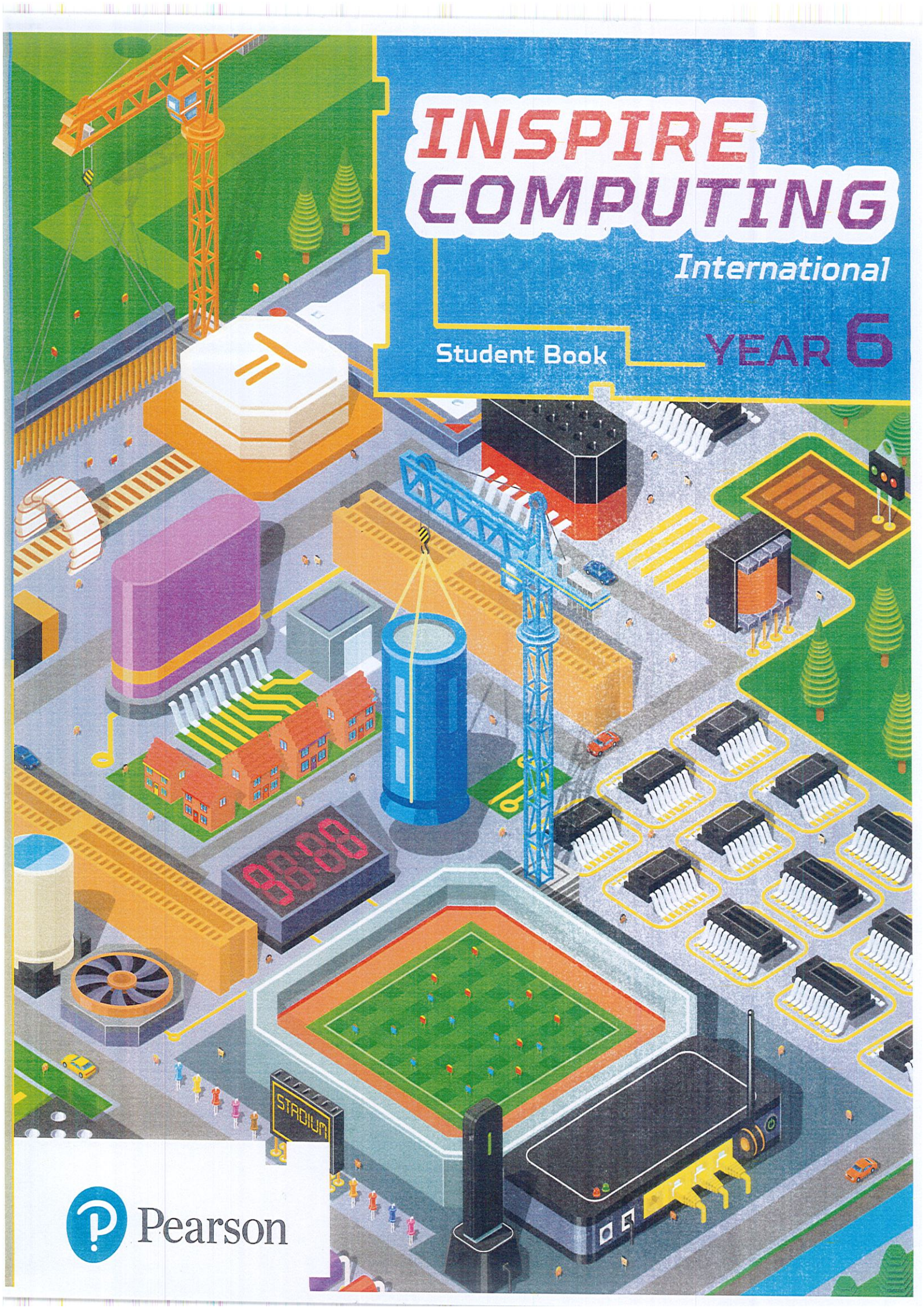


An isometric illustration of a city where buildings and infrastructure are represented by computer hardware. In the top left, a yellow tower crane lifts a large white server unit. Below it, a purple server tower stands next to a row of small red houses. A blue crane in the center lifts a blue cylindrical component. To the right, several black circuit boards with white pins are arranged in a grid. In the bottom center, a large green field with a red border is labeled 'STADIUM' on a sign. Other elements include a yellow car, a blue car, a black building with a red roof, and a blue river in the bottom right corner.

INSPIRE COMPUTING

International

Student Book

YEAR 6

INSPIRE COMPUTING

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Student Book

YEAR 6

Daniel Beh

Series editor: Paul Clowrey



Pearson

Published by Pearson Education Limited, 80 Strand, London, WC2R 0RL.
www.pearson.com/international-schools

Copies of official specifications for all Pearson Edexcel qualifications may be found on the website:
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Text © Pearson Education Limited 2023
Project managed and edited by Just Content
Designed and typeset by PDQ
Picture research by Integra
Original illustrations © Pearson Education Limited 2023
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First published 2023

25 24 23
10 9 8 7 6 5 4 3 2 1

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN 978 1 292 40426 4

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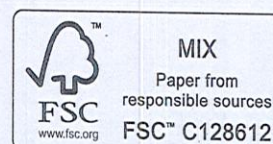
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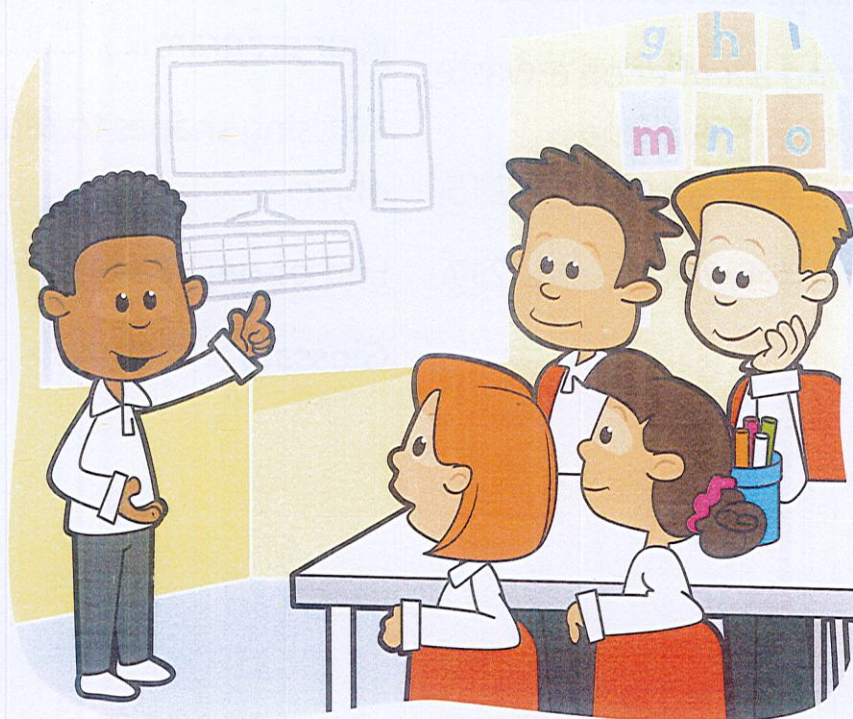
Glossary

Welcome to Inspire Computing

We are all living in a continually evolving digital world. By supporting learners in becoming confident and knowledgeable users of technology we can ensure you are prepared for the future.

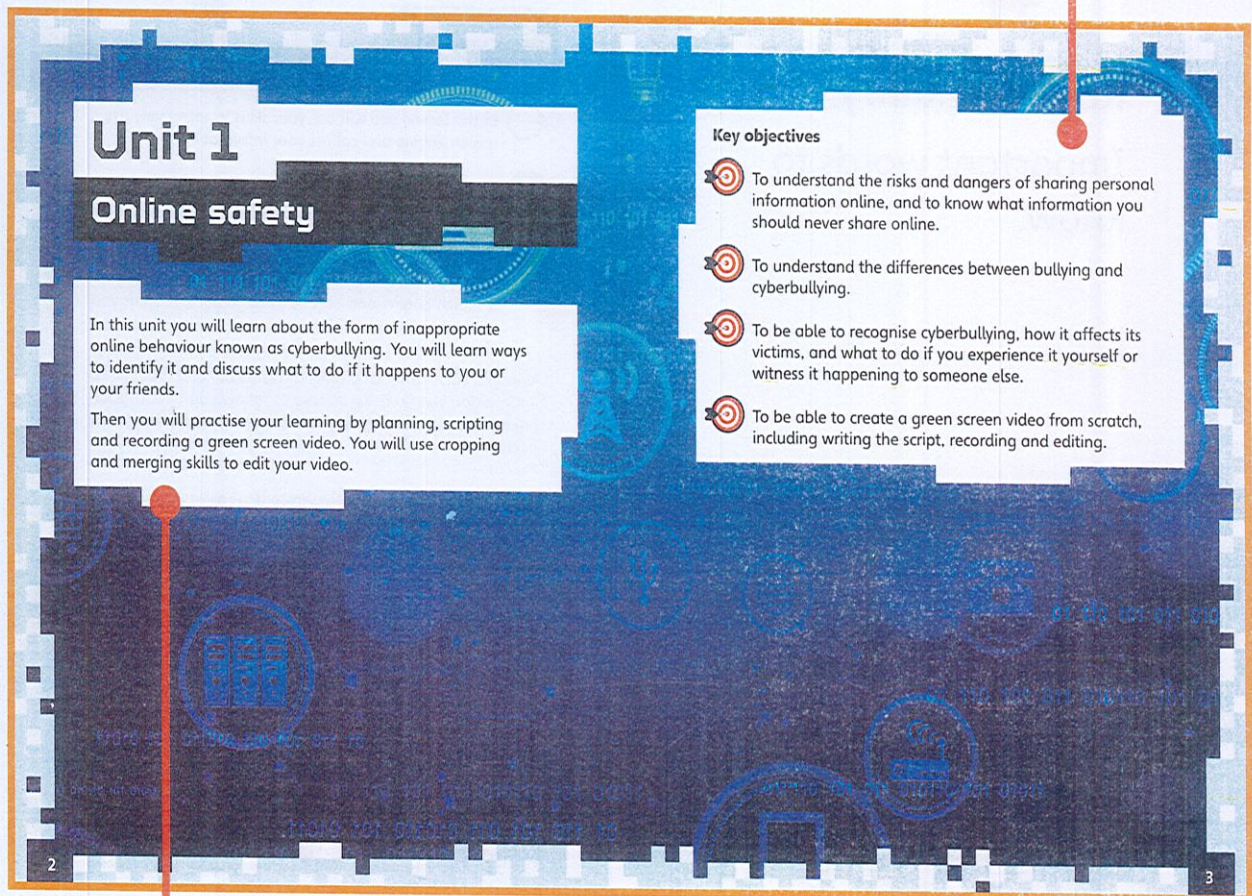
Inspire Computing makes important topics accessible for all learners. You will understand how to stay safe online while still enjoying the freedom to explore the World Wide Web. You will delve deeper into understanding algorithms through creative approaches, exploring networks and systems, and create and film exciting animation projects!

Each topic includes easy to understand theory, real-world examples, and ideas for further investigation. You will also have the chance to show off your knowledge and understanding through supportive assessments and student checkpoints!



Key objectives

What you will know or be able to do by the end of the unit.



Unit 1

Online safety

In this unit you will learn about the form of inappropriate online behaviour known as cyberbullying. You will learn ways to identify it and discuss what to do if it happens to you or your friends.

Then you will practise your learning by planning, scripting and recording a green screen video. You will use cropping and merging skills to edit your video.

Key objectives

- ✖ To understand the risks and dangers of sharing personal information online, and to know what information you should never share online.
- ✖ To understand the differences between bullying and cyberbullying.
- ✖ To be able to recognise cyberbullying, how it affects its victims, and what to do if you experience it yourself or witness it happening to someone else.
- ✖ To be able to create a green screen video from scratch, including writing the script, recording and editing.

2 3

Introduction

Here you can find out what this unit will be all about.



In this lesson you will:

This is what you will know or be able to do by the end of the lesson.



Key vocabulary.

Important words to know.

Starter

An introduction to the activity or information to start a discussion.

Lesson 9

Using a search engine efficiently



In this lesson you will use your skills to effectively use a search engine and collect your information.



Key words: paraphrase, plagiarism



Review your work from Lesson 8. Explain to your partner what you are going to research, how you are going to use a search engine and how you are going to present your research.

Now you can start your project by researching and saving the information you find. Remember to follow your school policy for online safety and make sure you know what you should do if you need help.

Remember to **paraphrase** (rephrase and rewrite) the information you find so you are not taking credit for other people's work. Pretending that someone else's work is your own and taking credit for it is called **plagiarism**.



Activity 1

Research your project using your planning. Record the information you find in a table.

Look out for these boxes for extra information and for key reminders.

2. If the part you want to trim is in the middle of the clip (for example, a mistake) you will need to split the clip after the mistake. To do this, select the clip that contains the mistake and drag the red box to the beginning of the mistake. This will cut out the mistake.
3. You will then need to **merge** the first and second parts of the clip as already described.

Pay attention to the location of the red line that shows the **timeline** when you import, crop, trim and edit your video. Swipe left and right to move your timeline along.



Activity 3

Edit any mistakes out of your video files on your device. Make sure you have merged the remaining video clips together.



Watch your finished video with a partner and discuss if you think you have cropped and edited the film well. Why or why not? What could you have done better?



I can use appropriate software or online services to meet the specified needs of a project.



I can import video files.



I can edit and merge video files.

Activity

You may need to write or draw an answer.

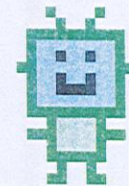
You may create a game or work with Scratch. You may work with a partner or on your own.

Refresher

To make sure that learning is secure.

Key vocabulary

Some tricky words are in **bold**. Find out what these mean in the Glossary at the back of the book.



Checklist

A handy list with the key parts of this lesson.

Unit 1

Databases

In this unit you will use simple database methods, structures and types. You will develop your skills with using databases and software to collect, present and evaluate data. You will learn some of the differences between a spreadsheet and a database, and the reasons why databases are used in schools and businesses. Finally, you will use advanced search methods to gather information from large databases online and present your solutions to a problem.

Key objectives

-  To understand the key features of a database management system (DBMS).
-  To understand different data types including alphanumeric/text, numeric/number and date.
-  To understand the structure of a given database, including record, field and table.
-  To use search/query, using a single criterion.
-  To select, use and combine appropriate software applications to design and create a range of content that accomplishes given goals.

Lesson 1



Looking at ways to store information



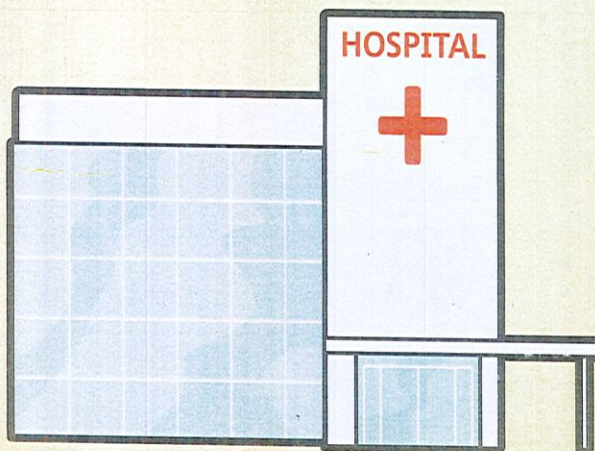
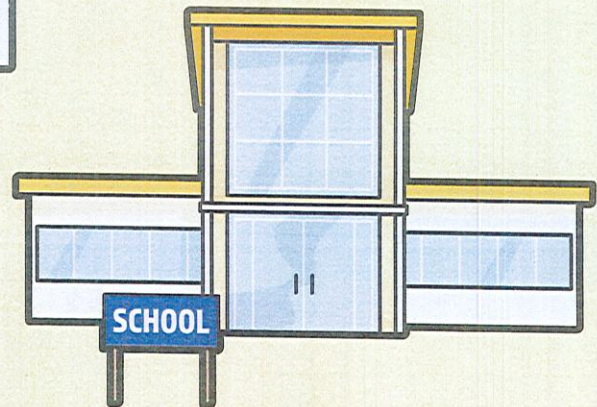
In this lesson you will learn about the main features of a database by looking at some examples.



Key words: data, database, database management systems (DBMS), field, information, record



With a partner, discuss the types of information that would be saved and used in the following places.



A **database** is information, or **data**, which is stored in a computer. **Information** is stored as **records**. Each record will have different **fields** where the data will be entered. Databases gather information in one place so that it can be ordered, filtered and analysed.

Think about your school database. All the student information needs to be stored, so in a school database the children are the records. In a library, the books it holds will be the main database, as well as the membership information for who has taken which book.

Here is a sample class database:

Student ID	Surname	First name	Gender	Form tutor	House	Date of birth	Bus number
109877	Chung	Conrad	M	Roberts	Jupiter	01/10/2014	18A
109901	Fischer	Heidi	F	Riemann	Jupiter	15/11/2014	18A
109945	Freund	Linda	F	Chapman	Mars	12/07/2015	7
109948	Gallia	Harriet	F	Chapman	Juno	22/02/2015	7
109967	Imran	Maria	F	Kapra	Jupiter	05/04/2015	13A
109984	Jacobs	Leonard	M	Riemann	Mars	15/12/2014	11
110013	Novas	José	M	Chapman	Mars	05/03/2015	18A
110056	Renaud	Olivia	F	Kapra	Juno	09/06/2015	7

In this example of your class database:

- a record is one student and all the information linked to them
- a field is a part of the information on the record, like surname, gender, form tutor, etc.
- the database is the whole collection of records of the class.



Activity 1

With your partner, think of five fields for this animal. The first one has been done for you.



Field 1

Length of neck

As technology has evolved and computers have become more common, there are more advantages to using computer-based records. There are several drawbacks to keeping hard copy data (data printed on paper). Printed material can be damaged or lost, and it can be hard or impossible to extract useful information from them. Computer databases are relatively easy to use and can be searched more easily.

Database management systems (DBMS) are a type of software that are used to create, search and store data.



a) Tell a partner three things that you learned about databases and why they might be useful.

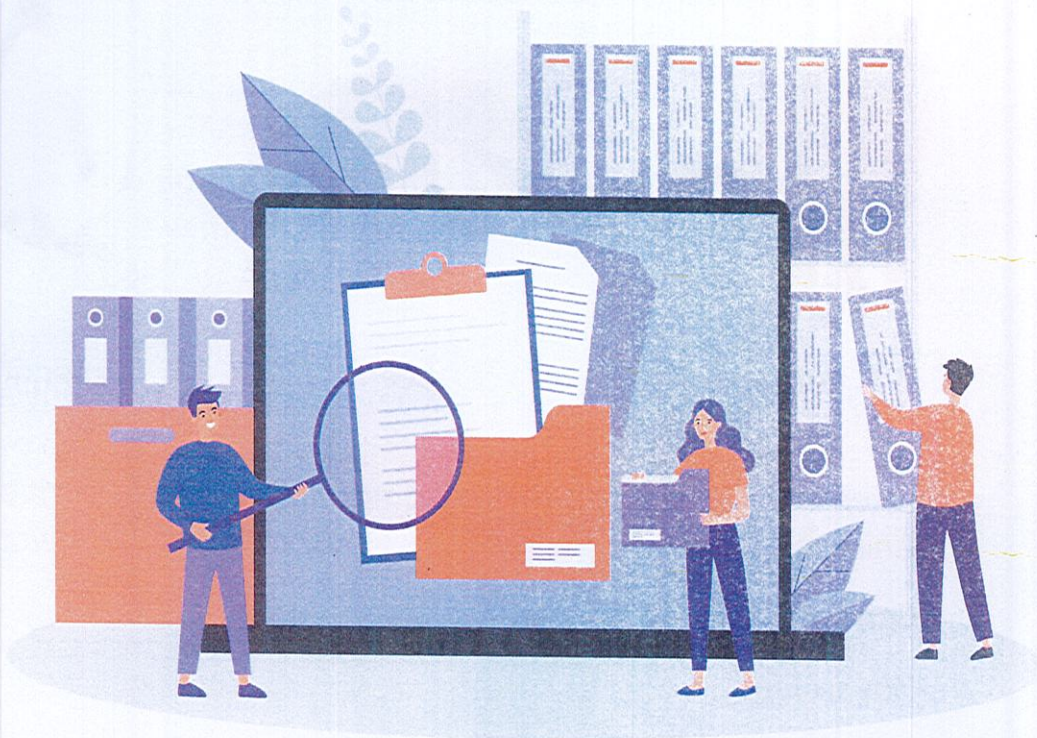
b) Discuss with your partner what kind of data you think would be included in a dentist's database.



I understand what the key features of a database are.



I understand the structure of a database, such as records, fields and tables.





Lesson 2

Creating a data table and running basic queries



In this lesson you will create a data table and learn how to filter and sort data to search for information.



Key words: cell, collate, filter, format, query, record, search, sort, spreadsheet, table



a) Work with a partner to complete the following fields for the databases for these three animals in your notebook.



cat



bee



penguin

Animal:

Can fly:

Has six legs:

Lives in large groups:

Lives on land

b) Choose your own animal and complete the fields for it.

Database software allows you to **sort** and **search records** easily and quickly, and then to present the data in a useful format. Databases usually present their information in the form of **tables**. These help you to organise records and spot patterns in the data.

In this lesson you will move the information from your paper-based tables to your device. You will then practise finding records and information as part of basic queries. A database **query** is the term used to describe the information you want the database to find.

For example, look at the information in the class database in Lesson 1. If you want to find only the female students in Juno house who take the number 7 bus, you can **filter** the information that meets the query. You can organise the results in a variety of ways to help you to understand or use the information.

A filter will only show the parts of the table that you have selected, and will hide the other parts.

The data from your paper records will need to be inputted into your computer. This store of information will be our database. We do not need any special applications to do this task as this is a simple example of a database. A good program to use would be a **spreadsheet**, such as Microsoft Excel®, Apache OpenOffice Calc® or Apple Numbers®.

