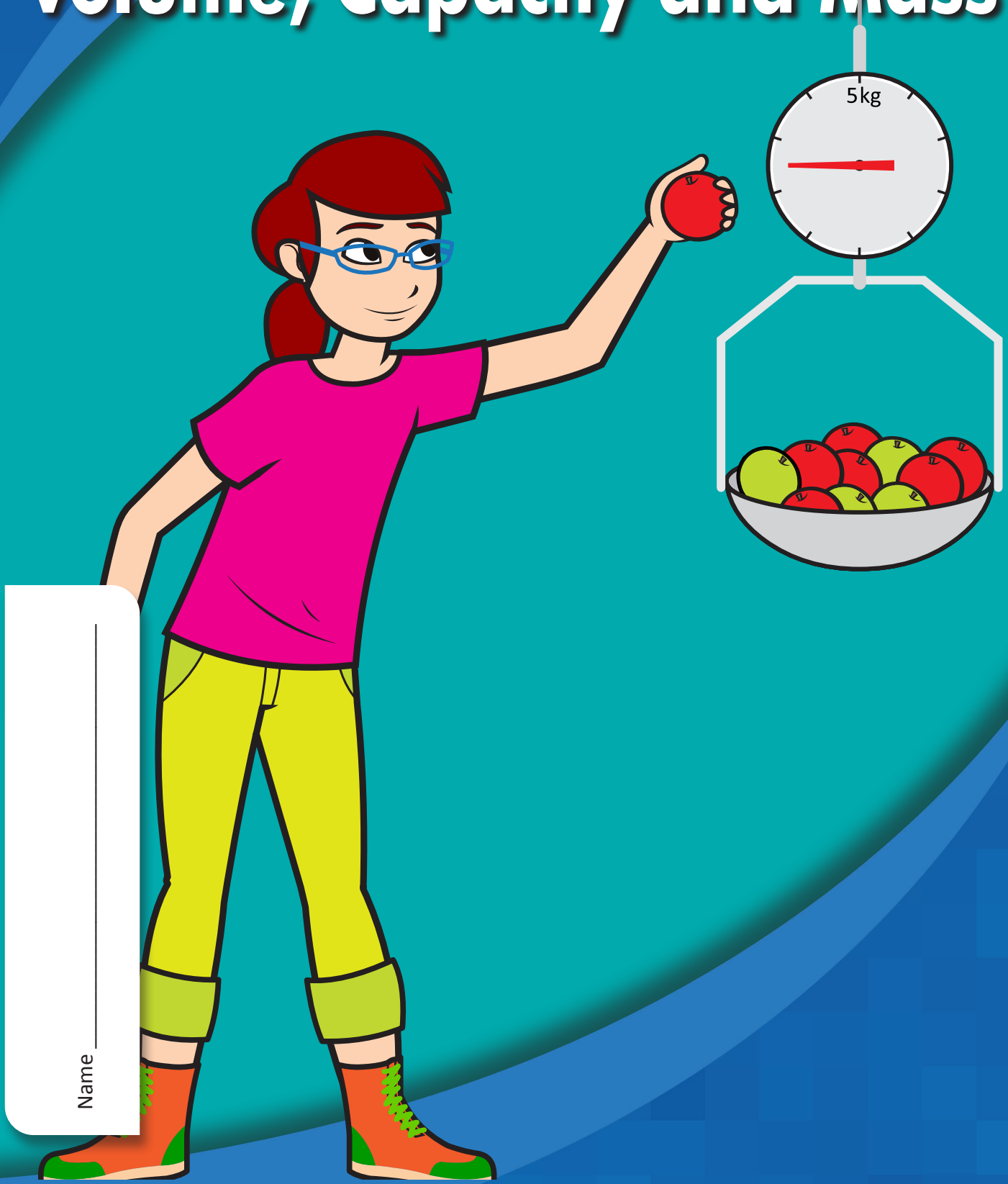
MATHLETICS

E SERIES Student Book

Volume, Capacity and Mass



Name _____

Series E – Volume, Capacity and Mass

Contents

Series Author:

Nicola Herringer

Volume and capacity – litres

Capacity is the amount of liquid that a container can hold.

