# Rates

- Rates are often written using the word **'per'**.
- Rates are values with respect to a different unit.
- Examples: the amount paid per hour for a job;
  the cost per kilogram of oranges;
  the speed of a vehicle in kilometres per hour.

**Examples:**

1  4 kg of apples cost $14.72. Calculate the cost of 3 kg of apples.

**Method 1**

Step 1: Write the information you are given in a brief statement.

4 kg cost **$14.72**

> Because you are trying to find a price, put the **price** on the **right**.

Step 2: Underneath write a parallel statement about what you want to know.

4 kg cost **$14.72**

copy ↓

3 kg cost **$14.72** $\times \dfrac{3}{4}$ = **$11.04**

> Multiply by either $\dfrac{3}{4}$ or $\dfrac{4}{3}$. Use $\dfrac{3}{4}$ here because 3 kg will cost **less**.

Or:

**Method 2**

Step 1: Work out how much 1 kg costs.

1 kg of apples costs **$14.72** ÷ 4 = $3.68

Step 2: Multiply the cost of 1 kg by how many you need.

So 3 kg of apples cost $3.68 × 3 = **$11.04**

2  Laundry powder comes in two different sizes. Which is better value for money?

Earthwear

$16.94

1.8L

Squeaky Clean

$37.56

4L

Step 1: Calculate the price per litre.

$16.94 ÷ 1.8 = $9.41          $37.56 ÷ 4 = $9.39

Step 2: Identify the product that is cheaper per litre.

Squeaky Clean is cheaper at $9.39 per litre.

Answer the following questions.

**1**  It costs $13.50 for 3 kg of kūmara. Calculate the cost of 5 kg of kūmara.

_____

_____

**2**  It costs $6.84 for 6 m of fabric. Calculate the cost of 1.5 m of fabric.

_____

_____

**3**  **a**  It costs NZ$1 to buy US$0.62. Amelia needed US$400 to take on a trip to the United States of America. To the nearest dollar, how much will it cost her in New Zealand dollars?

_____

_____

**b**  She had some United States money left over when she returned to New Zealand. The exchange rate had remained the same. She received NZ$77.42 for the leftover money. How many United States dollars did she bring back?

_____

_____

Show your reasoning for the following calculations.

**4**  Calculate which size of toothpaste is better value for money.

$3.23                                           $2.25

A   TOOTHPASTE                    B   TOOTHPASTE

170 g                                           90 g

_____

_____

**5**  Calculate which size of honey is better value for money:
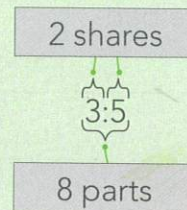
HONEY

a 400 g pot for $5.20    or    a 2.5 kg tub for $29.95.

BEE

_____

_____

# Ratios

- Ratios show how an amount is split into several shares, usually of different sizes.
- All shares must use the **same units**.
- Ratios use only **whole numbers**, not decimals or fractions.
- A **colon (:)** is used to separate the two shares. For example, 2:3 means one share made up of 2 parts and the other share made up of 3 parts.
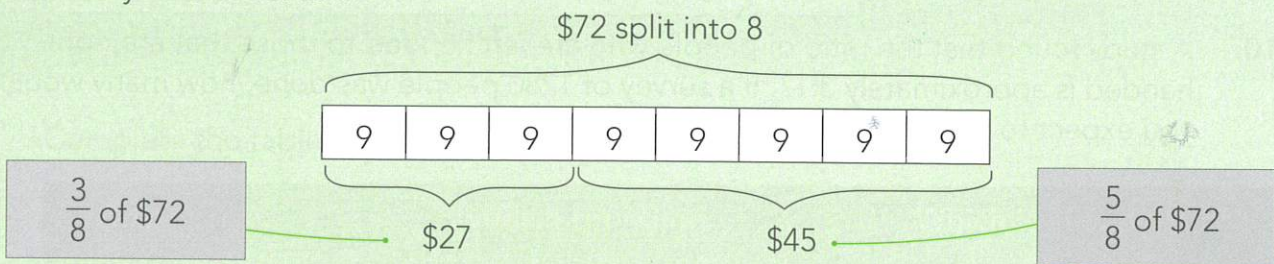- Ratios do **not** have units.

**Example:** $72 needs to be shared between two people in the ratio 3:5.

2 shares

3:5

8 parts

When there is a quantity that needs to be split using a ratio, follow these steps.

Step 1: Find the total number of parts by adding the numbers in each share: $3 + 5 = 8$

Step 2: Find the value of one part by dividing the total by the number of parts: $\$72 \div 8 = \$9$

Step 3: Multiply the value of one part by the number of parts in each share: $(3 \times 9):(5 \times 9)$

So the ratio is 27:45.

That is, one person gets $27 and the other gets $45.

Another way to think of this:

$72 split into 8

| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |

$\frac{3}{8}$ of $72 → $27

$45 ← $\frac{5}{8}$ of $72

Note: Ratios don't have units or decimals, but your answer could have them.

Share the quantities in the given ratios.

1  $90 in the ratio 2:7

2  $55 in the ratio 5:6

3  240 g in the ratio 2:3

4  160 mL in the ratio 1:7

**5**  2100 m in the ratio 4:3

_____

_____

_____

**6**  $92.25 in the ratio 3:6

_____

_____

_____

**7**  A 15 kg bag contains apples and oranges in a ratio of 3:2. How many kilograms of apples are in the bag?

_____

_____

**8**  The ratio of students who play a sport to those who don't is 3:1. If there are 552 students on the school roll, how many play a sport?

_____

_____

**9**  Two friends were paid to paint a fence. Kahu painted for 3 hours, but Leah painted for only 2 hours. In total, they were paid $130. To be fair, how should they split the money?

_____

_____

**10**  A study found that the ratio of people who are left handed to those that are right handed is approximately 3:17. If a survey of 1280 people was done, how many would you expect to be left handed?

_____

_____

**11**  The ratio of doctors to nurses in an emergency room is 1:5. If there are 36 staff working, how many of them are doctors?

_____

_____

**12**  The ratio of students in Pia's class who bus to those that don't bus to school is 5:2. If there are 28 students in Pia's class, how many of them bus?

_____

_____