To input the data on your devices, it is sometimes helpful to **collate** the data before you start typing each record. If you collate the data, you will not need to have all the individual records in front of you as you input the data. To collate the records, we will combine the information onto a new sheet which will show all the data at the same time.



Activity 1

Discuss the following questions by using the information in the table below.

Animal	Can fly?	Has six legs?	Lives in large groups?	Lives on land?
bat	yes	no	yes	yes
bee	yes	yes	yes	yes
dolphin	no	no	yes	no
rabbit	no	no	yes	yes
turtle	no	no	no	no
cat	no	no	no	yes
penguin	no	no	yes	yes
rhino	no	no	yes	yes
shark	no	no	no	no

- How many animals have six legs?
- Which animals live on land and in large groups?
- Which animal meets all the filters in the query?
- Can you think of any more animals that meet all the filters in the query?



Activity 2

Now that you have your paper table with all the collated information for the animals, input this into a spreadsheet on your device. This will be your simple database.

Use the table function from the tool bar to rearrange the data more easily to answer simple queries. You should be able to see the menu arrow in the **cell** – this means that you have activated the table function. If you do not do this, when you sort the columns the rest of the table will stay as it is, only the column you've selected will be sorted and the data then becomes mixed up.

The table below has been tidied up so that the fonts are clearer and the size of the columns and rows are appropriate. However, this is not yet a formatted table where we can use the sort function.

	A	B	C	D	E	F
1	Animal	Can fly?	Has six legs?	Lives in large groups?	Lives on land?	
2	bat	yes	no	yes	yes	
3	bee	yes	yes	yes	yes	
4	dolphin	no	no	yes	no	
5	rabbit	no	no	yes	yes	
6	turtle	no	no	no	no	
7	cat	no	no	no	yes	
8	penguin	no	no	yes	yes	
9	rhino	no	no	yes	yes	
10	shark	no	no	no	no	
11						

To **format** it as a table, we need to select the table and then click 'Format as Table' from the toolbar.

Format As Table

Where is the data for your table?

☒ My table has headers

Cancel OK

	A	B	C	D	E	F	G	H
1	Animal	Can fly?	Has six legs?	Lives in large groups?	Lives on land?			
2	bat	yes	no	yes	yes			
3	bee	yes	yes	yes	yes			
4	dolphin	no	no	yes	no			
5	rabbit	no	no	yes	yes			
6	turtle	no	no	no	no			
7	cat	no	no	no	yes			
8	penguin	no	no	yes	yes			
9	rhino	no	no	yes	yes			
10	shark	no	no	no	no			
11								

Now you will be able to sort the records by right-clicking the arrow at the top of the table and selecting your options.

	A	B	C	D	E	F	G
1	Animal	☐ Can fly?	☐ Has six legs?	☐ Lives in large groups?	☐ Lives on land?		
2	bat	yes	no	yes			
3	bee	yes	yes	yes			
4	dolphin	no	no	yes			
5	rabbit	no	no	yes			
6	turtle	no	no	no			
7	cat	no	no	no			
8	penguin	no	no	yes			
9	rhino	no	no	yes			
10	shark	no	no	no			
11							
12							
13							
14							
15							
16							
17							
18							
19							

Lives in large groups?

Sort

A-Z Ascending Z-A Descending

By colour: None

Filter

By colour: None

Choose One

Q

(Select All)

no

yes

Auto Apply

Apply Filter Clear Filter

You can sort the table alphabetically so that the same data is grouped together, which will make the records easier to see and count. For example, to answer the question, 'How many animals live in large groups?', sort the 'Lives in large groups?' column from A-Z so that the yes and no answers are grouped together. This makes the question easier to answer.

	A	B	C	D	E
1	Animal	☐ Can fly?	☐ Has six legs?	☐ Lives in large groups?	☐ Lives on land?
2	turtle	no	no	no	no
3	cat	no	no	no	yes
4	shark	no	no	no	no
5	bat	yes	no	yes	yes
6	bee	yes	yes	yes	yes
7	dolphin	no	no	yes	no
8	rabbit	no	no	yes	yes
9	penguin	no	no	yes	yes
10	rhino	no	no	yes	yes
11					

We can see that this table has been sorted because an arrow has appeared in the menu button. To answer our example, bats, bees, dolphins, rabbits, penguins and rhinos live in large groups.



Activity 3

a) Try running simple queries on your device. Can you find the answers to the following queries using the filter and sort functions?

- Identify the animals that live on land.
- Identify the animals that don't live in large groups.
- Identify the animals that live on land and can fly.

b) Carry out any more searches that you can think of.



Discuss with a partner:

- How does a table help you to find information?
- How could it be improved?
- Without recording information in a table, how would you search for the information?



I can create a database.



I know how to use the filter and sort functions database to find information.



I can run simple queries.

Lesson 3



Using spreadsheet software to work with a single table database



In this lesson you will work on a database and learn how to create database queries.



Key words: alphanumeric, column, criterion, filter, format, query, unformatted



What is a database? Discuss with a partner and pick three answers.

A database:

A retrieves its data from the internet

B is stored on a computer

C is a collection of tables that contain data

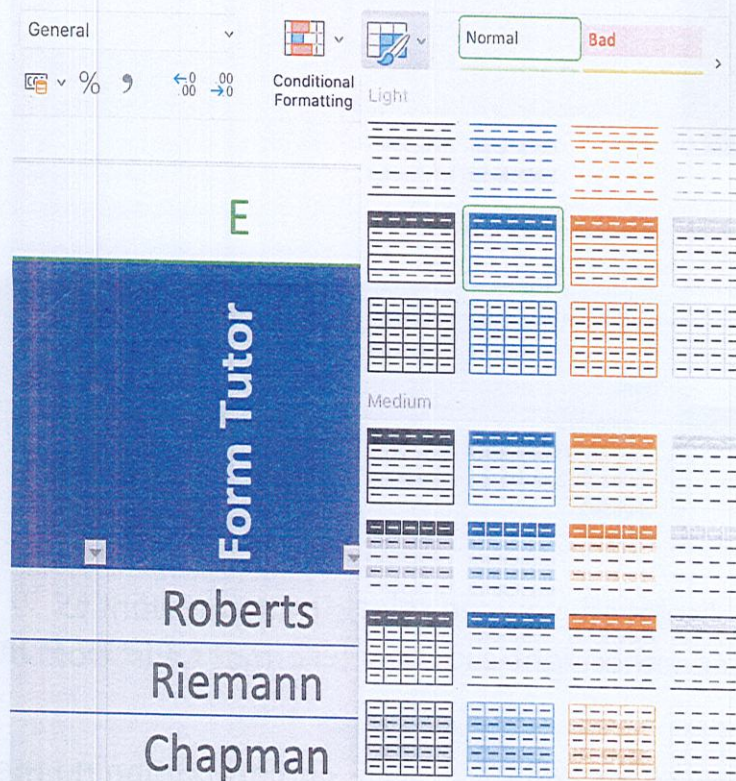
D can be used to search and sort a dataset

E is a collection of organised data.

To be able to run queries on data entered in spreadsheet software, the data needs to be formatted. In an **unformatted** table, only the data has been added.

To **format** a table in a spreadsheet, you can do the following (note: while this has been shown in Microsoft Excel, most spreadsheet applications will have the same features and similar icons).

Use the 'Format as Table' button and select a table design of your choice from the tool bar.



You can edit the look of the table so that it is easier to read. To do this, use the different fonts, sizes, colours, borders, bold and alignment features.

This table shows the different data types for each of the fields from the class database from Lesson 1:

Data type	Table fields	Example
text	Surname, First name, Gender, Form tutor, House	Chung, Jupiter
number	Student ID	109901
alphanumeric	Bus number	18A (a mix of letters and numbers)
date	Date of birth	01/10/2014

Date of birth	Bus number
01/10/2014	
15/11/2014	
12/07/2015	
22/02/2015	
05/04/2015	
15/12/2014	

Format Cells

Number	Alignment	Font	Border	Fill
Category:	Sample			
General	01/10/2014			
Number				
Currency				
Accounting				
Date	Type:			
Time	*14/03/2012			
Percentage	*Wednesday, 14 March 2012			
Fraction	14/03/2012			
Scientific	14/3/12			

To change how the data is displayed, you can select the cells you want to change the data type for and either right-click or select 'Format Cells' from the menu.

Change the height and width of the **columns** by clicking and dragging them to the size that you feel is appropriate.



Activity 1

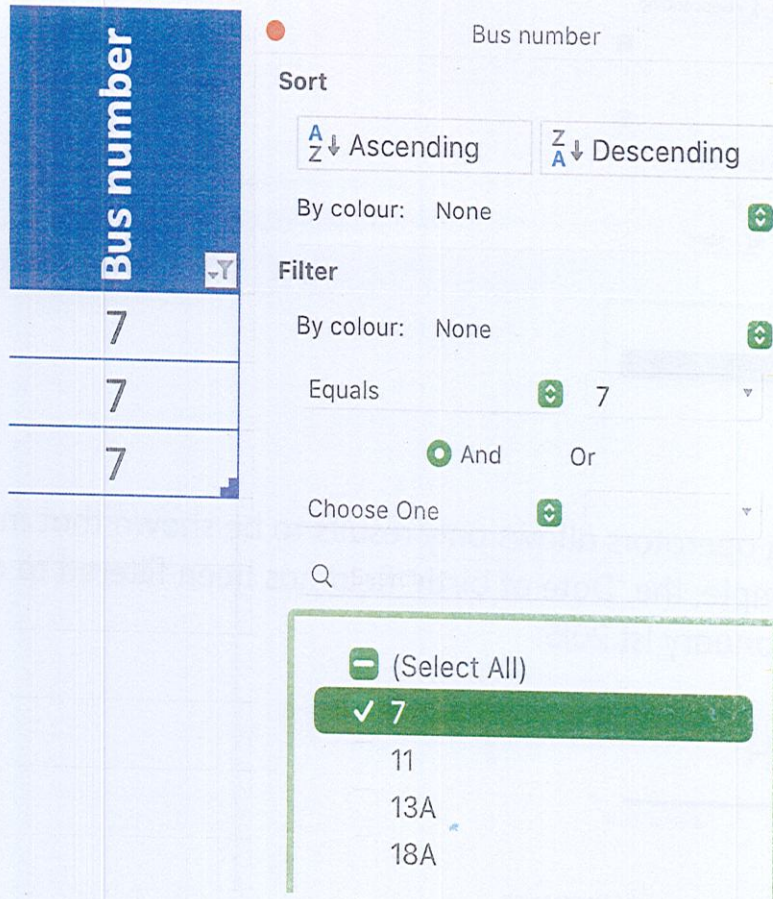
If you have an unformatted table, what ways can you change how it looks to make it easier to read?

Discuss with a partner or group.

Now that the table has been formatted, we can start analysing the data by using the sort function, as we did in Lesson 2.

Another technique to search for information is to use a **filter**. A filter will show only the parts of the table that you have selected, and will hide the rest. This is very useful if you have more than one **query** that you want to find. Using the sort function on a table is easy to do with one **criterion**, but when you have two or more, the table can't sort two different columns at the same time. Using filters allows you to select the criteria you want and then you can use the sort function afterwards if necessary.

Here is an example of how to use a filter. You need to click the column menu you want to filter and then select the options you want to see. In this example, only those using the number 7 bus have been selected.



Bus number

Sort

A Z ↓ Ascending Z A ↓ Descending

By colour: None

Filter

By colour: None

Equals 7

And Or

Choose One

Q

(Select All)

✓ 7

11

13A

18A

You can tell if a filter has been applied to a column by looking at the menu button. If there is a symbol that looks like a filter, then one has been applied.



A more complex filter is to set two or more criteria, like Mars and Juno house.

Conditional filtering using operators allows only results to be shown that meet a certain criteria. For example, the 'Date of birth' field has been filtered to only show those born before January 1st 2015.



Activity 2

What kind of queries could you filter about the data that has been collected?

Work with a partner to think of three queries for the data you have collected. An example is shown below.

Write down the names of any female student that travels on the number 7 bus.



Discuss with your partner how the information would have been sorted if there were only paper databases.

- How would it have worked if there were 100 records? Or 1000 records?
- What are the advantages of using a computer-based database system?



I can format a database.



I can use the filter function to answer more complex search queries.

Lesson 4



Investigating the use of databases in school



In this lesson you will explore the use of databases in school.



Key words: access, database, permission, spreadsheet



Look at the table below and answer the following questions.

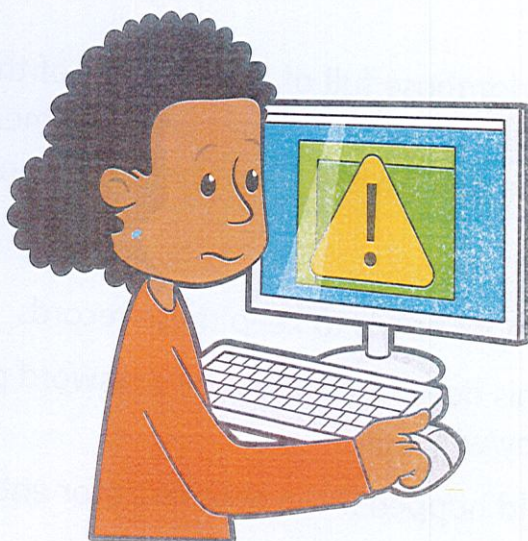
- What is the name of the male student who was born in 2014 and travels on the number 7 bus?
- What are the names of the students who were born in 2015 and have Ms Chapman as their form tutor?
- How many male students travel on the number 11 bus?

Student ID	Surname	First name	Gender	Form Tutor	House	Date of birth	Bus number
110748	Hussain	Niam	F	Kapra	Juno	06/07/2015	13B
110438	Fletcher	Max	M	Riemann	Jupiter	15/10/2014	7
110231	Nal	Sig	F	Chapman	Mars	10/02/2015	11
110715	Richards	Ben	M	Riemann	Juno	14/06/2015	11
110233	Wacim	Jane	F	Roberts	Mars	05/12/2014	13A
110298	Khan	Will	M	Chapman	Jupiter	28/03/2015	11

Schools have lots of different information stored in multiple **databases** that are linked together. This might include:

- information about the students, such as their reports, attendance and attainment
- contact details for students, such as names, telephone numbers, email and home addresses
- stock information, such as the number of devices in school or PE equipment, and where they are kept
- information about the school library, such as a list of books, who has them, how long they have got them for, their location and the authors of the books.

Not everybody in school will be allowed to look at all the data. Schools need to make sure that the people who see the data have **permission** to access it.



For example, a teacher in Year 6 does not need access to the parent information for the Year 1 class, but the school office staff will be able access that information for the whole school.

For this reason, **spreadsheets** are not the best application to store all this information. They are normally only accessed by one user and cannot perform the same level of tasks that a specialist database management system can.

Database management systems will be designed to only give access to certain parts of a database, whereas on a spreadsheet, if a person has permission to change something, they can change the whole document, which is very dangerous if they are not sure what they are doing.



Activity 1

Go on a database hunt around school with your class or group.
Ask about:

- what sorts of databases your school might use
- if your school uses multiple databases
- if children or parents can access any of the information in the database. If not, why not?
- if the school sends any of the information in the database to people outside the school. If yes, why?



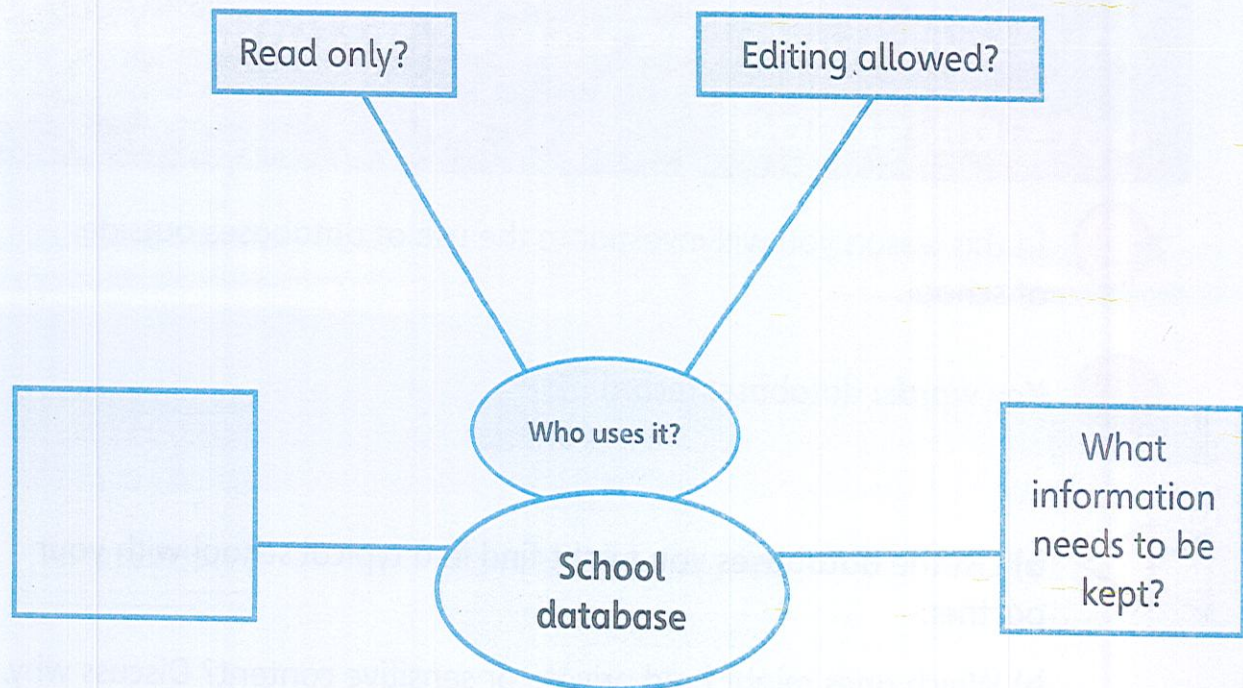
Activity 2

A school has a database full of exam results of their students. Each time students take an exam or have an assessment, the results are entered onto the database by the school's administrator.

Think about:

- why the school needs to keep these records
- whether this database should be password protected.
Explain why/why not
- what would happen if the administrator entered some data incorrectly
- what the data in this database is used for, and who sees the results from this data.

Create a mind map with ideas about your database research in your notebook. Can you make a list of other places databases might be useful?



Discuss your mind map with a partner.

- Are there any points you disagree with or want to include in your own?
- Can you explain to your partner how these database systems are different to spreadsheet databases?



I can investigate databases around my school.



I understand why databases are used, and that people have different levels of permission to access data.



I can explain the difference between a spreadsheet and a database management system.

Lesson 5



Investigating the use of databases outside school



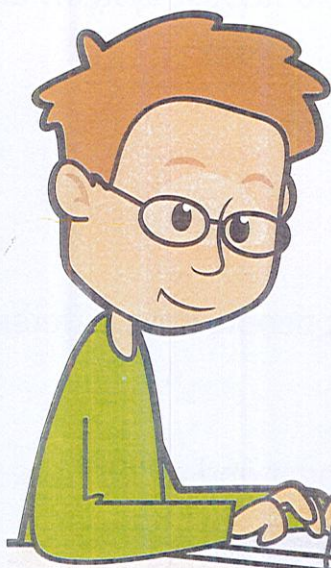
In this lesson you will investigate the use of databases outside of school.



Key words: database, record



- List the **databases** you might find in a typical school with your partner.
- Which ones might hold private or sensitive content? Discuss why.



ABC CLOTHING

Cotton T-shirt

New Account

First name

Last name

Date of birth

dd / mm / yyyy

Address

Any business or organisation that has to keep a **record** of its customers, employees, stock, deliveries, etc. will probably use a database system.

Here are two examples of organisations and the databases they might use.

Gym	Clothing store
Membership details, including: - Names and addresses - Medical records - Classes taken Gym equipment records Staff details, including: - Personal details - Job type - Exercise classes Searches might include: the classes a member has taken in the last month, or when equipment is due for renewal.	Customer details, including: - Names and address Stock information, including: - Product prices - Product quantities - Stock suppliers Staff details, including: - Personal details - Job type Searches might include: how many products a customer has bought, or which sizes are the most popular.



Activity 1

Discuss the following with your partner. What similarities and differences can you think of in databases that are used by the following?

- Schools
- Shops
- Gym or sports clubs

Personal, private and sensitive information

Think about the following organisations: a shop, gym, bank, library or school. Each of these may store personal information about the people in their databases, including:

- home and employment details
- school details, including grades
- medical information
- financial information, including savings.

It is essential that these organisations keep your personal data safe, and there are laws to protect this information being shared without your permission.



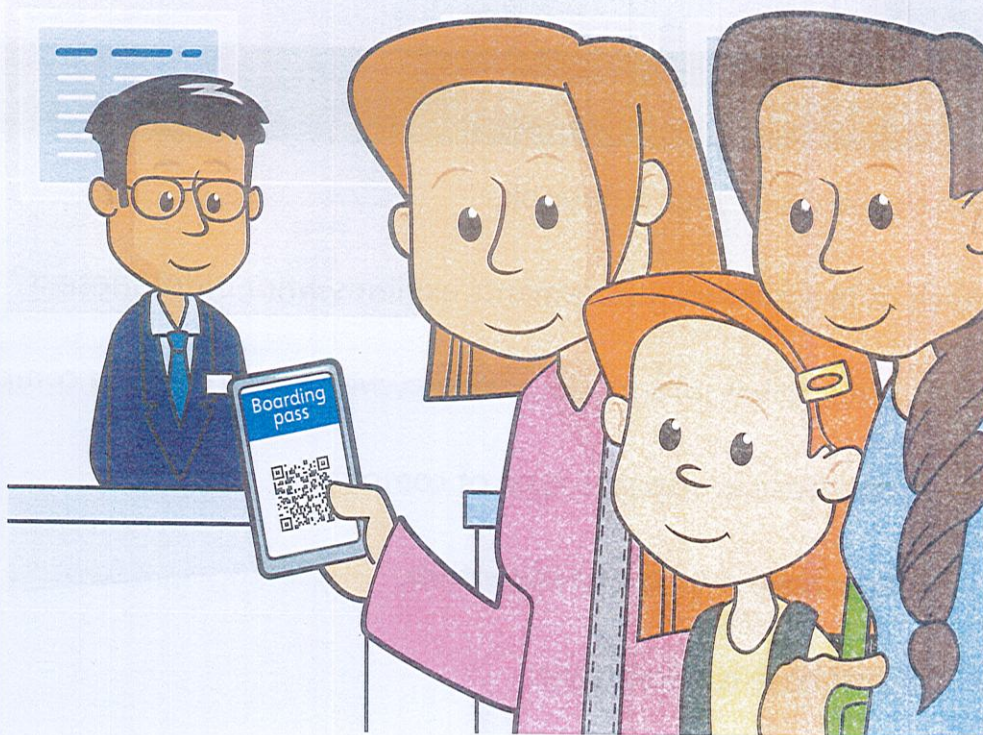
Activity 2

When booking flights, airlines use multiple databases and require lots of personal information. They need to know who travellers are at all stages – from the airport to the plane, to the next airport.

