



Unit 9: Fractions (2)

Lesson 1: Adding and subtracting fractions with the same denominator

→ pages 68–70

- $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$
 - $\frac{3}{8} + \frac{3}{8} = \frac{6}{8} = \frac{3}{4}$
 - $\frac{9}{10} - \frac{7}{10} = \frac{2}{10} = \frac{1}{5}$
- $\frac{13}{9} = 1 \frac{4}{9}$
 - $\frac{10}{7} = 1 \frac{3}{7}$
- Circle: $\frac{7}{12} + \frac{3}{12} = \frac{10}{12} = \frac{5}{6}$
 - Circle: $\frac{3}{4} + \frac{3}{4} = \frac{6}{4} = 1 \frac{2}{4} = 1 \frac{1}{2}$
- $\frac{3}{5}$
 - $\frac{1}{9}$
 - $\frac{11}{10} = 1 \frac{1}{10}$
 - $\frac{6}{12} = \frac{1}{2}$
 - $\frac{5}{3} = 1 \frac{2}{3}$
 - $\frac{10}{11}$
 - $\frac{15}{8} = 1 \frac{7}{8}$
- Join fractions: $\frac{6}{7}$ and $\frac{1}{7}$, $\frac{2}{7}$ and $\frac{5}{7}$, $\frac{3}{7}$ and $\frac{4}{7}$.
 Explanations may vary. $\frac{7}{7}$ makes 1 whole, so I chose pairs of numerators that total 7.
- Missing numbers:
 - 5
 - 2
 - 1
 - 5
 - 1
 - 9
- Yes, it is correct as $\frac{4}{5} + \frac{1}{5} = 1$ and $\frac{1}{6} + \frac{5}{6} = 1$; $1 + 1 = 2$
 - Yes, it is correct as $\frac{5}{8} + \frac{3}{8} = 1$ and $1 - \frac{5}{6} = \frac{1}{6}$

Reflect

The numerator of the second fraction must be greater than 4.

Explanations may vary. Children may say they know that $\frac{5}{9} + \frac{4}{9} = 1$, so any numerator greater than 4 will total a number greater than 1.

Lesson 2: Adding and subtracting fractions (I)

→ pages 71–73

- $\frac{2}{3}$ is equivalent to $\frac{4}{6}$
 $\frac{2}{3} + \frac{1}{6} = \frac{4}{6} + \frac{1}{6} = \frac{5}{6}$
 - $\frac{1}{4} = \frac{2}{8}$
 $\frac{3}{8} + \frac{1}{4} = \frac{3}{8} + \frac{2}{8} = \frac{5}{8}$
 - $\frac{1}{3} = \frac{3}{9}$
 $\frac{4}{9} - \frac{1}{3} = \frac{4}{9} - \frac{3}{9} = \frac{1}{9}$
- $\frac{2}{5} = \frac{4}{10}$
 $\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$
 - $\frac{1}{3} = \frac{4}{12}$
 $\frac{7}{12} - \frac{1}{3} = \frac{7}{12} - \frac{4}{12} = \frac{3}{12} = \frac{1}{4}$

- $\frac{7}{20} - \frac{1}{5} = \frac{7}{20} - \frac{4}{20} = \frac{3}{20}$
 - $\frac{7}{20} - \frac{3}{10} = \frac{1}{20}$
- $\frac{1}{4}$
 - $\frac{1}{3} (= \frac{2}{6})$
 - $\frac{2}{5} (= \frac{4}{10})$
 - $\frac{7}{20}$
- $\frac{1}{2} + \frac{1}{6} = \frac{2}{3}$. $\frac{2}{3}$ of the circle is shaded.

Reflect

Answers may vary – the denominators have been added, which is incorrect. Instead, $\frac{1}{4}$ can be written as $\frac{2}{8}$ and added to $\frac{5}{8}$ to get $\frac{7}{8}$.