To measure capacity we use millilitres and litres. 1 000 mL = 1 L

1 **For this activity you will need a 1 litre milk carton.**

Complete this table below. Estimate how many of each container it will take to fill the milk carton.

	Water bottle	Egg cup	Mug	Plastic cup
Estimate				
Actual				

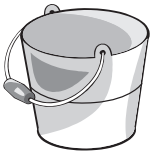
2 **How many litres are in:**

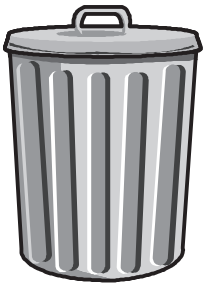
a 5 000 mL = ☐ L **b** 2 000 mL = ☐ L **c** 3 000 mL = ☐ L

d 1 000 mL = ☐ L **e** 12 000 mL = ☐ L **f** 20 000 mL = ☐ L

g 7 000 mL = ☐ L **h** 9 000 mL = ☐ L **i** 4 000 mL = ☐ L

3 **Match each container to its capacity in litres.**





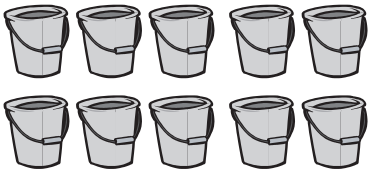
2 L 4 L 20 L 5 L

4 **Can you guess how many litres of water are used for one toilet flush?** ☐ L

Now turn to the next page to work out what it actually is.

Volume and capacity – litres

5 **Water is a precious resource so we should take care not to waste it. This table shows some of the ways we use water at home. Complete the last column if the bucket stands for 5 litres.**

	Ways we use water	Number of 5 litre buckets	Amount of water used in litres
a	Leaving the water running while brushing teeth.		
b	Flushing the toilet five times a day.		
c	Taking a five minute shower.		
d	Washing the dishes using a dishwasher.		
e	Taking a bath.		

6 **For homework, Jaz kept a diary of how much water his family used over 1 day on the weekend. There are four people in his family. This is what he noticed:**

- Jaz had an extra shower after swimming training.
- Each person brushed their teeth twice and left the water running.
- The toilet was flushed 10 times.
- The dishwasher ran twice.
- Barnaby the dog had one bath.
- Each person had two 5 minute showers.

How many litres of water did Jaz and his family use in 1 day?

Volume and capacity – millilitres

Millilitres are used to measure small amounts of liquid.

A drop measures about 1 millilitre (mL)

A teaspoon holds about 5 mL

A cup is about 250 mL

1 **Based on the information above, how many millilitres are in:**

a 15 raindrops ☐ mL

b 26 raindrops ☐ mL

c 2 cups of water ☐ mL

d 4 cups of orange juice ☐ mL

e 10 teaspoons ☐ mL

f 6 teaspoons ☐ mL

2 **Look carefully at the capacity of each of these items. Use numbers to order them from smallest to largest: 1 is the smallest, 7 is the largest.**

☐ ☐ ☐ ☐ ☐ ☐ ☐

3 **Based on the items in question 2, complete this table. Write down the capacity of each item and also how many more millilitres are needed to make 1 litre.**

	Item	Capacity	How many more millilitres?
a	Shampoo		
b	Juice pack		
c	Soap		
d	Tomato sauce		

Volume and capacity – millilitres

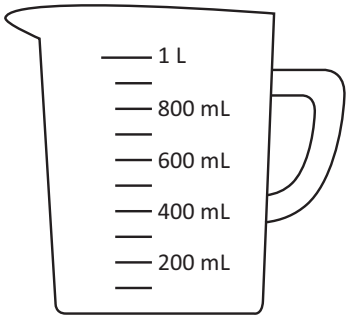
4 **All of these capacities are parts of a litre. Draw a line to match them to the correct fraction of a litre:**