With your partner, discuss what personal information would be important for an airline company to know during the following:

- at the check-in desk upon arrival at the airport
- when the person boards the plane, and throughout the flight.





In groups, make notes about key database features, and then present your notes to the class. While each group is presenting, think about the following questions:

- What similar features of databases have you found?
- What different features of databases have you found?
- How can you explain these differences?
- Are there any confidential or security elements to consider?
- Where might this be most relevant and why?



I can investigate databases that are outside school.



I understand why databases are used and that people need different levels of permission to access personal data.



I can understand some of the similarities and differences between databases.

Unit 1

Mid-unit assessment

Write your answers in your notebook.

1 Which of the following statements explains what a database is?

- A A database is information or data, which is stored in a computer.
- B A database is a special type of computer.
- C A database is a type of algorithm.
- D A database is a font style.

(1 mark)

2 What is a piece of data, like someone's address, known as?

- A a database
- B a record
- C a field
- D a query

(1 mark)

3 What is a collection of records known as?

- A a database
- B a record
- C a field
- D a query

(1 mark)

4 Here is an example of a student database.

Student ID	Surname	First name	Gender	Form Tutor	House	Date of birth	Bus number
109877	Chung	Conrad	M	Roberts	Jupiter	01/10/2014	18A
109901	Fischer	Heidi	F	Riemann	Jupiter	15/11/2014	18A
109945	Freund	Linda	F	Chapman	Mars	12/07/2015	7
109948	Gallia	Harriet	F	Chapman	Juno	22/02/2015	7
109967	Imran	Maria	F	Kapra	Jupiter	05/04/2015	13A
109984	Jacobs	Leonard	M	Riemann	Mars	15/12/2014	11
110013	Novas	José	M	Chapman	Mars	05/03/2015	18A
110056	Renaud	Olivia	F	Kapra	Juno	09/06/2015	7

a) How many fields are there?

A 3

B 8

C 48

D 12

b) State the name of a record.

c) State the name of a field.

(4 marks)

5 Which application could be used to create a simple database?

A a web browser application

B a stop motion application

C a spreadsheet application

D a word processing application

(1 mark)

Lesson 6



Investigating database management systems



In this lesson you will investigate the purpose of database management systems.



Key words: database management system (DBMS), primary key, query, record, table



Discuss with a partner three ways that a library database might be used. Think about the following:

- the people that work at the library.
- the books
- the people that visit the library.

You are already familiar with the structure of a database, and that they are used by a range of organisations. The examples you have seen so far have been created using spreadsheet software. This is fine for simple databases, but for more complex databases, a specialist **database management system (DBMS)** is used.

The examples shown in this lesson are created using a DBMS called Microsoft Access®. Other DBMS applications include Apache OpenOffice Base® and Claris FileMaker Pro®.

Setting up a simple database

Let's return to the class database from Lesson 1 and create a database of the first three **records** using a DBMS. In the screenshots shown, the following sequence has been followed:

1. Create a new database called 'Students'.
2. Create a new **table**.
3. Specify each of the required fields and their data types, before adding any records.

	Field Name	Field Type	
	ID	Integer [INTEGER]	Unique student identification
	Surname	Text [VARCHAR]	Surname of student
	First	Text [VARCHAR]	First name of student
	Gender	Text [VARCHAR]	Male or Female
	Form	Text [VARCHAR]	Form Tutor
	House	Text [VARCHAR]	Student house
	Date	Date [DATE]	Date of birth
	Bus	Text [VARCHAR]	Bus number

	ID	Surname	First	Gender	Form	House	Date	Bus
	0	Chung	Conrad	M	Roberts	Jupiter	01/10/14	18AA
	1	Fischer	Heidi	F	Riemann	Jupiter	15/11/14	18AA
	2	Freund	Linda	F	Chapman	Mars	12/07/14	7
								

Some DBMS applications will ask you to specify a **primary key** when creating a table. This is the field in the table that is unique and used to link multiple databases together. In this example it would be the 'ID' field.



Activity 1

Create a simple database of books using DBMS. Include the following fields and choose an appropriate data type for each:

- Book ID (Starting at 1, and use this as the primary key if required)
- Name of book
- Author surname
- Author first name
- Number of pages
- Date of release

When complete, add at least three books that you know to the database. Share the names of books with your classmates.

Creating a query

In Lesson 2, we searched for specific information inside a database. This is called a database **query**, and it is a key tool in all DBMS applications.

In the example below, a query has been created to search for students that use the 18AA bus. An important feature of DBMS applications is that multiple queries can be saved within the same database and used again at any time.

Field	Bus
Alias	
Table	Table1
Sort	
Visible	☒
Function	
Criterion	'18AA'

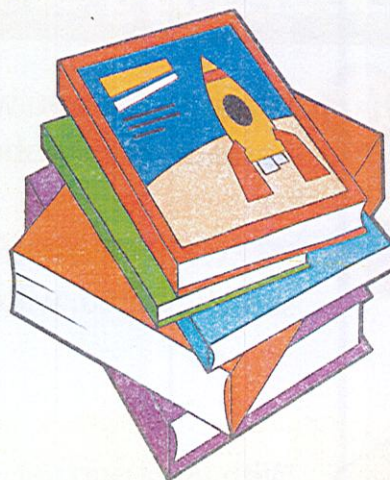
	ID	Surname	First	Gender	Form	House	Date	Bus
▶	0	Chung	Conrad	M	Roberts	Jupiter	01/10/14	18AA
	1	Fischer	Heidi	F	Riemann	Jupiter	15/11/14	18AA



Activity 2

Using the database from Activity 1, create one of the following simple database queries on your device:

- the surname of the author
- books from a specific year.



Discuss with a partner:

- What are some of the differences between using spreadsheet software or a database management system to create a database?
- What other queries could be run using the databases in this lesson?



I know what a database management system is.



I can create a simple database using a DBMS.



I can create a simple query using a DBMS.

Lesson 7



Searching online databases



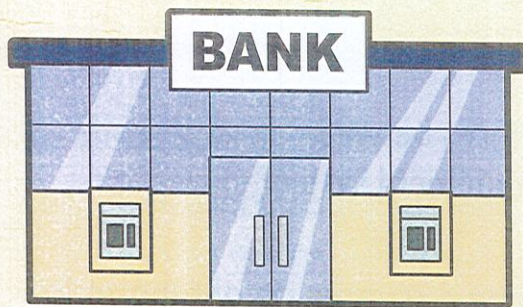
In this lesson you will understand how to perform advanced searches using online databases.



Key words: advanced search, keywords, plus sign, quotation marks, search engine, wildcard search



With your partner, think about these common databases: bank, supermarket, library. Which of these will be updated most often?



Explain to your partner the data you would expect to find in a shopping database.

In this unit we have looked at storing information on a computer using a database. We can search these databases, or create queries, to look for specific information. Information stored online is still stored in databases – much larger databases – and in this lesson we will look at how to search online for specific information.

In previous years, you created simple online searches, and considered important factors, such as the choice of **keywords**, and how to look for bias in the results.

Some **search engines**, and many large shopping sites, allow users to create **advanced searches** or filter the results as they appear.

Advanced online searches often include the following options:

- keywords to include
- keywords to not include
- language choice
- date ranges
- search within specific websites.

Advanced search

Keywords	
Keywords not to include	
Language	
Date range	

Google® and Yahoo® still have a specific advanced search page on their websites, but others allow searches to be refined with filter tools that appear after a search has been carried out.



Activity 1

With your partner, find three search engines that contain advanced search options and try the following searches:

- The most popular car in 2021 that doesn't have a petrol engine.
- A metal laptop computer from 2022 that uses the Microsoft Windows® operating system.
- A simple mobile phone from 2022 that doesn't have smart features.

The following characters can be used to carry out an advanced search:

- The **plus sign (+)**: this instructs the search engine to only include web pages containing a range of keywords. For example:

London + actor

- **Quotation marks ("")**: used to search for an exact phrase, rather than individual keywords. For example:

"solid state drive"

- The **minus sign (-)**: this instructs the search engine to exclude web pages that contain a specific keyword. For example, a search for the best selling car of 2022 that doesn't run on petrol would look like this:

2021 "best selling car" -petrol



- **Wildcard search (*):** The * symbol represents any character and can be used to complete words or widen a search. For example, searching for any year in the 2010s:

201*

These techniques can also be used to search large commercial websites for specific products. Those that don't allow wildcards or special characters in their search will normally have built-in filter tools to narrow down results.



Activity 2

With your partner, carry out a range of searches on the following, using all the techniques in this lesson, including large commercial shopping websites:

- budget price smartphone
- average price smartphone
- top of the range, expensive smartphone.

Compare your results with your classmates. Have you found the same models in your searches?



Discuss with your partner which advanced search technique you found the most useful.

- Can you explain why?
- Which search techniques did you find the least useful?
- Which of these techniques do you think you will use the most at home?



I can search databases using advanced search techniques.

Lessons 8 and 9



Carrying out an online research project



In this lesson you will carry out an online research project based on user requirements.



Key words: budget, criteria, database, research, user requirements



Explain to a partner what is meant by advanced search techniques. You should include some examples of an advanced search compared to a simple search.

The techniques discussed in this lesson could be applied to any research project. The project brief below outlines the topic and user requirements. You will then apply the skills you have developed in this unit to **research** and record your results in a **database**. You will then be able to make a recommendation based on your findings.

A family of two parents (Rasheed and Jo) and two children (Sofia and Adam) would each like a new smartwatch, but are confused by the choice available on the internet. However, they do have some ideas on the features that they would like. Both parents want to monitor their heart rate when exercising, and Rasheed would like to be able to look at maps when cycling. Jo would like to be able to listen to music on her device. Both children want to be able to see their smartphone messages and be able to install fun apps. Adam has said he would like his to be a different colour to his sister's. Rasheed and Jo have a budget of £500 each, but expect the children's smartwatches to cost at least half the price of theirs.

When considering a brief, it is important to first break it down and write a list of key **criteria**. This includes the user requirements for each person, including any budget.



Activity 1

After discussing it with a partner, write down the **user requirements** of each member of the family.

For example:

Jo's smartwatch: heart rate monitor, listen to music, budget of £500.



A database is ideal for recording results from a research project, as results can be sorted and filtered to help make decisions. Using spreadsheet software, as shown in Lesson 2, a database could be created to record research into different smartwatches, with the following field titles:

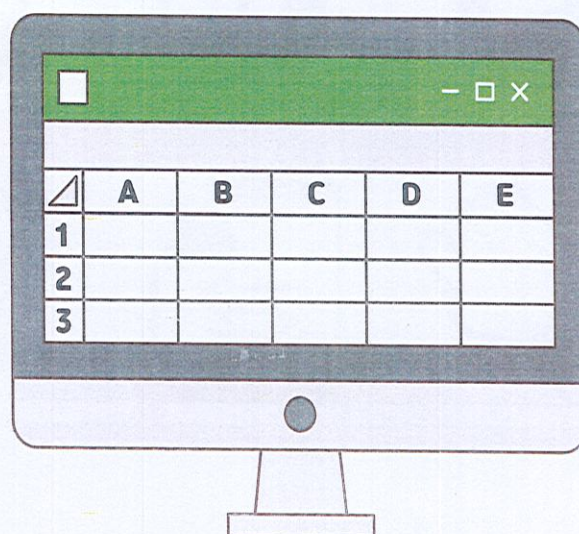
- Smartwatch brand and model name
- Feature 1 (this could be repeated for multiple features and completed using Yes/No)
- Price
- Website location
- Family member most suitable for (this could be completed after completing your research)



Activity 2

Using spreadsheet software, create a table to record your research. Use the headings suggested and any others that you think are appropriate.

Compare your table with your partner and be prepared to add or remove fields if you agree with them.



When searching for anything online, using basic or advanced methods, remember to carefully judge the results you find. Advertising, or paid-for results, will often appear at the top of your results and may not always be the most suitable.

Online searches bring up hundreds of results so don't just assume the first two or three are the best ones.



Activity 3

Using the methods listed and outlined in this unit, carry out your research. Add suitable devices to your database and remember to include website addresses so that you can return to them if necessary.



Feedback to your partner about your findings so far.

- Are you struggling to find anything?
- Could your peers help you?
- What conclusions have you made so far in your research?



I can search online databases using advanced search techniques.



I can record my findings using appropriate software.

Lesson 10



Reviewing research findings



In this lesson you will offer solutions based on your research and give your reasons.



Key words: criteria, requirements



Discuss with a partner the key requirements for the family hoping to choose new smartwatches.

Based on your research, you should have a table of results that can be used to make recommendations. The example below shows how the first few rows of research might look.

Brand /Model	Heart rate	Maps	Music	Messages	Apps	Colour choices	Price	Website	Most suitable for
GWS	Yes	Yes	Yes	Yes	Yes	Yes	499	LINK	Jo
SeriesM	Yes	No	Yes	Yes	Yes	No	450	LINK	Jo



Based on the original brief, these devices could both be recommended for Jo, but the 'SeriesM' would be a better recommendation because it is cheaper, and Jo doesn't need maps or the choice of colours.

The filter and sort tools would be ideal for looking through multiple rows of information.

Having more than one choice for each member of the family means that you need to make a judgement about which would be the best device. Think about:

- What were the main **criteria** for each person?
- Which devices meet the most needs?
- Can money be saved where possible?
- Which of the **requirements** are the most essential?



Activity 1

Complete your table, choosing a suitable member of the family for each device that you have researched.

Discuss your choices with a partner.





Activity 2

Prepare a short summary of your findings to present to the class. This could be either:

- a short presentation
- a poster illustrating your choices, or
- a short report that can be read out.

Make sure to include the reasons behind your choices and be prepared to answer questions about your decisions.



Discuss with your partner what you have enjoyed most in this unit about databases.

- What do you feel you are good at?
- What do you think you could spend more time learning about?



I can review a solution, considering all the user requirements.

Unit 1

End-of-unit assessment

Write your answers in your notebook.

- 1 Explain why a database would display information in a table.

(1 mark)

- 2 An unformatted table is:

- A a type of database device
- B a table in which queries can be entered
- C a type of application
- D a table where only the information has been entered

(1 mark)

- 3 The table here contains examples of four types of spreadsheet data. Copy the table into your notebook and label each type of data in the headings in the table.

?	?	?	?
Class 6T	Yellow	28.73	12/03/1995

(4 marks)

- 4 What is the meaning of the term 'query' in relation to a database?

(1 mark)

- 5 Who do you think should be able to have access to the following information in a library database?
For each example, write in your notebook whether it should be just the librarian (L), just the members (M) or everyone (E).

Information in the database

- a) titles of books in the library
- b) addresses of the members of the library
- c) how many late fees members have had
- d) when a book is due back into the library
- e) telephone numbers of members
- f) cost of the books the library holds

(6 marks)

- 6 Match the online search techniques to the correct descriptions.

the plus sign (+)

quotation marks ("")

wildcard search (*)

- A used to search for an exact phrase
- B represents any missing character
- C used to search for a range of keywords only

(3 marks)

7 What does DBMS stand for?

- A database manipulation search
- B database management systems
- C data build management system
- D database management software

(1 mark)

8 Why might a large organisation use a primary key when creating databases?

(1 mark)



Read the sentences. Do you agree? Think about what you have learned.

- I understand the structure of a database, such as records, fields and tables.
- I can create a simple database.
- I know how to search a database to find information.
- I can run simple queries.
- I can format a database.
- I can use the filter function to answer more complex search queries.
- I can investigate databases around my school.
- I understand why databases are used, and that people have different levels of permission to access data.
- I can explain the difference between a spreadsheet and database management systems.
- I can investigate databases outside school.
- I understand the similarities and differences between databases.
- I can search databases, using advanced search techniques.

Unit 2

Programming (part 1)

In this unit you will use your previous knowledge of algorithms and programming to design and create a simple game. You will be debugging throughout the unit, and you will be using more advanced variables to bring more functions to your game. Using role play to check your algorithms, you will create and edit your ideas and then commit your plans to paper. You will start using 'repeat' in your algorithm notations for your games that will include specified and non-specified features. Finally, you will test your game before your peers have an opportunity to test and review your creation.

Key objectives

- To understand how to create an algorithm to solve a particular problem (including controlling or simulating physical systems), making use of algorithmic constructs (sequence, iteration, selection and variables).
- To understand how to identify and correct errors in algorithms.
- To be able to decompose a problem into smaller subproblems.
- To be able to locate and fix errors (bugs) in a program.
- To be able to use sequencing, repetition/iteration selection and variable constructs in programs.
- To understand how to use variables.
- To understand how to write code that accepts and responds appropriately to user input.

```
select
_ob.select= 1
er_ob.select=1
ntext.scene.objects.active = modifier_ob
"Selected" + str(modifier_ob)) # modifier ob is the active ob
error_ob.select = 0
try:context.select= modifier_ob
ob.select=1
```

AJK5545001J-JK

Lesson 1



Introduction to writing algorithms



In this lesson you will examine algorithms for everyday tasks.



Key words: algorithm, debug, error, instruction, repeat, sequence, unintended results



Name three everyday situations that can be described using **algorithms**. Discuss with a partner how the algorithm for each one works.

As you may remember, an algorithm is a precise set of **instructions**. A device, such as a robot, can only read the instructions given in an algorithm, and they will follow them exactly.

Here is a simple algorithm to brush your teeth.

Unscrew the toothpaste lid.

Add pea-sized amount of toothpaste to the toothbrush.

Replace toothpaste lid and toothpaste tube.

Turn the tap on.

Add water to the toothbrush head.

Turn tap off.

Open mouth.

Raise toothbrush to mouth.

Scrub teeth.

Repeat until spit builds up.

Spit and repeat until teeth are clean.

Rinse toothbrush.

Replace toothbrush.

Dry mouth.

End.

These instructions are precise and in the correct **sequence**. If the sequence is wrong in an algorithm, it will produce **unintended results**. Depending on which step is not correct, the algorithm may still have some function and complete the task, but the device performing the task will be in a slightly different position. Sometimes, if the sequence is very wrong, the device will produce very different results, but it is not always the case.



Activity 1

Put the following steps of the algorithm to make a cup of tea in the correct order.

Add milk.

Add sugar.

Boil kettle.

Add teabag to cup.

Add water to cup.

Remove teabag.

Stir.



a) Discuss with a partner. Are both of your algorithms the same? Why/why not?

b) What does this algorithm not tell you?

Debug as you work to correct any **errors** you discover as you are working through the algorithm.



Here is an algorithm:

Get PE kit from hook.

Open bag.

Remove PE kit from bag.

Remove school shoes.

Remove T-shirt.

Put PE T-shirt on.

Remove shorts.

Put PE shorts on.

Put trainers on.

Place removed school uniform in a pile.

Sit down ready for your lesson.

Discuss the following points with a partner.

- What is the purpose of the algorithm?
- Are the instructions in the algorithm in the correct sequence?
- How does the algorithm end?



I understand the purpose of a given algorithm.



I can order instructions in an algorithm.



I can use logical reasoning to explain how an algorithm works.



I can debug algorithms.

Lesson 2



Creating an algorithm using loops



In this lesson you will test your algorithms and modify them to meet new conditions.



Key words: debug, loop, route



Can you find and **debug** the following algorithm? There are errors and missing elements.

Bake a cake

Start.

Select a baking tin.

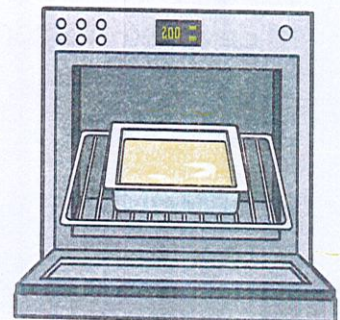
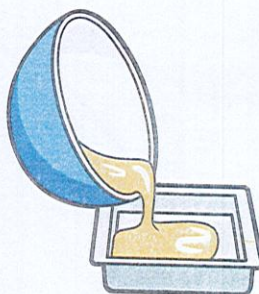
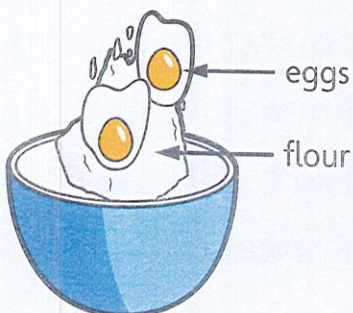
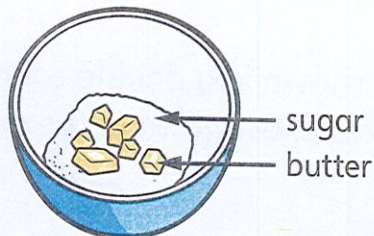
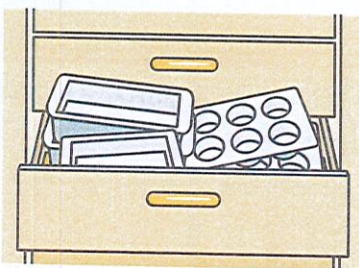
Beat butter with sugar in a bowl.

Mix in flour and eggs.

Pour the mixture into the baking tin.

Put the bowl in the oven.

End.



