}$ but may not be as confident that $3 = \frac{30}{10}$
- Children may subtract the numerator from the whole, for example $4 - \frac{1}{5} = \frac{3}{5}$

Key questions

- How many _____ are equal to 1 whole/2 wholes/5 wholes?
- What is the connection between the numerator in the question and the numerator in the answer when you subtract a fraction from 1?
- How can you show the problem using a bar model/ number line?
- How many of the wholes are affected when you subtract a fraction?
- How can you partition the whole number to help with the subtraction?

Possible sentence stems

- $1 - \frac{\square}{\square} = \frac{\square}{\square}$, so $2 - \frac{\square}{\square} = 1\frac{\square}{\square}$
- If the denominators are the same, to subtract the fractions I need to subtract the _____
- 1 whole is equal to $\frac{\square}{\square}$, so wholes are equal to $\frac{\square}{\square}$

National Curriculum links

- Add and subtract fractions with the same denominator

Subtract from whole amounts

Key learning

- Convert the whole numbers into fractions.

$1 = \frac{\square}{3}$ $1 = \frac{\square}{5}$ $2 = \frac{\square}{5}$ $2 = \frac{\square}{10}$ $5 = \frac{\square}{10}$

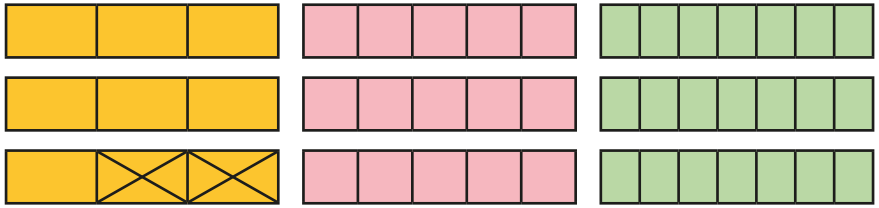
What do you notice?

- Use the diagrams to work out the subtractions.

$\frac{9}{9} - \frac{3}{9}$ $\frac{9}{9} - \frac{4}{9}$ $1 - \frac{5}{9}$

What is the same? What is different?

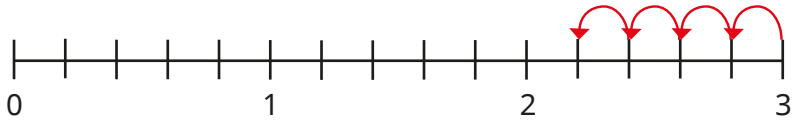
- Use the bar models to work out the subtractions.



$3 - \frac{2}{3}$ $3 - \frac{3}{5}$ $3 - \frac{5}{7}$

Compare answers with a partner.

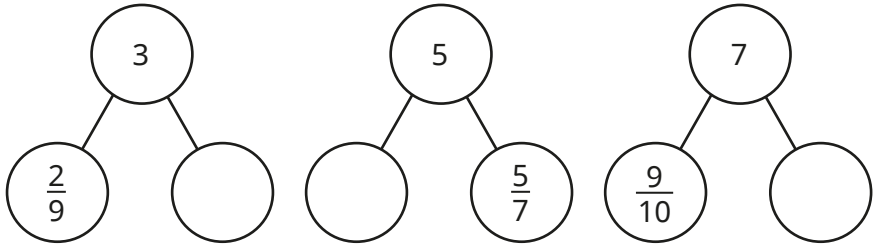
- Jo uses a number line to find $3 - \frac{4}{5} = 2\frac{1}{5}$



Use Jo's method to work out the subtractions.

$3 - \frac{2}{5}$	$2 - \frac{4}{5}$	$3 - \frac{7}{10}$	$5 - \frac{7}{9}$

- Complete the part-whole models.



- Huan has 5 m of ribbon.

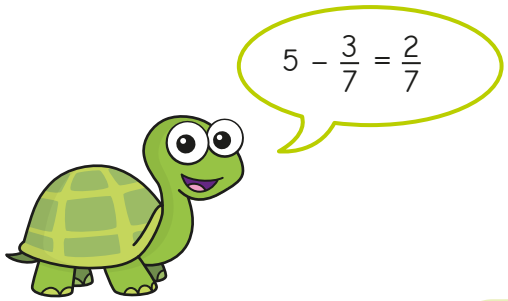
He cuts off $\frac{3}{5}$ m to give to Dani.

How much ribbon is left?

