NALA
National Adult Literacy Agency
Áisíneacht Náisiúnta Litearthachta do Aosaigh

Brushing up 2

working towards maths at Level 2

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What is this workbook?

Welcome to **Brushing up 2**: **working towards maths at Level 2**. This workbook includes maths topics at QQI Level 2. (QQI stands for **Q**uality and **Q**ualifications **I**reland.)

It will:

(1) show you how we use maths to solve number problems in everyday life; and

(2) let you practise any skills you want to improve.

Is it for me?

The workbook is designed for adults who want to:

(1) learn skills they did not have the chance to learn before; and

(2) brush up on skills that might have become "rusty" over time.

It is for you if you want to improve your knowledge and skills in:

- working with numbers,
- using shapes and talking about space,
- solving problems using numbers,
- using data and information, and
- using and talking about patterns and relationships.

What will I learn?

This workbook, together with some parts of **Brushing up 1: a maths workbook**, includes topics that are mapped to five QQI qualifications at Level 2. The qualifications are:

QQI: Quantity and Number (Level 2)

QQI: Shape and Space (Level 2)

QQI: Quantitative Problem Solving (Level 2)

QQI: Data Handling (Level 2)

QQI: Pattern and Relationship (Level 2)

You and your tutor can read more about these qualifications on the QQI website: www.qqi.ie
You need to click **awards information** and then type the name of the qualification into the **title** box.

How will I learn?

There is more than one way to learn. And there is more than one way to use this workbook.

1: Starting with the problems and brushing up on bits you need

✓ Work through it on your own, starting with **Section 1: Problems to solve**. You can have a go at solving one, two or all three of the problems. You can use these problems to work out what knowledge and skills you feel you need to develop. You can work through the relevant parts of **Section 2: Skills to learn** and check your answers as you go along. You can then return to Section **1: Problems to solve** and see if you have improved.

or

2: Refreshing your skills then applying them to the problems

✓ Start with **Section 2: Skills to learn**, and make sure you are comfortable with all the learning in this section. Then turn to **Section 1: Problems to solve**, to have a go at practising what you have learned.

or

3: Working with a tutor to pick and choose what interests you

✓ Work with a tutor, choosing the sections you feel are relevant or of interest to you.

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If you have any questions as you are using this book, call the NALA freephone support line, **1800 20 20 65**, Monday to Friday, 9.30 am – 5 pm.

If you call outside of these hours, please leave your name and number and we will call you back.

Introduction

What is in the workbook?

The workbook has three sections:

Section 1: Problems to solve

Introduction: How to solve problems

Problem 1: Planning an outing

Problem 2: Decorating a room

Problem 3: Choosing a mobile phone package

Section 2: Skills to learn

Part 1: **Quantity and number:**
Subtraction

Part 2: **Shape and space:**
Cylinders
Area and volume
Sorting 2D and 3D shapes and forms

Part 3: **Handling data:**
Using data in everyday life
Collecting data
Reading and interpreting data
Presenting data

Part 4: **Pattern and relationship:**
Using patterns in everyday life
Talking about patterns
Designing a pattern

Section 3: Answers

Tip: Some of the problems do not have set answers, so you will need to ask someone to help you check them.

Using the workbook to work towards qualifications
On pages 90 and 91, you and your tutor will find a table that shows how Learning Outcomes (LOs) for the maths QQI Level 2 qualifications map to activities.

Section 1:
Problems to solve

Section 1: Problems to solve

The three problems

This section contains three problems to solve. The problems relate to:

(a) Planning an outing
(b) Decorating a room
(c) Choosing a mobile phone package

What is a problem?

The word **problem** can sound negative, but it is just the word we use when a situation requires us to think, weigh up options and make decisions to reach a solution.

Think of a problem as a chance to try out what you know and can do.

By the end of this section you will be able to:

- apply your maths knowledge and skills to solve a range of everyday problems.

You might also have produced evidence that you and your tutor can use to work towards qualifications.

Tip: Your smartphone has a calculator on it. Find it and use it to work out numbers.

Introduction: How to solve problems

We all solve problems every day of our lives at home, at work, sometimes on our own, and sometimes with other people. The problems can be small and straightforward, or big and quite complex. Often there will not be a single correct answer — you need to make a decision, or a judgment, based on what seems sensible in the circumstances.

There are three stages to solving maths problems:

Stage 1: Planning to solve the problem

Stage 2: Finding a solution

Stage 3: Checking the solution

For example, imagine you had a job interview in the middle of December when the weather was bad. What would you have to work out to make sure you got there on time? What option would you choose? How would you know if it would work?

Think about this problem as you read through the stages of problem solving.

Stage 1: Planning to solve the problem

Good planning will:

- help you to understand the problem you are solving,
- help you to find a solution, and
- save time!

Follow these steps, to make sure you have planned well:

Planning step 1 – collecting information:

Get all your information together.

Planning step 2 – making sure you understand:

- Read the information carefully (at least twice).
- Underline key words.
- Make notes, or rewrite the problem in your own words.

Ask yourself:

- if you understand the situation,
- if you understand what the problem is about,
- if there are any words or technical terms you are not sure about, and
- how confident you feel making decisions about how to solve the problem.

Planning step 3 – making decisions:

Once you are sure you understand the problem, you need to make some decisions about:

- whether you need to do any maths (if there are numbers you probably will!),
- what maths you need to do (for example, deciding whether it is adding or subtracting),
- how you will use this maths to solve the problem, and
- what order to solve the problem in.

Stage 2: Finding a solution (solving)

Remember, there is sometimes more than one correct answer to a problem. The important thing is that the solution works!

Follow these steps to solve the problem logically and accurately.

Solving step 1 – finding information:

Now that you have decided what order to solve the problem in, start with the first part.

You have to find the information you need — this might be from:

- asking people questions (using a questionnaire).
- looking at tables of information (for example, bus timetables, or mobile data charges), or
- looking at websites on decorating.

Solving step 2 – doing the maths:

The next step is to use the information you have found to work out, using maths, what you need to know.

For example, this might be:

- comparing bus times to work out which bus you need to get to arrive at a certain time, or
- checking whether a new sofa will fit against a wall, by working out the measurements.

You can choose to do the maths in your head, on paper or on a calculator. Your smartphone has a calculator on it.

Stage 3: Checking the solution

It is important to check your answers as you go along. If you have used a pen and paper, look back at your original figures or check them with a calculator.

It is sensible to **estimate** what you think the answer is likely to be, so that you can get a quick sense of whether or not your answer "looks right".

You can read about **estimating** on pages 68 - 70 of **Brushing up 1: a maths workbook**.

Checking step 1 – accuracy:

Accuracy means how precise or exact your answer is. There are times when you need to be accurate and times when you do not.

If you were telling friends how many fans were at a concert in Croke Park, which of the following figures would you be most likely to use?

75,000 (an approximate, or **rough**, figure)

76,500 (a more precise, approximate figure)

76,532 (the exact, **accurate** figure)

Talking to friends, you would probably say 75,000 (or even, "more than 70,000").

The concert organisers would be interested in the exact figure, though, because they need to check the ticket takings.

Checking step 2 – does the solution make sense?

Problem solving is about real life and solutions need to make sense so that they work.

Here is an example of when an answer does not make sense:

Problem:

You are booking minibuses for a group to visit Dublin for the day. There are 18 people going on the trip. Each minibus takes 8 people.

How many minibuses do you need to hire?

You decide to divide 18 by 8, which gives an answer of 2.25.

You present your solution as this:

We need to hire 2.25 minibuses.

The problem here is that you cannot get 0.25 (a quarter) of a minibus.

If you hire only 2 minibuses, 2 people will not be able to go on the trip.

If you hire 3 minibuses, everyone will be able to go on the trip, so this is the **answer that makes sense.**

Of course, you could try to find a bigger bus, which might even work out cheaper!

Problem 1: Planning an outing

This problem asks you to:

- carry out a survey of other learners in your group about a day trip,
- research places you and the group could visit,
- work out how much it will cost to visit each place, and
- choose a destination and explain why you have chosen it.

You will:

- calculate numbers,
- solve problems with numbers, and
- handle data and information.

By working to solve this problem, and learning any new skills you need to use, you can produce evidence to help you work towards:

QQI: Quantity and Number (Level 2)

QQI: Quantitative Problem Solving (Level 2)

QQI: Data Handling (Level 2)

See page 90 to find the Learning Outcomes (LOs) that this problem can help you work towards.

Your problem: Planning an outing

You need to choose an interesting place for your learning group to visit for the day. You need to take account of:

- places they would like to visit,
- how practical it is to get to the place and back in one day, and
- the cost of transport and entry tickets to visitor attractions.

Tips for solving the problem:

Here are some tips and ideas for how you can go about solving the problem.

Taking account of places the learners would like to visit

You need to find out what places the other learners would like to visit. To find out this information, you will need to ask them some questions. A good way to do this would be by designing a survey or questionnaire. You can learn about surveys as a way of finding out information on pages 52 and 53.

Keep your survey simple. Suggest maybe five places and ask the learners to pick their favourite.

Taking account of how practical it is to get there and back in one day

After you have done your survey, you could pick the top three favourite places and then use Google maps (or another online map) to work out the distances between places.

You could look on the website www.getthere.ie to see how long it takes by bus or train to get to each of the places.

Taking account of costs

www.getthere.ie will also give you information about ticket prices for travel.

You can go on the websites of each of the top three favourite places and find out if you have to pay an entry charge. You can also see if there are discounts for groups.

Make notes of all the costs. Work out the difference between the costs. To do this, you will need to subtract numbers. See pages 26 to 39 to learn more about subtraction.

Making your choice

Your choice from the top three places will depend on how practical it is in terms of:

- time to get there and back, and
- cost of transport and entry.

The choice is yours, but you need to be practical and use common sense. Imagine you are really going on the trip.

Presenting reasons for your choice

To explain your choice to the other learners, you will need to convince them that you have looked at:

- their preferences,
- the time practicalities, and
- the costs.

You can use the results of the survey. You could also draw a table showing the different times, and another showing the different costs.

You could even use a map printed off the internet.

Be creative. Take a look at pages 52 to 65 about collecting and presenting data.

And if you do go on the trip, have a great day!

Problem 2: Decorating a room

This problem asks you to:

- plan to decorate a room, keeping to a budget,
- choose furniture to put in it, and
- design wallpaper.

You will:

- solve problems with numbers,
- handle data and information, and
- create patterns.

By working to solve this problem, and learning any new skills you need to use, you can produce evidence to help you work towards:

QQI: Quantity and Number (Level 2)

QQI: Shape and Space (Level 2)

QQI: Quantitative Problem Solving (Level 2)

QQI: Data Handling (Level 2)

QQI: Pattern and Relationship (Level 2)

See page 90 to find the Learning Outcomes (LOs) that this problem can help you work on.

Your problem: Decorating a room

You need to plan to decorate a room in your house with furniture that you can afford and wallpaper you have designed yourself.