Algorithms can be written to include repeated steps called **loops** to make them more efficient and easier to follow. Here is an example of one algorithm without a loop and one with a loop:

Forward

Left

Forward

Forward

Forward

Forward

Forward

Left

Forward

Forward

Forward

Left

Loop 5

Forward

Left

Forward

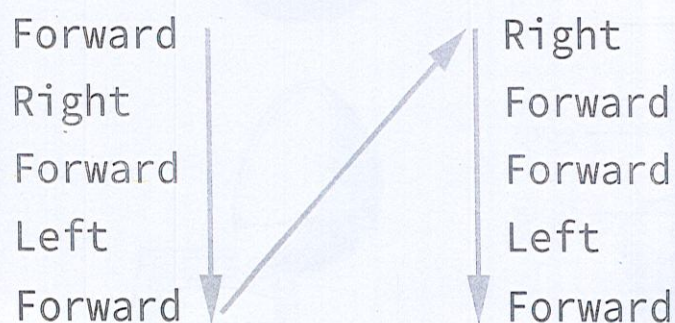
Forward

In this lesson your algorithms will have the following effects on your 'robots'. Each arrow represents one step, so to move three steps forward you can either use three forward directions or use a loop (annotating it to say 'loop x 3' or similar).

A repeating part of an algorithm is referred to as a loop.

Repeating lines in code can be referred to as repeats; the repeat command in Scratch, for example.

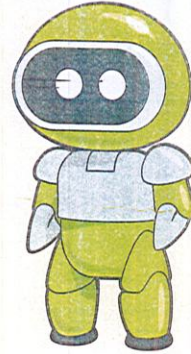
Algorithms may be shown in a double column. The correct reading order is downwards then across, as shown in the example below.



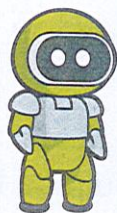


Activity 1

Practise making an algorithm for your partner to follow as the 'robot'. Then take a turn being the robot, following your partner's algorithms. Remember to debug your algorithms as you create them.



Here is a map for your robot to follow.

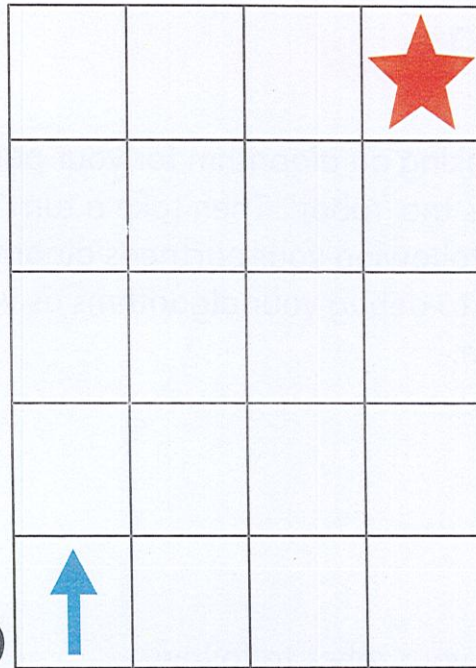


Start

The robot will start on the blue arrow. The directions 'Forward' and 'Backward' will make the robot move one square forward or one square backward. The directions 'Right' and 'Left' will make the robot do a quarter turn, either clockwise or anti-clockwise. 'Loop' will repeat the instruction that comes after it the number of times written next to the word 'Loop'.



Start



Activity 2

Here is an example of an algorithm to get the robot to the red star.

Forward

Forward

Right

Forward

Forward

Left

Left

Forward

Forward

Forward

Right

Discuss with your partner which path would be taken by the robot in this example.

Tip: Use a pencil as your robot to help you think about which way the robot is facing and which direction it needs to turn towards.

While the algorithm in Activity 2 gets the robot to the red star, we can make the algorithm more efficient by making a simpler **route**, like this one below.

Loop 4

Forward

Right

Loop 3

Forward

In this case, the algorithm that has fewer steps is more efficient.



Activity 3

Here is an algorithm. Use 'loops' to make it more efficient.

Forward

Forward

Forward

Right

Forward

Forward

Right

Forward

Forward

Left

Forward

Forward

Left

Forward



With a partner, check your algorithm from Activity 3 to make sure that there are enough steps and that the turn directions will send the robot the correct way. Debug any errors that you find.



I can create algorithms to solve a problem.



I can debug my algorithms as I create them.



I can use logical reasoning to predict the outcome of an algorithm.



Lesson 3

Programming a solution to a problem that contains loops (part 1)



In this lesson you will create algorithms that solve given problems to find the most efficient route between two objects.



Key words: command, criteria, debug, loop, route



James

I have created an algorithm to get my toy car from the sofa to the door.

It is: **Right-Forward-Forward-Left-Forward-Right-Forward-Forward-Right-Forward**

Yusuf

You could write it more efficiently like this:

Loop 6

Forward

Loop 3

Right

Left

Is Yusuf correct? Why/why not? Discuss.



There is often more than one way to solve a problem. The problems in this lesson will have more than one solution, but the goal is to find the most efficient one.



A			
			B

Here, the robot needs to get from point A to point B. There are several different **routes** it could take.



Activity 1

Discuss with a partner the different routes the robot could take to get from A to B.

Now that we can see some of the options for the robot, we can decide which of these would be the most efficient. To help us, we should think about which would need the fewest steps to code in our program. With fewer steps in our program, we are also less likely to go wrong. This could be considered the most efficient route.



Activity 2

Decide which of the routes you proposed would be the most efficient.

We might want to alter this route if there were other **criteria**. For example, perhaps the robot needed to collect stars before it reached point B. In this case, we would need to rethink our route so that the criteria are met. The efficiency of a route will depend on the criteria of the problem.

To find the most efficient route, you must first check that all the criteria are met, then check if there are any unnecessary **commands**. Finally, check if there are any commands that could be tidied up by using **loops**.



Activity 3

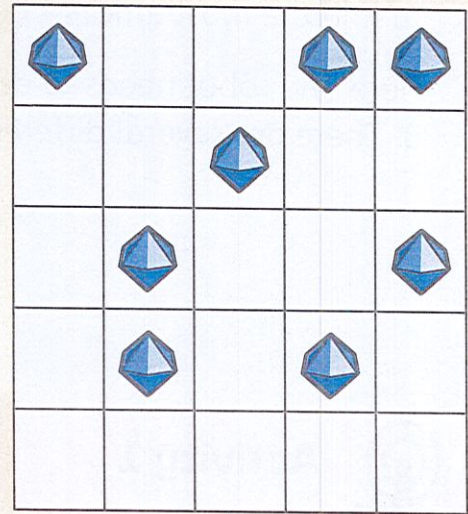
Work with your partner to complete the activity below.

Using any **start** and **end** point, plan a route that collects all the gems using the shortest algorithm. Use loops where possible.

Write down your algorithm.

Is there more than one way of producing the shortest possible algorithm?

Check and **debug** any errors you find.



Discuss with your partner what you both thought of the activities.

- Which was the most difficult for you to write?
- Did you manage to use loops to decrease the number of written lines?
- What makes a route efficient?
- Is it always the shortest in distance?
- Is it the algorithm with the fewest steps or the one that collects the most prizes?
- Does it depend on the criteria of the problem?



I can create algorithms to solve a problem and follow given criteria.



I can check an algorithm for bugs.



I can use logical reasoning to predict the outcome of an algorithm.

Lesson 4



Programming a solution to a problem that contains loops (part 2)



In this lesson you will use sequencing correctly and understand how to write code.

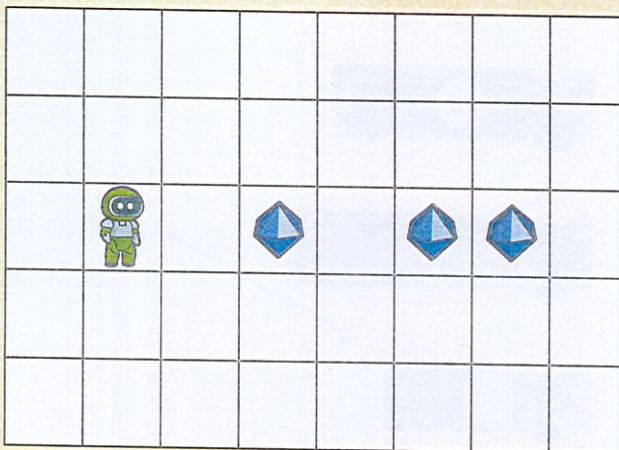


Key words: code, command, error, notation, programming, repeat, Scratch, sprite



What will happen when you click 'run'?

- A The robot will not move.
- B The robot will move five times and collect the gems.
- C The robot will only move one space.
- D The robot will only move four spaces.



When run

Repeat 5 times

Move forward

In this lesson you will be turning your algorithms into **code** for a program to use.

There are some technical differences between an algorithm and a code. You can think of the difference like this – an algorithm can follow any **notation** that has been agreed with the reader, but code is *exactly* what the device will read. For example, the **Scratch** program will not read ‘clockwise turn’, so this would be part of an algorithm. Scratch would read ‘right turn 90 degrees’, so this would be known as code.

Another example is how we use the term ‘loop’ to show that the same action is happening a number of times.

However, when we write code in a Scratch program, the correct term to use is ‘repeats’.

Here is a simple program in Scratch that rotates and moves the sprite (the cat) to random positions on the screen. Between each move there is a one-second pause.

The green flag event is used to start the program.

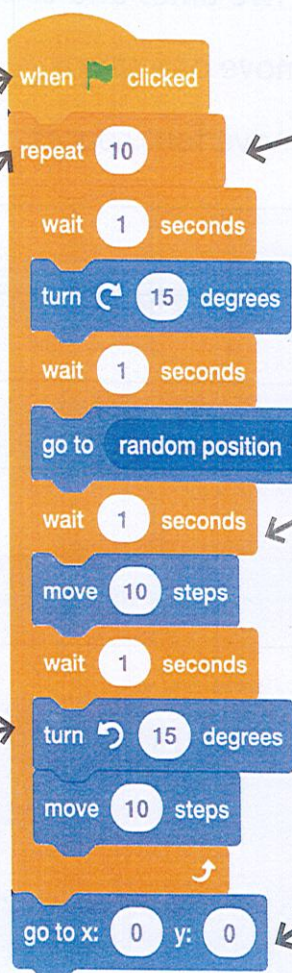
The repeat command repeats the commands within it 10 times.

The **repeat** and **wait** commands can be found in the **Control** section of Scratch.

The wait command is used to add a pause in seconds.

The move and turn commands can be found in the **Motion** section of Scratch.

At the end of the program, the sprite is returned to the centre of the screen $x = 0, y = 0$.





Activity 1

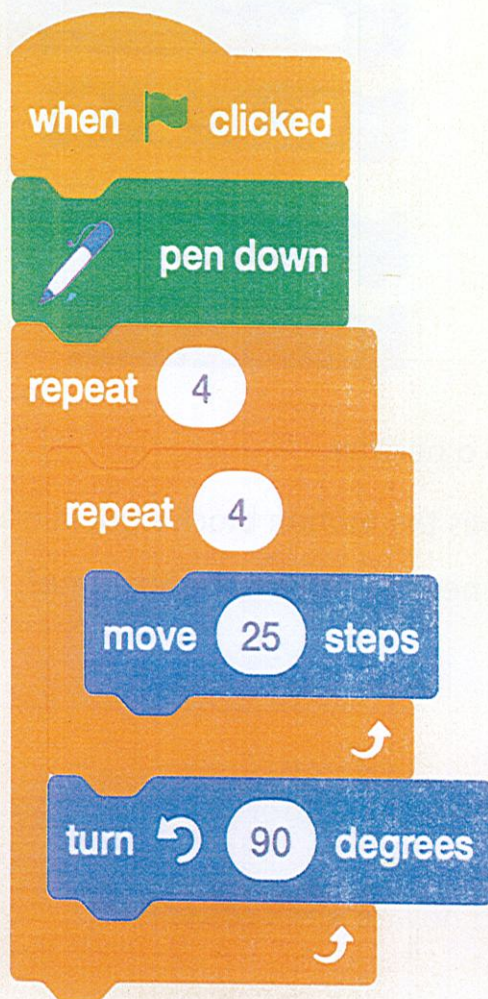
Use Scratch to check if the program on page 62 works as expected. If it does not, debug your code and correct the **errors**.



Activity 2

What shape does the following Scratch program create? Discuss with a partner.

Challenge: Can you change the code to create a triangle?





Look at the image below.

Motion



Discuss with a partner.

- How does the motion block work in a Scratch program?
- Do you need to include it every time?



I can use sequencing correctly in my programs.



I understand how to write code.

Lesson 5



Creating a 'Frogger'-style game



In this lesson you will learn about simple arcade games and start designing your own.



Key words: IF... THEN..., interact, loop, movement, repeat, sprite, string

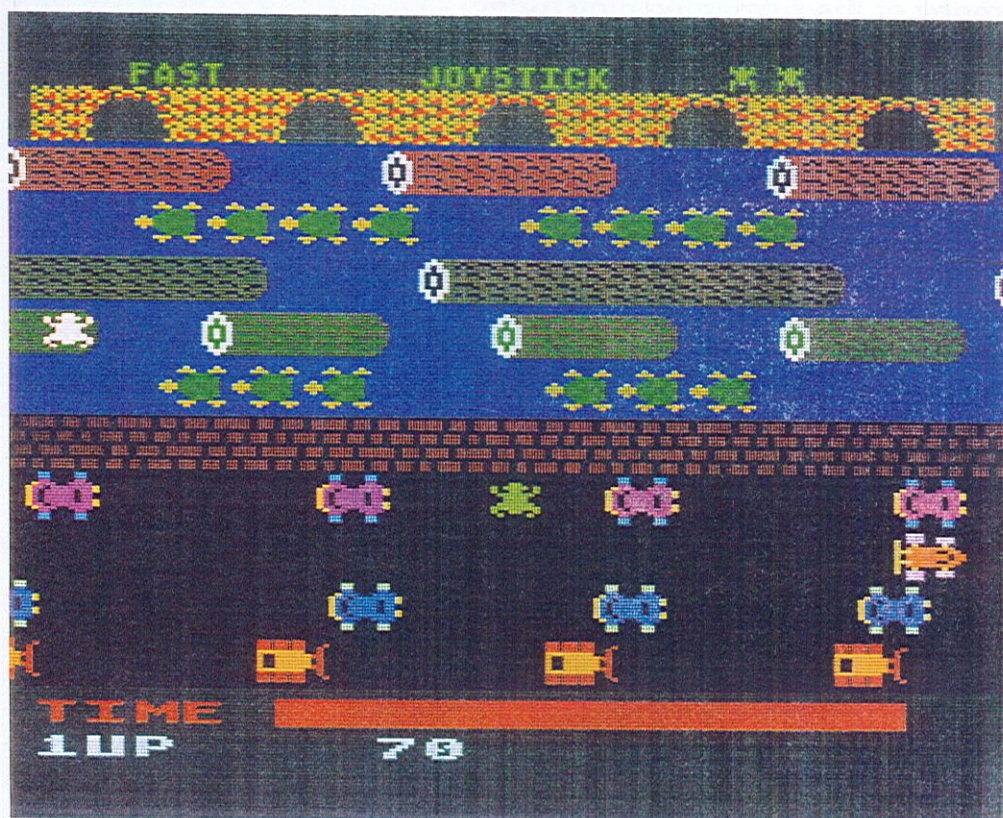


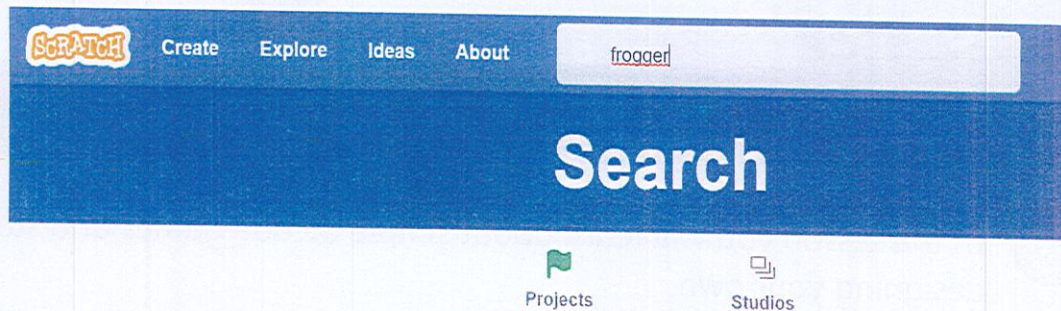
Write down five different block types in Scratch and their corresponding block colour.

Discuss with a partner, then check in the Scratch program itself.

'Frogger'-style game brief

In this game, you are a frog and your goal is to get home to the other side of the screen without hitting any obstacles, many of which are moving.





'Frogger'-style games can be found within the Scratch website. Simply type 'frogger' into the Scratch search bar. The website will display all the different projects and, from there, you can choose a project to play and test.

All 'Frogger' games follow the same general programming rules. They have a basic movement code for the frog and the objects, boundaries for the level, and a start and an end point.

The original Frogger arcade game was made in 1981 by Konami. The aim is to get the frog home safely through lanes of busy traffic using simply up, down, left and right movements. Like many games of that time, it has evolved into many of the games we play today.



Activity 1

With your partner, explore two different game types in Scratch. It includes a number of Scratch-made sample games to experiment with. Search for 'Scratchteam' in the search window and look for the following games: 'Maze Starter' and 'Hide and Seek'.

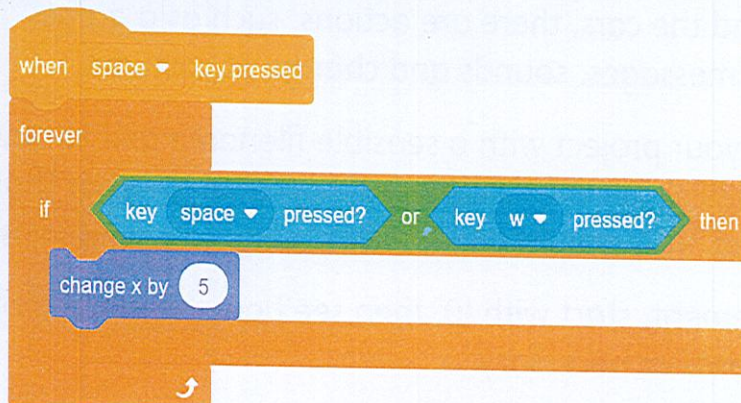
- Are there similarities between the games, and how they work?
- Are the games easy/hard to play?
- Are there different levels of challenge?

Choose one game and explain how it works to the class.

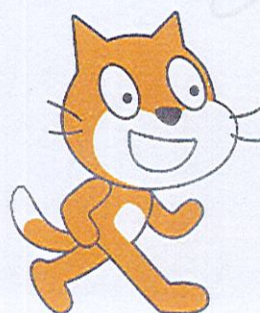
You will create your own 'Frogger'-style game. Here is a reminder of the commands you will need for your game, which should be familiar from the work you did in Year 5:

- linking from movement to key presses (**IF... THEN...** blocks)
- setting obstacle **sprites** to move continually across the level, from left to right (**repeat** blocks)
- if the frog touches an obstacle sprite, the frog stops and displays a text **string** (**IF... THEN...** blocks)
- if your frog reaches home safely, a message sting is displayed (**IF... THEN...** blocks)
- the shapes of the sprites change continually between a set of outfits (**repeat** blocks).

Here is an example of the IF... THEN... commands being used.



The term 'string' in computing is a sequence of characters. In your game, text string can be used to display messages to the user, such as 'Well done!'





Activity 2

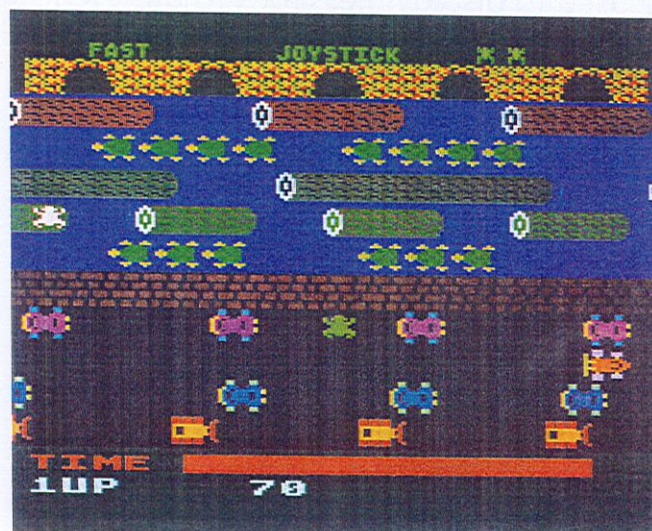
Start planning your game. You need to consider the following points.

- **Background:** you could create or find your own or use one of the pre-set backgrounds in Scratch.
- **Character sprite:** there is a frog sprite you could use or edit to make your own.
- **Sprite movement:** how is this going to be programmed? Left/right, up/down? How many steps will be appropriate for each press?
- **Additional objects:** 'cars' or other obstacles need repeated movement.
- **Character interaction:** when the frog **interacts** with the background and the cars, there are actions, such as a game counter, string messages, sounds and change of costume.

Remember to save your project with a sensible filename and to save regularly. Check small sections of code as you go along, rather than waiting until the end. This should make the debugging process easier.

When adding movement, start with 10, then see how the sprite moves and make adjustments as necessary.

Focus on your background and sprites in this lesson and have a costume ready for when the frog touches an obstacle.



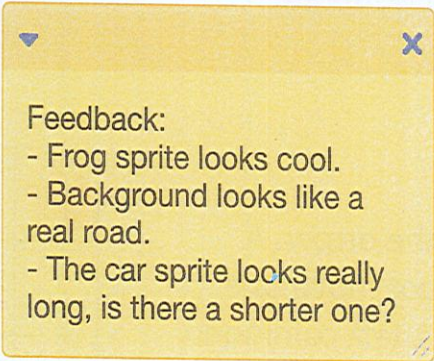


Discuss with your partner your program so far. Show each other what you have accomplished in today's lesson and give your partner the following feedback for the next lesson:

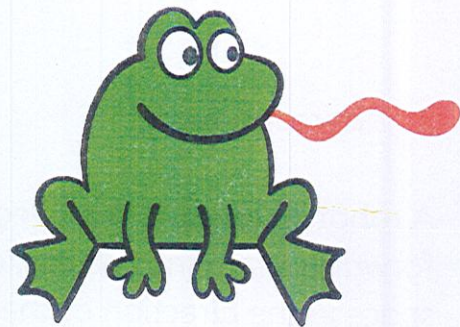
- two things you really like about their work
- one thing that could be made better next time.

