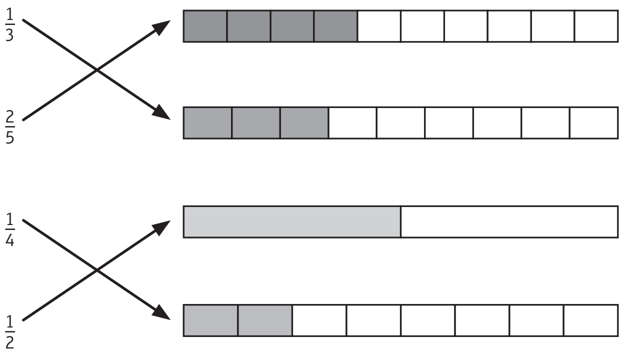
Unit 10: Fractions (2)

Lesson 1: Equivalent fractions (1)

➜ pages 6–8

1. a) $\frac{1}{4} = \frac{2}{8}$
b) $\frac{1}{6} = \frac{2}{12}$
c) $\frac{1}{3} = \frac{2}{6} = \frac{4}{12}$

2. Lines drawn as below:



3. a) $\frac{2}{3} = \frac{6}{9}$
(2 out of 3 parts shaded in the top bar; 6 out of 9 parts shaded in the bottom bar.)
b) $\frac{3}{15} = \frac{1}{5}$
(1 out of 5 parts shaded in the top bar; 3 out of 15 parts shaded in the bottom bar.)
c) $\frac{3}{12} = \frac{2}{8} = \frac{1}{4}$
(1 out of 4 parts shaded in the top bar; 2 out of 8 parts shaded in the middle bar; 3 out of 12 parts shaded in the bottom bar.)

4. $\frac{6}{8} = \frac{3}{4} = \frac{9}{12}$
(3 out of 4 parts shaded in the top bar; 6 out of 8 parts shaded in the middle bar; 9 out of 12 parts shaded in the bottom bar.)

5. Olivia is not correct, as she has not split the whole into 5 equal parts, so the parts are not fifths. Children may draw bar models to compare and show that $\frac{2}{5} \neq \frac{1}{3}$. Alternatively, they may add a line to the top diagram to split the circle into sixths and label the fraction as $\frac{2}{6}$.

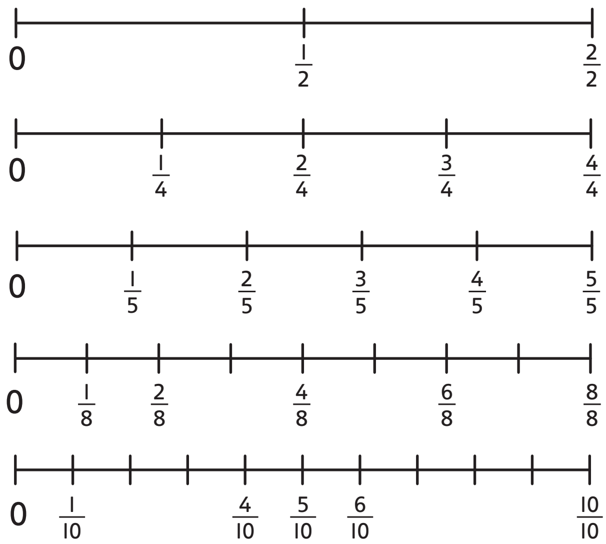
Reflect

An explanation should recognise that if you fold a sheet of paper into equal parts and shade one part, then the size of this shaded part stays the same even if the paper is folded again to make smaller equal parts; for example: I can fold my paper in half and shade in 1 half. If I then fold my paper in half again, I can now see $\frac{2}{4}$ shaded, which is the same as $\frac{1}{2}$.

Lesson 2: Equivalent fractions (2)

➜ pages 9–11

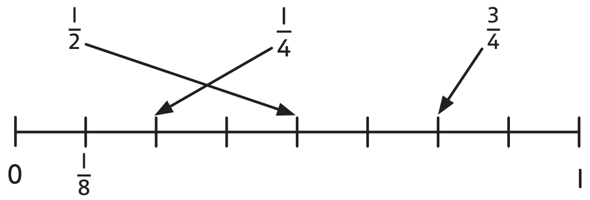
1.



2. a) $\frac{1}{2} = \frac{2}{4}$
b) $\frac{1}{2} = \frac{4}{8}$
c) $\frac{1}{2} = \frac{5}{10}$
d) $\frac{1}{4} = \frac{2}{8}$
e) $\frac{1}{5} = \frac{2}{10}$
f) $\frac{2}{5} = \frac{4}{10}$
g) $\frac{3}{4} = \frac{6}{8}$
h) $\frac{3}{5} = \frac{6}{10}$

3. a) $\frac{1}{3} = \frac{2}{6}$ b) $\frac{2}{3} = \frac{4}{6}$ c) $\frac{1}{2} = \frac{3}{6}$
d) Answers will vary: any three fractions that are not equivalent to $\frac{1}{3}$.