Lesson 3: Adding and subtracting fractions (2)

→ pages 74–76

- $\frac{1}{5} = \frac{2}{10}$
 $\frac{1}{5} + \frac{7}{10} = \frac{2}{10} + \frac{7}{10} = \frac{9}{10}$
 Bella has given away $\frac{9}{10}$ of the flowers.
 - Bella has $\frac{1}{10}$ of the flowers left.
- $\frac{3}{4} + \frac{3}{8} = \frac{6}{8} + \frac{3}{8} = \frac{9}{8} = 1 \frac{1}{8}$
 - $\frac{5}{9} - \frac{1}{3} = \frac{5}{9} - \frac{3}{9} = \frac{2}{9}$
- $\frac{4}{12} = \frac{1}{3}$
 - $\frac{24}{25}$
 - $\frac{16}{20} = \frac{4}{5}$
 - $\frac{7}{20}$
- The total length of the strips is $\frac{4}{5}$ m.
 - The white strip is $\frac{3}{10}$ m shorter than the grey strip.
- The total of the three fractions is $\frac{7}{8}$.
 $\frac{1}{2} = \frac{4}{8}$, $\frac{1}{4} = \frac{2}{8}$, $\frac{4}{8} + \frac{2}{8} + \frac{1}{8} = \frac{7}{8}$.
- $\frac{7}{12}$
 - $\frac{5}{24}$

Reflect

Answers may vary – the denominators have been added, which is incorrect. Instead, $\frac{1}{3}$ can be written as $\frac{2}{6}$ and added to $\frac{1}{6}$ to get $\frac{3}{6}$.

Lesson 4: Adding fractions (I)

→ pages 77–79

- $\frac{1}{3} = \frac{2}{6}$
 $\frac{5}{6} + \frac{1}{3} = \frac{5}{6} + \frac{2}{6} = \frac{7}{6} = 1 \frac{1}{6}$
 - $\frac{1}{2} = \frac{5}{10}$
 $\frac{1}{2} + \frac{9}{10} = \frac{5}{10} + \frac{9}{10} = \frac{14}{10} = 1 \frac{2}{5}$
- $\frac{1}{2}$
- $\frac{3}{4} = \frac{6}{8}$
 $\frac{3}{8} + \frac{3}{8} = \frac{6}{8} + \frac{6}{8} = \frac{12}{8} = 1 \frac{4}{8} = 1 \frac{1}{2}$
 - $\frac{2}{3} = \frac{8}{12}$
 $\frac{5}{12} + \frac{2}{3} = \frac{5}{12} + \frac{8}{12} = \frac{13}{12} = 1 \frac{1}{12}$
- The total amount of juice in both bottles is $1 \frac{1}{10}$ litres.



5. a) $1\frac{1}{4}$ b) $1\frac{8}{15}$
 6. a) $\frac{11}{12}$ c) $\frac{7}{12}$ e) $\frac{5}{12}$
 b) $\frac{3}{4}$ d) $\frac{7}{12}$ f) $\frac{1}{4}$

Reflect

Answers may vary. The denominators have been added, which is incorrect. Instead, $\frac{2}{3}$ can be written as $\frac{6}{9}$ and added to $\frac{7}{9}$ to get $\frac{13}{9}$ or $1\frac{4}{9}$.

Lesson 5: Adding fractions (2)

→ pages 80–82

1. $2 + 1 = 3$
 $\frac{1}{4} = \frac{2}{8}$
 $\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$
 Olivia walks $3\frac{5}{8}$ km in total.
2. $3 + 2 = 5$
 $\frac{3}{5} = \frac{6}{10}$
 $\frac{3}{5} + \frac{9}{10} = \frac{6}{10} + \frac{9}{10} = \frac{15}{10} = 1\frac{1}{2}$
 So, $3\frac{3}{5} + 2\frac{9}{10} = 6\frac{1}{2}$
3. a) $1\frac{2}{3}$ b) $4\frac{1}{4}$
 c) If you move 2 wholes from $3\frac{2}{3}$ to $\frac{7}{12}$, this changes the calculation in b) to $2\frac{7}{12} + 1\frac{2}{3}$ but the total will stay the same.
4. a) $3\frac{8}{9}$ b) $6\frac{8}{9}$
 The fractional part of the answer in b) is the same as in a) as children are adding the same fractional parts together. Just the whole number part is different as children are adding different whole numbers.
5. $3\frac{2}{3} + 5\frac{5}{6} = 9\frac{1}{2}$ or $5\frac{2}{3} + 3\frac{5}{6} = 9\frac{1}{2}$
6. $\frac{5}{6}$

Reflect

The fractional parts have already been added, so just add on the whole parts ($4 + 3$) to make $7\frac{5}{8}$.

