REAL-LIFE MATHS

Shape, Space and Measures

Workbook for National 3 Applications of Mathematics

Unit 2: Shape, Space and Measures



C. Blewis

Blewis LEARNING

Contents

GETTING STARTED

How to use this book 4

MEASURES

Topic 1 Measuring 6

SHAPE AND SPACE

Topic 2 Perimeter 18

Topic 3 Area 30

Topic 4 Volume 42

Topic 5 Directions 54

Topic 6 Patterns 66

SCALE AND TIME

Topic 7 Scale drawings 78

Topic 8 Scale factor 90

Topic 9 Time 102

AT THE BACK

My progress tracker 114

Answers 115

How to use this book

This book helps you use shape, space and measures in real life: measuring, building, planning, cooking and getting places on time. Each topic follows the same pattern, so you always know what comes next.

EACH TOPIC HAS

Opener	the story for the topic, what you will learn and the key words
Skill pages	a short explanation, a method box and a worked example
Practice pages	questions for you to try, with space for your working
Real-life task	a bigger problem that uses all the skills in the topic
Check-up	a few questions to show what you can do, and a checklist

LOOK OUT FOR

Method	the steps to follow
Worked example	a question that has been answered for you, step by step
Top tip / Watch out	helpful hints and common mistakes
Talk about it	questions to discuss with a partner or your teacher

SHOW YOUR WORKING
Write down your working in the boxes, not just the answer. It helps you check your answer, and your teacher can see how you got there.

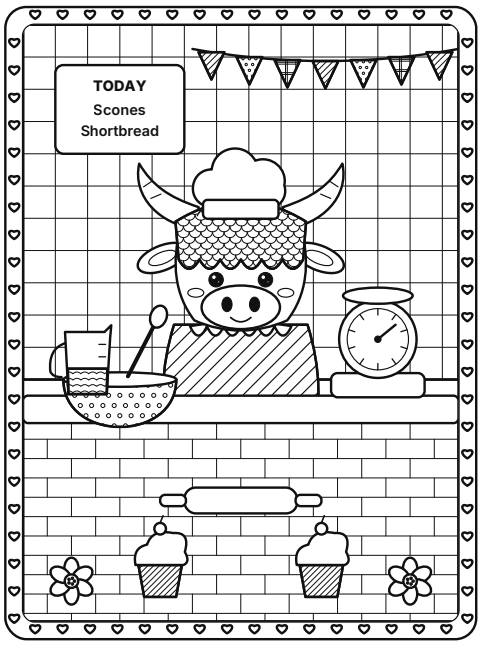
CALCULATORS
Try to work things out in your head or on paper first. You can use a calculator when the page says so, or when your teacher says it is OK.

ANSWERS
The answers are at the back of the book. Use them to check your work after you have tried the questions yourself.

Measuring

We measure things every day: how long, how heavy, how much and how hot. In this topic you will choose units, make estimates and change between units.

Theme: baking day. It is baking day at the Bothy Café in Glen Arrin. Ruby is helping the baker weigh flour, measure milk, line trays and set the oven. Every recipe needs careful measuring.



IN THIS TOPIC YOU WILL LEARN TO

Skill 1	choose a sensible unit for length, weight, volume and temperature
Skill 2	estimate the size of everyday things
Skill 3	change between units, like g and kg
Skill 4	compare and order measurements in different units

KEY WORDS

Length	how long, wide or tall something is (mm, cm, m, km)
Weight	how heavy something is (g, kg)
Volume	how much liquid something holds (ml, litres)
Temperature	how hot or cold something is (°C)
Estimate	a sensible guess, using what you already know
Convert	change a measurement into a different unit

❶ Choosing units

Every measurement needs a **unit**. Choose a unit that suits the size of the thing. Small things use small units. Big things use big units.

UNITS AND A FEEL FOR THEIR SIZE

Measuring	Units	A feel for the size
Length	mm, cm, m, km	1 mm: thickness of a bank card 1 cm: width of your fingernail 1 m: one big stride 1 km: about a 12-minute walk
Weight	g, kg	1 g: a paper clip 1 kg: a bag of sugar
Volume	ml, l	5 ml: a teaspoon 1 litre: a big carton of milk
Temperature	°C	0 °C: water freezes 37 °C: your body 100 °C: water boils

WORKED EXAMPLE

Ruby is getting ready to bake. Which unit should she use for each thing?

Length of a tray **cm** (a tray is about 30 cm long)

Bag of flour **kg** (it is heavy)

Milk for a cake **ml** (less than a litre)

The oven **°C** (about 180 °C)

WATCH OUT

Weight uses g and kg. Volume of liquid uses ml and litres. Do not mix them up: you cannot weigh milk in ml.