4.



5. $\frac{1}{3}$ written at first mark along the line.
These fractions circled on the bottom number line:
$\frac{1}{9}, \frac{2}{9}, \frac{4}{9}, \frac{5}{9}, \frac{6}{9}, \frac{7}{9}, \frac{8}{9}$.

6. $\frac{2}{2}$ and $\frac{7}{7}$ both equal 1 whole so they are equivalent fractions.
Any fractions equivalent to 1 whole (any fractions with a numerator the same as the denominator).

Reflect

Children need to explain that when they draw number lines to compare fractions, the number lines need to be the same length (the **whole** needs to be the same). They also need to explain that the whole needs to be divided into the number of **equal** parts determined by the denominator before they can compare.

Lesson 3: Equivalent fractions (3)

➜ pages 12–14

1. a) $\frac{1}{8} = \frac{2}{16}$
(1 out of 8 parts shaded in the top bar; 2 out of 16 parts shaded in the bottom bar.)
b) $\frac{4}{5} = \frac{8}{10}$
(4 out of 5 parts shaded in the top bar; 8 out of 10 parts shaded in the bottom bar.)
c) $\frac{3}{4} = \frac{9}{12}$
($\frac{3}{4}$ written at third mark along the top number line; $\frac{9}{12}$ written at ninth mark along bottom number line.)
d) $\frac{3}{4} = \frac{12}{16}$
($\frac{3}{4}$ written at third mark along top number line; $\frac{12}{16}$ written at twelfth mark along bottom number line.)

2. a) Answers will vary. Children could show and compare $\frac{2}{3}$ and $\frac{8}{12}$ pictorially, proving they are equal. Or they could write an explanation of how the numerator and denominator have both been multiplied by 4 to give $\frac{8}{12}$.
b) Answers will vary. Children could show and compare $\frac{2}{5}$ and $\frac{4}{15}$ pictorially, proving they are not equal. Or they could explain that the numerators and the denominators of the two fractions are not related by the same factor or multiple (the numerator of $\frac{2}{5}$ has been multiplied by 2, but the denominator has been multiplied by 3).

3. a) $\frac{6}{10} = \frac{12}{20}$ d) $\frac{4}{8} = \frac{1}{2}$ g) $\frac{4}{32} = \frac{1}{8}$
b) $\frac{3}{4} = \frac{12}{16}$ e) $\frac{5}{11} = \frac{30}{66}$ h) $\frac{12}{36} = \frac{3}{9}$
c) $\frac{8}{12} = \frac{4}{6}$ f) $\frac{5}{15} = \frac{1}{3}$ i) $\frac{5}{7} = \frac{20}{28}$
Children should have drawn a line between f) and h).

4. $\frac{27}{36}, \frac{30}{40}, \frac{33}{44}$

5. Emma is wrong. She has added 1 to the numerator and to the denominator – this does not show equivalence. In order to show equivalence, you need to either multiply both the numerator and the denominator by the same multiple or divide them both by a common factor.

Reflect

Teachers should look for an explanation that you can divide both the numerator and denominator in $\frac{4}{10}$ by the common factor 2 to make $\frac{2}{5}$.

Lesson 4: Comparing fractions

➜ pages 15–17

1. a) $\frac{1}{2} > \frac{1}{3}$ c) $\frac{1}{4} = \frac{4}{16}$
b) $\frac{1}{5} > \frac{1}{6}$ d) $\frac{10}{12} < \frac{9}{10}$

2. a) $\frac{1}{8} > \frac{1}{9}$ c) $\frac{2}{5} < \frac{5}{12}$
b) $\frac{5}{6} > \frac{2}{3}$ d) $\frac{3}{4} < \frac{9}{10}$

3. a) Answers will vary; the denominator must be less than 6.
b) Answers will vary; the denominator must be greater than 6.
c) Answers will vary; the denominator must be less than 8.
d) Answers will vary; the denominator must be greater than 8.

4. Answers will vary; the number of fifth parts must be greater than the number of quarter parts. Some possible solutions are: $\frac{2}{5} > \frac{1}{4}$; $\frac{3}{5} > \frac{2}{4}$; $\frac{4}{5} > \frac{3}{4}$.

5. Answers will vary. Some possible solutions are: $\frac{1}{2} = \frac{3}{6}$; $\frac{1}{3} = \frac{2}{6}$; $\frac{1}{6} < \frac{2}{3}$.