Tip

You can add notes to your Scratch program. Simply right-click the programming section and select 'add comment'.

A yellow rectangular comment box with a small blue 'x' in the top right corner and a small blue triangle in the top left corner.

Feedback:
- Frog sprite looks cool.
- Background looks like a real road.
- The car sprite looks really long, is there a shorter one?



I can turn an idea into a program.



I can design the background for my game.



I can create costumes for my sprite.

Unit 2

Mid-unit assessment

Write your answers in your notebook.

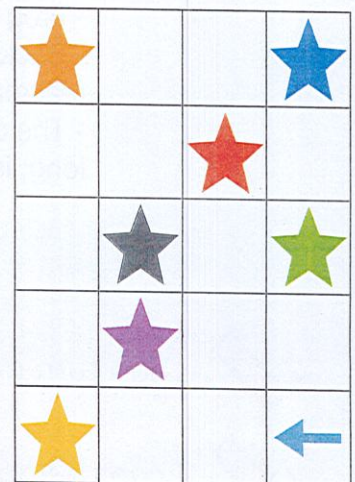
1 What happens if a sequence in an algorithm is wrong?

- A The algorithm will not start.
- B The algorithm will not stop.
- C The algorithm will produce unintended results.
- D The algorithm will function normally.

(1 mark)

2 Here is a map:

A robot is facing in the direction of the arrow. A forward command will make the robot move one space in the direction of the arrow. A left command will turn the robot anti-clockwise 90 degrees – the robot will remain in the same square. A right command will turn the robot clockwise 90 degrees – the robot will remain in the same square.



a) What colour star will the robot finish on if it follows the algorithm below?

Start	Right	Right	Forward
Forward	Forward	Forward	
Forward	Forward	Left	

A red

C blue

B black

D orange

- b) Write an algorithm to get the robot from the starting position to the green star.

(4 marks)

- 3 Why should you include loops in an algorithm?

- A to make the algorithm more efficient
- B to make the algorithm longer
- C to make the algorithm more complex
- D to make the algorithm less efficient

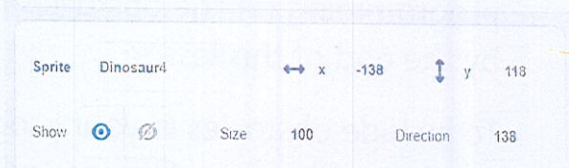
(1 mark)

- 4 Here is a screenshot of a sprite in Scratch.



- a) What is the location of the sprite?

- A (138, 118)
- B (-138, 118)
- C (-138, -118)
- D (-183, -181)

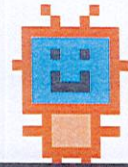


- b) The user wants to set the location of the sprite to the middle of the screen. What value should they input for x and y?

(3 marks)

- 5 What is the aim of 'Frogger'-style games?

(1 mark)



Lesson 6

Creating movement of game objects, including forever loops



In this lesson you will add obstacles to your game and set forever loops.



Key words: forever loop



Discuss with a partner what three things are important to include in a 'Frogger'-style game.

How will you create your backdrop?



Activity 1

List two different Scratch blocks that you will need in order to control the movement of your character.

The aim is to have completed the programming for the obstacles in your game by the end of this lesson.

To include obstacles in your program, you need to add sprites. Click on 'add sprite' and select a car like the one shown. Or you can draw your own using the brush icon.

Next, we need to add movement, which depends on the obstacle. For example, a car will move smoothly across the stage, but an alien spaceship might move in steps to make it harder for the player.



↔ x 35 ↔ y

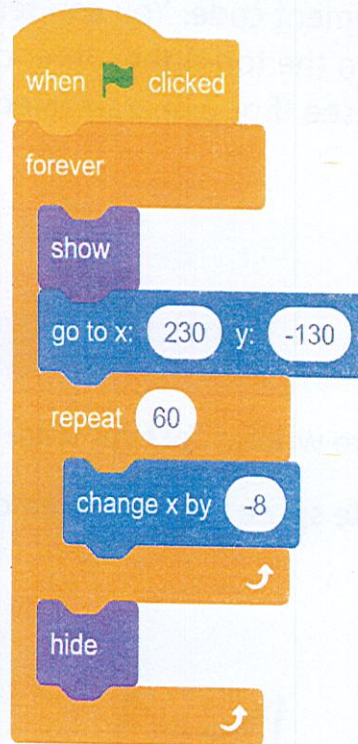
100

Direction

Choose a Sprite

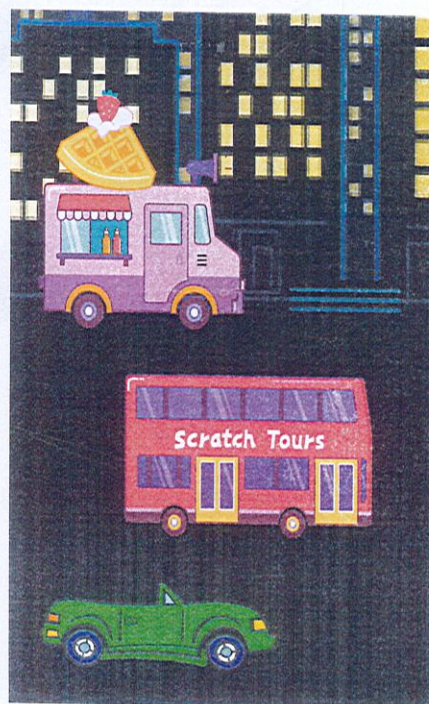


Here is some sample code that repeats the movement of the sprite across the stage.



You should change the y-axis value so that the sprite is where you want it to be. If you decrease the 'change x by' amount, it will change the speed of the sprite and the level of difficulty.

You should program each sprite separately, so you must repeat this three times to have three cars moving in the game.



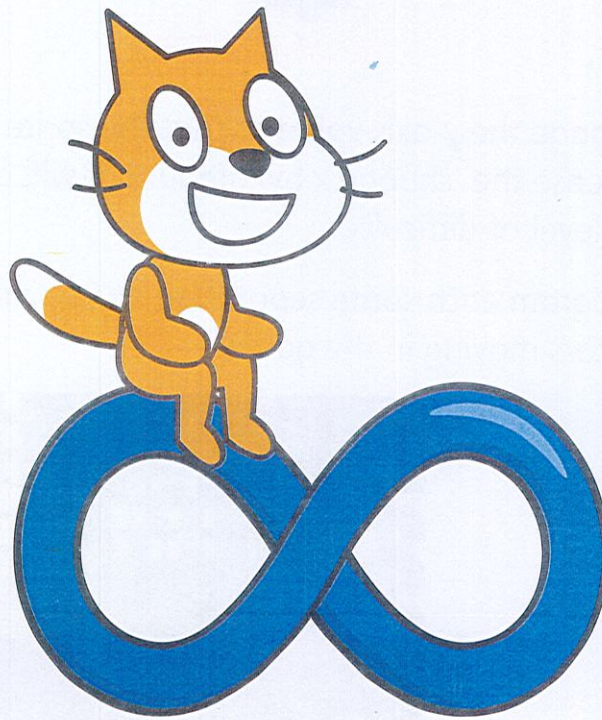
Ensure that you have selected the correct sprite before you start programming the movement code. You can tell which sprite you are working on by looking in the top-right corner of the coding section. In the sprites section, you will see that one is selected. Remember, the centre of the stage is 0,0.



Activity 2

As a class, explore what a **forever loop** does.

Add your obstacle sprite to your game and program them on a forever loop.



Here are some other things that you may want to program for your sprite.

- Flip the sprite so that it 'turns around' to go forward rather than backward, or flips upside down.
- Set the location of the cars when the game is started (when the green flag is clicked).

- Add a reset button so that the user can send the sprite to the starting location if it gets into trouble.
- Resize/recolour the sprites.



Ask your partner to review your game so far.

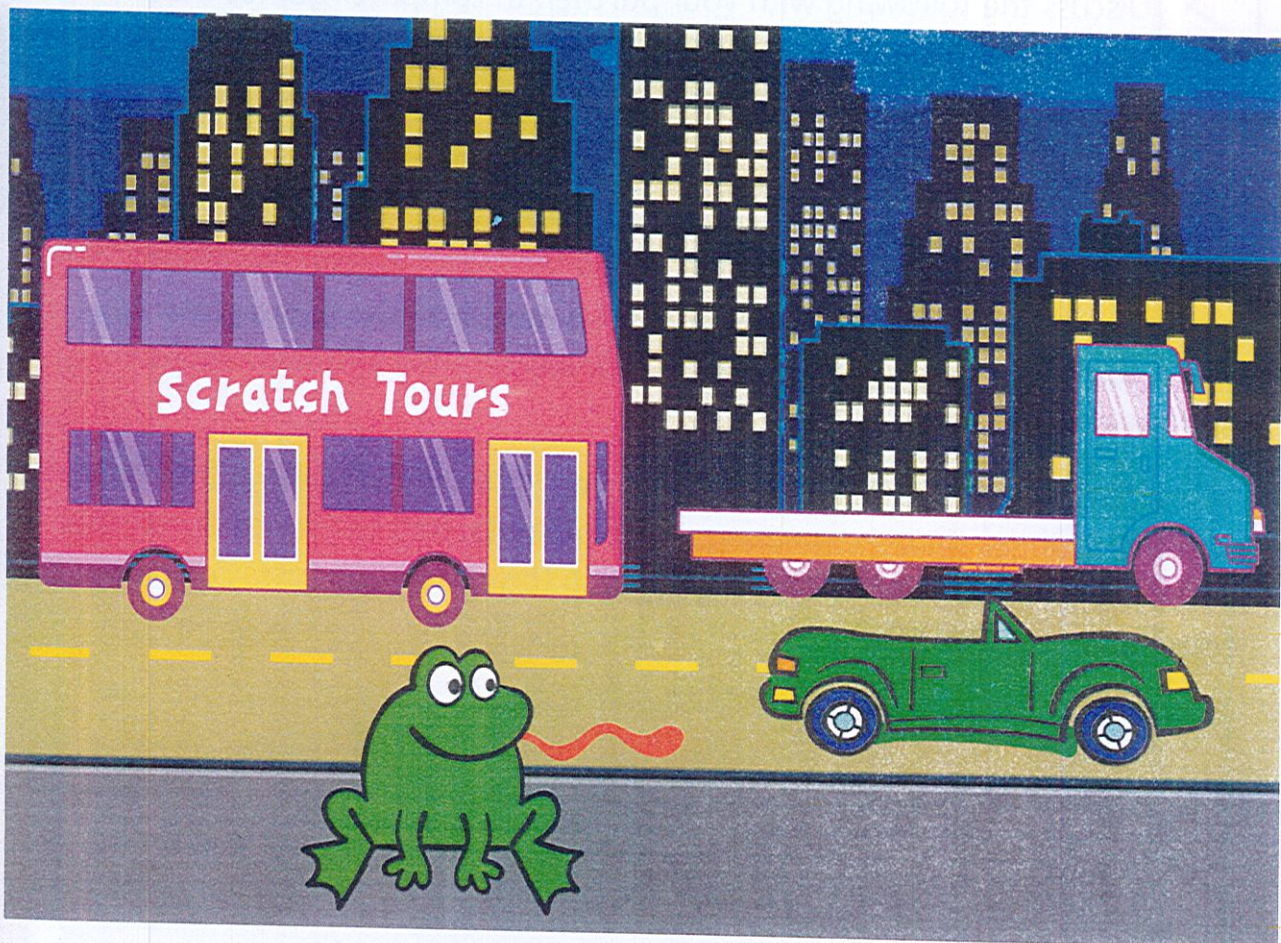
Think of three targets that you can set yourself to work on in the next lesson.

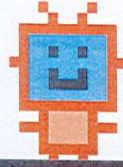


I can add obstacles to my game on forever loops.



I know how to program multiple sprites in my game.





Lesson 7

Using IF... THEN... in a game to add interaction



In this lesson you will add code to tell your program what to do if your sprite touches an obstacle or gets to the other side of the background.



Key words: condition, decompose, IF... THEN..., input, interaction, output, sensing block, string



Discuss the following with your partner. In computer games that you may have played at home or elsewhere, think about what happens when characters or objects collide. Write down three of your favourite ones.

By the end of this lesson you should be able to program your **conditions** to display different messages depending on what the user does. While this seems like a big task, you just need to **decompose** the tasks into smaller manageable blocks.

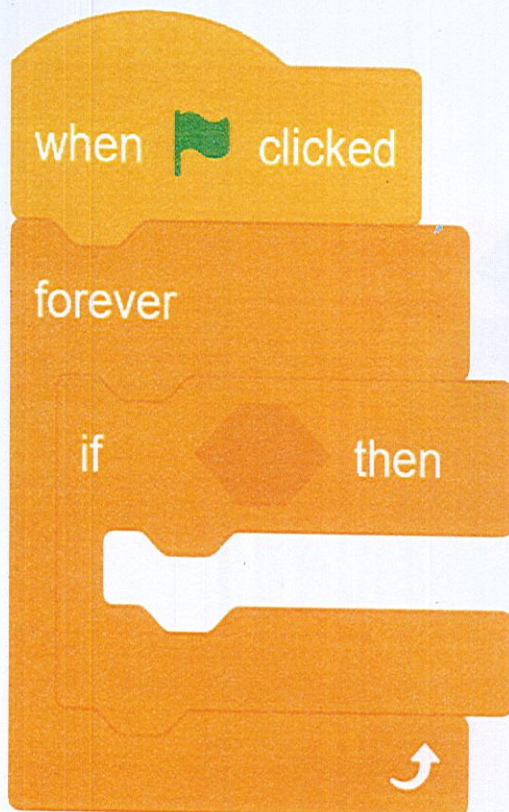
You will use the **IF... THEN...** commands. Your game will display different text and the sprite will change costume as the **outputs**, and the contact with the obstacles or destination will be the **input**. In this instance, sprites colliding is considered an **interaction**.

We need to program what happens to the sprite and the game when the sprite makes contact with a car. This is what we want to happen:

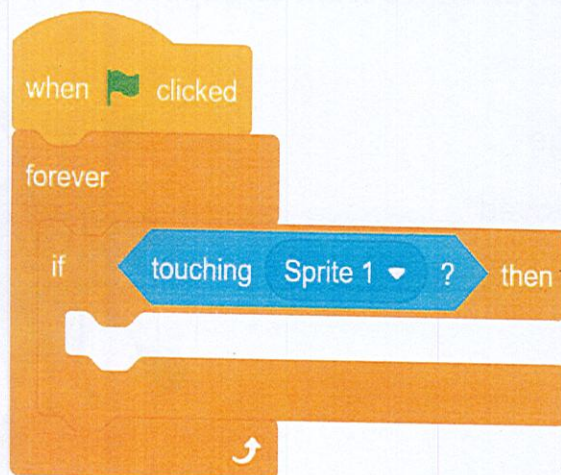
- the game stops
- the sprite costumes change
- a 'splat' sound effect is played
- the game resets after a short time.



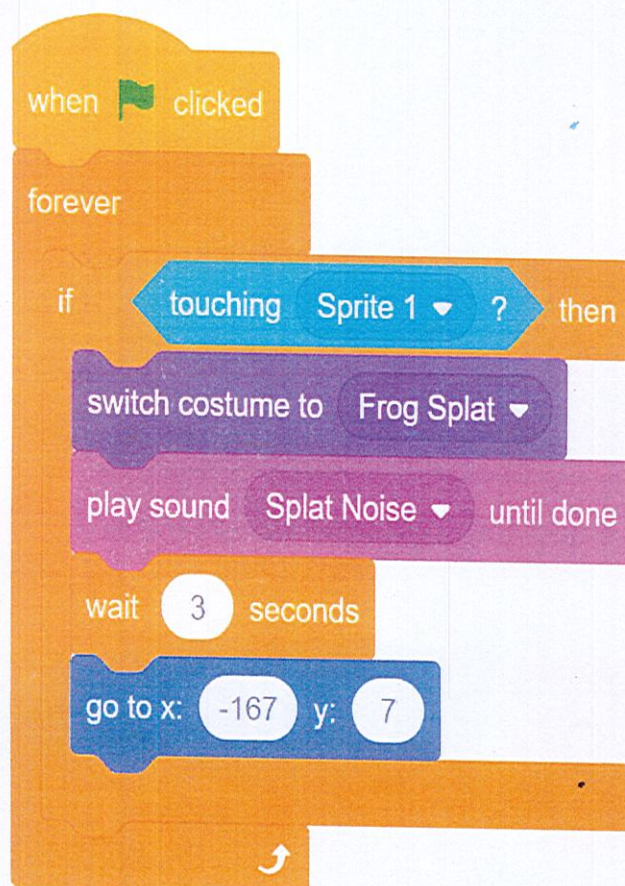
First, set a loop condition that will keep checking for the condition rather than just checking once.



Next, use a sensing block.



Followed by the output block.



Here, you can see that the sprite will change costume to one called 'frog splat', play a sound effect called 'splat noise' and then wait for three seconds before resetting to the starting position.



Activity 1

Write down the condition checks that you have used so far in your game.



Activity 2

Debug your new code and check for errors. A common error is that conditions haven't been set for all obstacles.

Next, you need to set a condition for when the user gets the frog to the destination. We want our game to display a 'Well done!' text string and to play a sound. This will follow a similar procedure to that given above, but you must draw a finish line in the correct place in your game before you can start programming it.



Work in pairs to test one another's work. Give feedback about what is working well and what could be improved. Remember, you can make a note in Scratch comments for next time, to remind you what you have talked about.

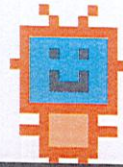


I can use conditional checks in my game.



I understand how to break down a problem into smaller parts.

Lesson 8



Using a variable to create a scoreboard



In this lesson you will use a variable to create a scoreboard for your game.



Key words: scoreboard, variable



In a group, discuss the main features of a **scoreboard**.

- Think about when you may have used or seen one before.
- Why would it be useful in your Frogger game?

A **variable** in computing is simply a place to store data. In this case, the program can store a number value, which will be the user's score.



Activity 1

Before you start adding variables, check your program and the notes you made at the end of the last session. Make any necessary alterations before you start the next task, which is to add a scoreboard.

A scoreboard makes any game into a competition. By the end of this lesson, you should be able to use variables to reset the game and add a scoreboard.

Here are the rules for our scoreboard:

- the game starts with 0 points on the scoreboard
- the score increases by 1 if the player reaches the finish line
- the score is reset to 0 if the game is reset.

New variable name:

score

☒ For all sprites ☐ For this sprite only

Cancel

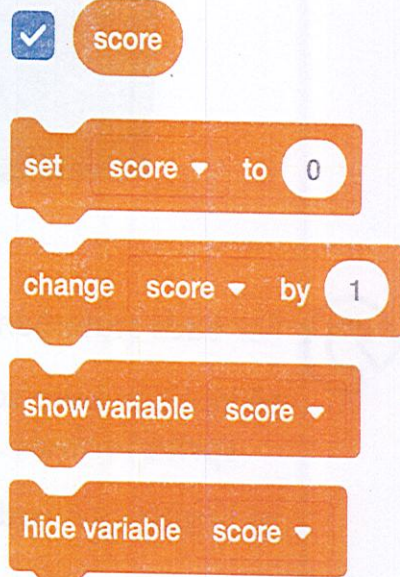
OK

Select the 'Variables' block section and click on 'make a variable'. Give it the name 'score'. This will unlock some extra blocks that you can now use in your game.

The 'set score to 0' block is best used when the game is being restarted.

You can use the 'change score by' block on the successful completion of the game, when the user gets to the finish line.

The blue tick next to the 'score' block means that the variable (the score) will be displayed on the output screen. This can be hidden by unticking the box or using a 'hide score' block.



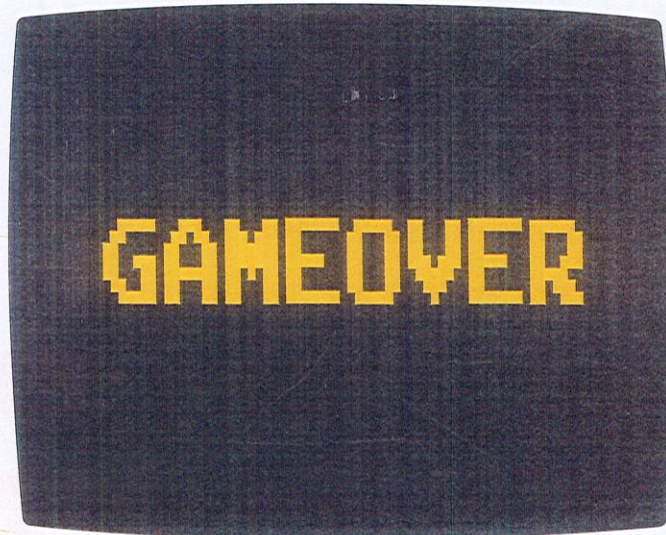
Activity 2

With a partner, look at games that other students have created. Are there any tips you can give them to help make their games better?

Can you borrow some ideas from their games to use in your own?

Remember, the feedback you give or receive about your games is something that you can choose to use or not to.

If you have time, you could program another variable to count down every time the frog is hit by a car. When all the lives have been used up, the game could stop and display a 'GAME OVER' background. Think about how many lives the frog should start with.



For each statement, pick the correct answer from the options.

- a) You can keep score in Scratch by using a **function/variable/sprite/formula**.
- b) Scratch is a **code/computer/programming tool/animation**.
- c) To change the appearance of a sprite, we change the **look/style/stage/costume**.
- d) Finding and fixing problems in code is called **fixing/correcting/debugging/breaking**.



I understand what variables are.



I can use variables in my game.

Lesson 9



Alpha and beta testing a game



In this lesson you will learn about debugging, and alpha and beta testing.



Key words: alpha testing, beta testing, interaction, output, result, test plan



Write down four features that you have used in your game. Think about which of these might still need to be debugged to work effectively.

