12 - 1 Fractions
Expressing the Size of Divided Parts (1)

Instruction When 1 m is divided into 3 equal parts, one of the parts is called **one-third** of 1 m.

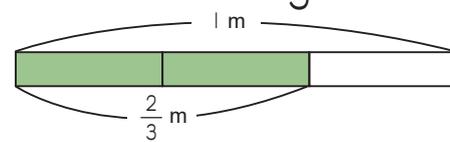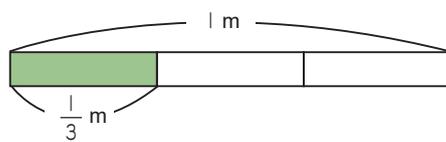**Numerator**: the length of 2 parts

$$\frac{2}{3} \text{ m}$$

Denominator: Dividing 1 m into 3 parts

The length one third of 1 m is written as $\frac{1}{3}$ m.
Two of the parts together is called **two-thirds** of 1 m.
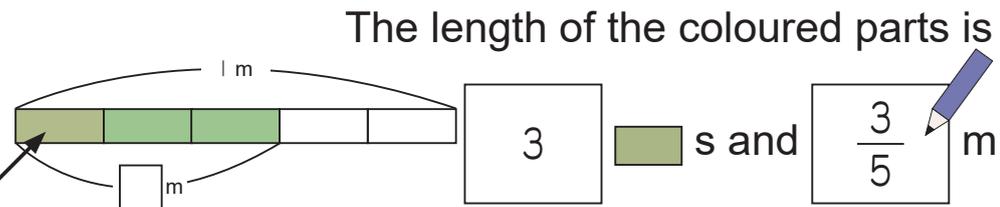The length two thirds of 1 m is written as $\frac{2}{3}$ m.

1 m

$\frac{1}{3}$ m

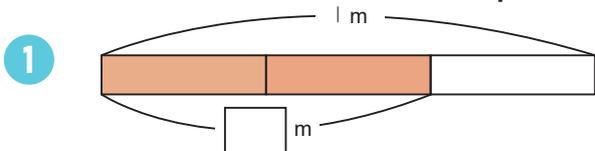1 m

$\frac{2}{3}$ m

Example 1 How many ▢ is the length of the coloured part? How many metres is the coloured part?
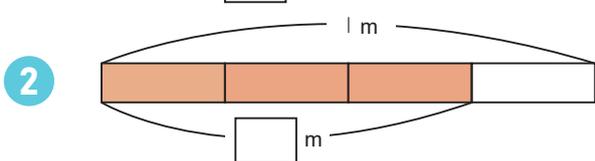
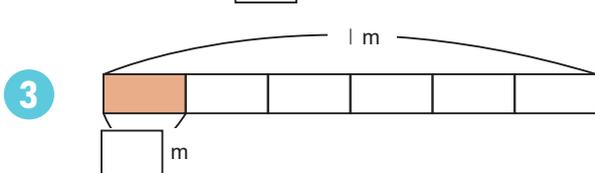1 m is divided into 5 parts equally. This is the size of 1 **measurement mark**.

1 m

☐ m

The length of the coloured parts is

3 ▢ s and $\frac{3}{5}$ m

1 How many ▢ is the length of the coloured part? How many metres is the coloured part?

① 1 m

☐ m

The length of the coloured part is

☐ ▢ s and ☐ m

② 1 m
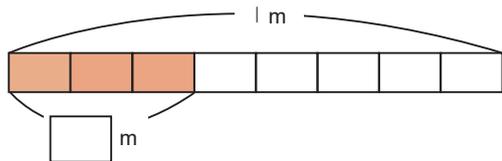
☐ m

The length of the coloured part is

☐ ▢ s and ☐ m

③ 1 m

☐ m

The length of the coloured part is

☐ ▢ s and ☐ m

④ 1 m

☐ m

The length of the coloured part is

☐ ▢ s and ☐ m

5

The length of the coloured part is

□ 🟫 s and □ m
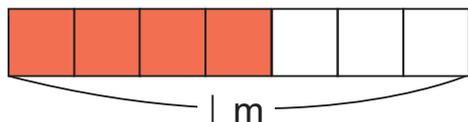
| m (top label over tape)
□ m (bottom label)

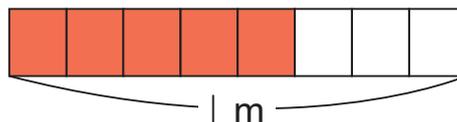**2** Colour the parts expressing the lengths shown below.