Lesson 6: Adding fractions (3)

→ pages 83–85

1. $2\frac{1}{3} = \frac{7}{3}$ $1\frac{2}{9} = \frac{11}{9}$
 $\frac{7}{3} = \frac{21}{9}$
 $\frac{21}{9} + \frac{11}{9} = \frac{32}{9}$
 $= 3\frac{5}{9}$
 So, $2\frac{1}{3} + 1\frac{2}{9} = 3\frac{5}{9}$
2. $2\frac{7}{8}$
3. a) $2\frac{7}{8}$ c) $5\frac{11}{20}$
 b) $6\frac{1}{5}$ d) $5\frac{3}{16}$
4. The total weight of the two boxes is $4\frac{1}{4}$ kg.

5. Yes, children should agree with Kate because if they convert these fractions to improper fractions before adding, then the numbers will get very big and they are more likely to make a mistake. Whereas adding wholes and then parts will keep the numbers that they are working with smaller.

6. $1\frac{5}{6} + 1\frac{7}{12} = \frac{11}{6} + \frac{19}{12} = \frac{22}{12} + \frac{19}{12} = \frac{41}{12} = 3\frac{5}{12}$
7. a) Max has finished on $9\frac{5}{16}$
 b) Max jumped $2\frac{11}{16}$ more to land on 12.

Reflect

Children's preference will vary. Encourage children to use the most efficient method of adding wholes, finding a common denominator for the parts, adding parts and then adding the wholes back on, instead of converting to improper fractions first.

Lesson 7: Subtracting fractions (I)

→ pages 86–88

1. $\frac{7}{9} - \frac{5}{9} = \frac{2}{9}$
 So $2\frac{7}{9} - \frac{5}{9} = 2\frac{2}{9}$
2. a) $\frac{1}{4} = \frac{2}{8}$
 $3\frac{7}{8} - \frac{1}{4} = 3\frac{7}{8} - \frac{2}{8}$
 $3\frac{5}{8}$
 b) $\frac{1}{2} = \frac{4}{8}$
 $3\frac{7}{8} - \frac{1}{2} = 3\frac{7}{8} - \frac{4}{8}$
 $3\frac{3}{8}$
 c) $3\frac{7}{8} - 1 = 2\frac{7}{8}$ $3\frac{7}{8} - \frac{7}{8} = 3$
3. There are $2\frac{1}{4}$ pies left.
4. a) $2\frac{1}{4}$ c) $2\frac{3}{8}$
 b) $1\frac{1}{5}$ d) $1\frac{1}{10}$
5. a) $\frac{1}{2}$ c) 4 (or $3\frac{9}{9}$)
 b) $3\frac{7}{9}$ d) $\frac{7}{12}$
6. The second show lasts $2\frac{1}{8}$ hours.

Reflect

Explanations will vary.

$\frac{1}{10}$ is smaller than $\frac{1}{5}$ so $\frac{3}{10}$ is smaller than $\frac{3}{5}$. Therefore $\frac{3}{10}$ can be subtracted from $\frac{3}{5}$ without a need to exchange one of the whole numbers, so the answer will be more than 2.



