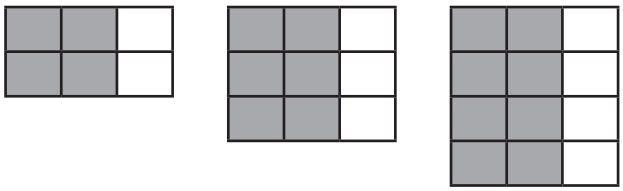
Unit 8: Fractions (I)

Lesson 1: Equivalent fractions

➜ pages 42–44

1 a) $\frac{1}{2} = \frac{4}{8}$ $\frac{1}{2} = \frac{3}{6}$ $\frac{1}{2} = \frac{8}{16}$

b) Answers may vary, for example:



$\frac{2}{3} = \frac{4}{6}$ $\frac{2}{3} = \frac{6}{9}$ $\frac{2}{3} = \frac{8}{12}$

c) 4 small squares should be shaded in each diagram as fractions are all equivalent to $\frac{1}{4}$ and $\frac{1}{4}$ of 16 is 4.

2 a) $\frac{1}{5} = \frac{3}{15}$ c) $\frac{10}{16} = \frac{5}{8}$ e) $\frac{1}{10} = \frac{3}{30}$

b) $\frac{3}{15} = \frac{4}{20}$ d) $\frac{3}{5} = \frac{9}{15}$ f) $\frac{3}{10} = \frac{9}{30}$

3 a) $\frac{80}{240} = \frac{8}{24} = \frac{2}{6} = \frac{200}{600}$

b) $\frac{3}{12} = \frac{5}{20} = \frac{8}{32}$

Answers will vary for the last fraction, for example, $\frac{1}{4}, \frac{2}{16}$.

4. Ambika is incorrect. Fractions are equivalent if each numerator has been multiplied by the same number to give the denominator. Children could draw diagrams to show that $\frac{3}{5}$ is not equal to $\frac{7}{9}$ or work out that $\frac{3}{5} = \frac{27}{45}$ but $\frac{7}{9} = \frac{35}{45}$.

5. a) $\frac{4}{16} = \frac{25}{100}$ $\frac{4}{25} = \frac{16}{100}$

b) $\frac{5}{6} = \frac{10}{12}$ $\frac{5}{10} = \frac{6}{12}$

c) $\frac{9}{10} = \frac{27}{30}$ $\frac{9}{27} = \frac{10}{30}$

d) $\frac{10}{25} = \frac{30}{75}$ $\frac{10}{30} = \frac{25}{75}$

Explanations will vary. Children may say they notice that you can swap the denominator of one fraction with the numerator of the other to make another pair of equivalent fractions.

Reflect

Methods may vary. Encourage children to show both pictorially and using multiplication or division to find equivalence.

Lesson 2: Converting improper fractions to mixed numbers

➜ pages 45–47

1. a) 1 kg in each bracket on top of the bar model

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

b) Missing number in diagram: 1

$\frac{9}{4}$ litres = $2\frac{1}{4}$ litres

c) $\frac{1}{3}$ written in each part of the bar model

$\frac{11}{3} = 3\frac{2}{3}$

2. 4 quarters make one whole circle.
Max has $\frac{15}{4}$ circles in total. That is $3\frac{3}{4}$ whole circles.

3. a) $\frac{13}{3} = 4\frac{1}{3}$ d) $\frac{14}{5} = 2\frac{4}{5}$

b) $\frac{13}{4} = 3\frac{1}{4}$ e) $\frac{15}{5} = 3$

c) $\frac{13}{5} = 2\frac{3}{5}$ f) $\frac{16}{5} = 3\frac{1}{5}$

4. a) $\frac{14}{4} = 3\frac{2}{4} = 3\frac{1}{2}$

b) $\frac{27}{6} = 4\frac{3}{6} = 4\frac{1}{2}$

c) $\frac{40}{12} = 3\frac{4}{12} = 3\frac{1}{3}$

5. Answers may vary. $\frac{11}{10} = 1\frac{1}{10}$; $\frac{12}{10} = 1\frac{2}{10}$; $\frac{23}{10} = 2\frac{3}{10}$
The square equals the whole number when the triangle is divided by 10 and the star is the remainder.

Reflect

Explanations may vary. Encourage children to see that $\frac{17}{3}$ is $\frac{1}{3}$ less than 6 and $\frac{19}{3}$ is $\frac{1}{3}$ greater than 6, so 6 is right in the middle between $\frac{17}{3}$ and $\frac{19}{3}$.

