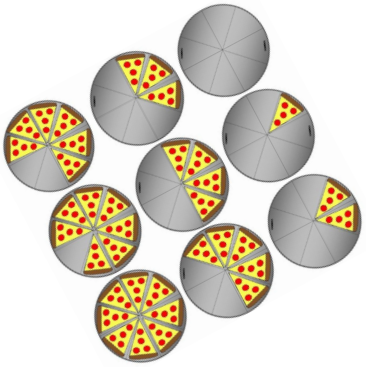
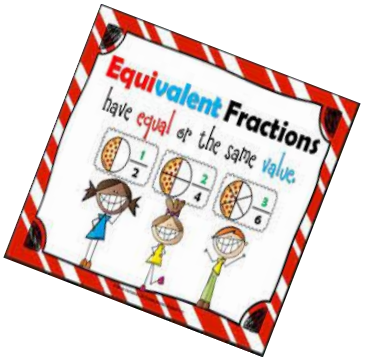
WALT: - Understand fractions & find equivalent fractions.
- Simplify fractions, & add + subtract fractions.

Success Criteria I can …

- Use a number line to organise fractions
- Write equivalent fractions
- Simplify fractions to their simplest form
- Add and subtract fractions with the same denominator
- Identify and write fractions



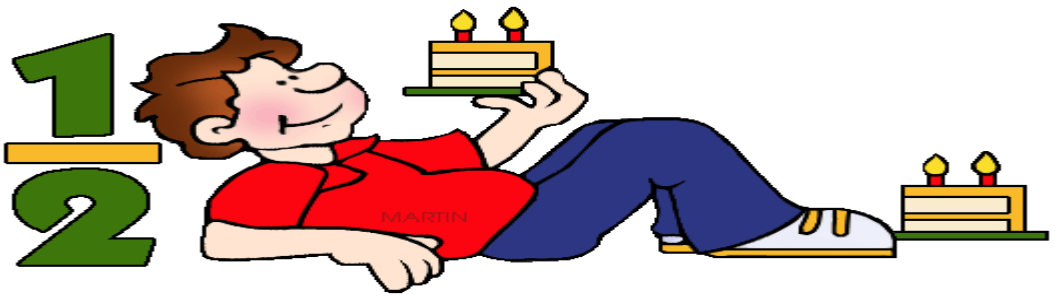


Types of fractions

Proper fractions have a numerator that is less than the denominator. They have values less than 1. Examples: $\frac{1}{2}$ and $\frac{3}{5}$.

Improper fractions have a numerator that is greater than or equal to the denominator. They have values greater than or equal to 1. Examples: $\frac{3}{2}$, $\frac{9}{9}$ and $\frac{17}{6}$.

Mixed numbers have whole number parts and fraction parts written separately. Examples: $1\frac{1}{2}$, $2\frac{5}{6}$ and $34\frac{2}{7}$.



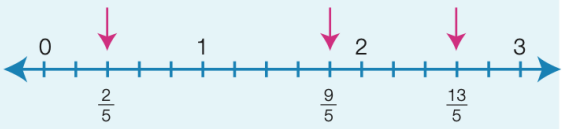
Using a number line to represent fractions

Using a number line to represent fractions

Placing fractions on a number line helps us to understand their size when compared to other numbers.

Drawing up a number line is easier if you can make the distance between whole numbers the same as the denominator. For example, if dividing into thirds, make the distance 3 cm. Then, you can mark off a third for every cm.

Copy this number line and show the positions of these fractions: $\frac{2}{5}$, $\frac{9}{5}$ and $\frac{13}{5}$.

Thinking	Working
1 Copy the number line.	
2 The denominator tells us how to divide up the spaces between the whole numbers (in this case, counting up in fifths). Make sure the distance between each marked division is the same.	
3 For each fraction, look at the numerator and count that many parts along from zero. Indicate the location of the fraction with an arrow.	

Fractions and division

There is an improper fraction that corresponds to each whole number on the number line.

If we fill in the rest of the fractions on the answer line in the Worked Example above, we can see that: $\frac{5}{5} = 1$, $\frac{10}{5} = 2$, $\frac{15}{5} = 3$ and so on.

We also know that: $5 \div 5 = 1$, $10 \div 5 = 2$, $15 \div 5 = 3$.

Writing $\frac{5}{5}$ is the same as writing $5 \div 5$.

We can write any whole number as an improper fraction by writing the numerator as a multiple of the denominator. For example, $3 = \frac{6}{2} = \frac{9}{3} = \frac{12}{4}$, because $6 \div 2 = 3$, $9 \div 3 = 3$ and $12 \div 4 = 3$.

