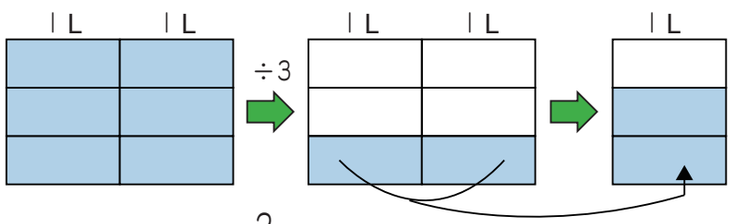
11 – 1

Relationship between Fractions, Decimal Numbers and Whole Numbers

Division and Fractions

Instruction When we share 2 L of juice among 3 people equally, each person get $\frac{2}{3}$ L of juice.



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

One of 3 equally divided parts of 2 L is 2 of $\frac{1}{3}$ L.

Sometimes when a whole number is divided by another whole number, the quotient is a fraction. ■ ÷ ● = $\frac{■}{●}$

Example 1 Express the following quotients as fractions.

1 $5 \div 4 = \frac{5}{4}$

2 $6 \div 7 = \frac{6}{7}$

1 Express the following quotients as fractions. Simplify the quotients if possible.

1 $3 \div 4 =$ ☐

2 $5 \div 12 =$ ☐

3 $11 \div 17 =$ ☐

4 $9 \div 2 =$ ☐

5 $3 \div 12 =$ ☐

6 $12 \div 8 =$ ☐

Example 2 Express the following fractions as division sentences.

1 $\frac{1}{9} = 1 \div 9$

2 $\frac{5}{6} = 5 \div 6$

2 Express the following fractions as division sentences.

1 $\frac{1}{4} =$ ☐

2 $\frac{3}{11} =$ ☐

3 $\frac{7}{2} =$ ☐

4 $\frac{2}{5} =$ ☐

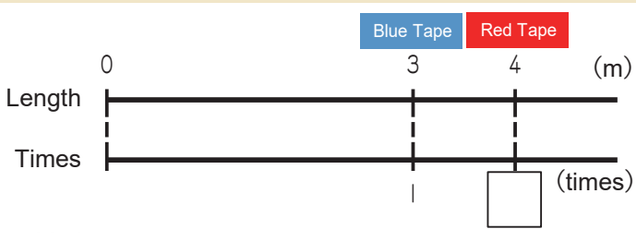
5 $\frac{8}{7} =$ ☐

6 $\frac{13}{6} =$ ☐

11 - 2 Relationship between Fractions, Decimal Numbers and Whole Numbers

Fractions and Times as Much

Example There is a piece of red tape 4 m long. There is a piece of blue tape 3 m long. How many times longer is the red tape than the blue tape?



3 m	4 m
1	□ times

When we express the answer as a decimal number, it is indivisible like "4 ÷ 3 = 1.333…". Therefore, we try to express it by using a fraction.

Math sentence

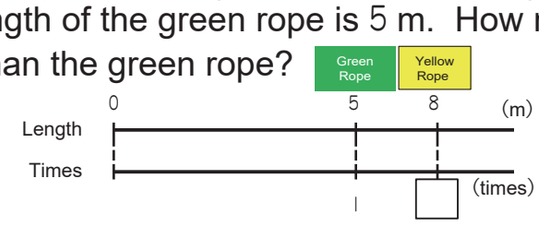
$$4 \div 3 = \frac{4}{3}$$

Answer $\frac{4}{3}$ times

We can use fractions to express times as much, just like whole numbers and decimal numbers. For example," $\frac{4}{3}$ times as much".

1 There is a yellow rope and a green rope. The length of the yellow rope is 8 m and the length of the green rope is 5 m. How many times longer is the yellow rope than the green rope?

Math sentence

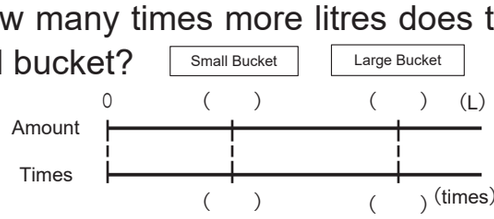


5 m	8 m
1	□ times

Answer

2 A small bucket holds 3 L of water and a large bucket holds 7 L of water. How many times more litres does the large bucket hold than the small bucket?

