1. Read and estimate mass



Name _____ Class _____ Date _____

Max and Tim's stop · Cape Reinga · lighthouse. At Cape Reinga, Te Rerenga Wairua, near the northern tip of New Zealand, Tim points down the path to the white lighthouse, where two seas meet in lines of rough water.

> **Today:** To read a scale, first work out what **one small mark** is worth; to estimate a mass, compare it with a mass you know.

Warm-up Halfway and quarters

Each answer helps with the next one. Fill in the model, then write the equation.

1 **a)** Halfway between 2 kg and 3 kg



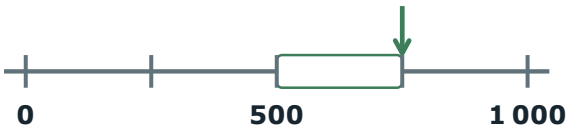
halfway between 2 kg and 3 kg = _____ kg

b) Halfway between 2 kg and 2,5 kg



halfway between 2 kg and 2,5 kg = _____ kg

c) 500 g + 250 g: the band is a quarter of a kilogram on from 500 g. Where does the arrow point?



500 g + 250 g = _____ g

d) 1 000 g − 750 g: how far is it from the arrow up to 1 kg?



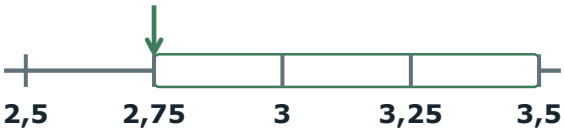
1 000 g − 750 g = _____ g

e) 4 × 250 g: the dots are four steps of 250 g from 0. Where does the arrow point?



4 × 250 g = _____ g

f) 3,5 kg − 2,75 kg: how far is it from the arrow up to 3,5 kg?

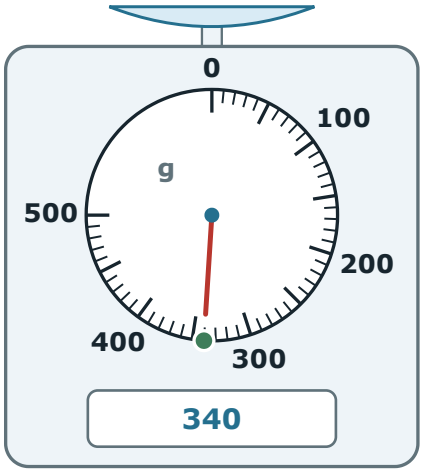


3,5 kg − 2,75 kg = 0,25 kg + 0,5 kg = _____ kg

Read and estimate mass

KNOWLEDGE **Read the scale, then estimate**

WORKED EXAMPLE **What mass does the scale show?**



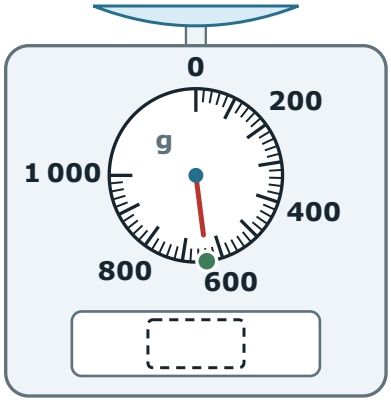
1. From 300 to 400 there are ten small steps, so each small mark is worth 100 ÷ 10 = **10** g.
2. The needle stops four small marks past 300: 300 + 40 = **340** g.

one small mark = 10 g · the scale shows 340 g

one small mark = 10 g

2 ★ Fill in the model, then write the equation.

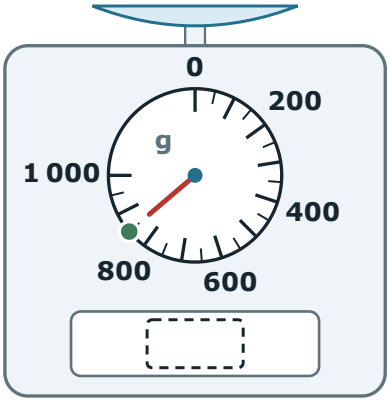
a) What mass does the scale show?



one small mark = _____ g

the scale shows _____ g

b) What mass does the scale show?



one small mark = _____ g

the scale shows _____ g

3 ★ What mass does this kitchen scale show? Read the needle in kilograms and tenths of a kilogram.

one small mark = _____ kg · the scale shows _____ kg



Read and estimate mass

4 ★ A bag hangs on a luggage scale. What mass does the luggage scale show, in kilograms?