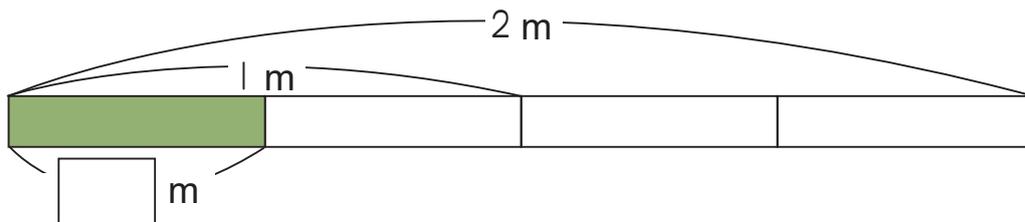**1** $\frac{4}{7}$ m

| m

2 $\frac{5}{8}$ m

| m

Example 2 The following shows a problem and Student A's answer. Is his answer correct?

> Question: How many metres is the coloured part?
> Student A's answer: $\frac{|}{4}$ m

2 m

| m

□ m

Student A's answer is incorrect.

The coloured part is a $\frac{|}{4}$ of the whole. Now the whole is 2 m, not | m. Therefore, the coloured part is $\frac{|}{4}$ of 2 m, which equals to $\frac{|}{2}$ m. The correct answer is $\frac{|}{2}$ m.
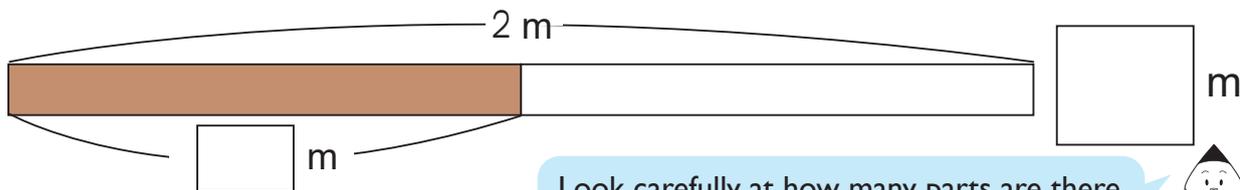
> We must think about how many parts are there in a | m long tape. In the above example, there are 2 parts in a | m long tape.
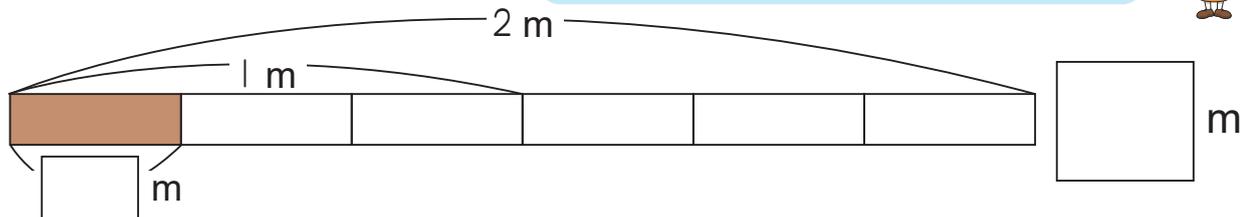
---

3 How many metres is the coloured part?

1

2 m

□ m

□ m

> Look carefully at how many parts are there in a |-m long, not in the whole tape.
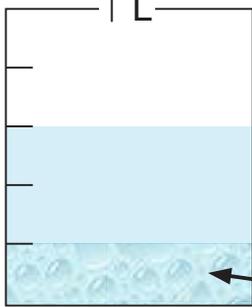
2

2 m

| m

□ m

□ m

12 - 2　Fractions

Expressing the Size of Divided Parts (2)

Example 1　How many litres of water is shown in the picture?

| L

The coloured parts is 3 [　　] s.