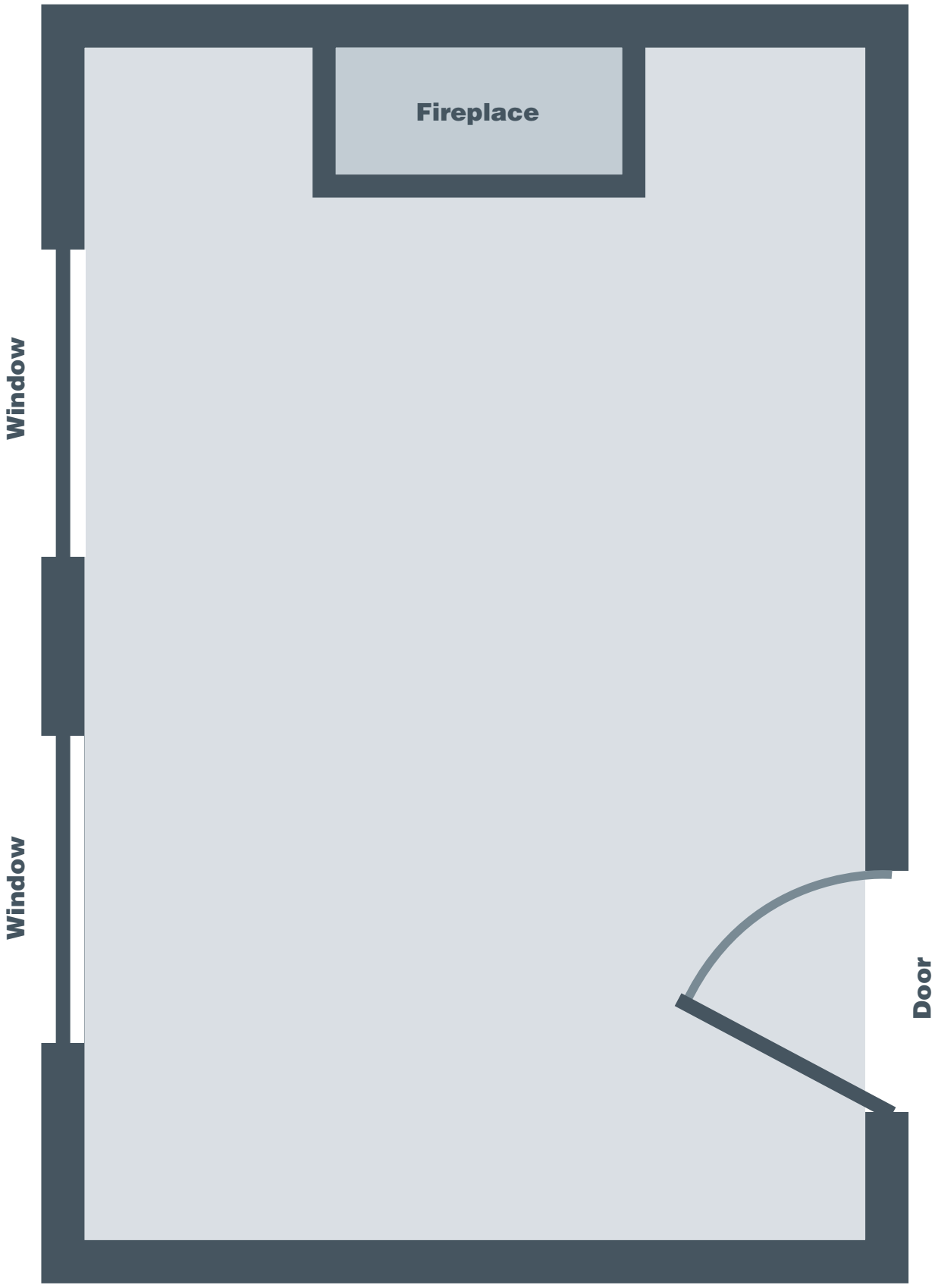
You need to:

- choose furniture that will fit in your room,
- design the wallpaper you want to put on the walls, and
- work out what you can afford within your budget.

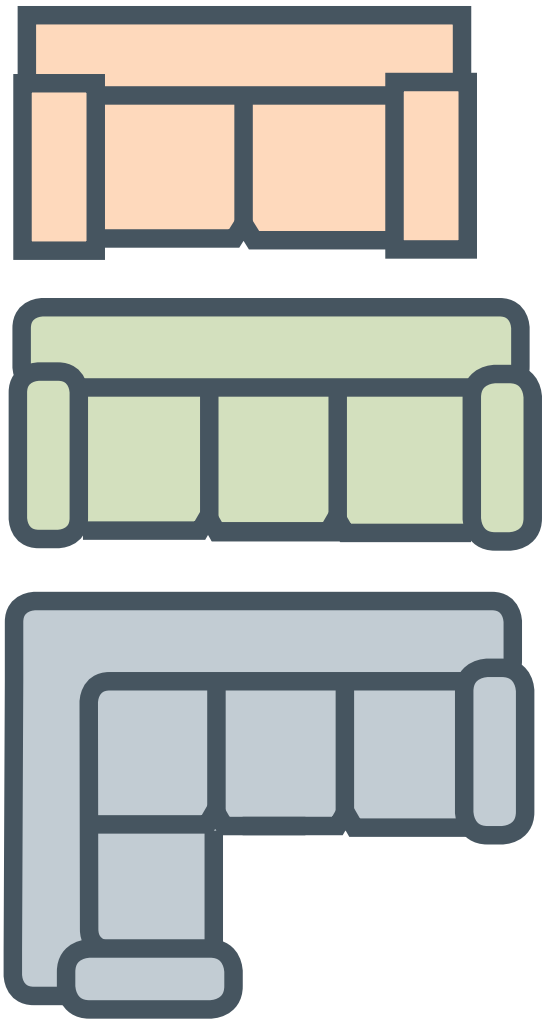
You then need to tell your tutor and the other learners about why you have made the decisions you have.

You can make a plan of your own room or you can use the plan on the following page.

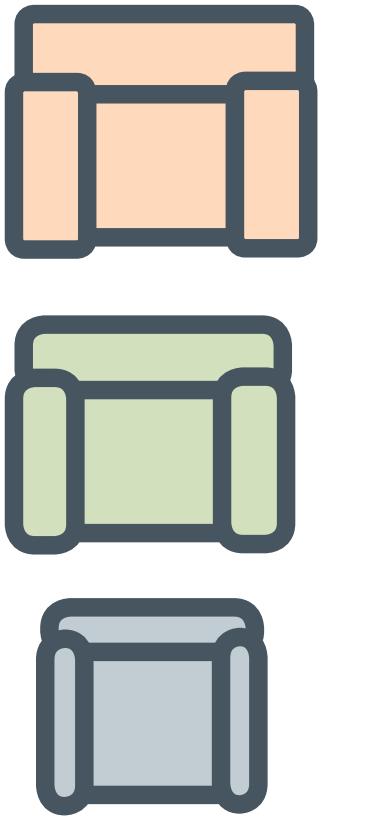
On this page, you will see a plan of a room and on the next page items of furniture. Choose which items you want in your room, cut them out and stick them onto the plan with glue or Blu Tack. You can copy these pages to do this.



3 sizes of sofas

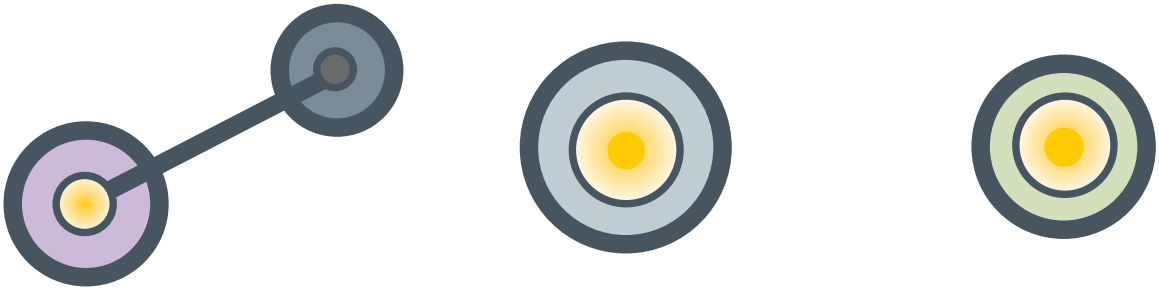


3 types of armchairs



TV

3 types of lamps



3 types of coffee tables

Tips for solving the problem:

Here are some tips and ideas for how you can go about solving the problem.

Checking whether furniture will fit in the spaces

You can use the cut-outs of furniture to check you have enough space, and to see how you want your room laid out.

If you want to, you can work with your tutor or a friend to measure a room and then plan to put furniture in it from a catalogue.

Here are some online catalogues that will help you choose furniture:

http://www.argos.ie

http://www.harveynorman.ie/furniture

http://www.ikea.com (and search for the word 'livingroom')

Working out what furniture you can afford

Give yourself a budget. It could be €500, €750, €1,000 or even €2,000. You cannot spend more than the amount you choose.

You might also need to add to check how much items are costing. If you want a reminder about adding, look at pages 57 to 67 of the first workbook, **Brushing up 1: a maths workbook**.

Look on the internet or in catalogues and choose furniture to go into the room.

You need to buy:

- a sofa,
- a coffee table, and
- a lamp.

If you have enough money left, you can buy more items for the room, like an armchair.

You can keep track of the cost of items using a table. If you want to learn more about tables, see page 57.

You might need to subtract to see if you have enough money to buy items you like. To learn more about subtracting, see pages 26 to 39.

Planning a pattern of wallpaper

You can to design your own wallpaper!

Have a look at wallpaper designs online and then make your own. It should have a pattern that repeats. It can be colourful or plain.

If you want to learn more about patterns, see pages 66 to 72.

Here are some websites that will help you choose a design:

https://www.ilovewallpaper.ie

https://www.harrycorry.com/wallpaper

http://www.realsimple.com (and search for 'wallpaper designs')

Remember to give yourself a budget. It could be €100, €150, €200 or even €300. You cannot spend more than the amount you choose.

You might need to estimate costs or quantities for your budget at times.

Look on the internet or in wallpaper catalogues and choose designs. You can also find out about the types and costs of plain wallpaper you can print designs on.

You need to buy:

- materials to make the design,
- plain wallpaper to put the design on.

You might have to add on costs for putting the design on the wallpaper.

You can keep track of the cost of items using a table. If you want to learn more about tables, see page 57.

Presenting your reasons for your choice

You can explain your choices to your tutor or the other learners by showing them the tables of prices and pages from catalogues or the internet.

You can check to see if you kept to your budget and if you are happy with the choices you made.

Problem 3: Choosing a mobile phone package

This problem asks you to:

- work out what contracts are available for your new phone,
- compare allowances of minutes, texts and data,
- decide which contract is best for you, and
- plan to explain to your tutor and other learners why you have chosen the contract you have.

You will:

- calculate numbers,
- solve number problems, and
- handle and present data.

By working to solve this problem, you can produce evidence to help you work towards:

QQI: Quantity and Number (Level 2)

QQI: Quantitative Problem Solving (Level 2)

QQI: Data Handling (Level 2)

See page 90 to find the Learning Outcomes (LOs) that this problem can help you work towards.

Tips for solving the problem:

Here are some tips and ideas for how you can go about solving the problem.

Working out what contracts are available

You can find information about contracts on the websites of different network suppliers. There is a danger of feeling overwhelmed, though, so it might be good to choose just two or three different suppliers and look at **the same type of contract**, for example:

- Pay-As-You-Go deals from Vodafone, Three and Tesco Mobile, or
- monthly contracts from Meteor, Three and Vodafone.

If you want to keep things simple, you might also choose to look only at allowances for:

- minutes,
- text messages, or
- data.

If you want to challenge yourself, you can look at two of these or all three.

Comparing allowances

You are going to be comparing quite a lot of data, so make sure you have a plan for collecting it. You can use a table. To find out more about collecting data, see pages 52 to 56.

Making your decision

You need to be able to see all the numbers in one place so that you can compare them.

When you compare the numbers, you will need to subtract them. To find out more about subtraction, go to pages 26 to 39.

Presenting the reasons for your choice

The data you are handling might be quite complicated. When you explain your choice to your tutor and the other learners, think about how to present it in a clear and helpful way.

Have a look at the pages on presenting data on pages 63 to 65.

Section 2:
Skills to learn

Introduction

This section contains four parts. Each part contains one or more topics.

Part 1: **Quantity and number:**
Subtraction

Part 2: **Shape and space:**
Cylinders
Area and volume
Sorting 2D and 3D shapes and forms

Part 3: **Handling data:**
Using data in everyday life
Collecting data
Reading and interpreting data
Presenting data

Part 4: **Pattern and relationship:**
Using patterns in everyday life
Talking about patterns
Designing a pattern

Part 1: Quantity and number

Subtraction

This section covers topics from QQI Quantity and Number Level 2.

- QN5: Subtract two digit whole numbers that require number bonding up to 10 in the context of an everyday situation.
- QN6: Use the plus, minus and equals signs and operations.

The QN6 content in this section will focus on using the minus and equals signs and operations.

The first workbook in this series, **Brushing up 1: a maths workbook**, included topics that were mapped to Quantity and Number (QN) at QQI Level 1. It also included topics from QN at QQI Level 2, as follows:

- Recognise numbers up to 100 (Learning Outcome QN1).
- Recognise the relationship between 100 and common large numbers, for example, 1,000, 100,000, 1 billion (Learning Outcome QN2).
- Know place value in relation to units, tens, hundreds (Learning Outcome QN3).
- Add two digit whole numbers that total less than 100 in the context of an everyday situation (Learning Outcome QN4).
- Use the plus and equals signs and operations (part of Learning Outcome QN6).
- Estimate quantities to the nearest value of in broad terms, for example, to the nearest quantity in 10s or 100s as appropriate (Learning Outcome QN7).

If you want to brush up on any of the above skills, please go to Section 3 of Brushing up 1: a maths workbook.

The first workbook did **not** cover:

- subtraction of two digit whole numbers (part of Learning Outcome QN5), and
- use of the subtraction sign (part of Learning Outcome QN6).

You can learn about subtraction here!