Lesson 8: Subtracting fractions (2)

→ pages 89–91

- $3\frac{2}{5} = 2\frac{7}{5}$
 $2\frac{7}{5} - \frac{4}{5} = 2\frac{3}{5}$
 So $3\frac{2}{5} - \frac{4}{5} = 2\frac{3}{5}$
- $2\frac{3}{8} = 1\frac{11}{8}$
 $1\frac{11}{8} - \frac{7}{8} = 1\frac{4}{8}$
 So $2\frac{3}{8} - \frac{7}{8} = 1\frac{1}{2}$
- Missing fractions:

a) $\frac{3}{7}$	c) $\frac{7}{7}$
b) $\frac{5}{7}$	d) $\frac{1}{7}$
- $4\frac{1}{4} = 4\frac{2}{8} = 3\frac{10}{8}$
 $3\frac{10}{8} - \frac{7}{8} = 3\frac{3}{8}$
 So, $4\frac{1}{4} - \frac{7}{8} = 3\frac{3}{8}$
- $1\frac{7}{10}$
- | | |
|--------------------|---------------------|
| a) $4\frac{5}{9}$ | c) $6\frac{5}{5}$ |
| b) $4\frac{3}{12}$ | d) $3\frac{13}{24}$ |
- There are $1\frac{5}{8}$ sandwiches left.
- Triangle = $\frac{7}{12}$
Circle = $1\frac{1}{12}$

Reflect

Explanations will vary. $\frac{9}{20}$ is more than $\frac{2}{5}$ so this means that one of the wholes in 2 will need to be exchanged into 20ths in order for the parts to be subtracted.

Lesson 9: Subtracting fractions (3)

→ pages 92–94

- $1\frac{1}{3} = 1\frac{2}{6}$
 $3 - 1 = 2$
 $\frac{5}{6} - \frac{2}{6} = \frac{3}{6}$
 $3\frac{5}{6} - 1\frac{1}{3} = 2\frac{3}{6} = 2\frac{1}{2}$
- $4\frac{3}{4} = 4\frac{6}{8}$
 $4 - 2 = 2$
 $\frac{6}{8} - \frac{5}{8} = \frac{1}{8}$
 $4\frac{3}{4} - 2\frac{5}{8} = 2\frac{1}{8}$
- $4\frac{1}{2} = 4\frac{4}{8}$
 $4\frac{4}{8} - 2\frac{7}{8} = 3\frac{12}{8} - 2\frac{7}{8}$
 $= 1\frac{5}{8}$
 So $4\frac{1}{2} - 2\frac{7}{8} = 1\frac{5}{8}$
- | | |
|--------------------|---------------------|
| a) $3\frac{7}{11}$ | c) $1\frac{14}{15}$ |
| b) $4\frac{5}{6}$ | d) $\frac{13}{18}$ |
- Calculations circled: $7\frac{8}{9} - 6\frac{1}{9}$, $4\frac{1}{9} - 2\frac{1}{3}$ and $6\frac{5}{8} - 4\frac{19}{24}$.
Explanations may vary. $5 - 3 = 2$ so $5\frac{1}{8} - 2$ will be more than 3.

- Towns B and C could be $2\frac{2}{5}$ km apart (if B lies between A and C) or $11\frac{2}{5}$ km apart (if A lies between B and C).

Reflect

Aki has forgotten that subtraction is not commutative. He has subtracted $\frac{1}{12}$ from $\frac{8}{12}$ instead of exchanging 1 whole to make more 12ths in order to complete the subtraction. The actual answer is $1\frac{1}{3}$.

Lesson 10: subtracting fractions (4)