Alpha testing: testing that is carried out in-house by the programmers or an in-house testing team (you and your group).

Beta testing: carried out by users outside the company, such as potential game players or professional testers (in this case, your classmates).

ALPHA
TEST

BETA
TEST

RELEASE



Before any game is ready for an audience to play, it needs to be run multiple times and alpha-tested thoroughly. The creator needs to be happy with how it runs and any remaining bugs should be found.

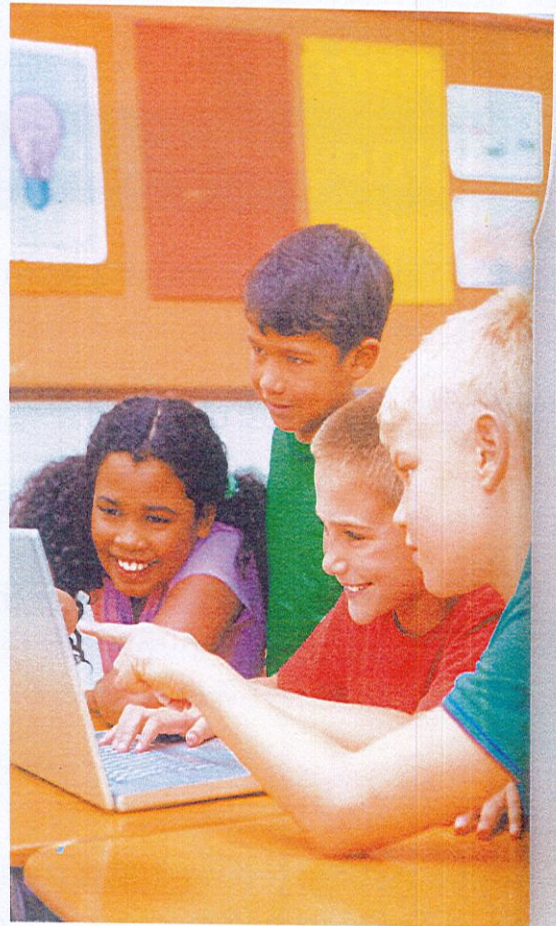
Common bugs to look out for in a 'Frogger'-style game are that:

- the game runs fine for one run, but then starts to go wrong – either a repeat or reset command is incorrect
- scores do not change correctly – maybe an 'if touching' or 'set variable to' command is missing
- messages are not displayed correctly – remember, the program will read the commands from the top down.

When testing games, you should use a **test plan** of expected and actual **outputs** or **results**, and any action required (if a problem is found). Test plan elements could include:

- the game starting sequence: positions, scores and movement
- **interaction** when a frog hits an obstacle (or similar)
- the reset function
- the variables, such as the life counter or the scoreboard.

Use your coding skills to predict what the program should do and then see what actually happens.



The f
feedb
consi





Activity 1

Carry out alpha testing of your game.

The final stage will be to allow others to beta test your game and provide feedback. By playing the game for real, they will find problems that you never considered, especially if they try it multiple times.



Activity 2

Carry out your beta test of your game with as large a sample of players as possible.



Activity 3

Discuss with a partner why beta testing is very important for game designers.



Study the results of your alpha and beta testing. Share how you found the experience with your partner and discuss what you have gained from testing your game.



I can debug programs.



I know what alpha and beta testing is.

Lesson 10



Completing a game and reviewing your learning



In this lesson you will complete your game and produce a user guide.



Key words: complex, feedback, learning, screenshot, user guide



As a class, think about how to give **feedback**:

- sensitively
- about the game, not the person designing the game
- constructively
- not forcefully
- using the style of two stars and a wish.





Activity 1

Make changes to your program so that your game is completely finished, and you *know* that it is working as it should.

Once any new game, or program, has been completed, most professional programmers will create a **user guide**. A user guide should explain what the aim of the game is and list the basic controls. Simple language should be used, so that the game does not appear to be overly **complex**.

A word processor is the most appropriate application to use to create a user guide as it is mainly text with only a few images. It should be created using a simple font so that the text is easy to read. Here is an example.

Welcome to my frogger game.

Get the frog to the other side as fast as you can.

Use the arrow keys to move the frog and take care to avoid the cars.

You have three lives to complete the level.

If you reach the other side, you get a point.

Good luck!



SCORE



Activity 2

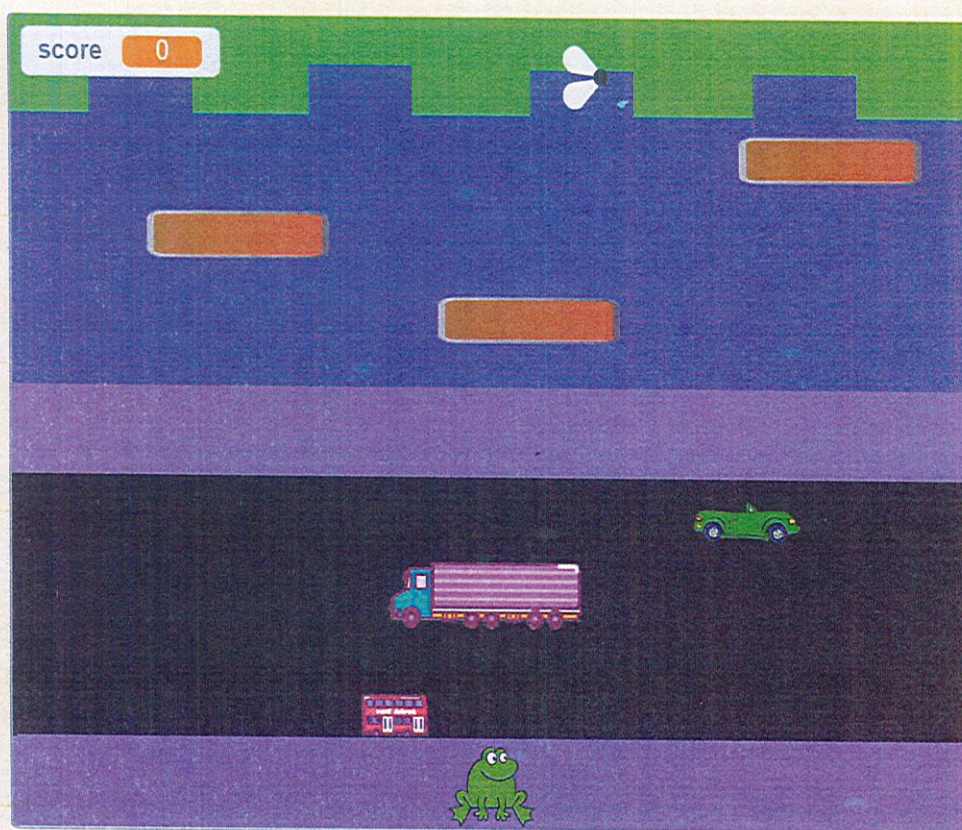
Start planning your user guide. Discuss with a partner:

- the object of the game
- how to start the game
- how to win/score.



Activity 3

Create your user guide. You could include **screenshots** of your game for an even more comprehensive guide.





Activity 4

Swap user guides with a partner. Spend some time playing your partner's completed game, and give them feedback about how easy their user guide was to follow.



Activity 5

Present your game to the class.

- Explain that you have put your game online.
- Tell your audience why your game is definitely one that everyone should play.
- Highlight the main features by using persuasive language.



Discuss with your partner two things that you feel you have improved and can do well, and one thing you feel you could still improve further, and explain why.

- What feature of your game are you most proud of? Why?
- What feature would you like to change or add? Why?



I can complete a game.



I can produce a user guide.

Unit 2

End-of-unit assessment

Write your answers in your notebook.

- 1 What is the name given to the process of finding and correcting errors in programs?

(1 mark)

- 2 Write a short algorithm to put on your coat.

(3 marks)

- 3 Describe the purpose of the two Scratch buttons below.



(2 marks)

- 4 Why would a user want to use this Scratch block?

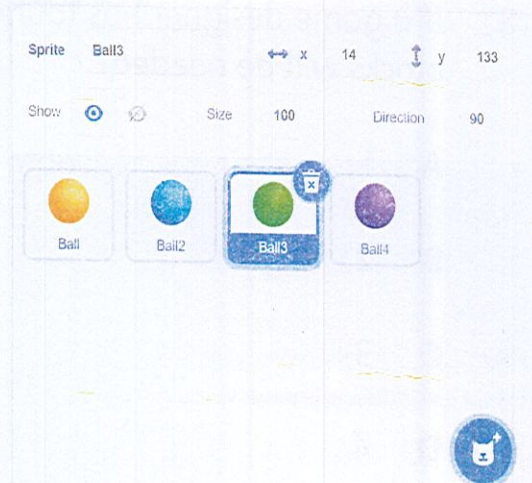


- A to add repetitions
- B to draw or edit a sprite or background
- C to program the sprite
- D to open the paint app

(1 mark)

- 5 Which value should be changed when setting the vertical position of a sprite?

A W
B X
C Y
D Z



(1 mark)

- 6 Here is a stack of blocks from a Scratch project that a student is working on.

What type of conditional check is this known as?

A condition to start an action
B condition to switch an action
C condition to stop a repeated action



(1 mark)

- 7 Explain why a repeat forever command is used. What happens if this is not included?

(2 marks)

- 8 If a game designer has four obstacle sprites, how many IF... THEN... blocks will be needed?

A 1
B 2
C 3
D 4

(1 mark)

- 9 When you are making a game, you may want to use a scoreboard to add an extra challenge for the players.

score 0

What is the score known as in programming?

A selection
B backdrop
C variable
D sprite

(1 mark)

- 10 Which block should you use when resetting your game?

A wait 1 seconds

B go to random position ▼

C change Score ▼ by 1

D set Score ▼ to 0

(1 mark)

- 11 Write two variables that could be added to a 'Frogger'-style game. (2 marks)
- 12 Explain what is meant by the term 'decompose' in computing. (1 mark)
- 13 Explain what beta testing is. (1 mark)



Read the sentences. Do you agree? Think about what you have learned.

- I can understand algorithms.
- I can use logical reasoning to explain how an algorithm works.
- I can debug algorithms and programs.
- I can create algorithms to solve a problem.
- I can write code.
- I can program multiple sprites in my game.
- I can use conditional checks in my game.
- I can understand how to break down a problem into smaller parts.
- I can use variables in my game.
- I can alpha and beta test my program.

Unit 3

Networks in society

In this unit you will look at the impact that technology has on us. You will research the uses of a global network (the internet), online communities and social networks. You will look at the dangers of using these communities and how to stay safe when using them. Finally, you will consider the positive effects and benefits of physical networking and create a code of conduct to share with others.



Key objectives

-  To understand the impact of networks on information services, such as learning, entertainment or leisure.
-  To understand the social impact of the use of networks, including social interaction, cyberbullying, physical activity and anonymity issues.
-  To understand key features of online communities.
-  To select, use and combine appropriate software applications to design and create a range of content that accomplishes given goals.
-  To know safe, responsible and respectful practices when using digital technologies.
-  To be able to recognise unacceptable behaviour and report concerns about content.



Lesson 1



The impacts of technology



In this lesson you will investigate how technology has changed our daily lives.



Key words: impact, technology



Work with a partner and think about the following.

- What is **technology**?
- What exciting pieces of technology have been invented in the last 10 years?
- In one sentence, try to define what technology is.



Considering that smartphones have more computing power than the Apollo II spacecraft, which reached the moon in 1969, it would be fair to say that technology is at the heart of how our civilisation is developing. In this lesson you will investigate the **impact** of technology on our everyday lives.



As you may notice, the modern classroom has a whiteboard, computers, colourful posters and artwork on the walls, and often groups of chairs rather than rows.



Activity 1

Think about how classrooms change as technology changes. Discuss this with your partner and come up the following:

- two classroom changes in the last hundred years
- two classroom changes that might happen in the next hundred years.



Activity 2

As a class, interview your teacher about how one form of technology may have changed considerably during their lifetime.

- What has changed and how?
- Do they think that it is a positive or a negative change?
- How easy/hard was it to use technology in the past compared to now?

Make notes of your thoughts and discussions in your notebook.



Activity 3

Think of an example of modern technology, such as a smartphone or smart speaker. With your partner, discuss what it can do and how this might change considerably in 10, 20 or even 50 years.

In your notebook, draw and label what features you might expect to see on your item in the future.



Explain to your partner what you think are some of the positive and negative aspects of the continuing developments in technology.



I understand how technology has changed over time.



I can think about the impact of technology on our daily lives, both positive and negative.

Lesson 2



The impact of technology on information services



In this lesson you will investigate the impact of technology on information services, such as those used in learning, leisure and entertainment.



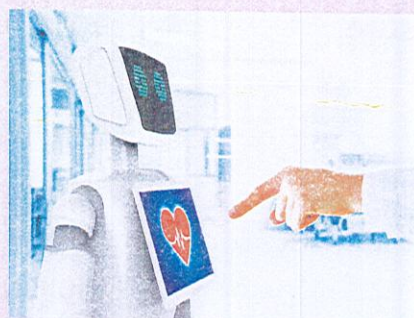
Key words: entertainment, impact, learning, leisure, technology



Read the following scenario.

Doctors, nurses and other staff are looking after patients in a hospital. A person comes in with a broken leg and is first seen by a doctor in the emergency department. The patient is then taken to a different department of the hospital for X-rays and then another department to put a cast on the leg. Finally, the patient is discharged by an administrator.

Imagine a hospital without doctors and nurses present, just machines and robots. There might be robots carrying out the role of a doctor, a nurse, a cleaner and so on. Think of a robot carrying out an operation, making precise movements and all accessible on a screen, or diagnosing medical conditions.



Discuss the scenario with your group.

- Who does this technology have an impact on?
- How does it affect them? Could it be both positive and negative?

In this lesson we will look at the learning, entertainment and leisure industries. The table below considers how the internet has changed the ways we can learn, enjoy entertainment and use our leisure time.

Industry	What we did before the internet	What we can do because of the internet
Learning	■ go to school ■ read a book ■ talk to teachers or experts ■ talk to family or friends ■ visit a museum or library	■ use virtual learning environments (VLEs) ■ stream educational videos and podcasts ■ join chat-based learning communities ■ video-meet with teachers anywhere in the world
Entertainment	■ watch a scheduled TV programme from a handful of channels ■ record a programme using a VHS recorder to watch later ■ listen to music on vinyl records, cassettes and compact discs	■ choose from hundreds of streaming TV channels ■ use on-demand streaming services for TV, film and music ■ play online multiplayer games on computers, tablets and smartphones
Leisure	■ book holidays using a travel agent ■ join local leisure and sport clubs ■ go out and explore ■ look in local newspapers or magazines for ideas	■ research and book holidays from home ■ research clubs and leisure facilities before trying them ■ join virtual clubs with members around the world ■ video-call family and friends anywhere ■ meet new friends using social networks



Activity 1

Using the table on the previous page, create a mind map to note real-life examples of things you or your family might have experienced for each of the categories – learning, entertainment and leisure. Include:

- examples before and after the internet became a key element
- positive and negative impacts.



The introduction of internet streaming technology has completely changed the ways young people watch television and films. In addition to smart TVs, so many handheld devices now also have the same ability to stream content. Limitless entertainment is only a few clicks or taps away.

Positives	Negatives
■ Content can be accessed any time, anywhere. ■ Favourite parts can be quickly skipped to or back to. ■ You can make comments to other viewers and the makers of the content.	■ Forgetting to take a break as programmes and other content don't naturally end like scheduled TV. ■ Peer pressure from friends and online communities about what to watch. ■ Lack of parental control over what is accessed.



Activity 2

Think about an imaginary student your age. They watch TV shows, listen to music, play games, chat to friends and spend many hours on their digital devices each day. They cannot seem to relax without them! This character hardly does any sport or other exercise outside school, spends many hours in their bedroom and gets upset and angry if their devices are taken away. Discuss the following questions with your partner.

- What concerns do you have?
- What advice could you give them?

Remember, the impacts of technology can be both positive and negative. It is important to be aware of the risks of developments in technology.



In future lessons, you are going to research an area from **one** of the three industries covered in this lesson. Discuss with your partner which area you have enjoyed hearing about most today.

- Was there anything that you found surprising?
- Have there been more impacts than you first thought?
- Which industry do you think you want to research and why?



I can consider the impacts technology has had on industries such as learning, entertainment and leisure.



Lesson 3

Planning a research project



In this lesson you will plan your research into your chosen industry.



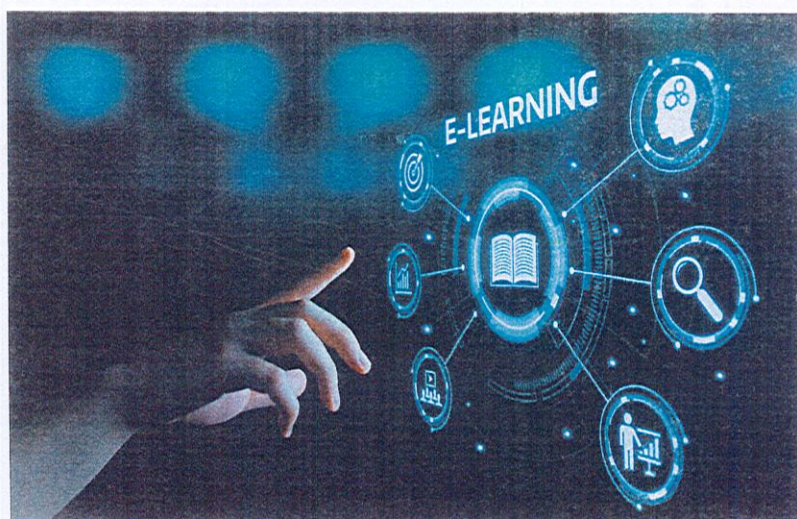
Key words: entertainment, impact, presentation, report, technology



In this lesson you are going to start your research into the impact that technology has had on the industry you have chosen.

Here are some general questions that might help you. You can adapt them to help you to think about your project.

- What industry are you going to cover?
- What technology does that industry use today?
- How has the technology changed (had an impact on) this industry?
- Who is affected by the changes to the industry? (Has it made things faster or perhaps taken jobs away from people?)
- Are there any negative impacts of the technology?
- Are there online communities to advertise, educate or discuss the industry?





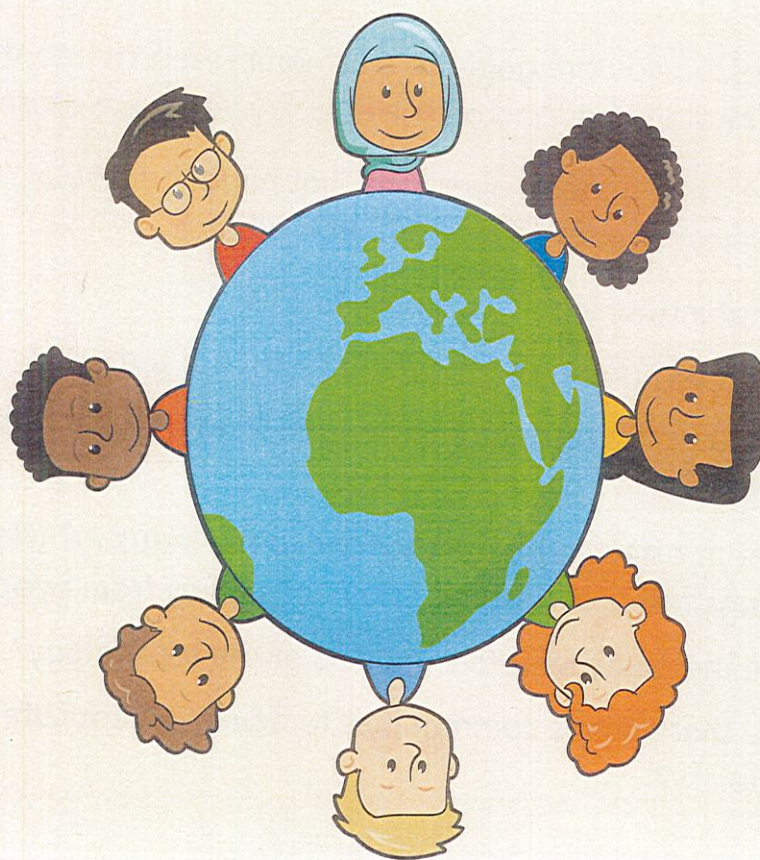
Activity 1

“Our world is now a global village.”

(anonymous)

Discuss this quote with your class or group. What does it mean?

Can you think of how/why a ‘global village’ might be a good thing?



You can do research for any project by using:

- **printed resources:** library books, newspapers, magazines or leaflets
- **interviews:** talk to people with experience, ideally people of different ages, to collect a range of opinions
- **the World Wide Web (WWW):** use the skills gained in Unit 1 and always look for reliable and appropriate content that you feel you can trust.



Activity 2

For your research, think about any key words that you might use to help you search for the information online. Write some of these down as a starting point.

Think about whether it is important to type the whole question in the search bar.