Subtraction

When you subtract, you are taking one amount from another.

Here are some examples when you subtract in everyday life. See how many you recognise, then suggest some examples of your own.

- **working out how much change you need to get after you buy something**

For example, you buy a cinema ticket costing €9, and pay with a €20 note. You have to do the sum:

€20 – €9 = €11

to work out that you should get €11 change.

- **calculating what time you need to leave work to catch a train**

For example, your train leaves the station at 5:23 pm. You know it takes 14 minutes to walk to the station, so you need to do this sum:

23 – 14 = 9

to work out that you need to leave work at 5.09 pm at the latest.

We use a number of different words to mean subtract. Circle the ones you are familiar with.

minus **from**

remove

take away

subtract

difference between

Try to use these terms to describe what is happening when you pay for a cake costing €4, using a €10 note, and get €6 in change.

For example, **The difference between €10 and €4 is €6.**

_____

_____

_____

Symbols and sums

– is the sign we use for subtraction.

To write 45 take away 12 equals 33, you would write:

45 – 12 = 33

Write the following sentences as sums:

14 take away 8 equals 6.	
27 minus 11 equals 16.	
Subtracting 22 from 33 equals 11.	
33 from 52 is 19.	
The difference between 25 and 9 is 16.	
The difference between 13 and 31 equals 18.	

Check your answers on page 74.

Subtracting using the 100 square

This square contains 100 smaller squares showing the numbers from 0 to 99.

If you read **up** a column from the bottom, you see that the number goes up 10 each time (for example, 5, 15, 25, 35, 45 and so on).

If you read **down** a column from the top, you see that number goes down 10 each time (for example, 96, 86, 76, 66 and so on).

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Can you think how to use the 100 square for subtraction?

Using the 100 square to subtract 10

Here is how you can use the 100 square to subtract numbers from each other.

If you want to subtract 10, you just go down to the next row, like this:

I have 62 (the green square).

I want to subtract 10 ... so I go down 1 row.

So the answer is ... 52 (the blue square).

We can write this as: 62 – 10 = 52

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Using the 100 square to subtract 10

If you want to subtract 40, you just go down 4 rows, like this:

I have 86 (the green square).

I want to subtract 40 ... so I go down 4 rows.

So the answer is ... 46 (the blue square).

We can write this as: 86 – 40 = 46

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Using the 100 square to subtract

Use the number square to do the following subtraction sums:

(a) 22 – 10 =

(b) 47 – 20 =

(c) 65 – 40 =

(d) 91 – 70 =

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Check your answers on page 74.

Using the 100 square to subtract other numbers

What if I want to subtract a different number? For example, 26 – 12 =

I would need to break the 12 into tens (T) and units (U), to give me: 10 + 2.

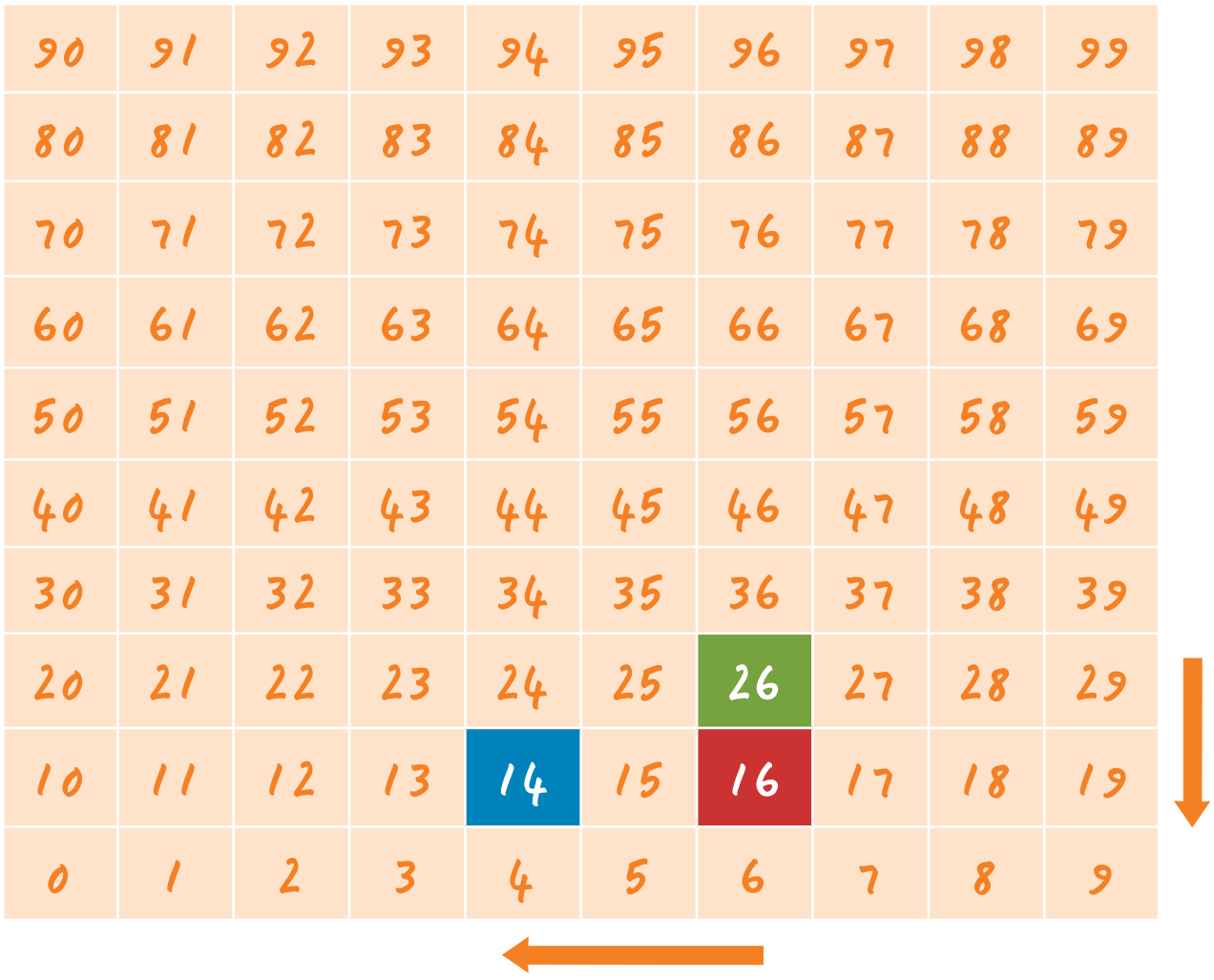
I start at 26 (the green square).

I then subtract 10 ... by going down 1 row, to 16 (the red square).

I then subtract 2 ... by counting 2 squares to the left.

This brings me to 14 (the blue square).

We can write this as: 26 – 12 = 14



Using the 100 square to subtract other numbers

Use the number square to do the following subtraction sums:

(a) 38 – 15 =

(b) 72 – 22 =

(c) 83 – 25 =

(d) 51 – 17 =

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Check your answers on page 74.

Subtracting without using the 100 square

You can subtract numbers **without** using the 100 square.

Example 1:

Imagine we want to do the following sum: **54 – 23 =**

We need to split each number into tens (T) and units (U).

		T		U
54	**=**	**50**	**and**	**4**
23	**=**	**20**	**and**	**3**
		30		**1**

And subtract the bottom number from the top number in the tens (T) column (50 – 20 = **30**).

Then subtract the bottom number from the top number in the units (U) column (4 – 3 = **1**).

So in total, we have **31**.

Example 2:

In our next example, we need to subtract **36 from 79**. We need to split the numbers up:

		T		U
79	**=**	**70**	**and**	**9**
36	**=**	**30**	**and**	**6**
		40		**3**

We then subtract the bottom number in the tens (T) column from the top number (70 – 30 = **40**).

Then subtract the bottom number from the top number in the units (U) column (9 – 6 = **3**).

Subtracting without using the 100 square

So in total, we have **43**.

Have a go at these subtraction sums:

(a) **54 – 13 =**

		T		U
54	**=**		**and**	
13	**=**		**and**	

(b) **77 – 45 =**

		T		U
77	**=**		**and**	
45	**=**		**and**	

(c) **63 – 22 =**

		T		U
	=		**and**	
	=		**and**	

Check your answers on page 75.

More 2-digit subtraction

Sometimes subtractions are a bit more complicated.

Example 1:

Say we are subtracting 17 from 35 (35 – 17 =).

We need to split each number into tens (T) and units (U).

		T		U
35	=	30	and	5
17	=	10	and	7

In this sum, we cannot take 7 from 5. (There are not enough numbers to take! For example, you cannot buy something costing €7 if you only have €5.)

We have to do what we do when we are short of cash – borrow from a friend or neighbour. In this case, we need to make the 5 bigger, so we borrow from the 30 next door. We borrow 10.

This means the 30 becomes a 20, and the 5 becomes 15. (20 + 15 still add up to 35!)

The sum now looks like this:

		T		U
35	=	20	and	15
17	=	10	and	7
		10	and	8

The sum now becomes simpler. The answer is 18.

Example 2:

In the next example, we need to subtract **23 from 62**. We need to split the numbers up:

		T		U
62	=	60	and	2
23	=	20	and	3

In this sum, we cannot take 3 from 2.

We have to make the 2 bigger by borrowing 10 from the 60.

We turn the 60 into a 50 and the 2 turns into a 12.

		T		U
62	=	50	and	12
23	=	20	and	3
		30	and	9

Once again, the sum becomes simpler. The answer is 39.

More 2-digit numbers to subtract

See if you can work out the answers to these sums yourself. Use the examples on pages 36 and 37 to help you:

(a) **36 – 28 =**

(b) **41 – 15 =**

(c) **66 – 29 =**

(d) **83 – 26 =**

Check your answers on page 75.

Try out some real-life subtraction tasks

Try to work out these problems with a pen and paper, or in your head, then check the answers on pages 75 and 76. You could also check the answers using a calculator if you want:

(1) €60 – €34 =

(2) €52 – €31 =

(3) €73 – €35 =

(4) You buy a new outfit costing €72 and pay for it with €90 in cash. What is the sum you need to do? What is the answer?

(5) Your food shopping comes to €46. You have a food budget this week of €65. What is left in your food budget now?

(6) There is a bus due at 45 minutes past the hour. It is now 8:17am. How long do you need to wait till the bus is supposed to arrive?

(7) Children have to be 92 cm tall to ride on the High Flyer fairground ride. Frankie is 78 cm tall. How many more centimetres does he need to grow before he can go on the High Flyer?

(8) According to this Yorkshire pudding recipe, you need 140 ml of liquid. The recipe suggests 75 ml of semi-skimmed milk and to make up the rest with water. How much water should you put in?

Check your answers on page 75.

Part 2: Shape and space

Contents:

(a) Cylinders

(b) Area and volume

(c) Sorting 2D and 3D shapes and forms

This section covers topics from QQI Shape and Space (SS) Level 2 Learning Outcomes SS1, SS2, SS3 and SS4:

- SS1: Name common shapes and forms in everyday life, for example, circles, rectangles, cubes, cylinders and spheres.
- SS2: Describe the properties of common 2D shapes and 3D forms, for example, number of faces, edges, area, volume.
- SS3: Recognise the relationship between area and volume.
- SS4: Sort 2D and 3D shapes and forms in relation to size.

The first workbook in this series, **Brushing up 1: a maths workbook**, included topics that were mapped to Shape and Space at QQI Level 1. It also included topics from Shape and Space at QQI Level 2, as follows:

- Name common shapes and forms in everyday life, for example, circles, rectangles, cubes and spheres.
- Describe the properties of common 2D shapes and 3D forms, for example, number of faces and edges.
- Sort 2D shapes in relation to size.

If you want to brush up on any of the above skills, please go to Section 2 of Brushing up 1: a maths workbook.

The first workbook did **not** cover:

- naming cylinders,
- describing area and volume of shapes and forms,
- recognising the relationship between area and volume, or
- sorting 3D shapes and forms in relation to size.

You can learn about these here!

(a) Cylinders

What is a cylinder?

A cylinder is a three-dimensional (3D) shape.
It looks like a circular tube.

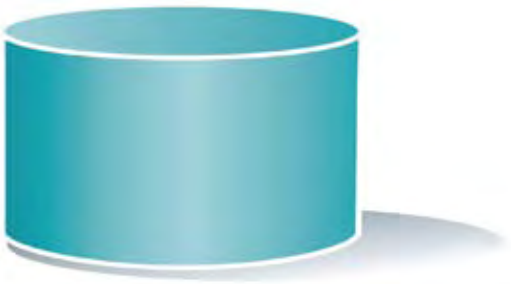
If something is the shape of a **cylinder**, we say it is **cylindrical**.