500 mL	$\frac{1}{4}$ litre
750 mL	$\frac{1}{2}$ litre
250 mL	$\frac{3}{4}$ litre

5 **Connect each label to the correct place on the jug by drawing a line:**

$\frac{1}{2}$ litre

$\frac{3}{4}$ litre

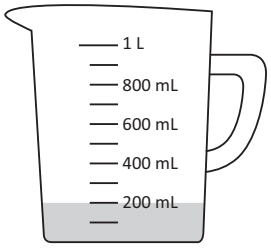


$\frac{1}{4}$ litre

$\frac{1}{10}$ litre

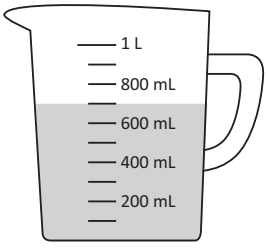
6 **Label each container with the amount of liquid it has:**

a



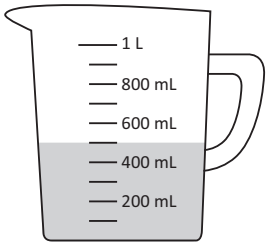
mL

b



mL

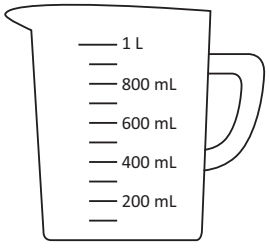
c



mL

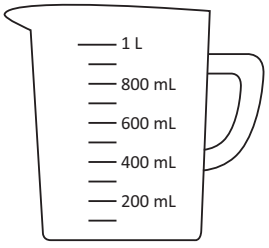
7 **Show the amount of water in each jug:**

a



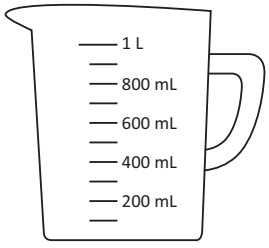
$\frac{1}{2}$ litre

b



100 mL

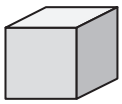
c



$\frac{3}{4}$ litre

Volume and capacity – measuring volume with cubic centimetres

Volume is the amount of space that an object takes up.
To measure volume we use cubic centimetres.

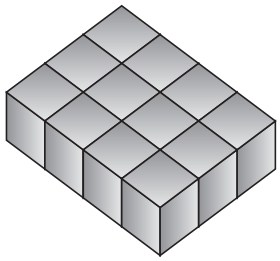


One cubic centimetre is 1 cm long, 1 cm wide and 1 cm high.
The symbol we use for cubic cm is cm^3.

$1\ cm \times 1\ cm \times 1\ cm = 1\ cm^3$

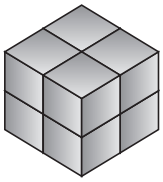
1 **Use centicubes to create the following models. Then calculate the volume of each model by counting the cubes.**

a



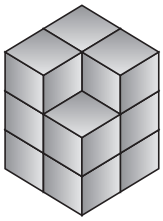
_____ cm^3

b



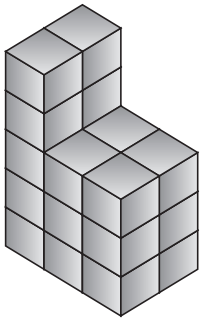
_____ cm^3

c



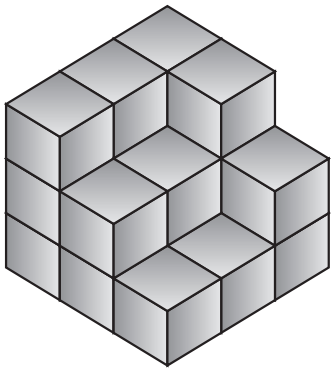
_____ cm^3

d



_____ cm^3

2 **How many more cubes would this model need to have a volume of 27 cm^3?**



_____ cubes

Displacement — investigate

What to do

For this investigation, you'll need a baking tray, an ice cream container, a measuring jug and a toy car.

Step 1 Place the ice cream container on the tray.