The simplest way of writing a whole number as an improper fraction is to write it with a denominator of 1. For example, $3 = \frac{3}{1}$ $(3 \div 1 = 3)$.

Drawing the line between the numerator and the denominator is equivalent to writing the division sign, ÷.

Whole class discussion - working in your books

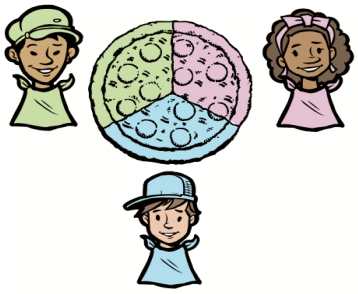
Write the whole number 9 as an improper fraction with a denominator of 4.

Thinking	Working
1 Which number divided by the denominator gives the required whole number? (Which number divided by 4 gives 9?)	$9 = \frac{\square}{4}$
2 Multiply the whole number you want by the denominator to find this number.	$9 \times 4 = 36$
3 Write the answer.	$9 = \frac{36}{4}$

We can consider all fractions in terms of division. Consider the following situation: 1 pizza is shared equally between 3 students. How much pizza does each student get?

We can show the answer is $\frac{1}{3}$ by drawing lines to divide the pizza into 3 equal pieces.

The different colours show which piece goes to which student.

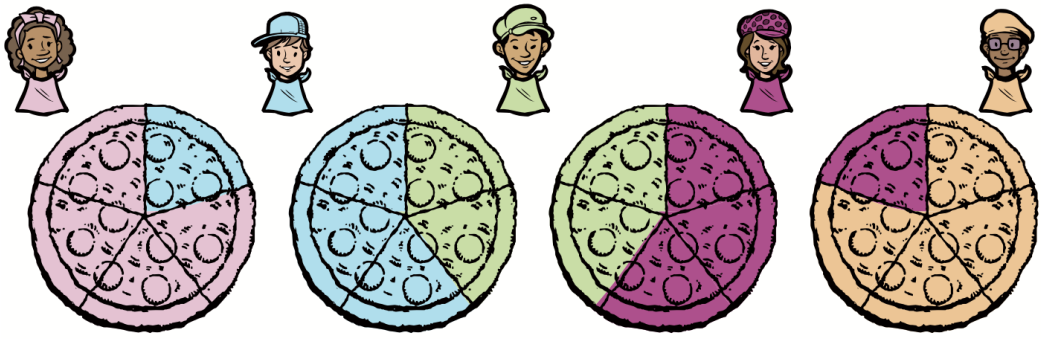


We can write the division of 1 whole pizza among 3 students as $1 \div 3 = \frac{1}{3}$.

View the pictures on how to divide fractions Each person's colour is given to the pizza for their share

Similarly, if 4 pizzas are shared between 5 students, each student receives $\frac{4}{5}$ of a pizza.

$4 \div 5 = \frac{4}{5}$



If we have a greater number of pizzas than students, each student receives more than a whole pizza. For example, 4 pizzas shared between 3 students gives $4 \div 3 = \frac{4}{3}$ of a pizza each.

It's your independent time to work on the activity given below

1 (a) How many smileys are there in $\frac{3}{4}$ of this collection?

(b) How many jelly beans are there in $\frac{2}{3}$ of this collection?

WE1

2 (a) Copy this number line and show the positions of these fractions: $\frac{3}{4}, \frac{8}{4}, \frac{5}{4}$ and $-\frac{1}{4}$.

WE2

(b) Copy this number line and show the positions of these fractions: $\frac{5}{6}, \frac{8}{6}, \frac{1}{6}$ and $-\frac{3}{6}$.

3 (a) Write the whole number 5 as an improper fraction with a denominator of:

WE3

(i) 2 **(ii)** 7 **(iii)** 11 **(iv)** 5 **(v)** 1

(b) Write the whole number 13 as an improper fraction with a denominator of:

(i) 2 **(ii)** 5 **(iii)** 8 **(iv)** 13 **(v)** 1

4 (a) For each of the following, write the amount each student receives as a fraction (or as a mixed number if appropriate).

(i) 1 pizza is shared equally between 2 students.

(ii) 2 apples are shared equally between 3 students.

(iii) 6 packets of lollies are shared equally between 5 students.

(iv) 10 packets of biscuits are shared equally between 7 students.

(b) In which of the above situations does a student receive more than one whole?