6. Smallest fraction = $\frac{6}{11}$
Greatest fraction = $\frac{8}{11}$

Reflect

Teachers should check for explanations that the denominator tells us how many equal parts the whole is split into. If the denominator is a smaller number, there are fewer equal parts, so each part is bigger. The larger the dominator, the more equal parts and the smaller each part.

Lesson 5: Comparing and ordering fractions

➜ pages 18–20

1. a) Possible answers: $\frac{7}{12}, \frac{8}{12}, \frac{9}{12}, \frac{10}{12}, \frac{11}{12}, \frac{12}{12}$
b) Possible answers: $\frac{1}{10}, \frac{2}{10}$
c) $\frac{3}{3}$
d) Possible answers: $\frac{6}{9}, \frac{6}{8}, \frac{6}{7}, \frac{6}{6}$
e) The denominator could be any number greater than 3.
f) The denominator could be any number smaller than 10.
g) Answers will vary; the fraction must be greater than $\frac{1}{2}$.
h) Answers will vary; the first fraction must be greater than the second fraction.
i) Answers will vary; the first fraction must be less than the second fraction.

2. a) $\frac{3}{12}, \frac{1}{2}, \frac{7}{12}$
b) $\frac{1}{8}, \frac{1}{5}, \frac{1}{3}$
c) $\frac{4}{10}, \frac{4}{8}, \frac{4}{6}$

3. a) $\frac{1}{5}$ circled
b) $\frac{1}{5}$ written at second mark along number line

4. $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$

5. $\frac{1}{9}, \frac{3}{7}$ (or possibly $\frac{2}{8}$), $\frac{5}{5}$

Reflect

Answers will vary. Children might find the fraction wall helps them to compare fractions. Some children may comment that it is easier to compare fractions that have the same denominator than those that have different denominators.

Lesson 6: Adding fractions

→ pages 21–23

1. a) $\frac{6}{7}$ b) $\frac{5}{9}$ c) $\frac{8}{12}$ d) $\frac{10}{10}$

2. a) $\frac{4}{5}$ b) $\frac{3}{4}$

3. a) $\frac{5}{9}+\frac{3}{9}=\frac{8}{9}$ b) $\frac{1}{8}+\frac{2}{8}=\frac{3}{8}$

4. a) $\frac{2}{3}$ b) $\frac{4}{4}$ c) $\frac{5}{9}$ d) $\frac{4}{6}$ e) $\frac{4}{8}$ f) $\frac{4}{5}$ g) $\frac{8}{10}$ h) $\frac{12}{12}$ i) $\frac{3}{7}$

5. Possible answers: $\frac{1}{6}+\frac{4}{6}$; $\frac{2}{6}+\frac{3}{6}$; $\frac{3}{6}+\frac{2}{6}$; $\frac{4}{6}+\frac{1}{6}$

6. a) Lines drawn to join:

$\frac{5}{8}$ to $\frac{3}{8}$
$\frac{1}{2}$ to $\frac{1}{2}$
$\frac{3}{4}$ to $\frac{1}{4}$

b $\frac{1}{5}+\frac{4}{5}=1$
$\frac{3}{6}+\frac{3}{6}=1$
$\frac{3}{10}+\frac{7}{10}=1$

Reflect

Jamilla is correct. When you divide a whole into 5 equal parts, each part is 1 fifth. Adding one fifth and another fifth gives you two of these equal parts, but each part is still 1 fifth, so 1 fifth add 1 fifth equals 2 fifths: $\frac{1}{5}+\frac{1}{5}=\frac{2}{5}$.

Richard is wrong. $\frac{1}{5}$ is equivalent to $\frac{2}{10}$ so $\frac{1}{5}+\frac{1}{5}$ cannot be $\frac{2}{10}$.

Lesson 7: Subtracting fractions

→ pages 24–26

1. a) $\frac{4}{9}$ b) $\frac{2}{10}$ c) $\frac{6}{12}$ (or $\frac{1}{12}$) d) $\frac{7}{8}$

2. Max has $\frac{3}{8}$ of the cake left.

3. a) $\frac{2}{3}$ b) $\frac{5}{8}$ c) $\frac{1}{6}$

4. a) $\frac{3}{9}$ b) $\frac{1}{8}$ c) $\frac{1}{4}$ d) $\frac{2}{10}$ e) $\frac{7}{11}$ f) $\frac{2}{8}$ g) $\frac{4}{6}$ h) $\frac{8}{9}$ i) $\frac{1}{9}$

5. Possible pairs are: 0 and $\frac{3}{8}$; $\frac{1}{8}$ and $\frac{4}{8}$; $\frac{2}{8}$ and $\frac{5}{8}$; $\frac{4}{8}$ and $\frac{7}{8}$; $\frac{5}{8}$ and $\frac{8}{8}$

6. $\frac{9}{10}-\frac{7}{10}=\frac{2}{10}$

7. a) $\frac{1}{5}$ b) $\frac{1}{9}$ c) $\frac{6}{12}$ d) $\frac{6}{10}$

Reflect

Teachers should look for an explanation of why the subtraction only affects the numerator (because the subtraction involves taking ninths from ninths so the answer will also be ninths). Children could also show this method pictorially with a bar model or using a number line.