Math sentence



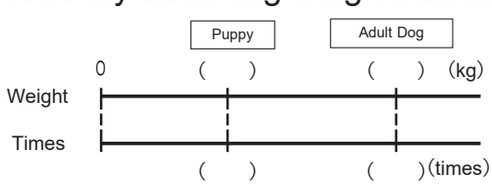
( ) L	( ) L
( )	( ) times

Complete the number line diagrams and tables.

Answer

3 My adult dog weighs 11 kg and my puppy weighs 6 kg. How many times heavier does my adult dog weigh than my puppy?

Math sentence



( ) kg	( ) kg
( )	( ) times

Answer

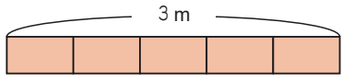
11 – 3 Relationship between Fractions, Decimal Numbers and Whole Numbers

Fractions and Decimal Numbers (1)

Example If a 3 m ribbon is shared equally among 5 children, how long will each piece of ribbon be? Express the answer as a fraction and as a decimal number.

This is divisible. Therefore, the answer could be expressed by using either fraction or decimal number.

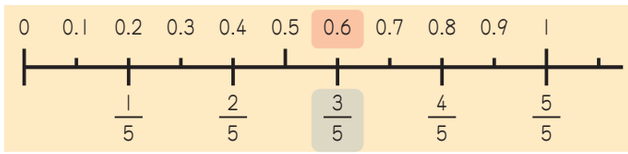
$3 \div 5 = \frac{3}{5}$ $3 \div 5 = 0.6$



Math sentence

$3 \div 5 = \frac{3}{5}$ or 0.6

Answer $\frac{3}{5}$ m or 0.6 m



$\frac{3}{5}$ and 0.6 are the same amount expressed in two different ways.

1 If a 14 m ribbon is shared equally among 5 students, how long will each piece of ribbon be? Express the answer as a fraction and as a decimal number.

Math sentence

Answer _____

2 Express the following as decimal numbers.

1. $\frac{1}{4} =$ ____
2. $\frac{1}{10} =$ ____
3. $\frac{5}{8} =$ ____
4. $\frac{23}{5} =$ ____
5. $1\frac{1}{2} =$ ____
6. $3\frac{2}{5} =$ ____

3 Express the following fractions as decimal numbers rounded to the hundredths place.

1. $\frac{1}{3} =$ ____
2. $\frac{5}{6} =$ ____
3. $\frac{9}{7} =$ ____
4. $\frac{7}{12} =$ ____

11 - 4 Relationship between Fractions, Decimal Numbers and Whole Numbers

Fractions and Decimal Numbers (2)

Example 1 Write 0.3, 0.05, and 1.23 as fractions.

1 0.3

$0.1 = \frac{1}{10}$

$0.3 = \boxed{\frac{3}{10}}$

2 0.05

$0.01 = \frac{1}{100}$

$0.05 = \boxed{\frac{5}{100}}$

3 1.23

$0.01 = \frac{1}{100}$

$1.23 = \boxed{\frac{123}{100}}$

Decimal numbers can be written as fractions with denominators of 10, 100, 1000 and so on.

1 Write the following decimal numbers as fractions.

1 $0.4 = \square$ 2 $1.7 = \square$ 3 $0.08 = \square$

4 $0.63 = \square$ 5 $1.09 = \square$ 6 $2.87 = \square$

Example 2 Write 7, 15 and 123 as fractions.

1 7

$7 = 7 \div 1 = \boxed{\frac{7}{1}}$

2 15

$15 = 15 \div 1 = \boxed{\frac{15}{1}}$

3 123

$123 = 123 \div 1 = \boxed{\frac{123}{1}}$

Whole numbers can be written as **fractions with denominators of** 1. Even if the denominator is not 1, the denominator become 1 when simplifying the fraction.