→ pages 95–97

- $2\frac{3}{5} = \frac{13}{5}$
 $1\frac{4}{5} = \frac{9}{5}$
 $2\frac{3}{5} - 1\frac{4}{5} = \frac{13}{5} - \frac{9}{5} = \frac{4}{5}$
- $3\frac{1}{6} = \frac{19}{6}$
 $1\frac{1}{2} = 1\frac{3}{6} = \frac{9}{6}$
 $3\frac{1}{6} - 1\frac{1}{2} = \frac{19}{6} - \frac{9}{6} = \frac{10}{6} = 1\frac{4}{6} = 1\frac{2}{3}$
- | | |
|-------------------|-------------------|
| a) $3\frac{1}{9}$ | b) $2\frac{1}{9}$ |
|-------------------|-------------------|
- | |
|----------------------------------------------------------|
| a) Parcel B weighs $2\frac{13}{15}$ kg. |
| b) Parcel B weighs $1\frac{2}{5}$ kg more than parcel A. |
- | | |
|--------------------|---------------------|
| a) $3\frac{7}{11}$ | c) $1\frac{14}{15}$ |
| b) $4\frac{5}{6}$ | d) $\frac{13}{18}$ |
- $126\frac{11}{15} - 72\frac{3}{5} = 54\frac{2}{15}$
 Methods may vary. Encourage children to use the most efficient method, in this case, subtracting the wholes then finding a common denominator to subtract the parts.

Reflect

Answers may vary. Encourage children to see that the whole part of the equations are the same, but the fractional parts are different. In the first equation, $\frac{2}{3}$ is bigger than $\frac{1}{6}$ so no exchange is needed. In the second equation $\frac{1}{6}$ is less than $\frac{2}{3}$, so exchange will be needed.

$$4\frac{2}{3} - 2\frac{1}{6} = 2\frac{1}{2}; 4\frac{1}{6} - 2\frac{2}{3} = 1\frac{1}{2}$$

Lesson 11: Problem solving – mixed word problems (I)

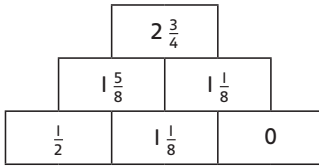
→ pages 98–100

- Alex has read $\frac{1}{2}$ of the book.
- | |
|--------------------------------------------------------------|
| a) The rabbit eats $\frac{9}{10}$ of the bag of carrots. |
| b) The rabbit has $\frac{1}{10}$ of the bag of carrots left. |
- Kate uses $6\frac{2}{3}$ kg of compost in total.



4. a) Jen travels $17\frac{1}{8}$ km in total.
 b) It is $6\frac{3}{8}$ km further from home to the cinema than from the cinema to the shops.

5.



Reflect

$2\frac{3}{5} - 1\frac{9}{10} = \frac{7}{10}$. Problems will vary. Ensure children have used an appropriate context for the subtraction problem. Remind children to answer their question with a sentence.

Lesson 12: Problem solving – mixed word problems (2)

→ pages 101–103

- Ebo has $\frac{2}{9}$ of his pocket money left.
- a) $\frac{4}{9}$ of the shape is now shaded.
 b) Explanations may vary. Encourage children to use a pictorial representation to visualise that $\frac{1}{3}$ is the same as $\frac{3}{9}$, so they understand that adding the extra $\frac{1}{9}$ makes $\frac{4}{9}$.
- $\frac{1}{8}$ kg of oats is left in the bag.
- Kate used $4\frac{7}{9}$ m of ribbon in total.
- Missing numbers:
 a) 4 c) 2
 b) 1 d) 12
- The difference between A and B is $1\frac{3}{10}$.
 Explanations may vary. B is $1\frac{7}{10}$ and A is $\frac{2}{5}$; $1\frac{7}{10} - \frac{2}{5} = 1\frac{3}{10}$
- The length of the missing side is $2\frac{3}{5}$ cm.

Reflect

Answers will vary. Encourage children to justify what they found challenging and explain what they now know about adding and subtracting fractions.

End of unit check

→ pages 104–106

My journal

- a) Methods may vary. Encourage children to explain preference with justifications.
 b) Methods may vary. Encourage children to explain preference with justifications.
- Max drank $6\frac{4}{6}$ or $6\frac{2}{3}$ litres of milk in the last two weeks.

Power puzzle

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

$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{7}{8}$

$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} = \frac{15}{16}$

$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} = \frac{31}{32}$

Answers may vary. Children may notice that each fraction is half the size of the fraction before in the number sentence and that the numerator of the answer is always 1 less than the denominator of the answer.

$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} = \frac{63}{64}$

$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} + \frac{1}{128} = \frac{127}{128}$