Lesson 3: Converting mixed numbers to improper fractions

➜ pages 48–50

1. a) $5\frac{1}{3} = \frac{16}{3}$ b) $4\frac{1}{4} = \frac{17}{4}$ c) $6\frac{3}{5} = \frac{33}{5}$

2. Images matched:

Top image $(3\frac{1}{2}) \rightarrow \frac{7}{2}$

Second image $(3\frac{1}{4}) \rightarrow \frac{13}{4}$

Third image $(2\frac{1}{4}) \rightarrow \frac{9}{4}$

Fourth image $(2\frac{2}{4}) \rightarrow \frac{5}{2}$

3. a) $3\frac{1}{2} = \frac{7}{2}$ c) $4\frac{2}{5} = \frac{22}{5}$

b) $2\frac{2}{3} = \frac{8}{3}$ d) $7\frac{1}{2} = \frac{15}{2}$ or $7\frac{2}{4} = \frac{30}{4}$

4. a) $4\frac{1}{5} = \frac{21}{5}$ b) $4\frac{2}{5} = \frac{22}{5}$ c) $4\frac{4}{5} = \frac{24}{5}$

5. The waiter can fill 14 glasses.

6. $22\frac{1}{8}$ kg weights would balance the box.

7. a) $\frac{14}{4} = 3\frac{1}{2}$
$\frac{28}{8} = 3\frac{1}{2}$
$\frac{21}{6} = 3\frac{1}{2}$

b) $4\frac{5}{10} = \frac{9}{2}$
$4\frac{6}{10} = \frac{23}{5}$
$4\frac{7}{10} = \frac{94}{20}$
$4\frac{8}{10} = \frac{72}{15}$

Reflect

Diagrams may vary. Encourage children to clearly show equal wholes and equal size parts of fifths. Diagrams should show $2\frac{4}{5}$ equals $\frac{14}{5}$.

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Lesson 4: Number sequences

➜ pages 51–53

1. a) $\frac{1}{4}$; $\frac{2}{4}$ ($\frac{1}{2}$); $\frac{3}{4}$; 1; 1 $\frac{1}{4}$; 1 $\frac{2}{4}$ (1 $\frac{1}{2}$)
b) $\frac{4}{3}$; $\frac{5}{3}$; $\frac{6}{3}$; $\frac{7}{3}$; $\frac{8}{3}$
c) Children should have drawn diagrams to match the sequence.
The rule for the sequence is counting back in quarters.

2. Sequences matched to descriptions:
Top sequence ➜ counts up in quarters
Second sequence ➜ counts down in halves
Third sequence ➜ counts up in eighths
Fourth sequence ➜ counts down in thirds

3. a) 3, 3 $\frac{1}{4}$, 3 $\frac{1}{2}$, 3 $\frac{3}{4}$, 4
b) 9 $\frac{1}{4}$, 9, 8 $\frac{3}{4}$, 8 $\frac{1}{2}$, 8 $\frac{1}{4}$

4. a) 2 and 3 are factors of 6 and so appear as denominators in the sequence. 4 is not a factor of 6 and so will not be a denominator in this sequence.
b) $\frac{1}{12}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{5}{12}$, $\frac{1}{2}$, $\frac{7}{12}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{11}{12}$
All denominators in this sequence are factors of 12.

Reflect

Answers may vary. Encourage children to write as quarters and as equivalent fractions. Do the children notice that all denominators are factors of 4?

Lesson 5: Comparing and ordering fractions (I)

➜ pages 54–56

1. a) $\frac{1}{6} < \frac{3}{6}$
1 part shaded
3 parts shaded
b) $\frac{2}{3} > \frac{2}{6}$
2 parts shaded
2 parts shaded
c) $\frac{4}{5} > \frac{3}{5}$
4 parts shaded
3 parts shaded
d) $\frac{5}{8} < \frac{3}{4}$
5 parts shaded
Bar split into quarters, 3 parts shaded

2. a) $\frac{2}{5} > \frac{3}{10}$
Max has run farther.
b) No, no one is in the lead as $\frac{8}{10}$ is equivalent to $\frac{4}{5}$.

3. a) $\frac{7}{8}$, $\frac{3}{4}$, $\frac{3}{8}$ b) $\frac{5}{6}$, $\frac{1}{2}$, $\frac{5}{12}$ c) $\frac{17}{20}$, $\frac{4}{5}$, $\frac{3}{4}$, $\frac{7}{10}$

4. Bella has not started with equal wholes. Both bars should be the same size and then be split into 5ths and 10ths before being shaded and compared.