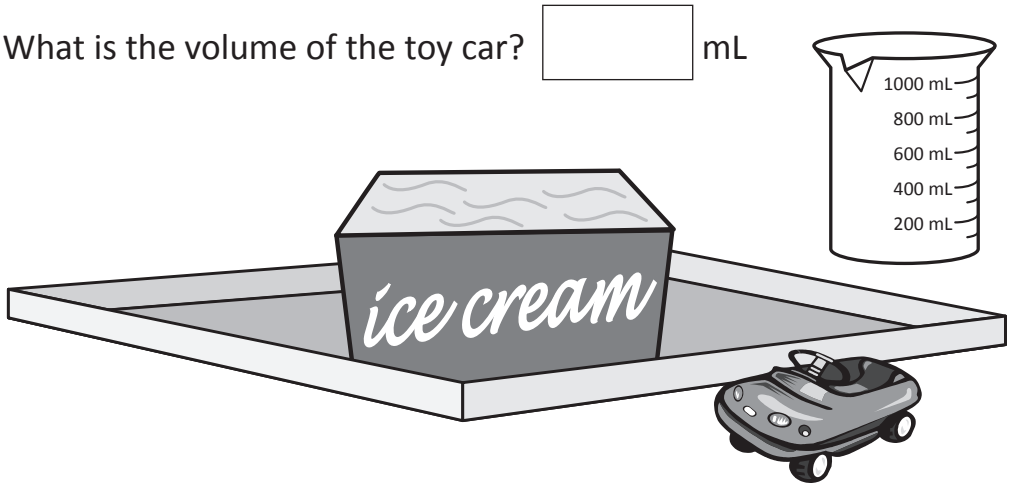
Step 2 Fill the ice cream container with water right up to the brim.

Step 3 Carefully place the toy car into the water.

Step 4 Observe the water spilling over the brim of the ice cream container into the baking tray.

Step 5 Measure how much water overflowed by pouring it into the measuring jug.

What is the volume of the toy car? ☐ mL



What to do next

Pretend that you're making peanut butter cookies and you need to measure 1 cup of peanut butter. It's not easy to measure a sticky, lumpy ingredient like peanut butter. If you spoon it into a measuring cup, it doesn't settle on the bottom so you're never sure exactly how much is there. However, don't despair. Displacement can help! Explain how it can help in the space below:

Punch problems

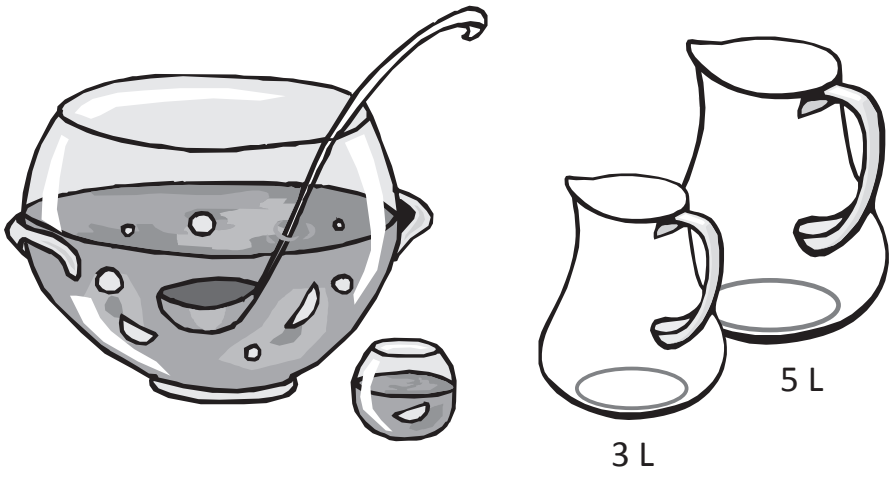
solve

What to do

Solve the problems below. Show your working.

Problem 1

Jess is making a ginger punch for her party. Part of the recipe calls for 4 litres of ginger beer. Jess only has a 5 litre jug and a 3 litre jug without any markings. How can Jess use both jugs to get exactly 4 litres in the punch bowl?



Continued on page 8.