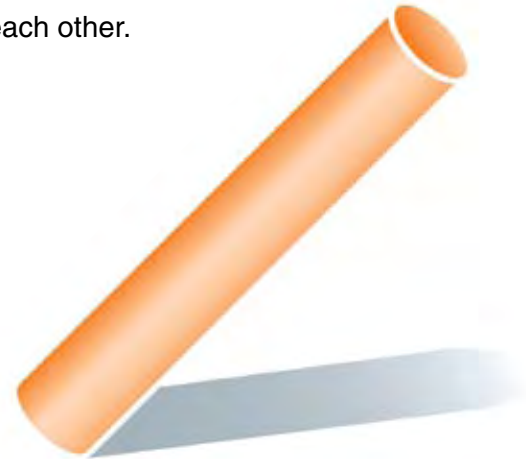
We can find cylinders and cylindrical objects everywhere in everyday life.

We can draw a cylinder like this:

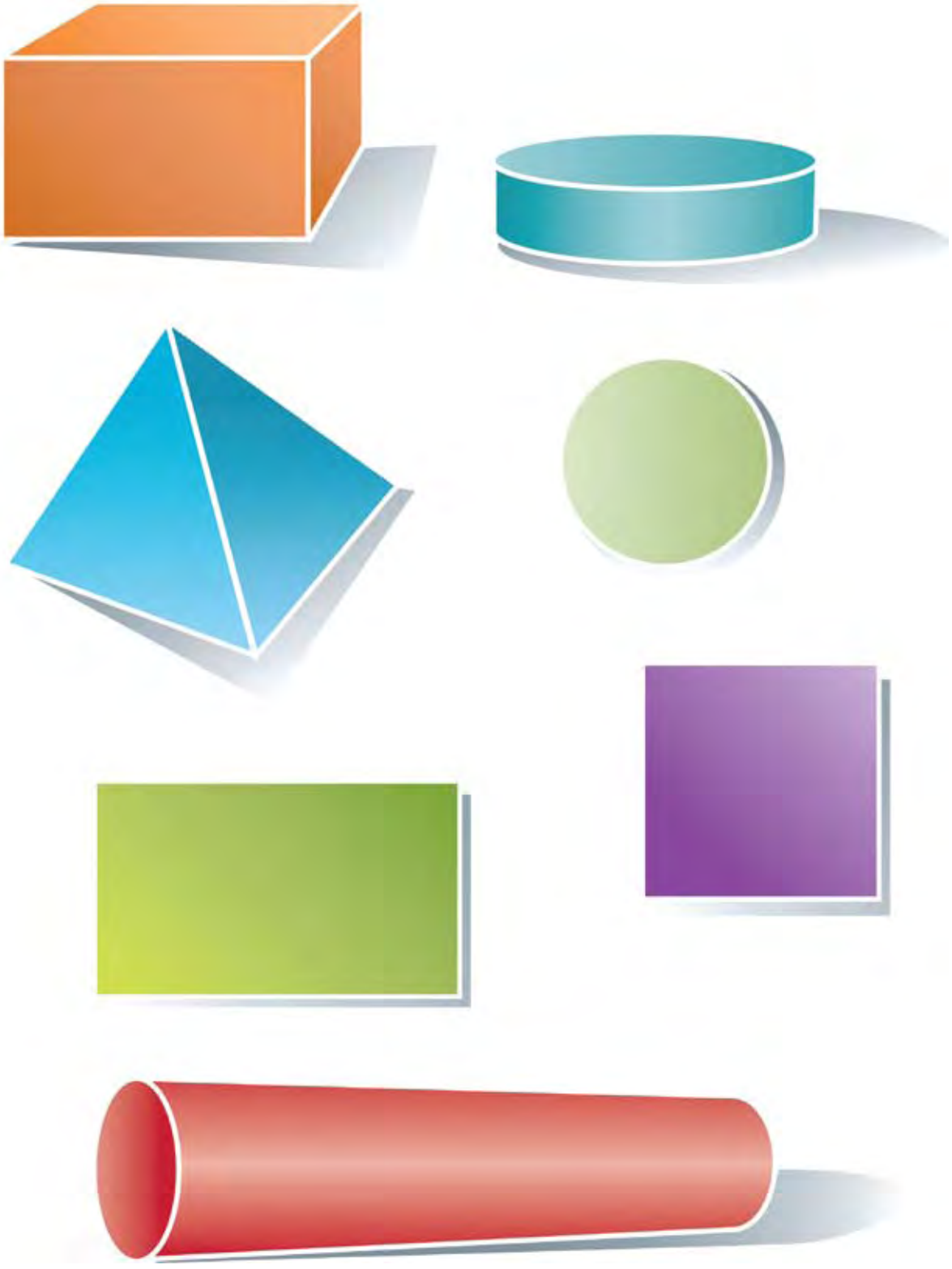
The circles at the two ends have to be the same size as each other.

All of the following shapes are cylinders:





Tick which of these you think are cylinders:



Check your answers on page 77.

Can you think of some items, large or small, that are cylindrical?

Write your ideas here, or draw them or take photos of them. Then look at the suggested answers on page 78.

1. _____

2. _____

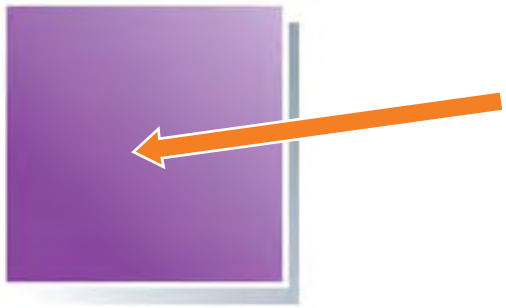
3. _____

(b) Area and volume

What are area and volume?

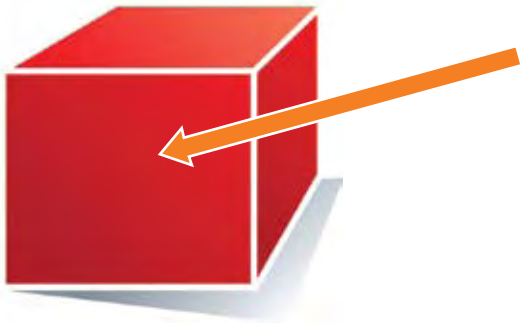
Area and **volume** are words we use to describe the space **inside** a shape.

Area refers to the space inside the edges of a two-dimensional (2D) or **flat** shape, like a square.



The **area** is the part coloured purple.

Volume refers to the space inside the edges of a three-dimensional (3D) or **solid** shape, like a cube.



The **volume** is all of the red inside the cube.

You might use **area** when you are talking about the area of a carpet, or of a GAA pitch.

You might use **volume** when you are talking about how many boxes you can fit inside a cupboard, or how much soup you can fit in a flask.

Can you think of any other examples of objects from everyday life which have area and volume?

1. _____

2. _____

3. _____

Quiz

Using the words area and volume

Have a go at filling in the gaps with either the word **area** or **volume**:

(1) I want to know the _____ of my dining room floor so I can order a new carpet.

(2) The _____ of my car boot is too small to fit all three of these suitcases.

(3) What is the _____ of this fridge freezer?

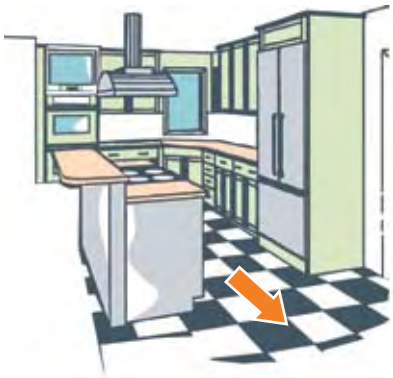
(4) The new supermarket covers an _____ larger than Croke Park!

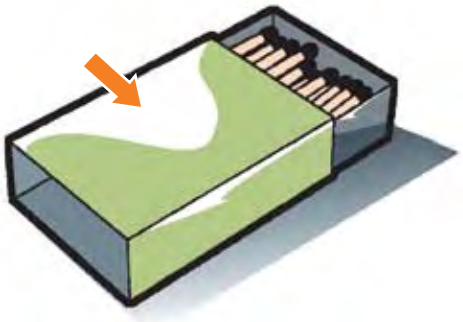
See page 78 for the answers.

Area and volume of everyday objects

Have a look at these everyday objects and spaces.

Label whether they show area or volume.





Did you know ...?

At QQI Level 3, you will learn how to calculate the area and volume of shapes and forms – even complicated ones like cylinders!

See page 78 for the answers.

(c) Sorting 2D and 3D shapes and forms

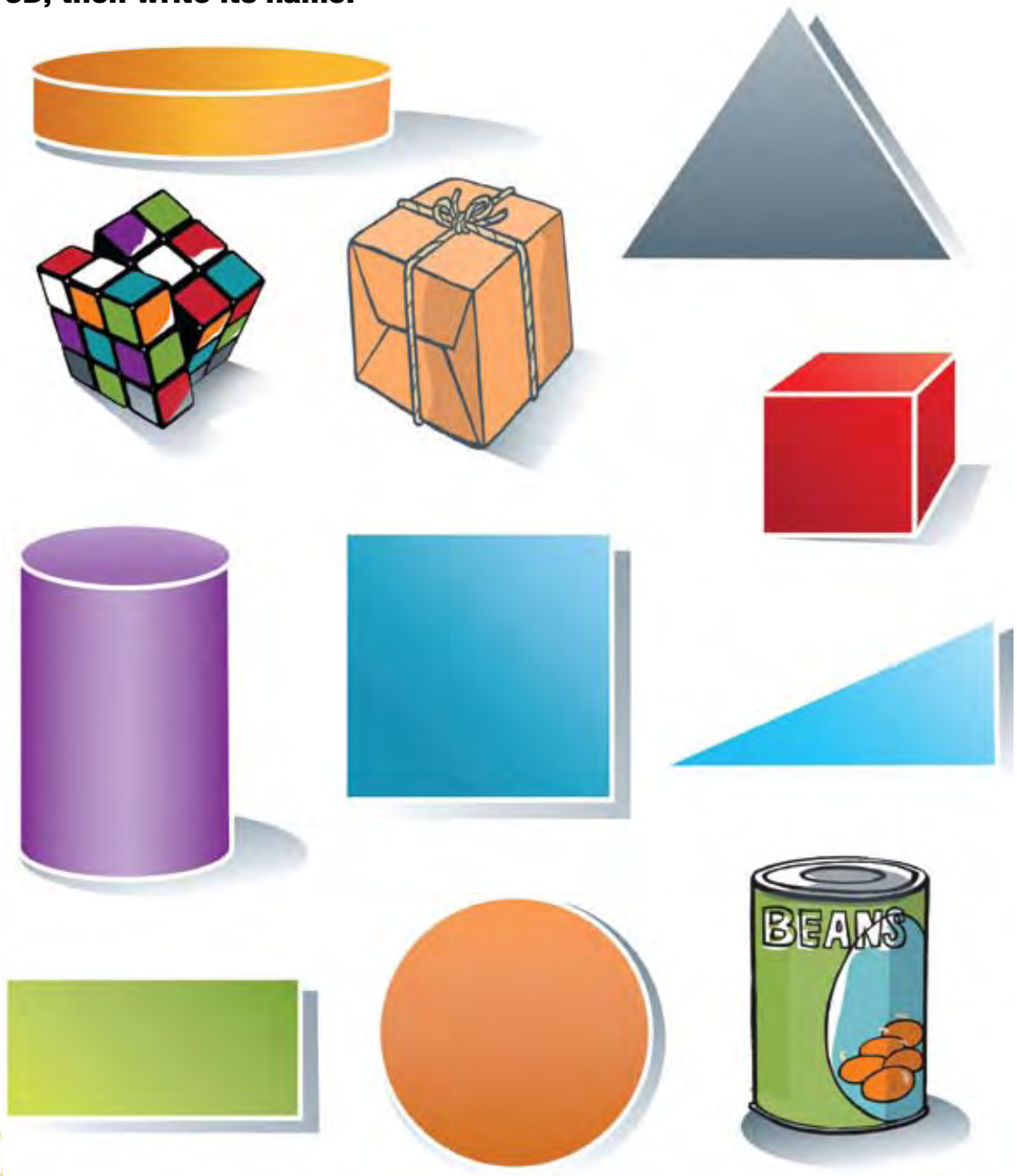
Try to remember what you have learned about:

- two-dimensional (2D) or **flat** shapes,

  and

- three-dimensional (3D) or **solid** shapes and forms.