The answer is $\dfrac{3}{5}$ L.

Think about how many equally divided parts of ⏐ L of water there are. This is the size of **1 measurement mark.**

1　How many measurement marks are shown in the picture? Then answer how many litres of water there are.

1 | L
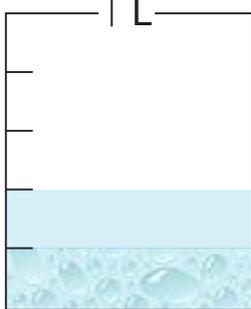
There are [　] measurement marks and [　] L

2 | L
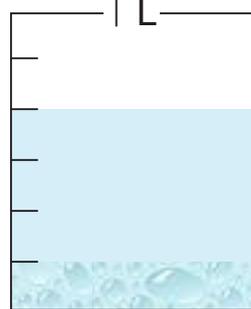
There are [　] measurement marks and [　] L

3 | L
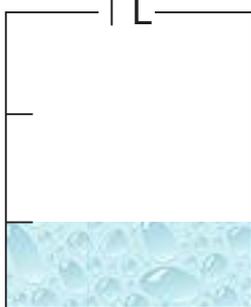
There are [　] measurement marks and [　] L

4 | L
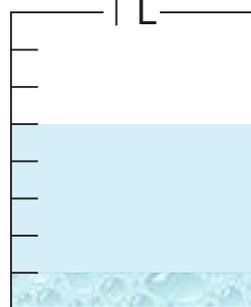
There are [　] measurement marks and [　] L

5 | L
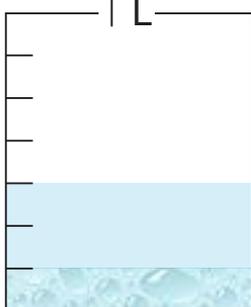
There are [　] measurement marks and [　] L

6 | L

There are [　] measurement marks and [　] L

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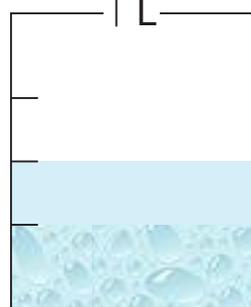
2   Colour in the following amounts of water.
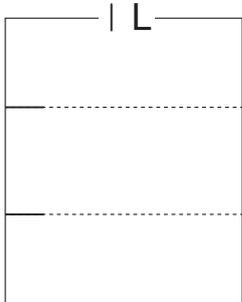
① $\dfrac{2}{3}$ L   **②** $\dfrac{1}{6}$ L   **③** $\dfrac{3}{4}$ L   **④** $\dfrac{3}{8}$ L
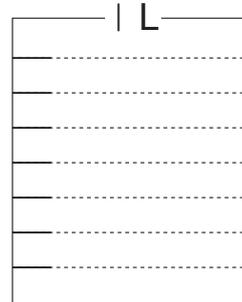
Example 2   How many litres of water is shown in the picture?
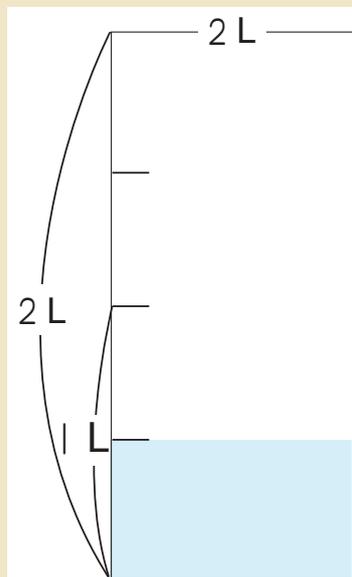
The coloured part (▢) is a $\dfrac{1}{4}$ of the whole.

However, the whole is 2 L, not 1 L.

Therefore, the colored part is $\dfrac{1}{4}$ of 2 L, which

equals to $\dfrac{1}{2}$ L.