one small mark = _____ kg

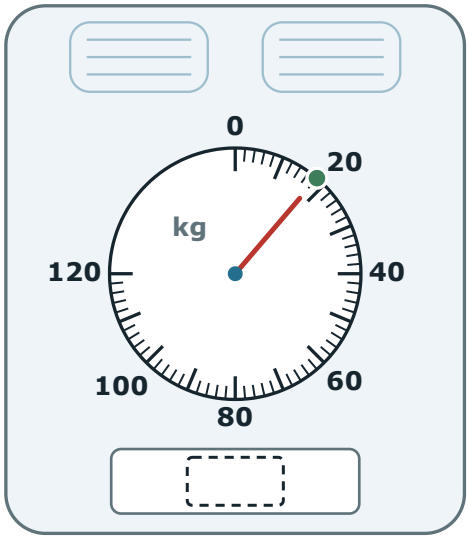
the scale shows _____ kg

5 ★ **a)** Circle the best estimate for the mass of an adult sheepdog.

◯ 15 g ◯ 1,5 kg ◯ 15 kg

◯ 150 kg

b) A sheepdog stands on a bathroom scale. What is its mass?



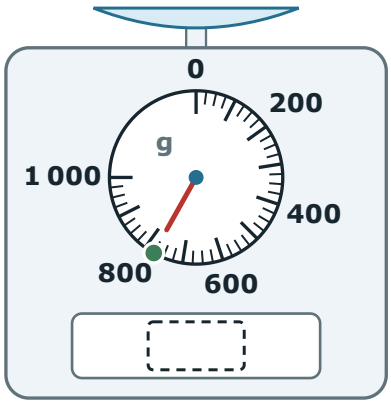
the sheepdog = _____ kg

6 ★ Which unit is the most appropriate to measure the mass of a coach?

◯ grams ◯ kilograms ◯ tonnes

7 ★ What mass does the scale show? Write it in grams, then in kilograms.

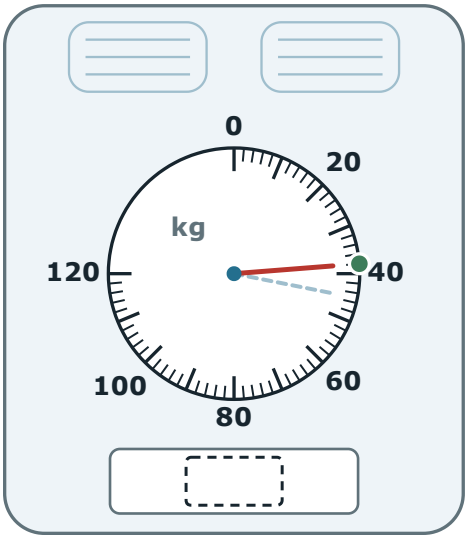
_____ = _____ kg



Read and estimate mass

8 ★

The dashed needle shows a guess of **45 kg**. Read the bathroom scale. Then work out how far out the guess was.

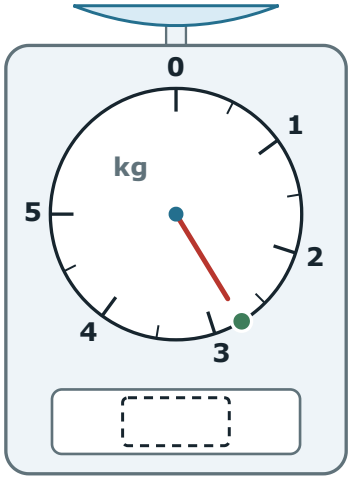


the scale shows _____ kg

the guess was out by _____ kg

9 ★

The needle stops halfway between two small marks. Estimate the mass in kilograms. Then write it in grams.



_____ = _____ g

10 ★

A parcel balances masses of **500 g, 200 g and 100 g** on the other pan of a balance. What is the mass of the parcel in grams?

Draw your model

500 g + 200 g + 100 g = _____ g

11 ★

A bag of kūmara balances masses of **1 000 g and 750 g** on the other pan. What is the mass of the kūmara in kilograms?

Draw your model

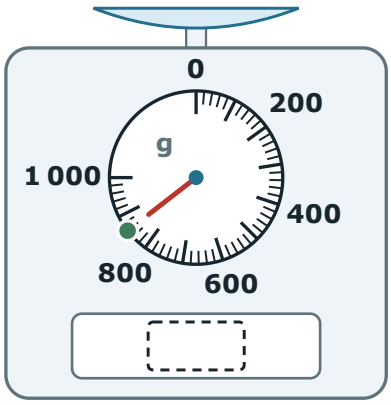
1 000 g + 750 g = _____ kg

APPLICATION **Before the walk** Show your thinking on the model, then complete the equation.