Now its time to show your understanding

5 Here are 16 lollies. How many will you eat if you eat these fractions of the total?

(a) $\frac{1}{4}$

(b) $\frac{3}{4}$

(c) $\frac{1}{8}$

(d) $\frac{5}{8}$

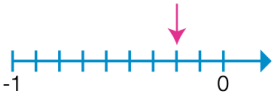
6 (a) What fraction of the bananas in this bunch are rotten?

(b) What fraction of the flowers in this vase are red?

7 Write the value of the fraction indicated by the arrow on each of the number lines below.

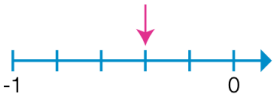
(a)

(b)



(c)

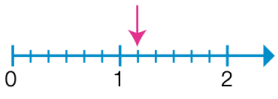
(d)



(e)

(f)

(g)



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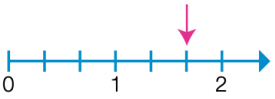


(i)

Printing

8 Write a fraction or a mixed number to show each of these:

(a) a numerator of 8 and a denominator of 17

(b) denominator of 4 and a numerator of 15

(c) nine chocolate biscuits in a packet of 20

(d) two wholes and two thirds

(e) 4 complete pairs of socks and one odd sock

(f) 3 whole 24-piece blocks of chocolate, with 7 extra pieces.

9 Write a fraction to show each of these:

(a) the weekend days as a fraction of a whole week

(b) 1 hour out of a whole day

(c) 1 second out of a whole minute

(d) 17 minutes out of a whole hour

(e) 157 mL of cola drunk from a 375 mL can

(f) 421L of water in a 500 L rainwater tank.

10 What fraction of this collection of shapes are:

(a) stars

(b) stars or hearts

(c) not hearts?

11 **(a)** Draw a diagram to show that if 5 pizzas are shared equally between 6 students, then each student receives $\frac{5}{6}$ of a pizza.

(b) Draw a diagram to show that if 5 blocks of chocolate are shared equally between 4 students, then each student receives 1 full block and $\frac{1}{4}$ of a second block.

12 Tim is 149 cm tall. His dad is 185 cm tall.

(a) Write Tim's height as a fraction of his dad's height.

(b) Write his dad's height as a fraction of Tim's height.

13 **(a)** After driving 8 km, the Johnson family are $\frac{1}{4}$ of the way to the zoo. How far away from the zoo do the Johnsons live?

(b) Toby and his Mum shared a bag of lollies: $\frac{2}{3}$ for Toby and $\frac{1}{3}$ for Mum. Mum had 6 lollies. How many did Toby have? How many lollies were in the bag?

Reasoning

14 4 girls share 5 pizzas evenly between them. 5 boys share 4 of the same size pizzas evenly between them. Write the fraction of pizza that each boy and each girl receives. Who gets more pizza, a boy or a girl?

15 To show fractions, a whole must be divided into equal parts. For each of the shapes below, consider whether the shaded section represents one or more equal parts. State the fraction shown. If you don't think it is possible to state a definite fraction, explain why.

(a) 

(b) 

(c) 

(d) 

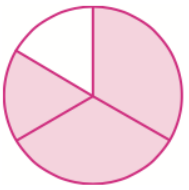
(e) 

(f) 

16 The fraction of this circle that is shaded is:

A $\frac{3}{4}$ **B** $\frac{4}{5}$ **C** $\frac{5}{6}$ **D** $\frac{7}{8}$

17 The fraction of this circle that is shaded is:



A $\frac{3}{4}$ **B** $\frac{4}{5}$ **C** $\frac{5}{6}$ **D** $\frac{7}{8}$

18 How many whole numbers would appear on the section of the number line between $\frac{1}{2}$ and $\frac{11}{2}$?

Open-ended

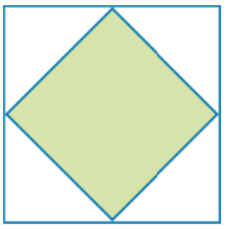
19 Draw a diagram that shows:

(a) three-eighths of an object **(b)** $\frac{5}{6}$ of a collection of objects **(c)** $\frac{9}{3}$

20 **(a)** This shape  represents $\frac{1}{5}$ of a whole. Draw two examples of what one whole could look like.

(b) This shape  represents $\frac{1}{4}$ of a whole. Draw two examples of what two wholes could look like.

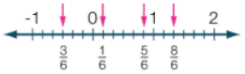
21 Draw a diagram to help you explain why the fraction of this tile that is shaded is $\frac{1}{2}$.