Answer $\boxed{\dfrac{1}{2}}$ L

As learnt in the previous section, we must think about how many parts are there in a 1 L. In the above example, there are 2 parts in a 1 L.

3   How many litres of water is there in the following containers?

①

Look carefully at how many parts are there in a 1 L, not in the whole container.

Answer $\boxed{}$ L

②

Answer $\boxed{}$ L

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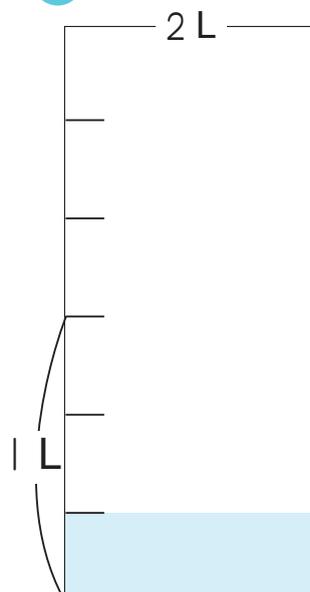
12 - 3 Expressing the Size of Fractions (1)

Example Look at the following number line. How many meters are two, three, four, five and six $\frac{1}{5}$ m?

Two $\frac{1}{5}$ m is $\boxed{\frac{2}{5}}$ m. Three $\frac{1}{5}$ m is $\boxed{\frac{3}{5}}$ m.

Four $\frac{1}{5}$ m is $\boxed{\frac{4}{5}}$ m. Five $\frac{1}{5}$ m is $\boxed{\frac{5}{5}}$ m.

Six $\frac{1}{5}$ m is $\boxed{\frac{6}{5}}$ m. $\frac{5}{5}$ m $= 1$ m
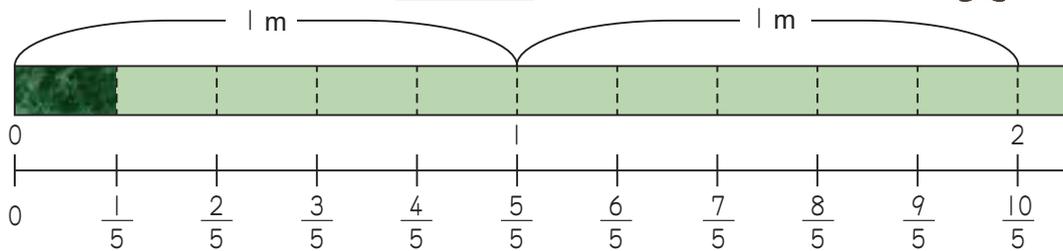
What are the lengths represented by tick marks (a) to (i).

1

2

3

(a) ☐ m
(b) ☐ m
(c) ☐ m
(d) ☐ m
(e) ☐ m
(f) ☐ m
(g) ☐ m
(h) ☐ m
(i) ☐ m

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12 - 4 Fractions
Expressing the Size of Fractions (2)

Example 1 Which is greater? Write the appropriate sign ($<$ or $>$) in the ☐ .

$\dfrac{4}{5}$ m $>$ $\dfrac{3}{5}$ m

$\dfrac{4}{5}$ is **four** $\dfrac{1}{5}$ and $\dfrac{3}{5}$ is **three** $\dfrac{1}{5}$.

0 ─── $\dfrac{1}{5}$ $\dfrac{2}{5}$ $\dfrac{3}{5}$ $\dfrac{4}{5}$ $\dfrac{5}{5}$ $\dfrac{6}{5}$ (m)