Next to each of the following shapes and forms, write first whether it is 2D or 3D, then write its name:



See page 79 for the answers.

Sort the following shapes and forms by size. Next to the largest on each row, write largest. Next to the smallest, write smallest. (Next to the middle-sized one, write medium.)

_____ _____ _____

_____ _____ _____

_____ _____ _____

See page 80 for the answers.

Part 3: Handling data

Contents:

(a) Using data in everyday life

(b) Collecting data

(c) Reading and interpreting data

(d) Presenting data

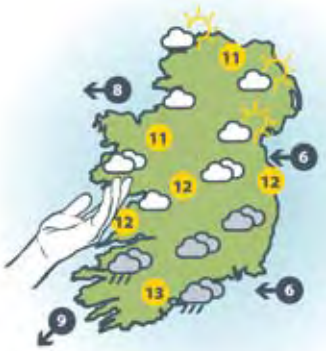
This section covers topics from QQI Data Handling (DH) Level 2 Learning Outcomes, as follows:

- DH1: Identify uses of data in everyday life, for example, price comparisons, surveys.
- DH2: Identify basic approaches to data collection, for example, record sheets, tally system, audio-visual records.
- DH3: Interpret basic data of two criteria, for example, more/less of one class than another, bigger/smaller and so on.
- DH4: Construct basic representations to communicate data with two criteria, for example, pictograms, bar charts, tally records.
- DH5: Interpret basic representations, for example, pictograms/bar-charts.

(a) Using data in everyday life

What is data?

Data is another word we use for **information** that we can use for a particular purpose.



Weather forecasters use **data** from satellites to help them make their predictions.
(Predictions are guesses or estimates of things that will or might happen in the future).

A computer uses **data** to run its programmes.

Supermarkets collect **data** about what we buy so they know what to put on their shelves.

Business people present **data** to their bosses about sales and profits.

You can buy a **data** allowance for your smartphone, to let you go online.

Data and maths

In maths, we often talk about data when we are looking for figures and statistics.

Bonus fact:

Statistics is the scientific study of data, and what it means.

Big organisations, businesses and governments use statistics all the time to work out what clients, customers and citizens need — and what the future holds.

You might hear a newsreader saying, "The government has published new statistics about childcare."

When you are learning maths, you start off by learning how to handle basic data. We call this **data handling.**

When you are learning to handle more complicated data, at a higher level, you say you are learning **statistics.**

(b) Collecting data

There are many ways to collect data. There are many reasons why you would want to collect data.

For each of the following examples of data handling, can you identify:

(a) the way the data was collected: how

(b) the reason it was collected: why

The first is done for you.

1. A community group carried out a survey of its members to plan a calendar of events for the next year.

   (a) How: a survey

   (b) Why: to plan a calendar of events for the next year

2. The government sends out census forms every five years to learn about the make-up of the country's population.

   (a) _____

   (b) _____

3. A woman does some research at the National Library to find out information about her family's history.

   (a) _____

   (b) _____

4. A small group of students compare the prices of five grocery items in different supermarkets.

   (a) _____

   (b) _____

Check your answers on page 81.

More about methods of collecting data

Survey

A survey is one of the most common methods for collecting data.

You can carry out a survey using a list of questions that you ask someone face-to-face or over the phone. Or you can ask people to fill in the survey on their own, with pen and paper, or over the internet.

Examples of surveys are:

- a questionnaire about people's spending habits at Christmas, and
- a confidential online survey about people's political opinions.

Can you suggest more examples of surveys that you have responded to or filled in?

Research

Research can involve looking at existing data, possibly in tables and charts, or in old documents that were collected long ago.

Research can be complicated. Some information can be hard to find. You may have to stick at it to find what you are looking for!

Examples of research are:

- finding timetable and ticket price information and comparing travel options (for example: train, plane or bus) to plan a journey, and
- looking at prices and benefits of different broadband, mobile phone and TV packages.

Observation

Observation involves watching for activity in a particular location.

The person, or team of people, observing needs to make notes about the activity they observe, possibly using a tally or a manual clicker or by recording what they see using video or audio recording equipment.

Examples of data collected from observation include:

- observing the numbers of passengers getting on a plane,
- watching the direction shoppers walk around a big department store, and
- observing road hazards to see if there is a need for a new pedestrian crossing or speed bumps near a school.

Using a tally for recording data

Tallying is a quick and useful way to count the number of times something happens.

You could use it for counting how many people enter a particular shop, or how many cars go down a particular street.

Example:

You are counting the numbers of people who use a public payphone.

You need to find a place to watch from. You also need paper, a pen and a clipboard to rest on.

For every person who goes into the payphone, you need to make a small vertical mark on your paper, like this:

When a second person comes along, make another mark next to the first:

You keep going like this until you have four lines. Then for the fifth person, you make a line across the four, like this:

You then start another set of five marks.

The reason we do this is because it is then easy to read how many fives there are at the end.

Compare two ways of tallying to see why it is easier to read in fives.

Rose has tallied 17 people entering the payphone. Which is the easiest to read?

or

Activity

Talk to your tutor or friends and decide on something you want to count.

It might be traffic using a car park over the course of an hour; or pedestrians passing a particular shop in a ten minute period; or anything else you are interested in.

Get your paper, a clipboard and a pen or pencil.

Plan over what period of time you will do your tally. If more than one person does it at the same time, you can compare your results afterwards.

(c) Reading and interpreting data

Tables

A table is a simple way of showing information (or **presenting data**).

It clearly shows the numbers in each category or group.

Example:

Table showing 100 people's favourite season

Season	Number of people
Spring	32
Summer	40
Autumn	27
Winter	1

In this survey, what was the most popular season?

What was the least popular?

What was the second most popular season?

Some more complicated tables, which show more detailed information are:

- bus or train timetables,
- mobile phone tariffs or pricelists, and
- information on price comparison websites.

What tables do you use?

Tally charts

We have already looked at tally charts. Have a look at this chart and answer the questions.

Students at a college took a tally one Wednesday lunchtime. It was of how many fellow students bought their lunches from the new 'Healthy Life' health food café on campus. At the same time, they counted the numbers of students using the 'Hot Dogs R Us' fast food café next door. Here is their tally sheet.

Number of students to campus cafés on Wednesday lunchtime

Name of café	Number of students using the café
Healthy Life	𝍸 𝍸 𝍸 | | |
Hot Dogs R Us	𝍸 𝍸 𝍸 𝍸 | |

How many students used the café 'Healthy Life'?

How many students used the café 'Hot Dogs R Us'?

Which café was more popular with the students?

Can you suggest something you could take a tally of?

Check your answers on page 82.

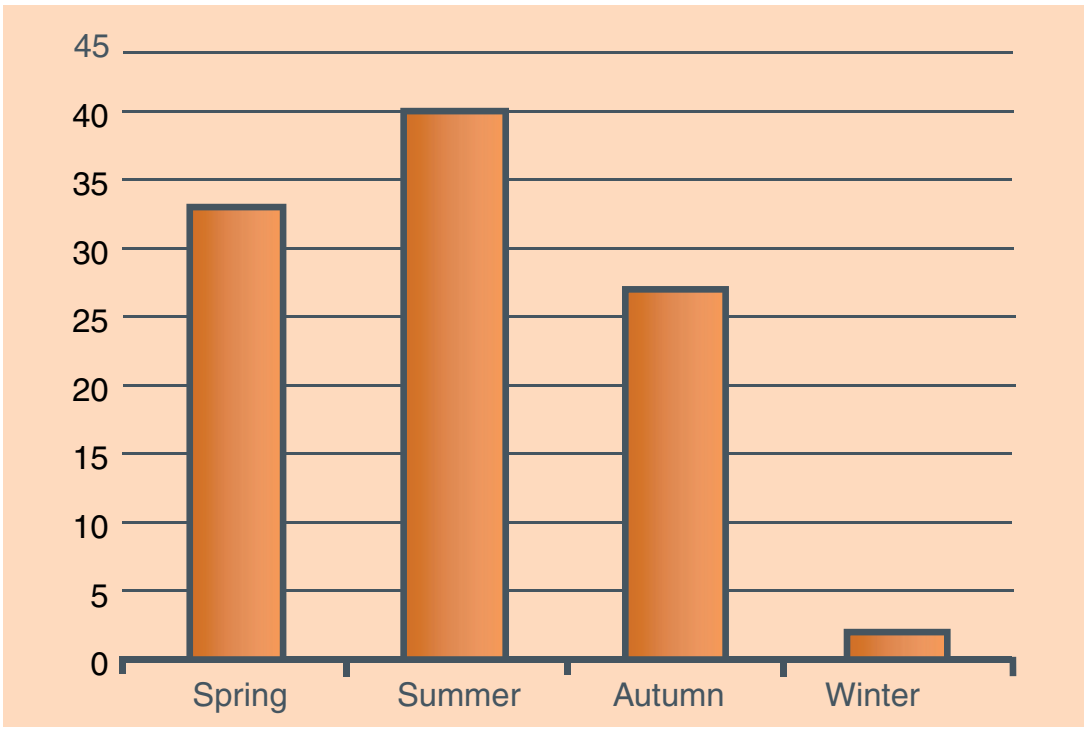
Bar charts

A bar chart is a way of making numbers visual so you can see quickly which categories or groups are bigger or smaller.

Bar chart 1 - Seasons

Do you remember the table about people's favourite seasons? We could turn the data from this table into a bar chart.

100 People's Favourite Season



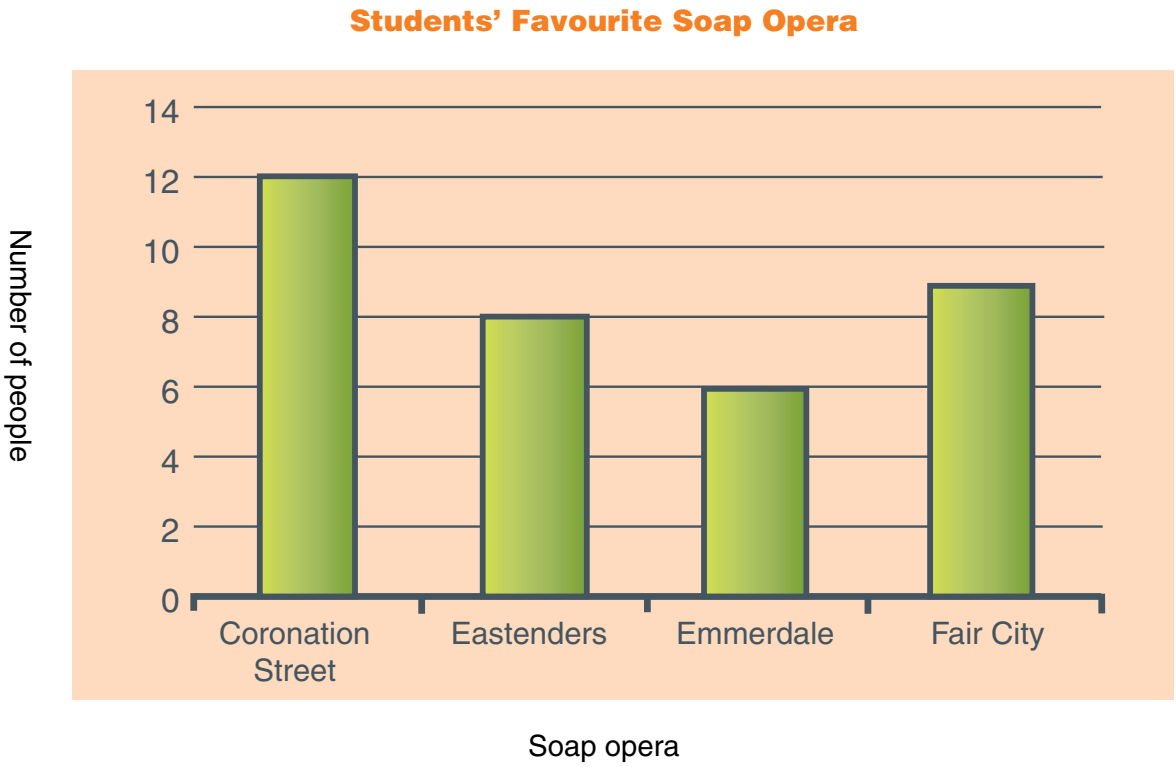
Do you find it easy to see **at a glance** which was the most popular season?

Are some of the bars trickier to read than others? If so, why?

Bar chart 2 – Favourite Soap Opera

Have a look at this bar chart and answer the questions below.

It shows the results of a survey of students in a college about their favourite soap opera.