Lesson 8: Problem solving – adding and subtracting fractions

→ pages 27–29

1. a) $\frac{4}{12}$ of Amy's cupcakes are chocolate or strawberry.
b) $\frac{8}{12}$ of the cupcakes are vanilla.
c) There were more vanilla cupcakes.
There were $\frac{7}{12}$ more vanilla cupcakes than chocolate cupcakes.

2. a) It is windy for $\frac{5}{9}$ of Emma's holiday.
b) It is windy for a greater amount of the holiday because $\frac{5}{9}$ is greater than $\frac{4}{9}$.

3. a) Possible answers: $\frac{0}{10}+\frac{3}{10}$; $\frac{1}{10}+\frac{2}{10}$; $\frac{2}{10}+\frac{1}{10}$; $\frac{3}{10}+\frac{0}{10}$.
b) Possible answers: $\frac{10}{10}-\frac{7}{10}$; $\frac{9}{10}-\frac{6}{10}$; $\frac{8}{10}-\frac{5}{10}$; $\frac{7}{10}-\frac{4}{10}$; $\frac{6}{10}-\frac{3}{10}$; $\frac{5}{10}-\frac{2}{10}$; $\frac{4}{10}-\frac{1}{10}$; $\frac{3}{10}-\frac{0}{10}$.
c) Answers will vary. Ensure the denominators are tenths and the numerators add and subtract to give 3.

4. Luis read $\frac{2}{10}$ of the book on Wednesday.

5. No, Ebo is not correct as Andy only ate $\frac{1}{7}$ of a pizza, so in total they ate $\frac{4}{7}$ of a pizza between them. Children could check their answer using a bar model or number line.

Reflect

Answers will vary. Ensure children are adding and subtracting fractions with the same denominator when creating their own word problems. Alternatively, some children may write problems around calculations using common fractions; for example: $\frac{3}{4}-\frac{1}{2}=\frac{1}{4}$.

Lesson 9: Problem solving – fractions of measures

→ pages 30–32

1. a) $\frac{3}{4}$ of the bottles are apple juice.
b) There are 30 bottles of apple juice.

2. Children should have circled:
a) $\frac{1}{3}$ of 1 litre of water
b) $\frac{2}{5}$ of 20 kg
c) $\frac{1}{5}$ of 10 hours
d) $\frac{3}{8}$ of a 12 cm strip of paper.

3. a) Kate played more netball.
b) Kate went swimming on $\frac{6}{10}$ of the days in April. $\frac{6}{10}$ is greater than $\frac{1}{2}$ as this is equivalent to $\frac{5}{10}$, so Kate is correct.

4. Ambika used $\frac{3}{5}$ of the ribbon and Lee used $\frac{1}{5}$, so they used $\frac{4}{5}$ in total. Yes, there was $\frac{1}{5}$ of the ribbon left, which is 2 metres in length.

5. The plant was 18 cm tall at the end of the second week.

Reflect

Look for an explanation that you need to add the fractions that Olivia spent on bananas and cherries, then work out what fraction she has left: $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$; $\frac{5}{5} - \frac{3}{5} = \frac{2}{5}$. Then work out $\frac{2}{5}$ of £10, which is £4, so Olivia has £4 left.

End of unit check

→ pages 33–34

My journal

Children may record answers such as follows:

Comparing ◯ with □
- They are unit fractions and the first fraction is smaller than the second.
- The more parts a unit is divided into, the smaller the size of each part.
- Looking at a fraction wall, the bigger the denominator, the smaller the size of the bar.

(Some children may prove this using real examples and show that, for example $\frac{1}{3} < \frac{1}{2}$ or $\frac{1}{10} < \frac{1}{8}$.)

Comparing △ with ⬠
- The denominators are the same, so the greater the numerator the greater the fraction.
- If I look at a fraction strip split into 5 equal parts, the more parts I have, the bigger the fraction is.

(Some children may prove this by using real examples and show that, for example, $\frac{4}{5} > \frac{2}{5}$.)