1 Which is greater? Write the appropriate sign ($<$ or $>$) in the ☐ .

① $\dfrac{5}{6}$ m ☐ $\dfrac{3}{6}$ m

② $\dfrac{2}{4}$ m ☐ $\dfrac{1}{4}$ m

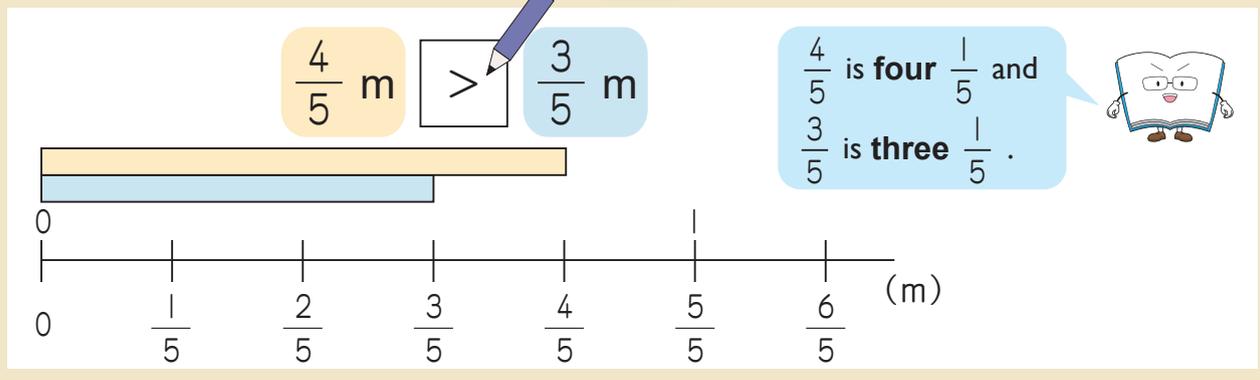0 ─── $\dfrac{1}{6}$ $\dfrac{2}{6}$ $\dfrac{3}{6}$ $\dfrac{4}{6}$ $\dfrac{5}{6}$ $\dfrac{6}{6}$ $\dfrac{7}{6}$ (m)

0 ─── $\dfrac{1}{4}$ $\dfrac{2}{4}$ $\dfrac{3}{4}$ $\dfrac{4}{4}$ $\dfrac{5}{4}$ (m)
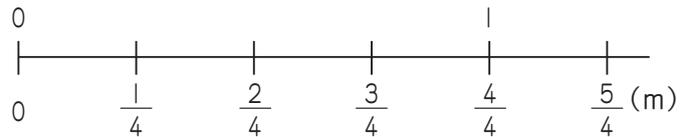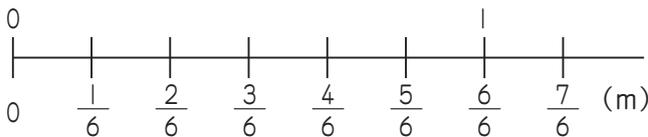
③ $\dfrac{1}{3}$ m ☐ $\dfrac{2}{3}$ m

④ $\dfrac{1}{8}$ m ☐ $\dfrac{5}{8}$ m

⑤ $\dfrac{3}{10}$ m ☐ $\dfrac{7}{10}$ m

⑥ $\dfrac{5}{6}$ m ☐ $\dfrac{4}{6}$ m

⑦ 1 m ☐ $\dfrac{1}{9}$ m

⑧ $\dfrac{2}{7}$ m ☐ $\dfrac{5}{7}$ m

Example 2 Write the fraction in the ☐ .

$\dfrac{4}{5}$ m is $\dfrac{1}{5}$ m smaller than 1 m.

0 ─── $\dfrac{1}{5}$ $\dfrac{2}{5}$ $\dfrac{3}{5}$ $\dfrac{4}{5}$ $\dfrac{5}{5}$ $\dfrac{6}{5}$ (m)
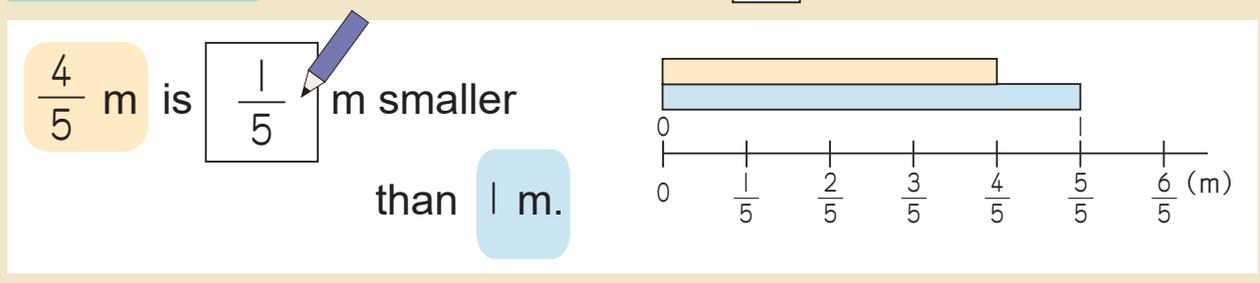
2 Write the fractions in the ☐ .