Punch problems

solve

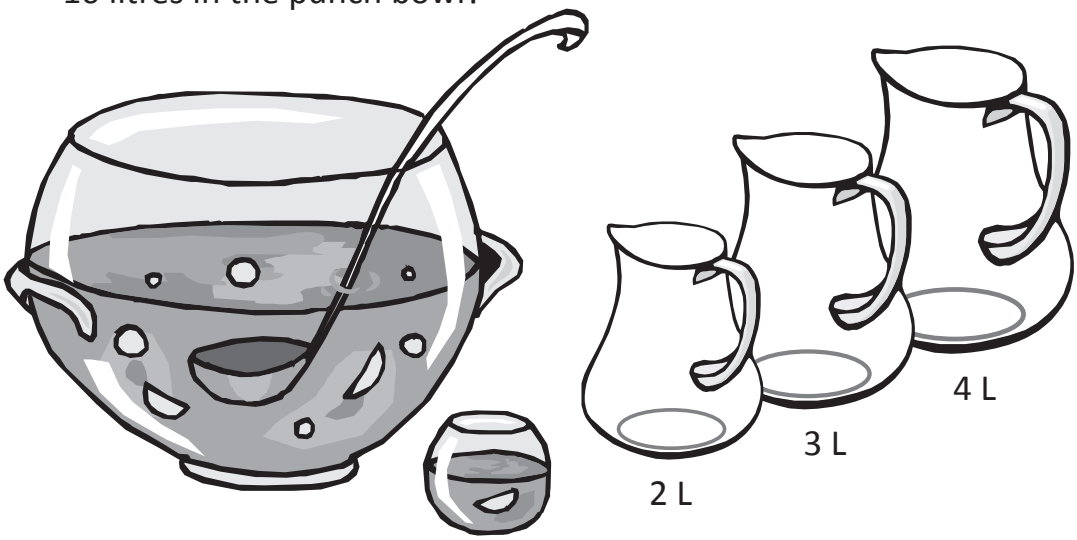
Continued from page 7.

What to do next

Solve the problems below. Show your working.

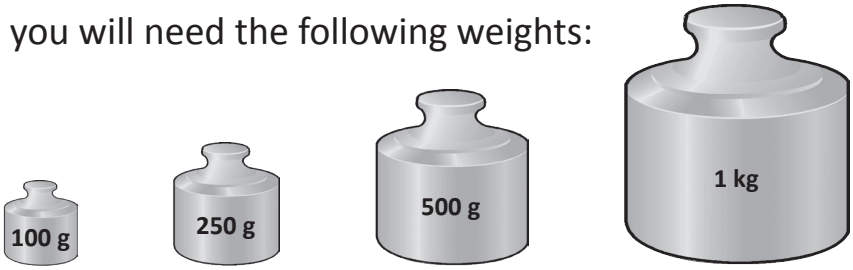
Problem 2

This time, Jess is making a different fruit punch for her party. Part of the recipe calls for 10 litres of orange juice. Jess only has a 4 litre jug, a 3 litre jug and a 2 litre jug without any markings. How can Jess use all the jugs, the least amount of times, to get exactly 10 litres in the punch bowl?



Mass – using different weights

For this page, you will need the following weights:



1 **Play a guessing game with your partner. Place one of the weights in your partner's hand, then they must guess which weight it is. Take turns.**

2 **Write the total for each of these combinations of weights:**

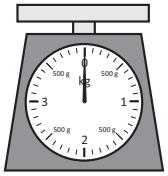
a 500 g + 250 g + 100 g + 100 g = ☐

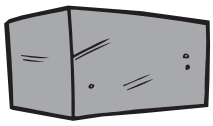
b 100 g + 500 g + 1 kg + 100 g = ☐

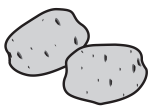
c 250 g + 100 g + 250 g = ☐

d 250 g + 100 g + 500 g + 1 kg = ☐

3 **Gather these objects and weigh them using a set of kitchen scales. Complete the table and put a ring around the combination of weights that each object is closest to.**

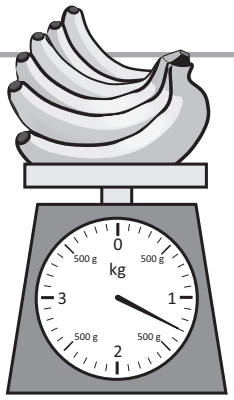






	Object	Mass of object	Combination of weights closest to
a	A brick		1 kg 500 g 250 g 100 g
b	A bottle of tomato sauce		1 kg 500 g 250 g 100 g
c	A can of baked beans		1 kg 500 g 250 g 100 g
d	A shoe		1 kg 500 g 250 g 100 g
e	Two large potatoes		1 kg 500 g 250 g 100 g

Mass – kilograms and grams



We measure mass in kilograms and grams. We use grams to measure smaller units of mass and kilograms for larger items.