Questions:

(a) Which was the most popular soap opera in this survey?

(b) Which was the least popular?

(c) How many people liked Eastenders the most?

(d) How many liked Fair City?

(e) What else could you show using a bar chart like this?

Tip: To find out more about what the different headings or labels on this bar chart tell you, turn to page 63.

Check your answers on page 83.

Pictograms

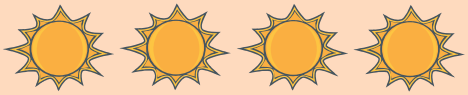
A pictogram is a way of showing data using pictures.

Hours of sunshine:

Here is an example taken from the first workbook, **Brushing up 1: a maths workbook**.

Pictogram showing how sunny it was in Galway one weekend in June

 means 1 (one) hour of sunshine

Friday	
Saturday	
Sunday	

Questions:

(a) How many hours of sunshine were there on Friday? _____

(b) How many hours of sunshine were there on Saturday? _____

(c) How many hours of sunshine were there on Sunday? _____

Check your answers on page 83.

Ice creams:

Sometimes in a pictogram, the picture means more than one of something.

For example, in the next pictogram, each ice cream means that 10 were sold.

Pictogram showing the numbers of ice creams sold in Dingle on three days in May

Monday	
Tuesday	
Wednesday	

Questions:

(a) On which day were most ice creams sold? _____

(b) How many were sold that day? _____

(c) How many more ice creams were sold on Tuesday than on Wednesday?_____

Check your answers on page 83.

(d) Presenting data

We have seen a number of ways you can present data:

- as numbers in a table,
- in a bar chart, or
- in a pictogram.

When you present data you need to:

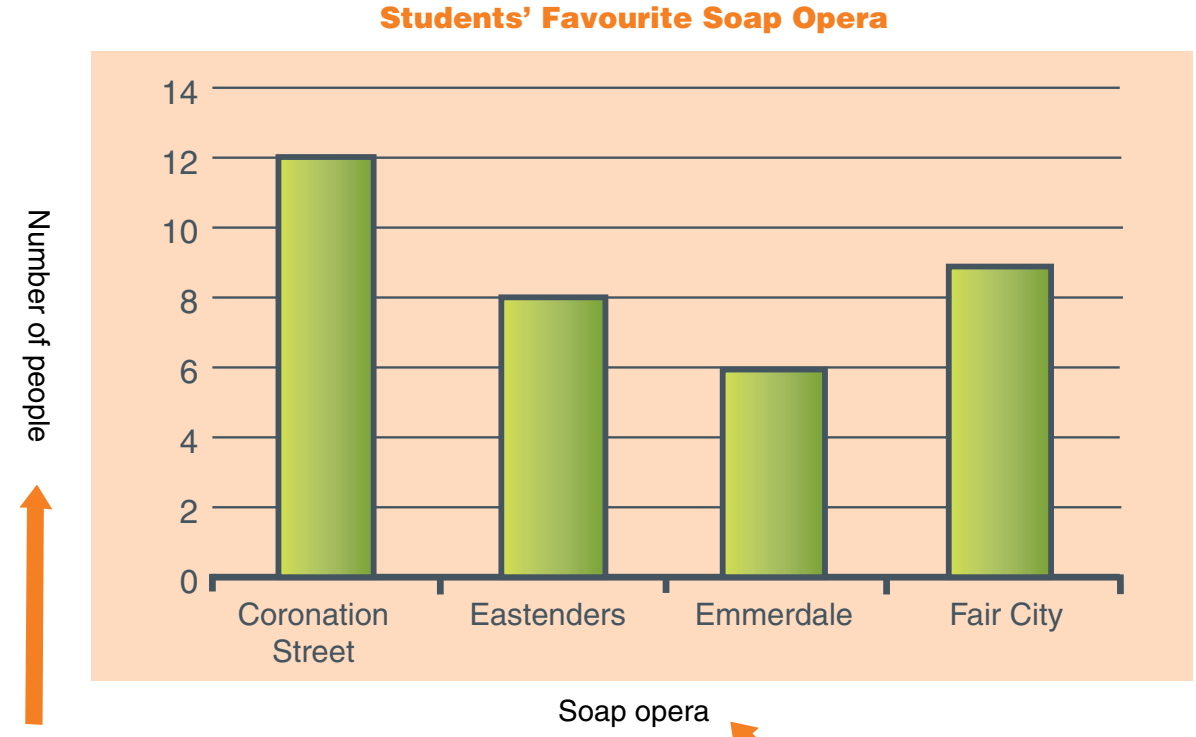
- decide on the best type of chart or graph to present the data, and
- make sure you label your graph or chart clearly.

Labelling a chart is important, or readers might not be able to read the data clearly.

Example:

We can look at the bar chart from earlier to make sure it is labelled properly.

This is the **title** of the chart.



This label tells you what the **scale** refers to.

This label tells you what the bars refer to.

What do we mean by scale?

The scale on a bar chart also shows you the numbers involved. The numbers can go up in steps of 1, 2, 5, 10, 100, 1,000 and so on.

Presenting data in a table

Have a go at completing this table with the missing bits of data:

Maria explains, “We did a survey of people using the student café to find out what they liked to eat for lunch. We found that 7 like soup, 11 like a sandwich, and 5 prefer a salad box.”

Table showing the favourite lunch option of people using the student café

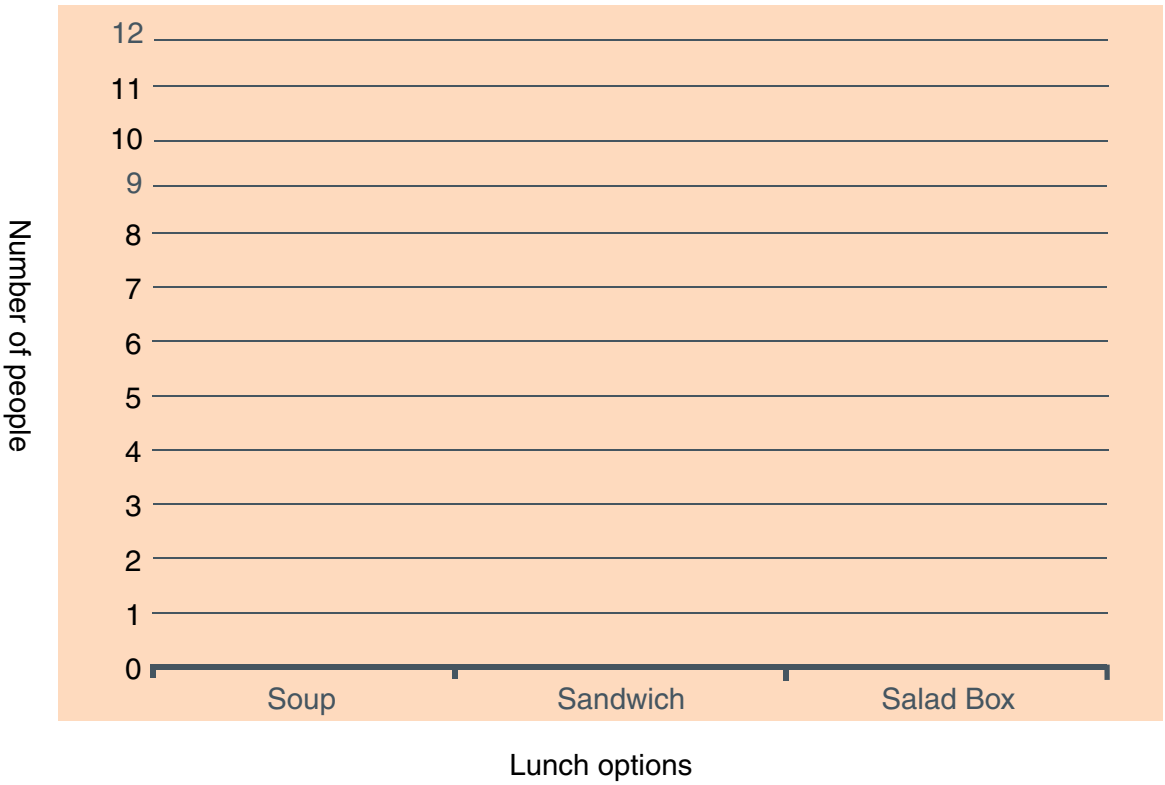
Lunch options	Number of people
soup	7
sandwich	[ ]
[ ]	5

Check your answers on page 84.

Presenting data in a bar chart

Now have a go at using these numbers to make a bar chart. The labels and scale are done for you. Just draw in the bars and then colour them in.

Bar chart showing the favourite lunch option of people using the student café



Ask your tutor or a friend to have a look at the bar chart you have made.

Part 4: Pattern and relationship

Contents:

(a) Using patterns in everyday life
(b) Talking about patterns
(c) Designing a pattern

This section covers topics from QQI Pattern and Relationship (PR) Level 2 Learning Outcomes:

- PR1: Identify a range of regular and linear and irregular and non-linear patterns, for example, musical rhythms and phrases, in the natural and built environment, heartbeats.
- PR2: Identify number patterns, for example, increases in steps of two.
- PR3: Use number to describe pattern, for example, clapping out a rhythm, visual descriptions, two yellows, one red.
- PR4: Design a simple pattern with a limited range of variables.

(a) Using patterns in everyday life

Patterns are everywhere; in the design of buildings, parks, clothes, and in art.

What is a pattern?

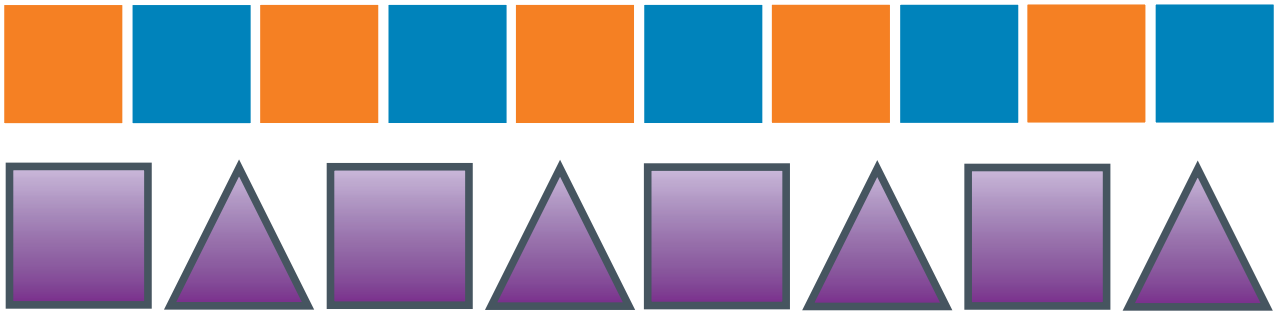
A pattern is a repeated sequence or series of steps. Put simply, patterns are things that repeat themselves. Some patterns are regular and others are not; for example, you can have a regular heartbeat or an irregular heartbeat.

A visual pattern can be a sequence of numbers, colours or shapes.

A sound pattern can be the regular beats in a song or the regular steps in a march.

Examples of patterns:

1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2



These patterns are all **repeating patterns**.

Here are some examples of patterns that are not regular. Can you think of any more?

Why are patterns important?

When we see a pattern, we can use it to make predictions of what number, colour, or shape, will come next.

Have a go at predicting what number comes next in each of these number patterns, by filling in the box:

3, 7, 3, 7, 3, 7, 3, 7, 3, 7, ☐

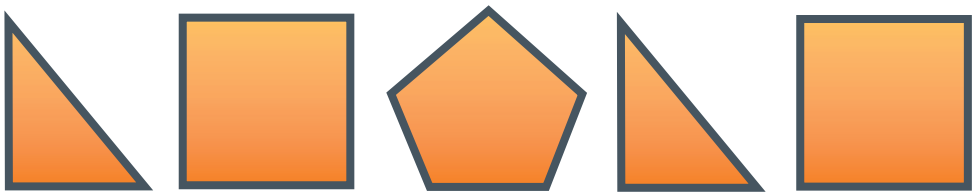
15, 20, 25, 30, 35, 40, 45, ☐

2, 4, 4, 2, 4, 4, 2, 4, 4, 2, 4, ☐

1, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1, ☐

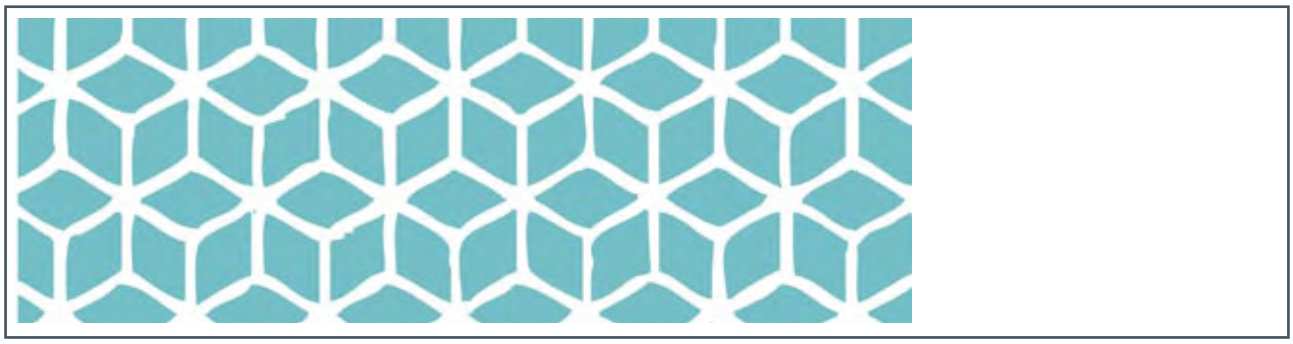
Now have a go with letters and shapes:

X, O, Z, X, O, Z, X, O, Z, X, O, ☐

 ☐

Check your answers on page 85.