1 (a) 9 (b) 6

2 (a)

(b)



3 (a) (i) $\frac{10}{2}$ (ii) $\frac{35}{7}$ (iii) $\frac{55}{11}$ (iv) $\frac{25}{5}$ (v) $\frac{5}{1}$

(b) (i) $\frac{26}{2}$ (ii) $\frac{65}{5}$ (iii) $\frac{104}{8}$ (iv) $\frac{169}{13}$ (v) $\frac{13}{1}$

4 (a) (i) $\frac{1}{2}$ (ii) $\frac{2}{3}$ (iii) $\frac{6}{5}$ or $1\frac{1}{5}$ (iv) $\frac{10}{7}$ or $1\frac{3}{7}$

(b) (iii) and (iv)

5 (a) 4 (b) 12 (c) 2 (d) 10

6 (a) $\frac{5}{8}$ (b) $\frac{4}{9}$

7 (a) $\frac{1}{2}$ (b) $-\frac{2}{9}$ (c) $\frac{11}{4}$ (or $2\frac{3}{4}$)

(d) $-\frac{2}{5}$ (e) $\frac{3}{14}$ (f) $\frac{25}{8}$ (or $3\frac{1}{8}$)

(g) $\frac{7}{6}$ (or $1\frac{1}{6}$) (h) $\frac{5}{3}$ (or $1\frac{2}{3}$) (i) $-\frac{2}{7}$

8 (a) $\frac{8}{17}$ (b) $\frac{15}{4}$ (c) $\frac{9}{20}$ (d) $2\frac{2}{3}$

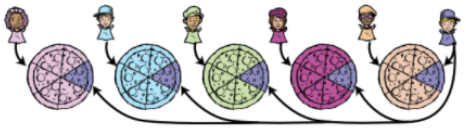
(e) $4\frac{1}{2}$ (f) $3\frac{7}{24}$

9 (a) $\frac{2}{7}$ (b) $\frac{1}{24}$ (c) $\frac{1}{60}$ (d) $\frac{17}{60}$

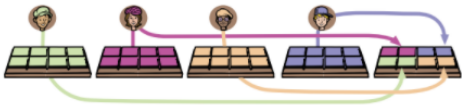
(e) $\frac{157}{375}$ (f) $\frac{421}{500}$

10 (a) $\frac{7}{14}$ or $\frac{1}{2}$ (b) $\frac{11}{14}$ (c) $\frac{10}{14}$ or $\frac{5}{7}$

11 (a)



(b)



12 (a) $\frac{149}{185}$ (b) $\frac{185}{149}$ or $1\frac{36}{149}$

13 (a) 32 km (b) Toby ate 12 lollies. 18 lollies in bag.

14 Boys: $\frac{4}{5}$ of a pizza each. Girls: $\frac{5}{4}$ of a pizza each ($1\frac{1}{4}$).
Girls each receive more pizza.

15 (a) $\frac{1}{4}$

(b) Not possible—not divided into equal parts and unable to create equal parts by further dividing shape up.

(c) $\frac{1}{2}$ (d) $\frac{3}{8}$

(e) Not possible—same reason as (b). (f) $\frac{1}{2}$

16 D **17** C

18 5 whole numbers: 1, 2, 3, 4, 5

Open-ended – Sample answers

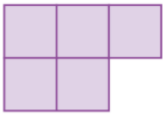
19 (a) $\frac{3}{8}$ of the shape is shaded

(b) $\frac{5}{6}$ of the collection of stars is shaded.

(c) $\frac{9}{3}$

20 (a)

Or



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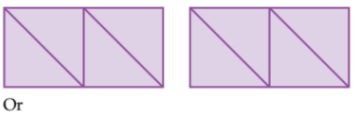

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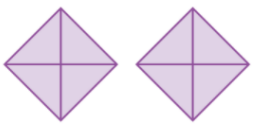

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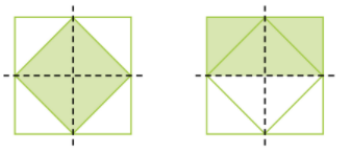
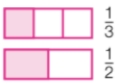


Drawing in a vertical and a horizontal line divides the square into quarters and shows that half of each quarter is shaded. We can rearrange things so that it is more obvious that half the square is shaded.

22 **(a)** Oliver's shaded areas (representing the fractions $\frac{1}{2}$ and $\frac{1}{3}$) look the same because he is not comparing fractions of the same-sized whole.

(b)



$\frac{1}{3}$

$\frac{1}{2}$