1 000 grams = 1 kilogram

1 000 g = 1 kg

Sometimes, mass can be in both kg and g. These bananas weigh more than 1 kg. They weigh 1 300 g or 1 kg and 300 g.

1 **Write the mass of each of the following in kilograms and grams.**

a 1 500 grams = ☐ kg ☐ g

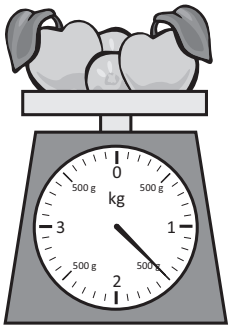
b 2 100 grams = ☐ kg ☐ g

c 1 600 grams = ☐ kg ☐ g

d 3 250 grams = ☐ kg ☐ g

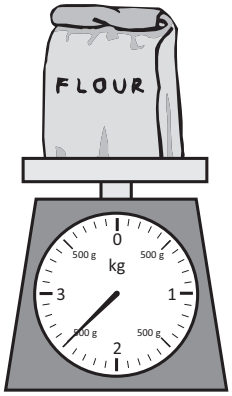
2 **These items weigh more than 1 kg. Write the mass of each in kilograms and grams:**

a



☐ kg ☐ g

b

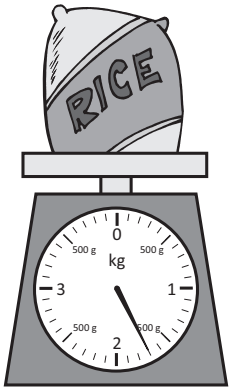


☐ kg ☐ g

c

☐ kg ☐ g

d



☐ kg ☐ g

Mass – kilograms and grams

When measuring smaller items, we can record their measurements as grams or as part of a kilogram. We do this by writing the amounts as decimals.

You should learn these mass facts:

1 kg = 1 000 g
0.5 kg = 500 g
0.25 kg = 250 g
0.1 kg = 100 g

3 **Write each mass in kilograms. Use decimal notation when it is less than 1 kg.**

a 3 000 g = ☐ kg

b 6 000 g = ☐ kg

c 250 g = ☐ kg

d 500 g = ☐ kg

e 100 g = ☐ kg

f 300 g = ☐ kg

4 **Write each mass in grams:**

a 45 kg = ☐ g

b 70 kg = ☐ g

c 0.25 kg = ☐ g

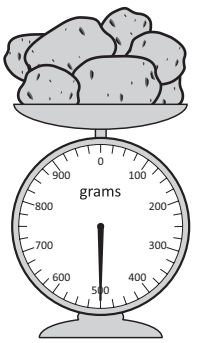
d 5.5 kg = ☐ g

e 12.25 kg = ☐ g

f 50.75 kg = ☐ g

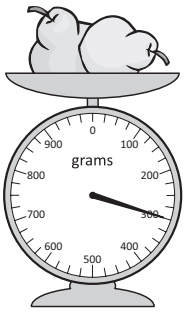
5 **Read the scales carefully and label the mass of each item in kg. Use decimals.**

a



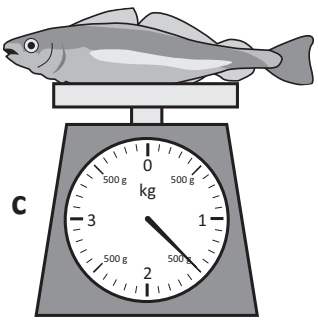
☐ kg

b



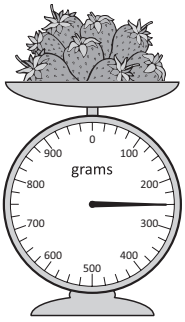
☐ kg

c



☐ kg

d

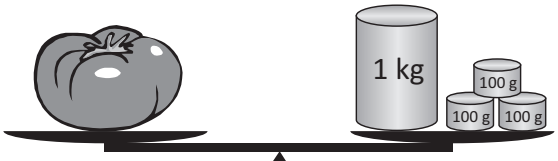


☐ kg

Mass – kilograms and grams

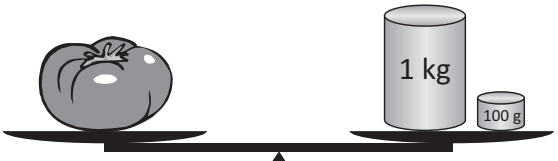
6 **What is the mass of each of these prize-winning tomatoes in kg?**