And now have a go at completing the designed pattern on this wallpaper. To do this, shade in the pattern in the box on the right-hand side:



Ask your tutor or a friend to see how well you did it.

(b) Talking about patterns

For the next sequences, have a go at describing the pattern.

Example:

4, 8, 12, 16, 20, 24, 28, 32 ...

Answer: You add 4 each time.

Tip:

Work out the difference between a number and the one that comes after it. You can do this using subtraction.

For example, in the pattern above, we have 4, then 8. If you subtract 4 from 8, you get 4. Then look at the next number after 8. It is 12. 12 – 8 = 4.

So, the rule for our pattern is to add 4 each time.

Have a go at working out rules for the following patterns. Discuss this with your tutor, or with other learners, or with a friend:

(a) 7, 9, 11, 13, 15, 17, 19, 21, 23 ...

Pattern: _____

(b) 3, 5, 3, 5, 3, 5, 3, 5, 3, 5, 3, 5 ...

Pattern: _____

(c) 27, 24, 21, 18, 15, 12, 9, 6, 3, 0

Pattern: _____

The next two are tricky!

(d) 5, 6, 8, 11, 15, 20, 26, 33, 41 ...

Pattern: _____

(e) 14, 15, 17, 18, 20, 21, 23, 24, 26 ...

Pattern: _____

Check your answers on page 86.

Useful patterns

Being able to predict things using patterns is very useful.

What patterns can you think of that can help us make useful predictions?

Check the answers on page 86 for ideas.

(c) Designing a pattern

Have a go at designing a colour pattern using the boxes below.

You can use two or three colours, but the pattern needs to be **repeated.**

Be as creative as you like!

DIY designs!

Have a go at designing a pattern using items you can find around you. You could use buttons, matchsticks, coins, or anything else you like.

Take photos of the patterns you create!

Patterns in nature

You can find patterns in nature and everyday life.

Examples are:

- waves on the sea,
- an animal's heartbeat,
- the ticking of a watch, and
- the sound of a train going over the tracks.

Find patterns near you and record their sound, or video them if you can.

Patterns are beautiful

Humans love patterns. Maybe there is something reassuring about a pattern that is repeated in a regular way.

Design a beautiful pattern that you could print on:

- a tea towel,
- a bedspread,
- a tee-shirt,
- your project folder, or
- wallpaper for your living room.

You can take inspiration from design websites such as:

- http://www.wilko.com (and type in 'wallpaper' in the search bar)
- http://www.pinterest.com
- http://todryfor.com
- https://www.marimekko.com (and type in 'fabrics' in the search bar)

Section 3:
Answers

Answers Section 1

Activity on page 27

Subtraction

14 take away 8 equals 6.	14 – 8 = 6
27 minus 11 equals 16.	27 – 11 = 16
Subtracting 22 from 33 equals 11.	33 – 22 = 11
33 from 52 is 19.	52 – 33 = 19
The difference between 25 and 9 is 16.	25 – 9 = 16
The difference between 13 and 31 equals 18.	31 – 13 = 18

Activity on page 31

Using the 100 square to subtract

Use the number square to do the following subtraction sums:

(a) 22 – 10 = 12

(b) 47 – 20 = 27

(c) 65 – 40 = 25

(d) 91 – 70 = 21

Activity on page 33

Using the 100 square to subtract other numbers

Use the number square to do the following subtraction sums.

(a) 38 – 15 = 23

(b) 72 – 22 = 50

(c) 83 – 25 = 58

(d) 51 – 17 = 34

Activity on page 35

Subtracting without using the 100 square

Have a go.

Have a go at these subtraction sums:

(a) **54 – 13 =** 41

		T		U
54	=	50	and	4
13	=	10	and	3
		40		1

(b) **77 – 45 =** 32

		T		U
77	=	70	and	7
45	=	40	and	5
		30		2

(c) **63 – 22 =** 41

		T		U
	=	60	and	3
	=	20	and	2
		40		1

Activity on page 38

More 2-digit numbers to subtract

(a) **36 – 28 =** 8

(b) **41 – 15 =** 26

(c) **66 – 29 =** 37

(d) **83 – 26 =** 57

Activity on page 39

Try out some real-life subtraction tasks

(1) €60 – €34 = €26

(2) €52 – €31 = €21

(3) €73 – €35 = €38

Activity on page 39

Try out some real-life subtraction tasks

(4) You buy a new outfit costing €72 and pay for it with €90 in cash. What is the sum you need to do? What is the answer?

€90 - €72 = €18

(5) Your food shopping comes to €46. You have a food budget this week of €65. What is left in your food budget now?

€19

(6) There is a bus due at 45 minutes past the hour. It is now 8:17 am. How long do you need to wait till the bus is supposed to arrive?

28 minutes

(7) Children have to be 92 cm tall to ride on the High Flyer fairground ride. Frankie is 78 cm tall. How many more centimetres does he need to grow before he can go on the High Flyer?

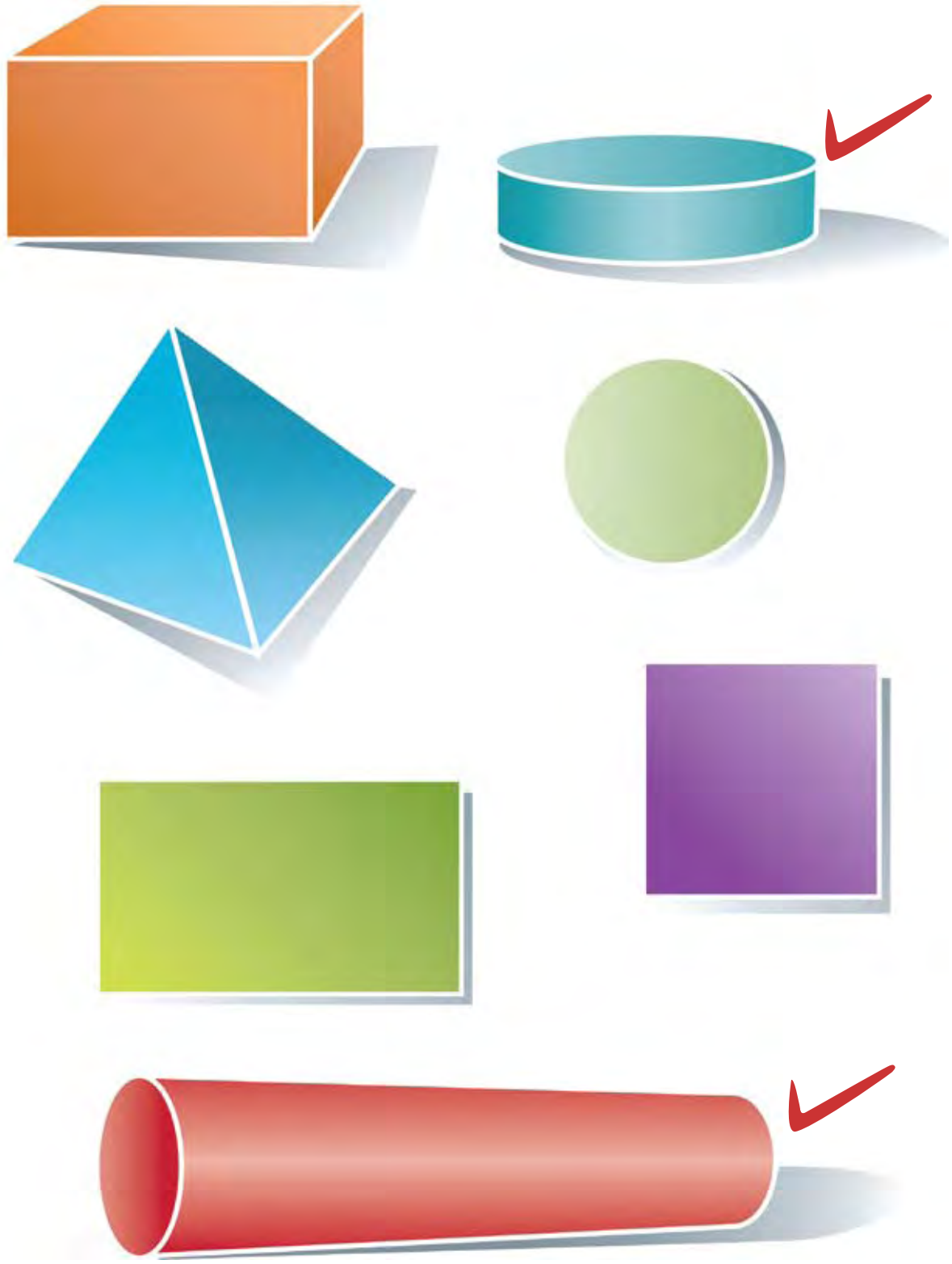
14 cm

(8) According to this Yorkshire pudding recipe, you need 140 ml of liquid. The recipe suggests 75 ml of semi-skimmed milk and to make up the rest with water. How much water should you put in?

65 ml

Activity on page 42

Tick which of these you think are cylinders.



Activity on page 43

Suggested answers:

1. A toilet or kitchen roll.
2. A tube of mints.
3. A can of fizzy drink.

Activity on page 45

(b) Area and volume

Can you think any other examples of objects from everyday life which have **area** and **volume**?

Suggested answers:

1. A bathroom floor has area.
2. A rucksack has volume.
3. A manhole cover has area.

Quiz

Using the words **area** and **volume**

Have a go at filling in the gaps with either the word **area** or **volume**:

(1) I want to know the ___area___ of my dining room floor so I can order a new carpet.

(2) The ___volume___ of my car boot is too small to fit all three of these suitcases.

(3) What is the ___volume___ of this fridge freezer?

(4) The new supermarket covers an ___area___ larger than Croke Park!

Activity on page 46

Area and volume of everyday objects

Have a look at these everyday objects and spaces.

Label whether they show **area** or **volume**.

The kitchen floor has area.

The table top has area.

The tin of beans has volume.

The box of matches has volume.

The tube of Pringles has volume.