Subtract from whole amounts

Reasoning and problem solving

Tiny is subtracting a fraction from a whole number.



What mistake has Tiny made?

What is the correct answer?

$4\frac{4}{7}$

Find as many ways as you can to complete the statement.

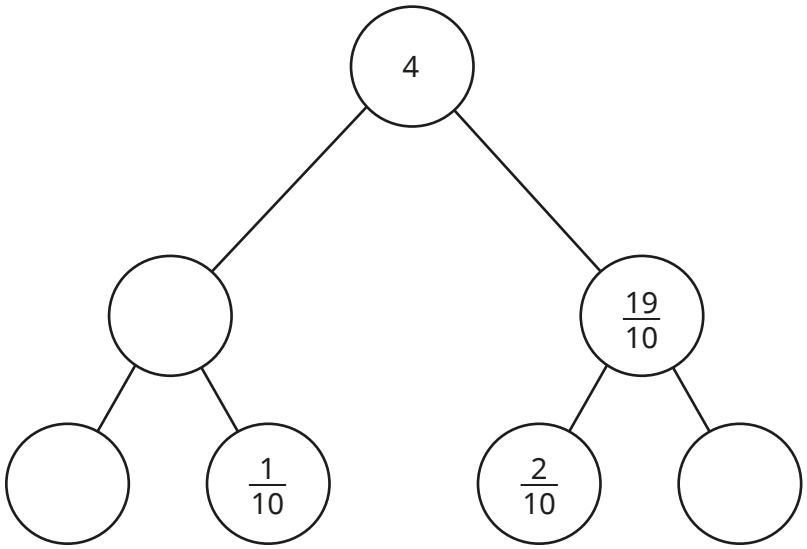
$$2 - \frac{\square}{8} = \frac{5}{8} + \frac{\square}{8}$$

multiple possible answers, e.g.

$2 - \frac{\mathbf{1}}{8} = \frac{5}{8} + \frac{\mathbf{10}}{8}$

$2 - \frac{\mathbf{7}}{8} = \frac{5}{8} + \frac{\mathbf{4}}{8}$

Complete the part-whole model.



$\frac{21}{10}$ or $2\frac{1}{10}$

$\frac{20}{10}$ or 2 $\frac{17}{10}$ or $1\frac{7}{10}$

Subtract from mixed numbers

Notes and guidance

In this small step, children subtract from mixed numbers. This step only covers subtracting a whole or a fraction from a mixed number; this will be developed in more detail and extended to subtracting mixed numbers from mixed numbers in Year 5

Children are introduced to these subtractions using bar models and number lines. Firstly, they explore what happens when they subtract a whole number from a mixed number, and then a fraction that does not cross a whole from a mixed number. Once this is secure, children complete subtractions that cross a whole number, exploring different methods.

Things to look out for

- When subtracting a whole number from a mixed number, children may subtract a fraction instead, for example $3\frac{4}{7} - 1 = 3\frac{3}{7}$
- Children may think they cannot complete a subtraction if the fraction they are subtracting is greater than the fractional part of the mixed number, for example $3\frac{1}{3} - \frac{2}{3}$

Key questions

- How is subtracting from a mixed number different from subtracting from wholes or fractions? How is it the same?
- How can you show the subtraction as a bar model? Will you subtract whole bars or parts of bars?
- How can you show the subtraction on a number line?
- How can you partition the mixed number/fraction to help you solve the calculation?
- If you subtracted back to the previous whole number, why would this help?

Possible sentence stems

- If the denominators are the same, to subtract the fractions I need to subtract the _____
- I can partition _____ into _____ and _____
- When I subtract a whole number from a mixed number, the _____ stays the same.

National Curriculum links

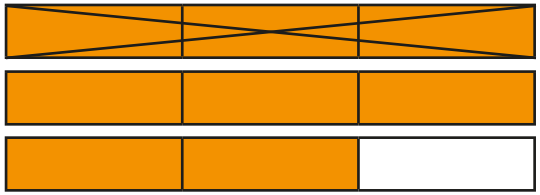
- Add and subtract fractions with the same denominator

Subtract from mixed numbers

Key learning

- Aisha uses a bar model to show that $2\frac{2}{3} - 1 = 1\frac{2}{3}$

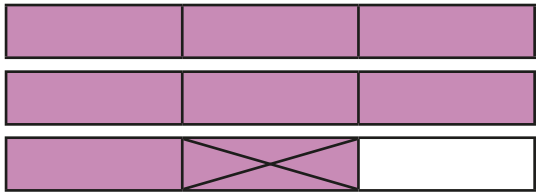
  What do you notice?