Practice: choosing units

1 Choose the best unit for each one. Pick from: mm, cm, m, km, g, kg, ml, l, °C.

Thing to measure	Best unit
The length of a rolling pin	
The weight of an egg	
The water in a full kettle	
The distance from Glen Arrin to the city	
The temperature of a hot oven	
The thickness of a biscuit	
The weight of a big sack of potatoes	
The height of the café door	

2 Circle the sensible answer.

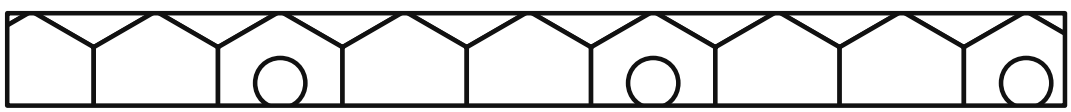
a A mug holds	3 ml	300 ml	30 litres
b A cake weighs	1 g	1 kg	100 kg
c A fridge is kept at	4 °C	40 °C	400 °C
d A teaspoon is	12 mm	12 cm	12 m

3 Ruby says, “The café teapot holds 1 ml of tea.” Is she right? Explain.

.....

.....

DOODLE CORNER



❷ Estimating

An **estimate** is a sensible guess. You do not need a ruler or scales. Compare the thing with something you already know.

METHOD

Step 1	Think of something you know the size of (a stride is about 1 m, an apple is about 100 g).
Step 2	Compare. How many times bigger or smaller is it?
Step 3	Give your estimate **with a unit**.

WORKED EXAMPLE

a Estimate the length of the café counter.

Know	One big stride is about 1 m.
Compare	The counter is about 4 strides long.
Estimate	**about 4 m**

b Estimate the weight of a bag of 6 apples.

Know	One apple is about 100 g.
Compare	6 × 100 g = 600 g
Estimate	**about 600 g**

TOP TIP

An estimate does not have to be exact. It must be sensible, and it must have a unit. “About 4” on its own means nothing.

TALK ABOUT IT

When might a baker estimate, and when must she measure exactly?

Practice: estimating

1 Estimate each one. Remember to write a unit.

Thing	My estimate
The height of a classroom door	
The length of a teaspoon	
The weight of a loaf of bread	
The juice in a can	
The temperature outside on a cold winter's day	

2 Estimate the length of each line in cm. Then measure it with a ruler.

a



b



c

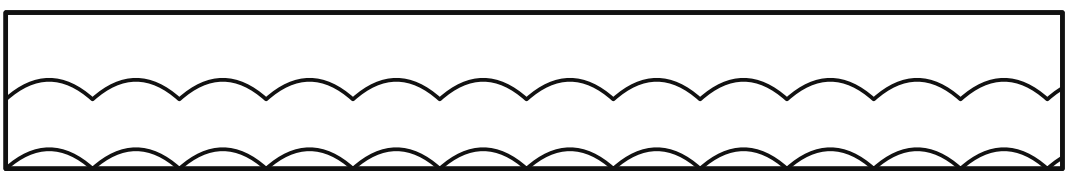


Line	My estimate	Measured length	How close was I?
a			
b			
c			

3 A bag of flour weighs 1 kg. Ruby lifts a box of butter. It feels as heavy as 3 bags of flour. Estimate the weight of the box.

Answer:

DOODLE CORNER



3 Changing units

Units in the same family are linked. Learn these facts:

METHOD

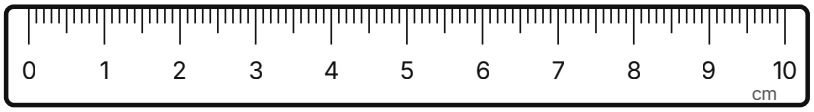
Length 10 mm = 1 cm · 100 cm = 1 m · 1000 m = 1 km

Weight 1000 g = 1 kg

Volume 1000 ml = 1 litre

Big unit to small multiply (× 10, × 100 or × 1000)

Small unit to big divide (÷ 10, ÷ 100 or ÷ 1000)



Each centimetre on a ruler is split into 10 millimetres.

WORKED EXAMPLE

2 kg in g big to small, so × 1000: 2 × 1000 = **2000 g**

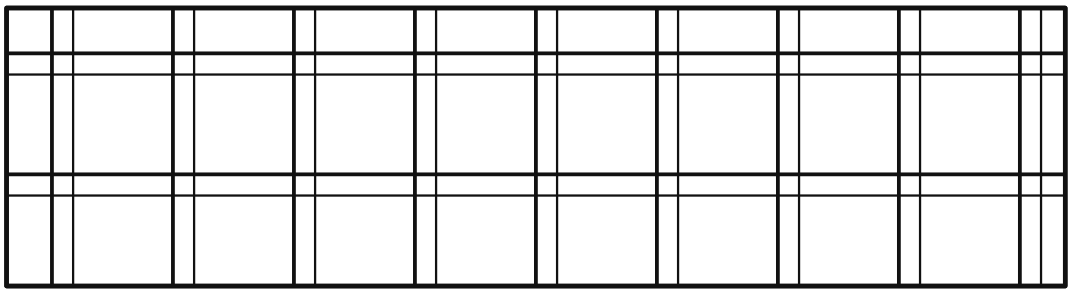
350 cm in m small to big, so ÷ 100: 350 ÷ 100 = **3.5 m**

1500 ml in litres small to big, so ÷ 1000: 1500 ÷ 1000 = **1.5 litres**

WATCH OUT

Check your answer makes sense. A smaller unit always gives a bigger number. 2 kg is 2000 g, not 0.002 g.

DOODLE CORNER



FREE SAMPLE

Shape, Space and Measures (N3 Maths, Unit 2)

This sample shows a few pages. The full printed workbook is available from Amazon.

blewislearning.co.uk

Blewis
LEARNING