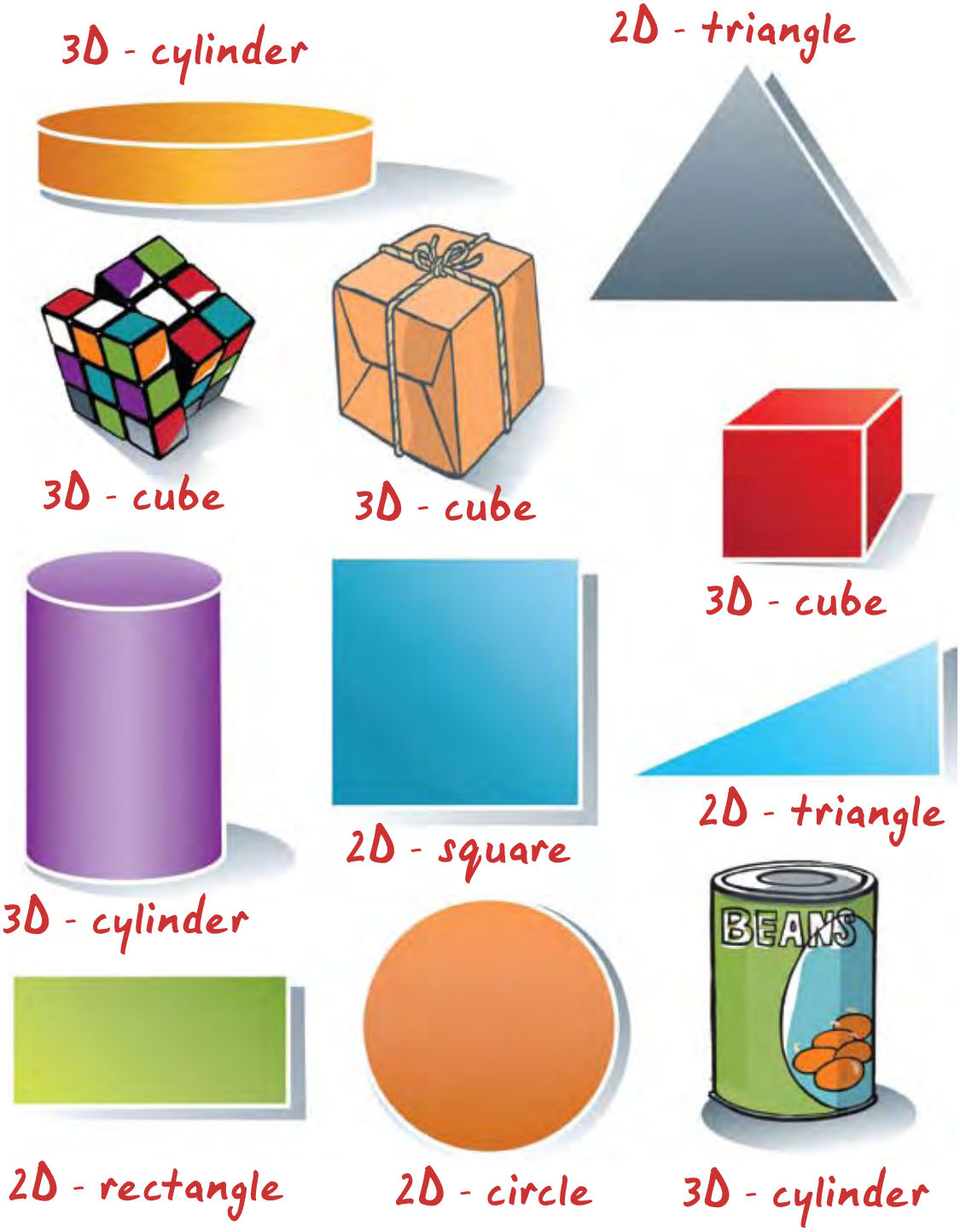
The box of tissues has volume.

Activity on page 47

(c) Sorting 2D and 3D shapes and forms

Try to remember what you have learned about:

Next to each of the following shapes and forms, write first whether it is 2D or 3D, then write its name:



Activity on page 48

Sort the following shapes and forms by size. Next to the largest on each row, write **largest**. Next to the smallest, write **smallest**. (Next to the middle-sized one, write **medium**.)

largest _____ medium _____ smallest _____

medium _____ largest _____ smallest _____

medium _____ smallest _____ largest _____

Part 3: Handing data

Activity on page 52

(b) Collecting data

2. The government sends out census forms every five years to learn about the make-up of the country's population.

   (a) How: census forms.

   (b) Why: to learn about the country's population.

3. A woman does some research at the National Library to find out information about her family's history.

   (a) How: research

   (b) Why: to find out about her family's history

4. A small group of students uses record sheets to compare the prices of five grocery items in different supermarkets.

   (a) How: record sheets

   (b) Why: to compare the prices of grocery items in different supermarkets

Activity on page 58

Tally charts

Number of students to campus cafés on Wednesday lunchtime

Name of café	Number of students using the café
Healthy Life	
Hot Dogs R Us	

How many students used the café 'Healthy Life'? 18

How many students used the café 'Hot Dogs R Us'? 22

Which café was more popular with the students? Hot Dogs R Us

Can you suggest something you could take a tally of? Answers could include: numbers of cars passing along a road, numbers of people using a coffee machine, and lots of other ideas.

Activity on page 60

Bar chart 2 – Favourite Soap Opera

Questions

(a) Which was the most popular soap opera in this survey?
Coronation Street

(b) Which was the least popular?
Emmerdale

(c) How many people liked Eastenders the most? 8

(d) How many liked Fair City? 9

(e) What else could you show using a bar chart like this?
Suggested answers could include people's shoe size, their favourite breakfast item, or lots of other ideas.

Activity on page 61

Pictogram showing how sunny it was in Galway one weekend in June

Questions:

(a) How many hours of sunshine were there on Friday? 4

(b) How many hours of sunshine were there on Saturday? 9

(c) How many hours of sunshine were there on Sunday? 3

Activity on page 62

Ice creams:

Sometimes in a pictogram, the picture means more than one of something.

For example, in the next pictogram, each ice cream means that 10 were sold.

Pictogram showing the numbers of ice creams sold in Dingle on three days in May

Questions:

(a) On which day were most ice creams sold?
Tuesday

(b) How many were sold that day?
50

(c) How many more ice creams were sold on Tuesday than on Wednesday? 20

Activity on page 64

(d) Presenting data

Table showing the favourite lunch option of people using the student café

Lunch options	Number of people
soup	7
sandwich	11
salad box	5

Part 4: Pattern and relationship

Activity on page 68

(a) Using patterns in everyday life

3, 7, 3, 7, 3, 7, 3, 7, 3, 7,

3

15, 20, 25, 30, 35, 40, 45,

50

2, 4, 4, 2, 4, 4, 2, 4, 4, 2, 4,

4

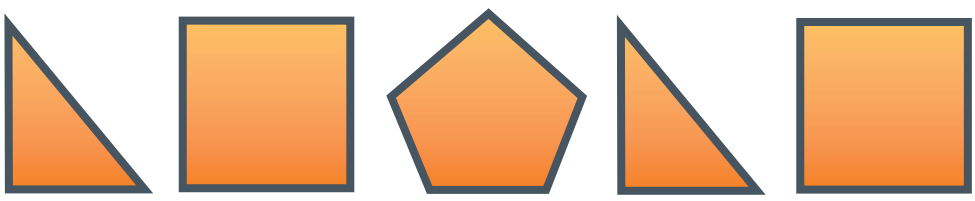
1, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1,

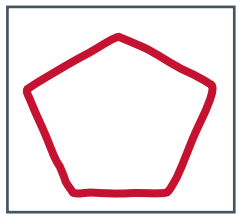
1

Now have a go with letters and shapes:

X, O, Z, X, O, Z, X, O, Z, X, O,

Z





Activity on page 70

(b) Talking about patterns

(a) 7, 9, 11, 13, 15, 17, 19, 21, 23 ...

Pattern: You add 2 each time.

(b) 3, 5, 3, 5, 3, 5, 3, 5, 3, 5, 3, 5 ...

Pattern: After 3 you have 5, after 5 you have 3, and so on.

(c) 27, 24, 21, 18, 15, 12, 9, 6, 3, 0

Pattern: You subtract 3 each time.

The next two are tricky!

(d) 5, 6, 8, 11, 15, 20, 26, 33, 41 ...

Pattern: You start by adding 1, then 2, then 3, then 4, and so on.

(e) 14, 15, 17, 18, 20, 21, 23, 24, 26 ...

Pattern: You start by adding 1, then 2, then 1, the 2, and so on.

Useful patterns

What patterns can you think of that can help us make useful predictions?

We can look at weather patterns to make forecasts
we can look at diseases to see who is likely to be at risk
and lots of other ideas.

Learning Outcomes

The following pages show how the activities in **Brushing up 2: working towards maths at Level 2** can help learners to show evidence of learning for five QQI qualifications at Level 2.

These qualifications are:

QQI: Quantity and Number (QN)

QQI: Shape and Space (SS)

QQI: Quantitative Problem Solving (QS)

QQI: Data Handling (DH)

QQI: Pattern and Relationship (PR)

The individual Learning Outcomes (LOs) are set out in the following tables.

Those in **bold** are included in this workbook.

The LOs **not** in bold were covered in the first workbook.

QQI: Quantity and Number (QN)

QN1	Recognise numbers up to 100
QN2	Recognise the relationship between 100 and common large numbers for example, 1,000, 100,000, 1 billion
QN3	Know place value in relation to units, tens, hundreds
QN4	Add two digit whole numbers that total less than 100 in the context of an everyday situation
QN5	**Subtract two digit whole numbers that require number bonding up to 10 in the context of an everyday situation**
QN6	**Use the** plus, **minus and equals signs and operations**
QN7	Estimate quantities to the nearest value of in broad terms, for example, to the nearest quantity in 10s or 100s as appropriate

QQI: Shape and Space (SS)

SS1	**Name common shapes and forms in everyday life,** for example, circles, rectangles, cubes, **cylinders** and spheres
SS2	**Describe the properties of common 2D shapes and 3D forms,** for example, number of faces, edges, **area, volume**
SS3	**Recognise the relationship between area and volume**
SS4	**Sort** 2D and **3D shapes and forms in relation to size**

QQI: Quantitative Problem Solving (QS)

QS1	**Identify quantitative elements in a range of everyday circumstances, for example, daily budget, planning an outing – including distances, dates, times and costs**
QS2	**Be aware of approaches that can be used to solve quantitative problems, for example, estimation, modelling and flow charts**
QS3	**Use mathematical terms and symbols to represent problems**
QS4	**Find a solution to a real life quantitative problem**
QS5	**Evaluate the solution obtained for the problem**

QQI: Data Handling (DH)

DH1	**Identify uses of data in everyday life, for example, price comparisons, surveys**
DH2	**Identify basic approaches to data collection, for example, record sheets, tally system, audio-visual records**
DH3	**Interpret basic data of two criteria, for example, more/less of one class than another, bigger/smaller etc**
DH4	**Construct basic representations to communicate data with two criteria, for example, pictograms, bar charts, tally records**
DH5	**Interpret basic representations, for example, pictograms/bar-charts**

QQI: Pattern and Relationship (PR)

PR1	**Identify a range of regular/linear and irregular/non-linear patterns, for example, musical rhythms and phrases, in the natural and built environment, heart beats**
PR2	**Identify number patterns, for example, increases in steps of two**
PR3	**Use number to describe pattern for example, clapping out a rhythm, visual descriptions- two yellows, one red**
PR4	**Design a simple pattern with a limited range of variables**

Learning Outcomes (LOs) included in Problems to solve

There are no set answers for the three problems. However, we have indicated those Learning Outcomes (LOs) that learners will **probably** cover as they solve each problem, and shown those that learners will **possibly** cover.

We believe that individual tutors are best placed to support learners to produce evidence towards qualifications, as appropriate.

Problem number	LOs learners will **probably** produce evidence for	LOs learners will **possibly** produce evidence for
1	QN 1, 3, 4, 5, 6 QS 1, 2, 3, 4, 5 DH 1, 3, 4, 5	QN 2, 7 QS 7 DH 2
2	QN 1, 3, 4, 5, 6 and 7 SS 2 QS 1, 2, 3, 4, 5 DH 1, 3, 4, 5 PR 1, 4	QN 2 SS 1, 3, 4 DH 2
3	QN 1, 2, 3, 4, 5, 6, 7 QS 1, 3, 4, 5 DH 1, 3, 4, 5	QS 2 DH 2

Learning Outcomes included in Skills to learn

The following information shows the Learning Outcomes (LOs) that learners can produce evidence for by answers to the questions in **Skills to learn**.

Part 1: Quantity and number

	Subtraction:	QN 1, 3, 5, 6

Part 2: Shape and space

(a)	Cylinders:	SS 1 (part of LO relating to cylinders)
(b)	Area and volume:	SS 2 (part of LO relating to area & volume) SS 3
(c)	Sorting 2D shapes and 3D forms:	SS 1, 4

Part 3: Handling data

(a)	Using data in everyday life:	DH 1
(b)	Collecting data:	DH 2
(c)	Reading and interpreting data:	DH 3, 5
(d)	Presenting data:	DH 4 QN 1, 3, 4, 5

Part 4: Patterns and relationships

(a)	Using patterns in everyday life:	PR 1, 2 QN 1, 3, 4, 5 SS 1, 2, 4
(b)	Talking about patterns:	PR 2, 3 QN 1, 3, 4, 5
(c)	Designing a pattern:	PR 4

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Áisíneacht Náisiúnta Litearthachta do Aosaigh

Thank you very much for your support.

Some wording and ideas were adapted form the literacy learning website writeon.ie

Notes

Notes

NALA
National Adult Literacy Agency
Áisíneacht Náisiúnta Litearthachta do Aosaigh

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Literacy learning websites:
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