2 Write the following whole numbers as fractions.

1 $9 = \square$ 2 $23 = \square$ 3 $415 = \square$ 4 $700 = \square$

Example 3 Which of the following fractions can be written as whole numbers?

(a) $\frac{6}{2}$ $\boxed{= \frac{3}{1} = 3}$ (b) $\frac{20}{6}$ $\boxed{= \frac{10}{3}}$ (c) $\frac{40}{8}$ $\boxed{= \frac{5}{1} = 5}$ (d) $\frac{55}{10}$ $\boxed{= \frac{11}{2}}$

Answer (a), (c)

If we simplify each fraction, we can find which can be written as whole number?

3 Which of the following fractions can be written as whole numbers?

(a) $\frac{5}{1}$ (b) $\frac{8}{3}$ (c) $\frac{28}{4}$ (d) $\frac{31}{6}$ (e) $\frac{147}{7}$

Answer _____

11 – 5

Relationship between Fractions, Decimal Numbers and Whole Numbers

Calculations of Fractions and Decimal Numbers

Example 1 Which is greater, $\frac{5}{6}$ or 0.8 ?

To compare numbers, both numbers must be either fractions or decimals.

Method 1: Comparing by fractions

We change 0.8 to a fraction.

$0.8 = \frac{\overset{4}{\cancel{8}}}{\underset{5}{\cancel{10}}} = \frac{4}{5}$

We find a common denominator of 30.

$\frac{5}{6} = \boxed{\frac{25}{30}}$

$0.8 = \frac{4}{5} = \boxed{\frac{24}{30}}$ $\boxed{\frac{5}{6} > 0.8}$

Method 2: Comparing by decimal numbers

We change $\frac{5}{6}$ to a decimal number.

$\frac{5}{6} = 5 \div 6 = \boxed{0.8333\cdots}$

$\boxed{\frac{5}{6} > 0.8}$

1 Which number is greater? Write the inequality sign in the □.

1. $0.7 \square \frac{2}{3}$
2. $\frac{4}{15} \square 0.27$
3. $1.85 \square 1\frac{19}{20}$
4. $\frac{9}{4} \square 2.2$

It doesn't matter whether we calculate them as decimal numbers or as fractions.

Example 2 Calculating the following problems.

1. $\frac{3}{4} + 0.6 = 0.75 + 0.6 = 1.35$ or $= \frac{3}{4} + \frac{6}{10} = \frac{15}{20} + \frac{12}{20} = \frac{27}{20}$ or $1\frac{7}{20}$
2. $\frac{3}{4} - 0.6 = 0.75 - 0.6 = 0.15$ or $= \frac{3}{4} - \frac{6}{10} = \frac{15}{20} - \frac{12}{20} = \frac{3}{20}$

2 Calculate the following addition and subtraction problems.

1. $1.5 + \frac{1}{5}$
2. $\frac{1}{7} + 0.9$
3. $1.6 - \frac{4}{5}$
4. $\frac{24}{25} - 0.84$

11 - 6 Relationship between Fractions, Decimal Numbers and Whole Numbers

Review

1 Express the following quotients as fractions. Simplify the quotients if possible.

① $7 \div 9 =$ ☐ ② $6 \div 8 =$ ☐ ③ $28 \div 12 =$ ☐

2 Express the following as decimal numbers.

① $\frac{2}{5} =$ ☐ ② $\frac{7}{10} =$ ☐

③ $\frac{15}{6} =$ ☐ ④ $\frac{9}{8} =$ ☐

3 Write the following decimal numbers as fractions.

① $0.9 =$ ☐ ② $3.1 =$ ☐ ③ $0.17 =$ ☐

④ $0.09 =$ ☐ ⑤ $5.27 =$ ☐ ⑥ $2.01 =$ ☐

4 Which number is greater? Write the inequality sign in the ☐.

① 0.23 ☐ $\frac{1}{4}$ ② 1.6 ☐ $\frac{7}{5}$ ③ 2.4 ☐ $2\frac{1}{2}$

5 Calculate the following.

① $2.7 + \frac{3}{4}$

② $0.12 + \frac{1}{3}$

③ $\frac{5}{8} - 0.52$

④ $0.4 - \frac{1}{7}$