a



kg

b



kg

7 **Balance the mass of each present in two different ways. Tick the different combinations of weight:**

a

2.5 kg

	2 kg	1 kg	500 g	200 g	100 g	50 g
1						
2						

b

1.8 kg

	1 kg	500 g	200 g	100 g	50 g	10 g
1						
2						

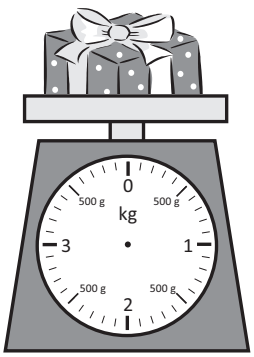
c

2.75 kg

	2 kg	1 kg	500 g	200 g	100 g	50 g
1						
2						

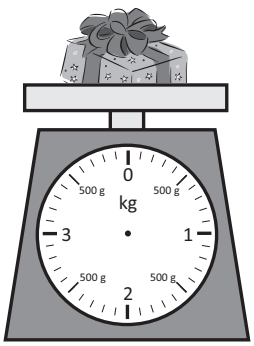
8 **Show where the arrow would be on each scale:**

a



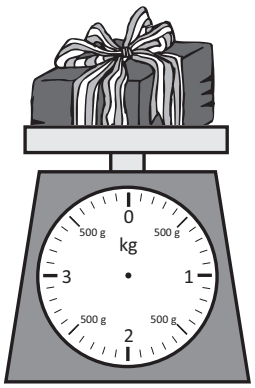
2.5 kg

b



1.8 kg

c



2.7 kg

Mass challenges

solve

Getting ready

Find the mass of each cat by using each clue:

a Felix is half the weight of Ambrose.

b Ambrose is 2 kg more than Mosley.

c Mosley is half the weight of Roy-Brown.

d Roy-Brown is 6 kg.

Felix

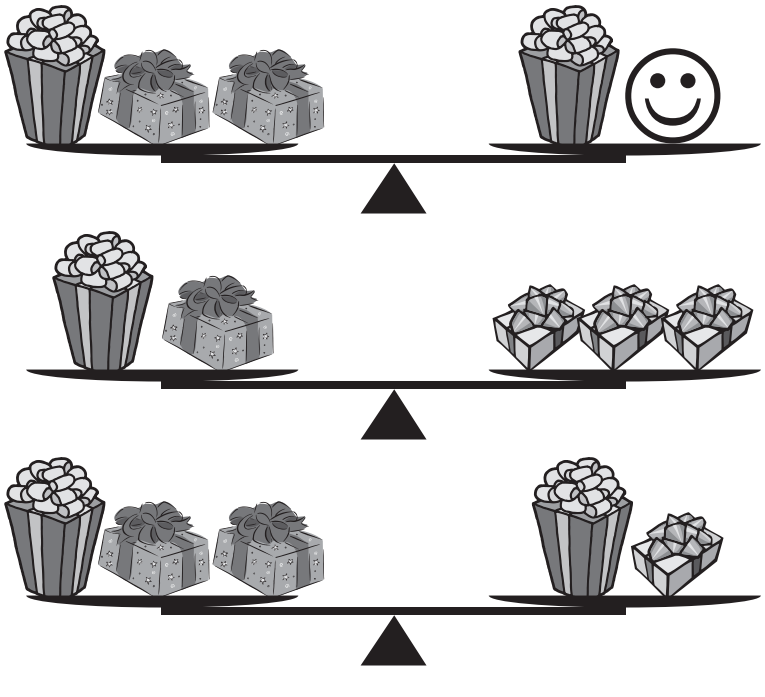
Ambrose

Mosley

Roy-Brown

What to do next

Find the mass of each shape by looking carefully at each clue:



 = ☐

 = ☐

 = ☐