12 ★★

Max sets the fat travel journal on Aroha's kitchen scale. **What is the mass of the journal?** Write it in grams, then in kilograms.

the journal = _____ g = _____ kg

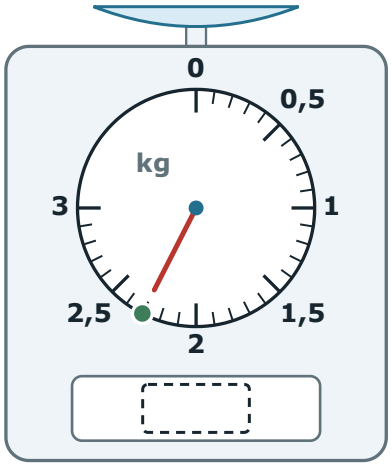


Read and estimate mass

13 ★★

Aroha weighs the snack bag on her kitchen scale. **What is its mass?** Her cool box holds at most **4 kg** of food: **how much more food could go in with the snack bag?**

the snack bag = _____ kg · more food = _____ kg



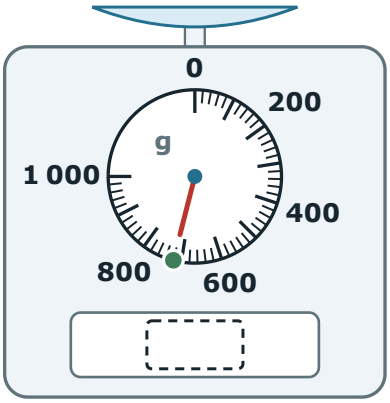
REASONING **Which unit, which mark?** Decide, then explain how you know.

14 ★★★

a) Max says: "I will weigh Tim's binoculars in kilograms." Tim says: "Grams would be better: the binoculars are lighter than 1 kg." **Do you agree with Tim?**

- ◯ Yes: grams suit a mass lighter than 1 kg
- ◯ No: a mass is always best in kilograms

b) So read the mass of the binoculars in grams on Aroha's kitchen scale.



one small mark = _____ g

the binoculars = _____ g

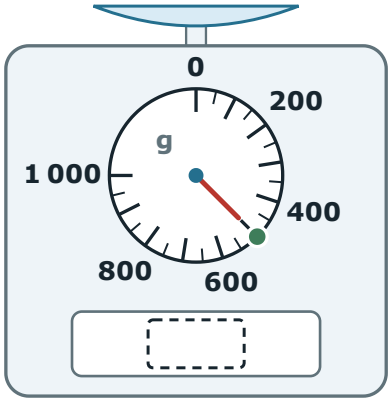
Explain: _____

15 ★★★

a) Max reads Aroha's kitchen scale for the journal. Four small steps share the gap from 400 to 600, and the needle stands two small marks past 400. Max writes **420 g**. **What mistake has Max made?**

- ◯ He started from the wrong number
- ◯ He counted each small mark as 10 g
- ◯ There is no mistake

b) So read the scale correctly: what is one small mark worth, and what is the mass?



one small mark = _____ g

the scale shows _____ g

Explain: _____

16 ★★★

a) Aroha weighs Tim's bedroll: **1,2 kg**. Max had guessed **1 kg** and Tim **1,5 kg**. Tim says: "My guess is closer." Max says: "No, mine is." **Who is right?**

- ◯ Max
- ◯ Tim

16 *Question 16 continued*

b) So find how far out each guess was. The arrow shows the real mass of the bedroll.



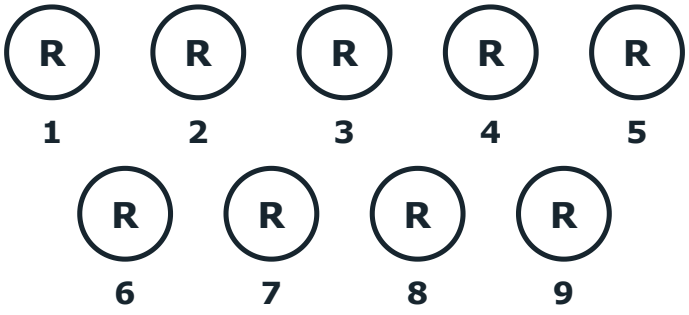
Max's guess is out by _____ kg · Tim's guess is out by _____ kg

Explain: _____

17 PROBLEM OF THE DAY **Flip them all**

Back at Aroha's coach, below the lighthouse at Cape Reinga, Max and Tim find a puzzle that Aroha keeps for the long drive, and Tim lays it out on the step of the coach: nine round markers in rows, every one red side up; the other side of each marker is yellow. Max must turn them until every marker shows yellow. In one move Max turns over exactly five markers, no more and no fewer.

Turn every marker to yellow in at most three moves; a marker may be turned back. Write down which markers you turn in each move, or explain why it cannot be done.



R = red side up **Y = yellow side up**

Think further: Could 9 markers be done turning exactly 4 at a time? Explain.

Explain one thing you learned.

I can do this: ○ independently ○ with help ○ I need more practice