5. $\frac{2}{5} > \frac{5}{15}$
$\frac{1}{8} < \frac{1}{4}$
$\frac{6}{12} < \frac{3}{4}$ or $\frac{6}{9} < \frac{3}{4}$
$\frac{1}{9} < \frac{5}{18}$ or $\frac{1}{12} < \frac{5}{18}$

6. a) Answers may vary – possible solutions are $\frac{1}{2}$, $\frac{5}{9}$, $\frac{7}{12}$
b) Answers may vary – possible solutions are $\frac{3}{10}$, $\frac{5}{15}$, $\frac{7}{20}$
c) Answers may vary – possible solutions are $\frac{19}{20}$, $\frac{29}{30}$, $\frac{99}{100}$

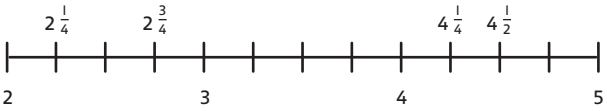
Reflect

Answers may vary, for example, $\frac{1}{5}$, $\frac{9}{5}$, $\frac{12}{12}$ or $\frac{1}{12}$, $\frac{5}{12}$, $\frac{5}{9}$.
Encourage children to use equivalence to help compare and order the fractions made.

Lesson 6: Comparing and ordering fractions (2)

➜ pages 57–59

1. a)



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

2. a) Right-hand diagram circled
b) Left-hand diagram circled
c) Right-hand diagram circled

3. a) 3 $\frac{1}{5}$ < 3 $\frac{4}{5}$ c) $\frac{15}{5}$ < 3 $\frac{3}{5}$ e) 4 $\frac{2}{6}$ > $\frac{23}{6}$
b) $\frac{13}{5}$ < $\frac{17}{5}$ d) 4 $\frac{2}{5}$ < $\frac{23}{5}$ f) $\frac{23}{7}$ < 4 $\frac{2}{7}$

4. Kate has cycled farther.

5. a) 2 $\frac{7}{8}$ < 4 $\frac{3}{4}$ e) $\frac{31}{5}$ > $\frac{31}{10}$ i) $\frac{21}{5}$ > 2 $\frac{1}{5}$
b) 3 $\frac{2}{3}$ > 3 $\frac{1}{6}$ f) $\frac{41}{6}$ < $\frac{41}{2}$ j) $\frac{31}{10}$ = 3 $\frac{1}{10}$
c) 5 $\frac{1}{5}$ = 5 $\frac{2}{10}$ g) $\frac{21}{2}$ > $\frac{41}{4}$ k) 5 $\frac{1}{3}$ > $\frac{31}{6}$
d) 6 $\frac{3}{6}$ < 6 $\frac{2}{3}$ h) $\frac{13}{3}$ = $\frac{39}{3}$ l) 4 $\frac{4}{9}$ > $\frac{13}{3}$

6. a) Answers may vary depending on the denominators chosen – a possible solution is:
$\frac{43}{10}$, $\frac{87}{20}$, $\frac{44}{10}$
$\frac{21}{5} < \frac{43}{10} < \frac{87}{20} < \frac{44}{10} < 4\frac{5}{10}$
b) Answers may vary depending on the denominator chosen – a possible solution is:
3 $\frac{11}{32}$, 3 $\frac{21}{64}$, 3 $\frac{23}{64}$, 3 $\frac{41}{128}$
From greatest to least: 3 $\frac{3}{8}$, 3 $\frac{23}{64}$, 3 $\frac{11}{32}$, 3 $\frac{21}{64}$, 3 $\frac{41}{128}$, $\frac{53}{16}$

Reflect

Answers may vary, for example, $\frac{8}{3}$ = 2 $\frac{2}{3}$; $\frac{2}{3}$ is greater than $\frac{1}{6}$ so $\frac{8}{3}$ > 2 $\frac{1}{6}$.
2 $\frac{1}{6}$ = $\frac{13}{6}$; $\frac{8}{3}$ = $\frac{16}{6}$ so $\frac{8}{3}$ is greater than 2 $\frac{1}{6}$.

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Lesson 7: Fractions as division (I)

➜ pages 60–62

1. a) $4 \div 5 = \frac{4}{5}$
There is $\frac{4}{5}$ of a cake for each table.
b) $3 \div 8 = \frac{3}{8}$
There is $\frac{3}{8}$ of a pie for each table.
c) $5 \div 6 = \frac{5}{6}$. There is $\frac{5}{6}$ kg of strawberries in each bowl.

2. a) $1 \div 5 = \frac{1}{5}$ c) $3 \div 5 = \frac{3}{5}$ e) $\frac{4}{11} = 4 \div 11$
b) $2 \div 5 = \frac{2}{5}$ d) $3 \div 10 = \frac{3}{10}$ f) $8 \div 9 = \frac{8}{9}$

3. a) Each length is $\frac{3}{8}$ m long.
b) Each length is $\frac{4}{8}$ or $\frac{1}{2}$ m long.