① $\dfrac{7}{8}$ m is ☐ m smaller than 1 m.

0 ─── $\dfrac{1}{8}$ $\dfrac{2}{8}$ $\dfrac{3}{8}$ $\dfrac{4}{8}$ $\dfrac{5}{8}$ $\dfrac{6}{8}$ $\dfrac{7}{8}$ $\dfrac{8}{8}$ $\dfrac{9}{8}$ (m)

② $\dfrac{5}{8}$ m is ☐ m larger than $\dfrac{2}{8}$ m.

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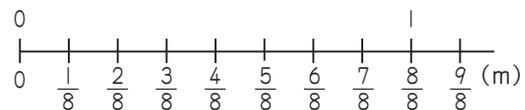
12 - 5 Fractions

Addition

Example There is $\dfrac{1}{5}$ L of juice in a carton and $\dfrac{2}{5}$ L in another carton. How much juice is there altogether?

Math sentence is $\dfrac{1}{5}$ + $\dfrac{2}{5}$. How can you calculate this?

One $\dfrac{1}{5}$ L   Two $\dfrac{1}{5}$ L   Three $\dfrac{1}{5}$ L

So, $\boxed{\dfrac{1}{5} + \dfrac{2}{5} = \dfrac{3}{5}}$ Answer $\boxed{\dfrac{3}{5}}$ L

1 There is $\dfrac{1}{7}$ L of milk in a carton and $\dfrac{2}{7}$ L in another carton. How much milk is there altogether?
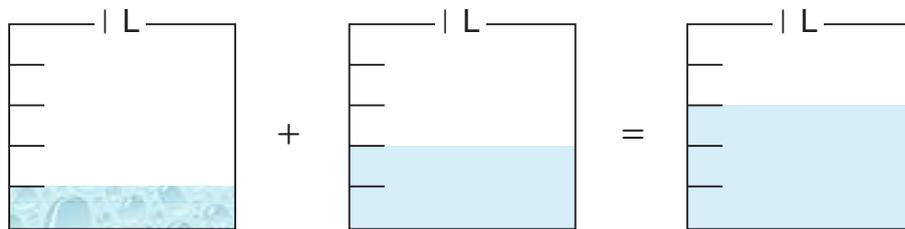
Math
Sentence ☐   Answer ☐ L

Since the denominators are the same, we can calculate only the numerators.

2 Calculate the following addition problems.

① $\dfrac{1}{5} + \dfrac{3}{5} = \square$ ② $\dfrac{3}{7} + \dfrac{2}{7} = \square$ ③ $\dfrac{3}{9} + \dfrac{4}{9} = \square$

④ $\dfrac{1}{8} + \dfrac{2}{8} = \square$ ⑤ $\dfrac{2}{6} + \dfrac{3}{6} = \square$ ⑥ $\dfrac{2}{3} + \dfrac{1}{3} = \square$
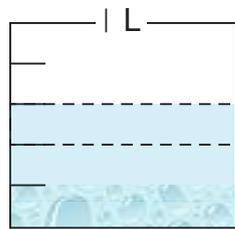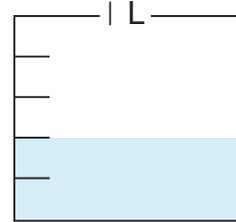
12 - 6   Subtraction (1)

Example There is $\dfrac{3}{5}$ L of juice in a carton. If a boy drinks $\dfrac{1}{5}$ L of juice, how much juice will be left?