You will need to think about how you are going to show your project to your classmates. This could be in the form of a:

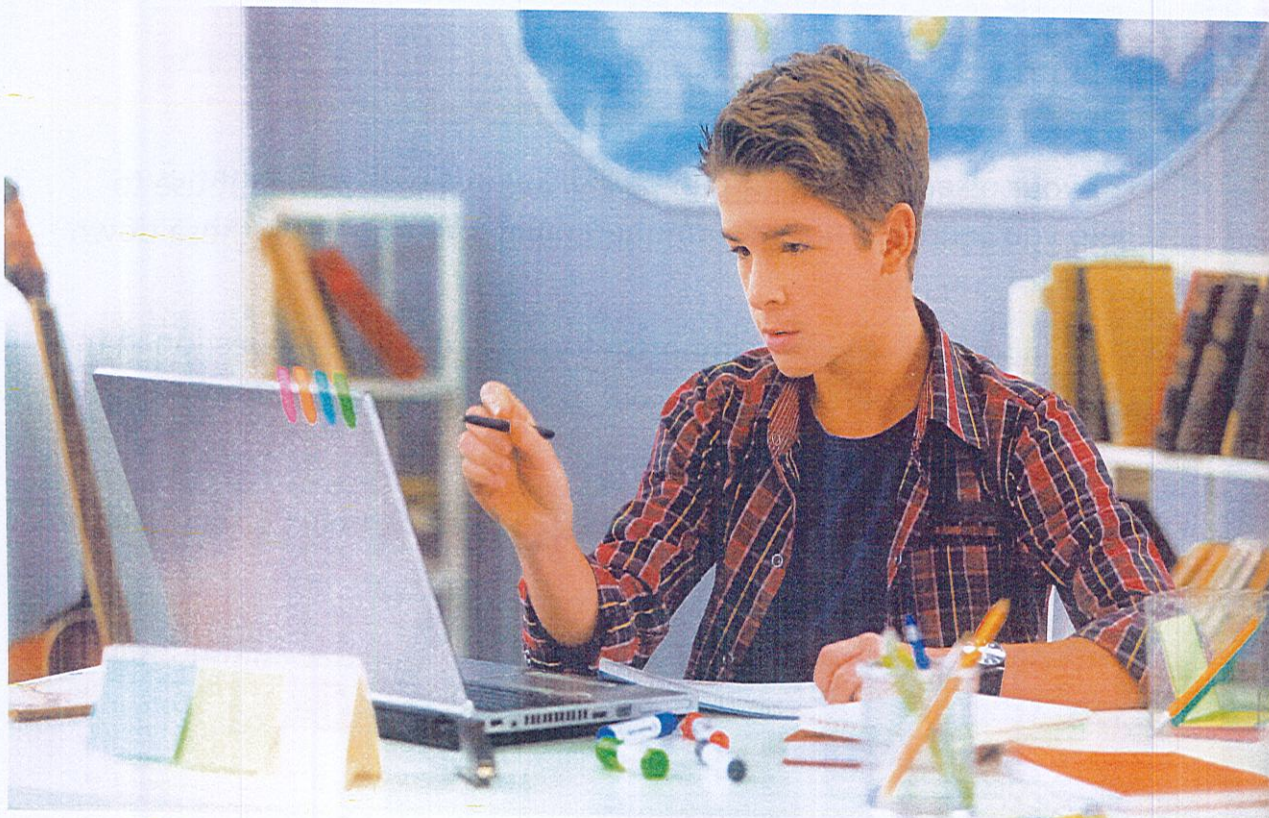
- presentation
- report
- audio podcast
- video
- poster.



Activity 3

Start your research and make bullet point notes about the information you find. Try to include the following:

- historical facts
- real-life examples
- positive and negative opinions
- examples of potential future use.



Discuss with your partner what you have achieved in this lesson and what method you have chosen to present your findings. Make notes in your notebook of the tasks you need to complete in the next lesson to continue your research project.



I can plan a research project.



I can use the World Wide Web (WWW) to find information.



I understand the key features of software and can choose a suitable application for the task.

Lesson 4



Analysing your research into technology



In this lesson you will analyse and complete your research into the impacts and risks of technology on your chosen industry.



Key words: analyse, appropriate, bookmark, reliable, research, social media, unbiased



Discuss the following statement with a group:

Most information found on the internet is true, especially all the facts and figures.

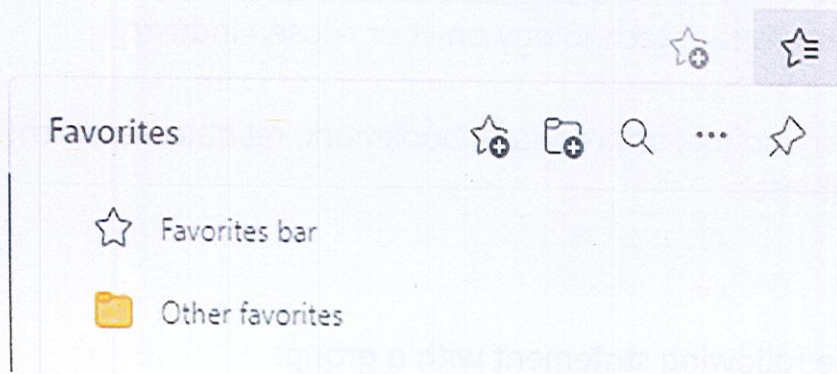
Do you agree or disagree with this statement? Give your reasons why.

Next, discuss what key words and advanced search techniques you might use when researching your project.

As you are conducting your **research**, it is important to **analyse** the sources you find in order to make sure that the information given is accurate and suitable. Here are some useful questions to help you to decide if the information is **appropriate** or not.

- Do I understand the information, and would my audience also understand it?
- Is the information **reliable**? (Is the website trustworthy? News websites may be a good source of reliable information, but they may be biased.)
- How do I know it is reliable? Should I check it against another source?
- Are the images appropriate for my audience?
- Is the information **unbiased**? Are there a lot of personal opinions?

Remember to save useful website addresses so that you can return to them later. Either copy the address and paste it into a text document or use your web browser's 'bookmark' or 'favourite' tool.



Online communities

When you do a research project, you should take into account the opinions of real people. Online communities can be a good source of these. Such communities include **social media**, forums, message boards, messaging services and blogs.

The content posted on such sites can provide useful information, but they also all share a similar disadvantage: how *real* are the users if you don't know them in real life? Here are some examples of where useful research might be found:

- **leisure industry:** social network group pages
- **learning industry:** subject-specific help forums, learning post comments
- **entertainment industry:** social media pages for shows and those working for them, both official and fan-based.



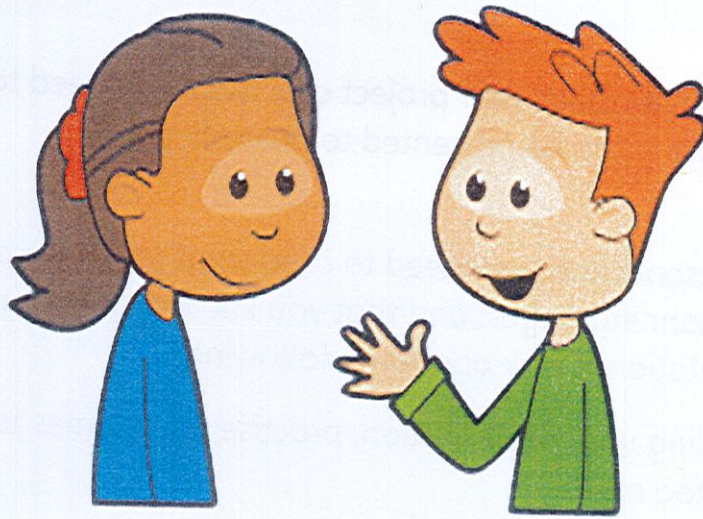
Activity 1

Include an example of an online community in your research, making sure that you apply the same rules of judgement and appropriateness as you would for any other online research you might do.



Report on your progress to a partner and explain how you will present your findings. Also discuss the following questions.

- Are you finding the research difficult? If so, why?
- Where can you find help if you are stuck?



I can research information on the World Wide Web (WWW) and check its reliability.

Lesson 5



Presenting a research-based project



In this lesson you will finalise your project and present it to the class.



Key words: impact, presentation, social media



Talk to a partner about your project and what you need to get finished before it can be presented to an audience.

To finalise your **presentation**, you need to check that you have covered all the points from your planning pages, and that you know how you are going to deliver your presentation. Think about the following:

- if you are reading your presentation, practise a few times to avoid looking at your notes too much
- the order of your presentation – check that it is correct and that it flows well
- if it is audio- or video-based, prepare a short verbal introduction
- keep it to two minutes, as that is a good length for any presentation.





Activity 1

Practise your presentation with a partner, and check that you have both followed the advice listed on the previous page.



Activity 2

Time to give your presentation!

When listening to presentations given by other students, think about whether they mentioned any risks or impacts of technology that you had not thought about. Note them down.



When you have listened to all of the presentations, look over your notes and draw together any common **impacts**, positive and negative, such as these:

Using online forums
can be risky because...

Using the
internet might
always be risky
because...

Using **social media** can
be good because...

The World Wide
Web (WWW) is
beneficial because...

Discuss your ideas with your partner.



I can present my project to my classmates.



I understand the impacts of technology on the leisure, learning and entertainment industries.

Unit 3

Mid-unit assessment

Write your answers in your notebook.

- 1 Name three devices that can be used to access streaming TV and films other than a modern smart TV.
(3 marks)
- 2 Explain how technology has allowed users to access information more easily than in the past. Include how people got information before and after the advent of the internet in your answer.
(2 marks)
- 3 Explain how technology has changed the ways that people can watch television. Include how people watched TV before the invention of streaming services and mobile devices, and how people watch it today.
(2 marks)
- 4
 - a) Name an advantage that technology has given to users who want to take part in physical exercise.
 - b) Name a disadvantage that technology has given to users who want to take part in physical exercise.
(2 marks)
- 5 Name three ways that you can research a topic.
(3 marks)
- 6 Which of the following is not an example of an online community?
 - A social media group chat
 - B computer science forum
 - C printed magazine
 - D video channel comment posts
(1 mark)

Lesson 6



A class survey on the social impact of technology



In this lesson you will design a survey to find out about the social impact of technology and analyse the results.



Key words: collate, cyberbullying, online, open and closed questions, social networking



Discuss with your partner the impacts of technology from the last lesson. Think about each of the three industries that were looked at, and give a positive and a negative impact. Think about how this might be affecting our behaviour and the choices we make.

Technology has changed our behaviour. Here are some examples that you might have discussed:

- Watching videos **online** on a portable device rather than on a TV or cinema screen. This could lead to isolation, less socialising with family and friends, and being less active.
- The use of **social networking** instead of meeting friends in person can lead to increased isolation, less exercise and increased risk of **cyberbullying**. Body language, facial expressions and our tone of voice can be lost or misread online.
- Playing computer games instead of playing physical or mentally challenging games in person can lead to decreased physical activity and increased isolation.



The aim of the survey is to further understand how technology has a social impact on specific members of your class. You will need to think of a set of questions to put to your interviewees.

For example, if you are studying the impact of online entertainment, you could ask questions such as these.

- Have you watched any videos online in the past week/month?
- How many have you watched?
- What topic(s) did the videos you watched relate to?
- What might you do instead of watching videos?
- What did you do before you had access to videos?

Use a mix of both **open and closed questions**. Open questions are ones without a definite answer, so the person can explain what they think freely. Here is an example.

Tell me about your favourite TV show.

A closed question is where there is a definite answer. You can make questions closed by giving a choice of answers, such as the following.

Which type of TV show is your favourite?

- A comedy
- B science fiction
- C quiz games
- D drama



Activity 1

Discuss with your partner what questions you could ask about the impact of technology. What does it mean to use 'open' and 'closed' questions?

Come up with four closed questions and two open questions.



Activity 2

When you have all your questions, you can begin your interviews.

Interview your classmates and teachers. You can record the results in your notebook.

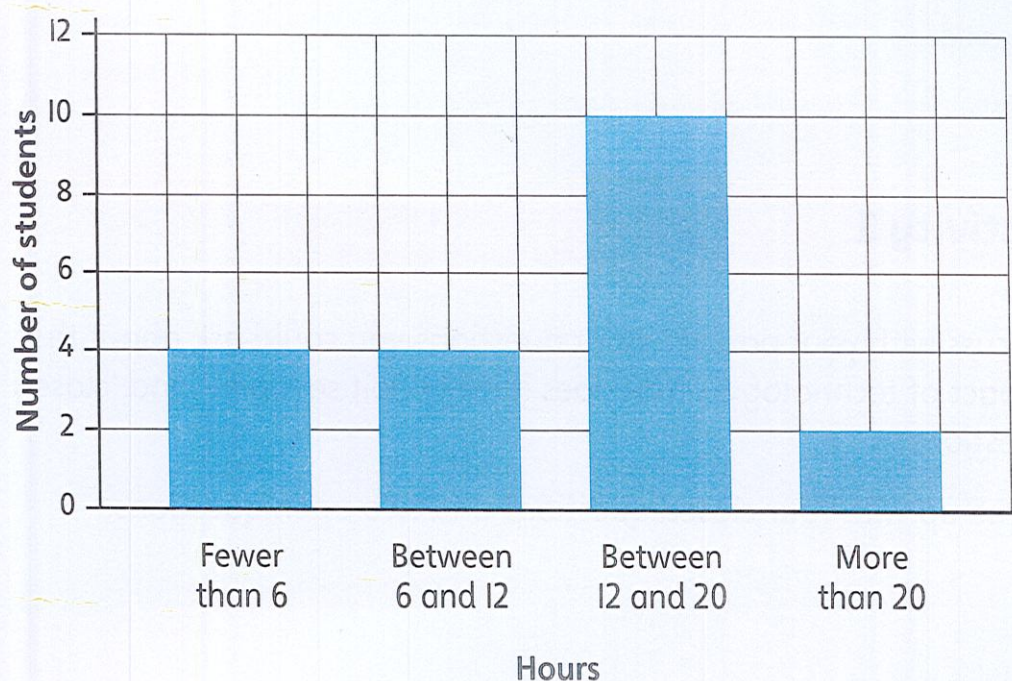
After you have collected your answers, you should **collate** the data. This means that you look at the responses and see if there are any trends. The easiest way to do this is to sort and count the responses. For example, in a survey of 20 students:

- 12 students watch a video every day; 8 do not
- 10 students took part in non-online activities, such as football, dancing and art – 4 of these were male and 6 were female.

Next, analyse the results and display them. Here are three ways this could be done.

- Write a series of statements, describing the key results.
- Create simple graphs or charts using an online chart creator.
- Enter your data into a spreadsheet and use the built-in chart tools.

Time spent watching online videos in the last week





Activity 3

Layla has the following results from her class survey.

- 11 students generally spend one hour online after school.
- 13 students spend two hours online after school.
- 6 students do not do any online activities after school.

Work with your partner to answer the questions below.

- How could you present this data?
- How many children were surveyed altogether?
- How many hours are spent online after school by all of the students in Layla's class?



With your partner, generate three or more data questions that could be answered by other classmates when looking at the charts that you have created.



I can design a survey to find out about the social impacts of technology.



I can analyse my results using appropriate software.



Lesson 7

The benefits of physical social networking



In this lesson you will investigate the social benefits of physical networking.



Key words: physical networks



Tell your partner the different types of physical activities that you and your family might do each week.

- Which activities do you participate in individually?
- Which activities do you participate in as a family or with wider family and networks of friends?
- How often do you take part in your favourite activity each week?



Taking part in **physical networks** can have many benefits. You can learn new things and make friends. By meeting other people face to face, you will be practising your communication skills without thinking about it. These things cannot be replaced by online social networks, but technology can help us to take part in them.

For example, if you go to a football club, you play football, yes, but think about it and try to break down what you do into all the things that you do. You work on your fitness, fine-tune your muscles and coordination, communicate with your teammates, work on attacking and defensive strategies, predict the flight of the ball and watch the movements of the players, to name a few things. You do a lot more than just play football.





Activity 1

Read the scenario below.

Sofia had activities after school every day this week.

Monday: Sofia did one hour of gymnastics at the local sports club and then played a tennis match against her brother. She also spent an hour doing homework with her best friend, who, luckily, lives next door to her.

Tuesday: Sofia went to a baking class with her mum and, afterwards, they went swimming together.

Wednesday: Sofia had a playdate with her friend and also had a violin lesson.

Thursday: Sofia had an after-school science club and more gymnastics.

Friday: the whole family went to watch a film, followed by a meal with some family friends. It was so much fun!

With a partner, highlight all the activities that Sofia did.

- Which activities involved lots of communication?
- Which activities included some competition?
- Are there any activities that Sofia carried out alone?
- How did technology help Sofia to take part in these activities?

Technology has made finding information about physical networks much easier. For example, you can:

- research new clubs using the World Wide Web (WWW)
- book activities, lessons and cinema tickets online
- let friends and family know about the activities you are taking part in.



Activity 2

Work with a partner and discuss the following scenario.

You have been given an opportunity to design a brand new club for your local area. It can be a sport, social or creative club.

- What would you like this new club to be?
- What types of activities would it include?
- How would the club members network with one another?
- What other facilities might you include to encourage this?
- How could technology help the club to get started?

Be as creative as you can!



Is online social networking always a bad thing? Discuss this as a group, giving reasons why/why not.



I know what a physical social network is.



I can explain what the advantages of physical social networks are.



I know how technology can support physical social networks.

Lesson 8



Online social networking



In this lesson you will learn about online social networks and some of the possible risks associated with them.



Key words: anonymity, block, cyberbullying, moderate, moderator, report, social networking



Think about what the term 'social network' means. Discuss this with your partner and write down a simple definition in your notebook.



In this lesson we are going to discuss **social networking**. A lot of social networking websites have an age restriction of 13-plus for individual accounts. According to research, however, lots of children under the age of 13 use them, with or without parental permission. Whatever the case, it is important that you understand what social networking websites are, what behaviour is acceptable and what to do if someone is acting in a disrespectful way.



Activity 1

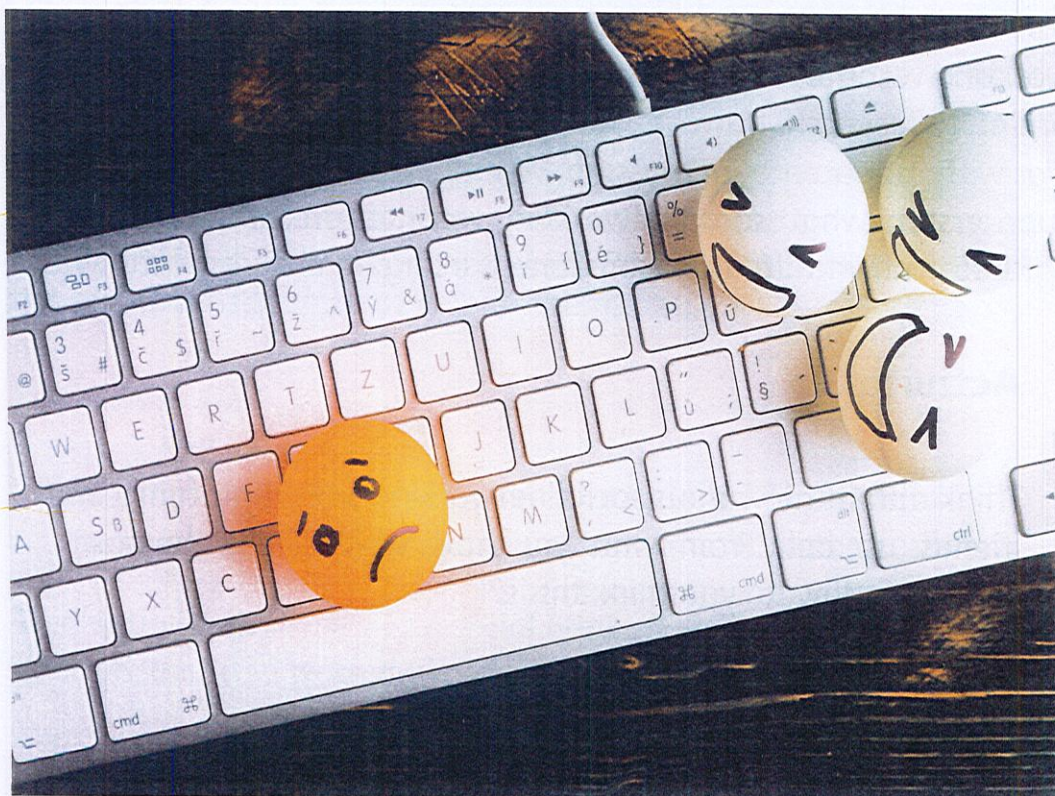
Think about the various social networking sites that family and friends use daily. From what you know, which site is the most popular? Why do you think this is?

Most social networks have the following features:

- you can send both public and private messages
- you can post comments about other people's posts or images
- you can upload images from devices
- **report** buttons/**block** buttons
- you can request to become a friend or join a group.

Here are some key terms that you should know when you are using social networks:

- **Respectful behaviour online:** posting polite and positive messages, keeping friends' and families' personal information safe.
- **Disrespectful behaviour online:** doing something that upsets someone, causes them worry or puts them at risk of harm. Posting images and comments about someone without their permission, for example.
- **Cyberbullying:** using online methods, including mobile phones, to bully someone. For example, calling someone names or criticising their looks in a message app or blog.
- **Anonymity:** staying unknown when using the internet, not revealing anything that might identify you or where you live, go to school or play. Never give any pieces of information that could be used to identify you.



It is important to understand that:

- even social networking sites aimed at younger children can never be completely safe
- using social networking on a smartphone also includes the user's location at the time
- posting information online or sharing it with others (including messaging on phones or in emails) can easily be copied and re-shared
- social network age restrictions can be ignored by using a false identity (children pretending to be older and older people pretending to be younger)
- it is important to report anything that worries you, or if you think that something is wrong
- *trusting* someone online is not the same as *liking* someone online, so, for example, you may add someone as a friend online, but that is very different from agreeing to meet up with them.

You should *never* meet up with anyone you do not already know in real life. If you find something that makes you feel uncomfortable, or someone is acting in an inappropriate way – asking to meet up in real life, for example – you have three options, which are shown in the box on the next page.

If something is not right on a social networking site:

- click 'report': this button reports the post to the website, to be checked by a **moderator**
- click 'block': this stops someone from contacting you or sending you requests to be your friend
- click '**moderate**': messages and posts are monitored by a human or special software, and they will check to see if people are breaking the rules. If they are, their posts will be taken down, and there may be further consequences.



Activity 2

List three popular social networking sites and survey your classmates about the age that they think you need to be to sign up for an account.

Research the social networking sites and find out who was right!



With a partner, write down three 'top tips' for how to be respectful online.



I understand what respectful online behaviour is.



I know what to do if someone is being disrespectful.



Lesson 9



Staying safe on social networking sites



In this lesson you will learn how to stay safe when using social networks.



Key words: anonymity, block, cyberbullying, report, social network



Write down what the terms **anonymity** and **cyberbullying** mean. Discuss with your partner why you think these can be a problem with social networking sites.

Cyberbullying is a real problem around the world. Social networks allow attacks to be sent 24 hours a day, creating unhappiness and loneliness. Unlike physical bullying, **anonymity** can make it hard to find the culprits.