4. Each circle shows $\frac{1}{6}$, so the diagram shows that $4 \div 6 = 4$ sixths $= \frac{4}{5}$.

5. Divisions matched to fractions.
$2 \div 8 \rightarrow \frac{1}{4}$ $3 \div 9 \rightarrow \frac{1}{3}$ $1 \div 10 \rightarrow \frac{2}{20}$
$4 \div 10 \rightarrow \frac{2}{5}$ $4 \div 20 \rightarrow \frac{1}{5}$ $3 \div 4 \rightarrow \frac{9}{12}$

6. a) The first glasses hold $\frac{5}{6}$ litre and the second glasses hold $\frac{6}{9}$ litre.
$\frac{5}{6} = \frac{15}{18}$; $\frac{6}{9} = \frac{12}{18}$
$\frac{15}{18} > \frac{12}{18}$ so $\frac{5}{6} > \frac{6}{9}$
This means the first glasses are bigger.
b) Red watering cans hold $\frac{8}{20}$ litre $= \frac{2}{5}$ litre
Blue watering cans hold $\frac{12}{30}$ litre $= \frac{2}{5}$ litre
So, the red and blue watering cans are equal in size.

Reflect

Explanations may vary. Encourage children to explain that the answer to the calculation $3 \div 8$ is equal to $\frac{3}{8}$. Children may draw diagrams to show why this is true.

Lesson 8: Fractions as division (2)

➜ pages 63–65

1. a) $5 \div 2 = 2$ remainder 1
$5 \div 2 = 2\frac{1}{2}$
b) $8 \div 3 = 2$ remainder 2
$8 \div 3 = 2\frac{2}{3}$

2. a) $14 \div 3 = 4\frac{2}{3}$ m
b) $24 \div 3 = 8$ m

3. Each person receives $62\frac{1}{2}$ g of chocolate.

4. a) $97 \div 8 = 12$ remainder $1 = 12\frac{1}{8}$
b) $98 \div 8 = 12\frac{2}{8} = 12\frac{1}{4}$
c) $100 \div 8 = 12\frac{1}{2}$
d) $102 \div 8 = 12\frac{3}{4}$
e) $193 \div 8 = 24\frac{1}{8}$

5.

Division with remainder	Mixed number	Improper fraction
$6 \div 4 = 1$ remainder 2	$1\frac{2}{4}$ or $1\frac{1}{\boxed{2}}$	$\frac{6}{4}$ or $\frac{3}{\boxed{2}}$
$18 \div 4 =$ [4] remainder [2]	$4\frac{2}{4}$ or $4\frac{1}{2}$	$\frac{18}{4}$ or $\frac{9}{2}$
$22 \div 5 = 4$ remainder 2	$4\frac{2}{5}$	$\frac{22}{5}$
$26 \div 5 = 5$ remainder 1	$5\frac{1}{5}$	$\frac{26}{5}$
$58 \div 10 = 5$ remainder 8	$5\frac{8}{10}$ or $5\frac{4}{5}$	$\frac{58}{10}$ or $\frac{\boxed{29}}{5}$

6. a) $20 \div 6 = 3\frac{2}{6}$ or $3\frac{1}{3}$
b) Parts in diagram: $\frac{54}{6}$ and $\frac{3}{6}$
$57 \div 6 = 9\frac{3}{6}$ or $9\frac{1}{2}$
c) Missing part in diagram: $\frac{1}{7}$
$365 \div 7 = 52\frac{1}{7}$

Reflect

$150 \div 4 = 37$ remainder 2
$150 \div 4 = 37\frac{2}{4} = 37\frac{1}{2} = 37{\cdot}5$

End of unit check

➜ pages 66–67

My journal

Answers may vary – some possible answers include:

$\frac{5}{10} = \frac{6}{12}$
$\frac{3}{10} = \frac{6}{20}$
$\frac{4}{10} = \frac{6}{15}$
$\frac{10}{10} = \frac{6}{6}$
$\frac{12}{10} = \frac{6}{5}$
$\frac{15}{10} = \frac{6}{4}$

Power play

Children should be able to use their understanding of improper fractions and mixed number fractions to fluently find equivalent fractions. If asked, children should be able to prove their equivalent fractions with a picture of shared 2D shapes or a fraction strip. If children find this activity challenging it will be beneficial to offer them support with finding equivalent fractions and converting between mixed numbers and improper fractions. If dice are not available then children could use spinners labelled 1 to 6 (which they can make with a paper clip and some paper).

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