Math sentence is $\dfrac{3}{5} - \dfrac{1}{5}$. How can you calculate this?

| 1 L |
Amount of juice drunk

| 1 L |

Three $\dfrac{1}{5}$ L   One $\dfrac{1}{5}$ L   Two $\dfrac{1}{5}$ L

So, $\dfrac{3}{5} - \dfrac{1}{5} = \dfrac{2}{5}$ Answer $\dfrac{2}{5}$ L

1 There is $\dfrac{4}{7}$ L of milk in a carton. When a girl drinks $\dfrac{1}{7}$ L of milk, how much milk will be left?

Math Sentence [   ]   Answer [   ] L

Since the denominators are the same, we can calculate only the numerators.

2 Calculate the following addition problems.

① $\dfrac{8}{9} - \dfrac{4}{9} = \boxed{}$ ② $\dfrac{2}{3} - \dfrac{1}{3} = \boxed{}$ ③ $\dfrac{7}{8} - \dfrac{6}{8} = \boxed{}$

④ $\dfrac{4}{5} - \dfrac{2}{5} = \boxed{}$ ⑤ $\dfrac{5}{6} - \dfrac{4}{6} = \boxed{}$ ⑥ $\dfrac{6}{7} - \dfrac{3}{7} = \boxed{}$
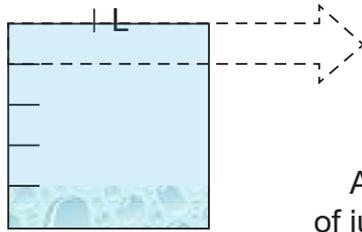
12 − 7 | Fractions

Subtraction (2)

Example There is 1 L of juice in a carton. If a girl drinks $\frac{1}{5}$ L of juice, how much juice will be left?
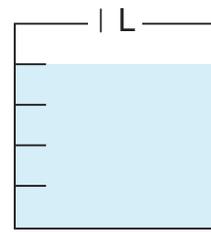
Math sentence is $1 - \frac{1}{5}$. How can you calculate this?

1 L is the same as $\frac{5}{5}$ L.

Amount of juice drunk

Five $\frac{1}{5}$ L   One $\frac{1}{5}$ L   Four $\frac{1}{5}$ L

So, $\quad 1 - \frac{1}{5} = \frac{5}{5} - \frac{1}{5} = \frac{4}{5}$ Answer $\frac{4}{5}$ L

---

1 There is 1 L of milk in a carton. When a child drinks $\frac{1}{5}$ L of milk, how much milk will be left?

1 L is seven $\frac{1}{7}$ L.

Therefore, 1 L is the same as $\frac{7}{7}$ L.