  Use Aisha's method to work out the subtractions.

$3\frac{2}{3} - 2$ $2\frac{4}{5} - 1$ $5\frac{3}{10} - 3$ $4\frac{6}{7} - 4$

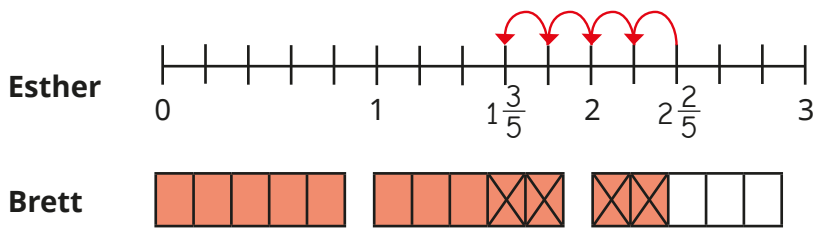
- Ron uses a bar model to show that $2\frac{2}{3} - \frac{1}{3} = 2\frac{1}{3}$



  Use Ron's method to work out the subtractions.

$3\frac{4}{5} - \frac{1}{5}$ $3\frac{4}{5} - \frac{3}{5}$ $2\frac{7}{10} - \frac{3}{10}$ $3\frac{9}{10} - \frac{9}{10}$

- Esther and Brett are working out $2\frac{2}{5} - \frac{4}{5} = 1\frac{3}{5}$

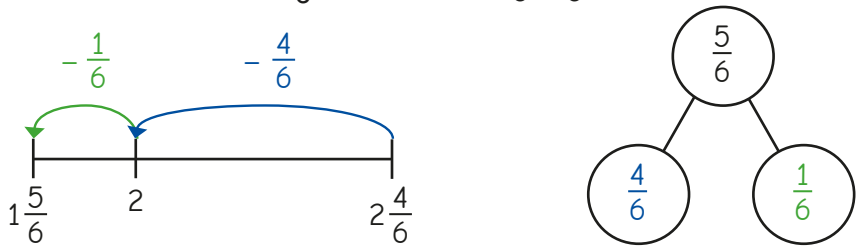


  What is the same about the methods? What is different?

  Use your preferred method to work out the subtractions.

$2\frac{1}{5} - \frac{4}{5}$ $3\frac{2}{5} - \frac{3}{5}$ $2\frac{1}{6} - \frac{5}{6}$ $3\frac{4}{7} - \frac{6}{7}$

- Jack has partitioned $\frac{5}{6}$ to work out $2\frac{4}{6} - \frac{5}{6}$



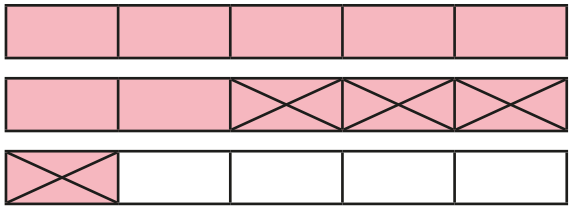
  Use Jack's method to work out the subtractions.

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

Subtract from mixed numbers

Reasoning and problem solving

What subtraction does the bar model show?



How do you know?

$2\frac{1}{5} - \frac{4}{5} = 1\frac{2}{5}$

A piece of ribbon is $3\frac{1}{4}$ m long.

Tom and Alex cut off $\frac{3}{4}$ m of ribbon each.

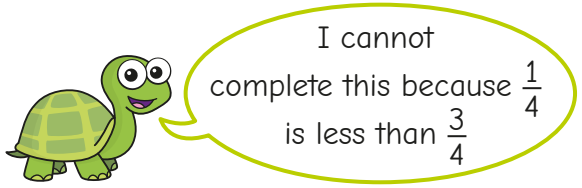
Nijah needs 2 m of ribbon to complete an art project.

Is there enough ribbon left for Nijah?

Explain your answer.

No

Tiny is working out $7\frac{1}{4} - \frac{3}{4}$



Do you agree with Tiny?

Explain your answer.

No

Use the digit cards to complete the calculation.

3	4	5	6	7

You may use each card only once.

$\square\frac{\square}{7} - \frac{\square}{7} = 2\frac{\square}{\square}$

$3\frac{4}{7} - \frac{5}{7} = 2\frac{6}{7}$