Math Sentence [ ]   Answer [ ] L

2 Calculate the following addition problems.

1 $\quad 1 - \frac{3}{4} = \boxed{}$

2 $\quad 1 - \frac{1}{3} = \boxed{}$

3 $\quad 1 - \frac{5}{8} = \boxed{}$

4 $\quad 1 - \frac{2}{9} = \boxed{}$

5 $\quad 1 - \frac{3}{7} = \boxed{}$
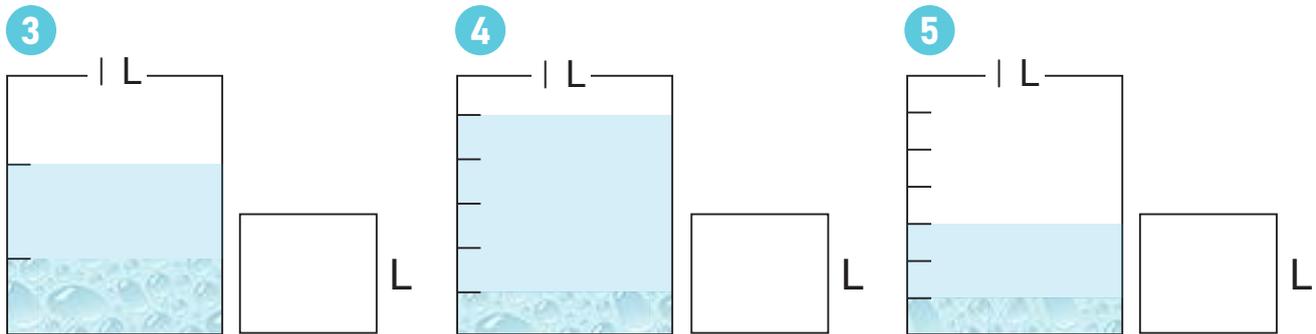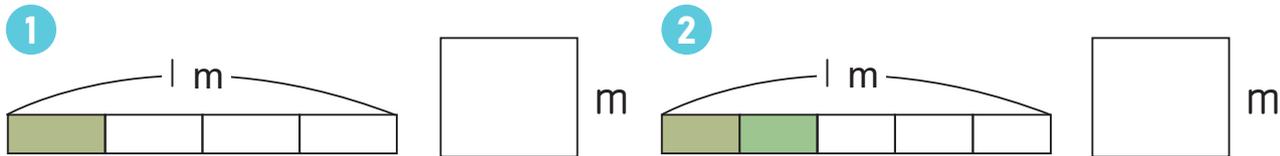
6 $\quad 1 - \frac{3}{5} = \boxed{}$

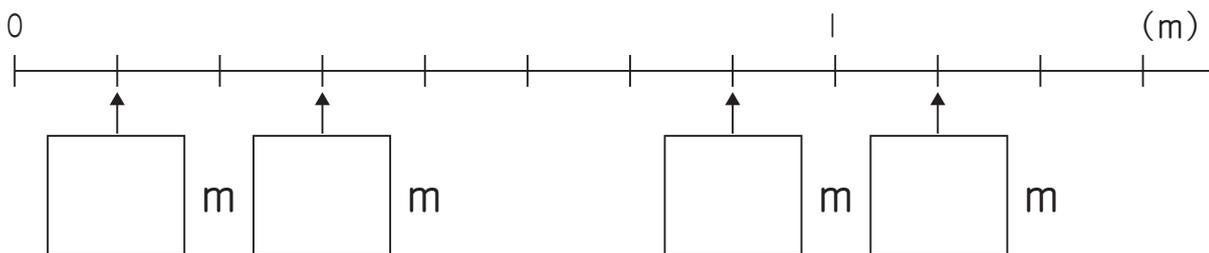In this case, 1 L is nine $\frac{1}{9}$ L. Therefore, 1 L is the same as $\frac{9}{9}$ L.

12 - 8

Review

1 Use fractions to express different lengths and different amounts of water as shown by the coloured parts.

1 ⌐ m ⌐ ☐ m

2 ⌐ m ⌐ ☐ m

3 ⌐ L ⌐ ☐ L

4 ⌐ L ⌐ ☐ L

5 ⌐ L ⌐ ☐ L

2 Write fractions in the ☐.

0   l   (m)

☐ m   ☐ m   ☐ m   ☐ m

3 Which is greater? Write the appropriate sign (< or >) in the ☐.

1 $\frac{2}{5}$ m ☐ $\frac{3}{5}$ m   **2** $\frac{5}{8}$ m ☐ $\frac{3}{8}$ m   **3** $\frac{6}{7}$ m ☐ l

4 Calculate the following.

1 $\frac{1}{5} + \frac{1}{5} = $ ☐   **2** $\frac{2}{7} + \frac{3}{7} = $ ☐   **3** $\frac{2}{4} + \frac{1}{4} = $ ☐

4 $\frac{4}{8} - \frac{3}{8} = $ ☐   **5** $\frac{4}{9} - \frac{2}{9} = $ ☐   **6** $\frac{5}{6} - \frac{2}{6} = $ ☐

7 $1 - \frac{1}{3} = $ ☐   **8** $1 - \frac{3}{5} = $ ☐   **9** $1 - \frac{5}{6} = $ ☐