Tips

How to help protect yourself from cyberbullying.

- Make sure that you know what an app or social networking site does before installing it on your phone.
- Always log out of social networks on shared computers and have an extra passcode on a smartphone.
- Only accept friend requests that are from people you know in real life.
- Set privacy settings to the highest level.
- **Report** anything inappropriate to the site (look for a report button) and to a responsible adult.
- Make sure that you have turned off location services for the social networking apps or sites.
- Never meet online 'friends' in person.

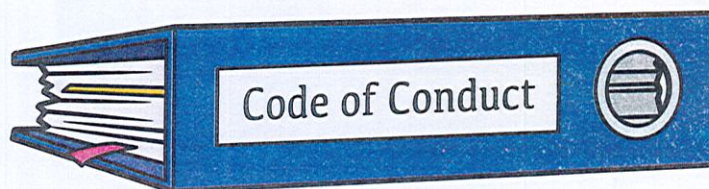


- Never share any personal details, such as your password, address or the name of your school.
- Make sure that you know how to **block** someone.
- If you are not sure whether to sign up for an app or site, ask a parent or trusted adult to advise you.

Thinking about these tips on how to stay safe online, we can write a 'Top five tips' list for everyone to follow.

- Report anything inappropriate to an adult.
- Never post anything about another person without asking their permission first. This way, you can be sure that they are happy for you to do that.
- Block anyone you do not know who tries to contact you.
- Never give out your personal details and location.
- Make sure that you log out properly and have a password or passcode.

This can be called our 'code of conduct' and should be agreed by everyone who uses technology in our class.



Activity 1

With a partner, discuss examples of personal information that people share online.

What should you do if someone is claiming to be a friend from school and has asked you for your school login and password?

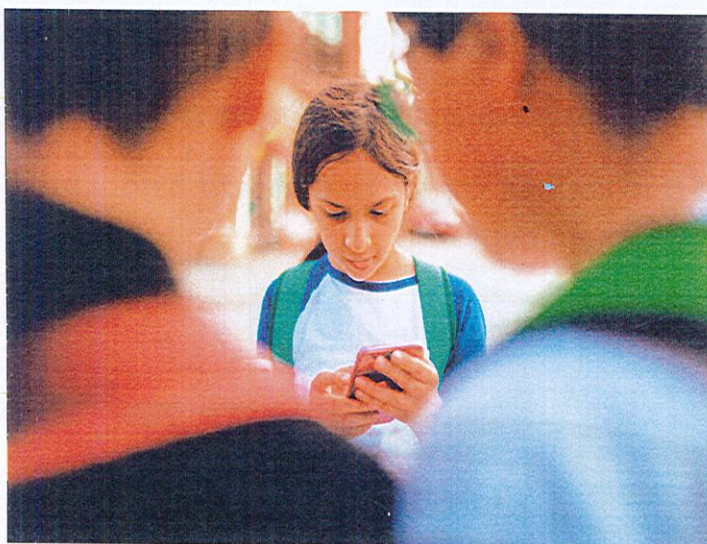


Activity 2

Read the following scenario.

With your partner, discuss what you think Amina should do.

Amina is playing outside. A friend comes over and shows Amina an unkind social media post about someone from school who they know really well. Amina's friend wants her to send it to all their other friends too.



In the next lesson you are going to produce a code of conduct on the safe use of social networks. Discuss with your partner what you will want to include in this resource, what information and images, and which format might be most effective for getting the point across.



I understand what acceptable behaviour online is.



I know how a code of conduct can keep me safe.



Lesson 10

Presenting your code of conduct



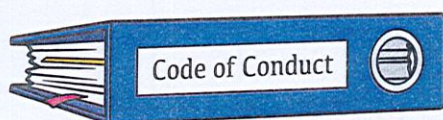
In this lesson you will create your code of conduct for the safe use of social networks and present it to the class in a format that you choose.



Key words: code of conduct



Explain to a partner what a **code of conduct** is. Discuss why it is useful to have one.



Activity 1

In Lesson 9, you discussed with your partner what you want to include in the code of conduct for your class. Now it's time to write it. It should include specific examples of social networking.

You can create your code of conduct as a poster, a leaflet, a podcast or a short video.



As well as your code of conduct, you should think about what to do if a user experiences unacceptable behaviour. This could include examples of what unacceptable behaviour is, what someone should do if they spot any, and how to use social networking safely to limit the chance of it happening to them.



Activity 2

Read the following scenario and discuss with a partner what you should do next.

On a popular social media platform, you notice that someone keeps taking pictures of your friend and posting mean comments about them. Other social media users are commenting with unkind messages underneath.

- Who could you report this to online?
- Who could you tell at home, school or elsewhere?



Activity 3

Create a 'stop cyberbullying' poster for your classroom.

Make sure that you include:

- *who* you should tell about a cyberbullying situation
- *who* you could report it to online
- *when* you should tell someone about the cyberbullying
- *what* actions you could take if you know/hear about it in the playground
- *why* you should never ignore a cyberbullying situation, even if you are not directly involved.



Now present the code of conduct you created in Activity 1 to the class.

Discuss with your partner or with a group how you think the code of conduct will help to stop cyberbullying and how it will keep yourself and others safe.

Cyberbullying will simply stop if you learn to ignore it. You do not need to worry about your online reputation as it is not important.



I understand what acceptable or unacceptable online behaviour is.



I can create a code of conduct to help keep me and others safe.



Unit 3

End-of-unit assessment

Write your answers in your notebook.

- 1 How can you check if information you have found is reliable?
Write two things that you should check.
(2 marks)
- 2 Explain what 'bias' means.
(1 mark)
- 3 What is a website bookmark or 'favourite' tool?
 - A a tool to protect your computers from viruses
 - B a list of websites you have visited
 - C a website that sells books
 - D a tool to save the address of a useful website
(1 mark)
- 4 Explain the benefits of social networks.
(1 mark)
- 5 Explain the negative aspects of social networks.
(1 mark)
- 6 Give one advantage and one disadvantage of the effects of online gaming on children's play.
(2 marks)
- 7 Explain what is meant by 'anonymity' when using social networks.
Give an example in your answer.
(2 marks)

- 8 The table shows some results from a class survey of 30 students.

Question	Yes	No
Have you watched a video or part of a video in the past 24 hours?	30	0
Did you watch this on a TV?	8	22
Did you watch this on a tablet?	12	18
Have you played a computer game in the last 24 hours?	22	8
Did you play with others who you don't know?	12	18
Have you done any homework on a device in the past 24 hours?	20	10
Have you gone out to a club or other activity in the past 24 hours?	7	23

- a) Which statement is true about the data collected?
- A Everybody watched a video or part of a video on a tablet.
 - B More than half the children played with someone they don't know.
 - C Everybody watched a video or part of a video in the past 24 hours.
 - D Half the pupils have gone out to a club or other activity in the past 24 hours.
- b) What types of questions are these an example of?
- A open questions
 - B closed questions
 - C multiple-choice questions
 - D true or false questions
- c) Write a statement about what you can conclude from the results.
(3 marks)

- 9 What does the report button do on social media?
- A It reports the post to the police.
 - B It reports the post to the person who posted it.
 - C It reports the post to moderators on the website.
 - D It deletes the post and reports this to the person who posted it.
- (1 mark)
- 10 What happens if you block someone on social media?
- (1 mark)
- 11 Give two tips for things someone could do to help minimise the risk of cyberbullying.
- (2 marks)
- 12 Explain what you should do if you experience unacceptable behaviour online.
- (1 mark)



Read the sentences. Do you agree? Think about what you have learned.

- I understand how technology has changed over time.
- I can think about the impacts of technology on our daily lives, both positive and negative.
- I can consider the impacts technology has had on the learning, entertainment and leisure industries.
- I can research information on the World Wide Web (WWW) and check its reliability.
- I can present a project to my classmates.
- I can design a survey to find out about the social impacts of technology.
- I can analyse my results using appropriate software.
- I can explain what the advantages of physical networks are.
- I understand what is acceptable and unacceptable behaviour online.
- I know what to do if someone is being disrespectful.
- I can create a code of conduct to help keep me safe.
- I can present information on how to overcome unacceptable behaviour online.

Unit 4

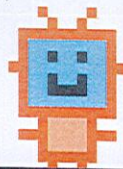
Video editing

In this unit you will learn about responsible and safe behaviour when creating, editing or broadcasting videos. You will learn how to use sound and text in videos, which you will plan using storyboards. Then, you will edit videos to help with the transition between scenes and add special effects, such as sound. The outcome will be a video that you will share with others in a responsible way. In the final session, you will discuss and create some guidelines for other students to follow for safe video sharing.

Key objectives

-  To understand how to stage a video.
-  To know how to use sound and text in a video.
-  To be able to plan and shoot a video.
-  To know how to edit a video using a video editing software.

Lesson 1



Staging on screen



In this lesson you will understand why staging is important when making a video.



Key words: audience, background, camera, frame, prop, scene, shot, staging



To make a video, all you need to do is take lots of pictures of characters or objects and then simply add them together to make a video.

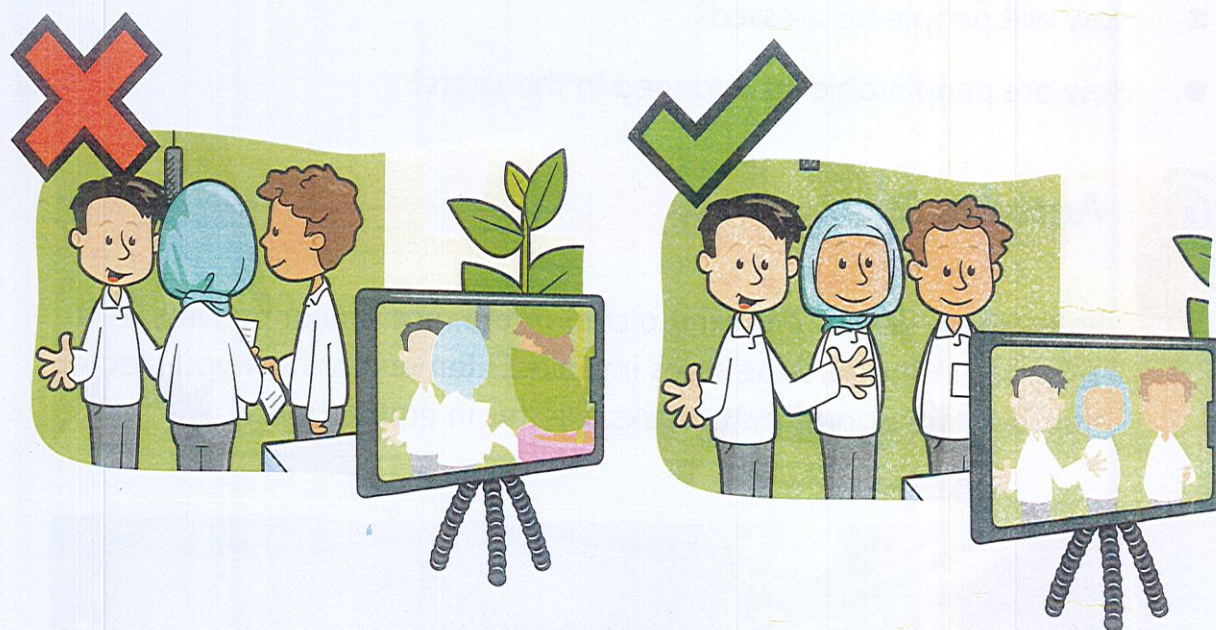
Discuss this statement with a partner.

Throughout this unit, you will plan, shoot and edit a short video.



- A **frame** is a single picture.
- A video is set of moving pictures (frames).
- A **shot** is a series of frames that run together uninterrupted.

Videos are not created by just pointing and pressing buttons on a **camera**. Every shot in the video must be thought out and planned – this process is known as **staging**. Effective staging will maximise the position of the objects in the scene so as to create the best effects for the viewers.



Activity 1

Ask your teacher to show a short clip of a video that focuses on two people talking. Summarise what happens in three sentences.

Consider:

- the characters in the video
- the storyline (what you think is happening)
- what you think the most important part of the video is.

When making a video of any kind, keep the answers to the following questions in mind.

- What is the function of the video? For example, is it to tell a story or to give instructions?
- Who is the intended **audience**? What age group must it appeal to?
- Where is the camera placed? Will it move? On what basis will it be fixed or move – will it follow the action, for example?
- What background will be on show?
- How will people be dressed?
- How are people/objects arranged in the shots?



Activity 2

Role-play a scene of making a cup of tea, or a similar activity, with a partner. What are the steps involved? Remember how you created step-by-step algorithms of tasks like this in earlier units.





Activity 3

Think about the role-play and imagine turning it into a video. Turn to the questions listed earlier in this lesson and work out how you could apply your answers to them to making the video.

Staging isn't the same as simply filming something happening. Imagine you are watching someone making a hot drink. If you couldn't see everything, you would simply move to a better position or ask the person making the drink a question if something wasn't clear. The position of the camera and what the audience will see and hear has to be carefully planned because your audience can't move or ask questions.



Explain to a partner what steps you have included. Why did you mention those particular stages of making the hot drink and not others?

Link your explanations to the purpose of your video and who might need to watch it. This shows that you know why your scenes are suitable for the intended audience of the video.



I understand why staging is important when making a video.



I can focus my planning so that my video will suit its intended audience.

Lesson 2

Using sound



In this lesson you will learn how sound can be used to create mood in a video.



Key words: atmosphere, mood, script, sound effects, soundtrack, speech



Many videos contain a mixture of sounds, music and speech. Imagine a scene of people at a party. What types of sounds might you expect to hear?



Sound in videos includes **speech**, music and **sound effects**. Adding sound can set the scene, create a mood, direct the attention of the viewer or be used to add a verbal explanation.



Activity 1

Your teacher will play you some soundtracks. Write down all the different sounds that you can hear on the soundtracks once you have finished listening to them.

Compare your list with a partner.

Do you have the same/different sounds written down?

How did certain sounds make you feel? For example, happy, sad, scared.

You may have noticed that certain sounds and music will make you feel a certain way. Therefore, you can vary the music depending on what images are being shown in the video and what mood you want to create. Generally, fast music with a high tempo will indicate energy and action, while slow music will suit thoughtful, calm or sad scenes. Imagine a video of someone running downstairs really fast. Music that creates suspense will make it seem like the person is in danger or being chased, but light-hearted music may create an entirely different mood – it might even look quite funny!



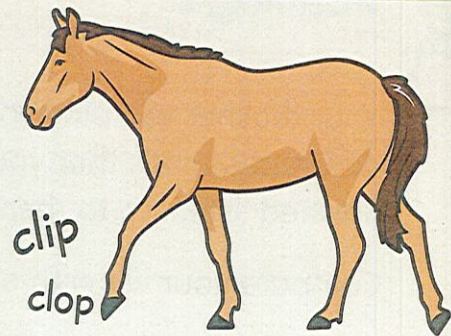
Activity 2

With a partner, each choose three video clips and then show them to one another without looking at the screen. From the sound only, try to answer the following questions for each clip.

- What is the video clip showing?
- What is the atmosphere in the video?
- What types of emotions are being presented? Is the clip sad, happy or exciting?

Generally, sound effects are added to a video after it has been shot. Something as simple as walking on a beach or cooking a meal will require lots of additional sound effects to be added to make the video seem realistic when watched on screen.

One of the sound effects most commonly added for TV and cinema films is made using coconuts. The clip-clop noise they make when the cut edges are rubbed and tapped together sounds just like a horse walking along a road.



Activity 3

Look at your role-play plan for Lesson 1 and write a sound script to accompany it. This script should include the following:

- speech, perhaps for an introduction
- sound effects, especially if objects are involved
- music, if required.



Share your sound **scripts** with the class. Explain why you selected the sounds or speech. Offer feedback to other groups, saying what you thought worked well and how the sounds they chose made you feel. Listen to any feedback that might give you some ideas about how to use sound in a better way to create the **mood** for the audience of your video later in the unit.



I know how sound can affect the mood of the audience when watching a video.



I can select and use appropriate sounds to create a suitable mood for a video.

Lesson 3



Good use of text



In this lesson you will understand why text is used in videos.



Key words: closing credits, screenplay, script, subtitles, title credits



Discuss the following statement with a partner:

Subtitles are used in videos when the language spoken is a foreign language.

Why else might subtitles be used in videos?

In most videos, information is spoken by a narrator or an actor. Sometimes, a video will use text to help make the information clearer for the audience. Text is generally used in three ways:

- **title credits:** the name of the film, main actors, director, producer and others
- **subtitles:** when a foreign language is used or when actors use sign language
- **closing credits:** full actor and film or video crew credits.



Actors and narrators in videos know what to say because they have memorised a **script**. In most cases, a script will contain dialogue, action and stage directions, so that everybody knows what they should be doing and when they should be doing it. A **screenplay** is written to be recreated in a film or video. Here are some of the additional key features of a screenplay:

- what actors say and do
- the setting of each scene
- camera action/position (zoom, pan)
- scene numbers.



When you are writing your own script, you should include the following:

- clear indications of who is speaking
- clear text that is easy to read
- enough detail so that everyone understands what is going on in a scene.



Activity 1

Plan a short scene for two people for which you could write a script. It could be the role-play exercise from earlier in this unit or something new of your own choosing.

Think about:

- who the characters are
- what the characters' conversations might be
- what will happen in each scene
- what the setting will be for each scene.

Develop these ideas with your partner and make notes in your notebook.

Challenge: Think about how the cameras might be placed and what sound effects will be needed.



Explain to a partner how text is used in videos. Give examples of when it is used and why.

Think about how you will include text in the video that you will make later in this unit.



I know why text is used in videos.



I understand the purpose of a script.



I can write a script and know how to use text in a video.

Lesson 4



Planning a short video



In this lesson you will plan a short video for your school.



Key words: outline, scene, script

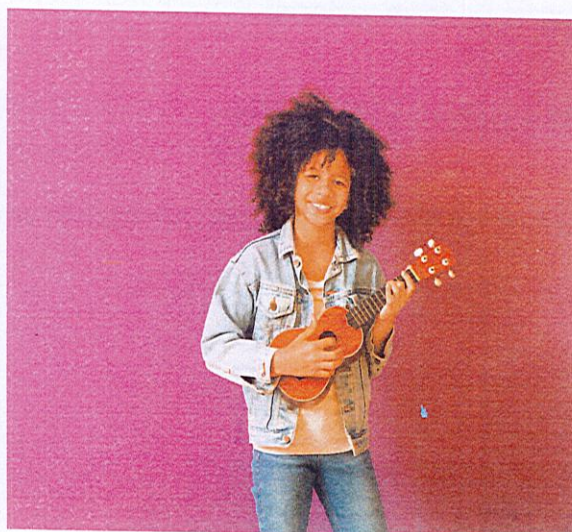


This lesson is about planning a group video project, which you will continue to develop during the rest of this unit. The aim is to create a video for your school about a topic of your choosing. Here are some ideas for possible subjects for your video:

- a hobby you enjoy
- a favourite holiday location
- a school subject
- a cultural festival from anywhere in the world.

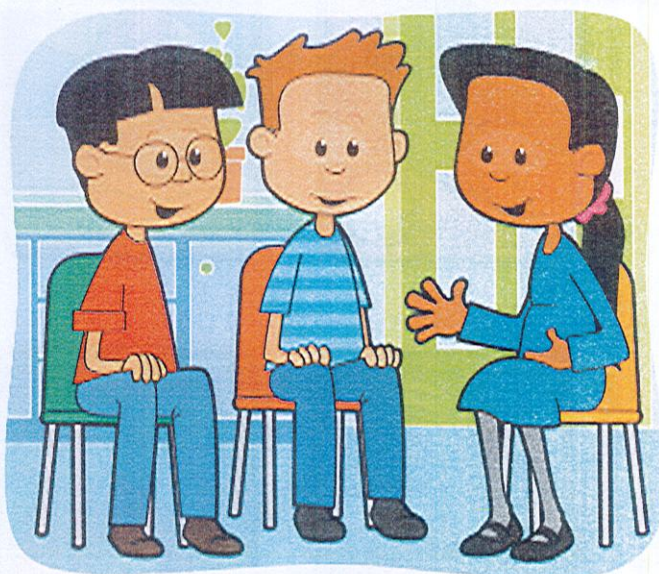
You should pick a topic that you know well and have been interested in for a long time. Being familiar with the subject will help with the planning and research.

Discuss your ideas for the video topic with a group and make a note of the possible ideas that you have agreed on in your notebook.



This project should:

- have video content, such as interviews with other students, acting based on a planned script, appropriate locations and backgrounds
- last no longer than five minutes
- include titles and credits
- include sound and imagery – still images can be included in the video.



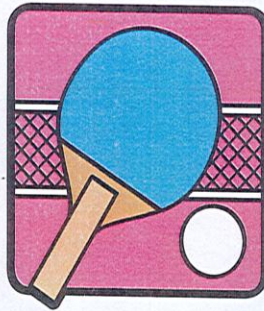
Any film or video is broken down into scenes. A five-minute video might contain anywhere from six to twelve scenes. Here is an example of how these might be divided up.

- **Scene 1:** A title introduction with the name of the video.
- **Scene 2:** Set the scene, show the location and provide an idea of where the video is based.
- **Scene 3:** The first actor is talking, either to the camera or to another actor, introducing the video to the audience.
- **Scenes 4 and 5:** These are the main content, covering the main elements of the video.
- **Scene 6:** A closing scene, bringing the topic of the film to a close.
- **Scene 7:** End title credits, including everyone involved in making the video.



Activity 1

In your group, choose a topic for the video. Then, set a timer for five minutes and see how many relevant words you can both come up with. Write these down in your notebook.



Discuss your ideas for your video with another group. Listen to any feedback and what they think of it so far, making notes on how improvements can be made.

Think about the items you might need for the video, such as clothing, physical items, also known as props, and background or location set-ups.



I can create a scene outline and include how-to-use text in a video.



I can contribute to a group project.



I can evaluate and feed back about a project.

Lesson 5



Planning each scene



In this lesson you will plan each scene for your video, using a storyboard.



Key words: angle, finger-framing, scene, script, shot, storyboard

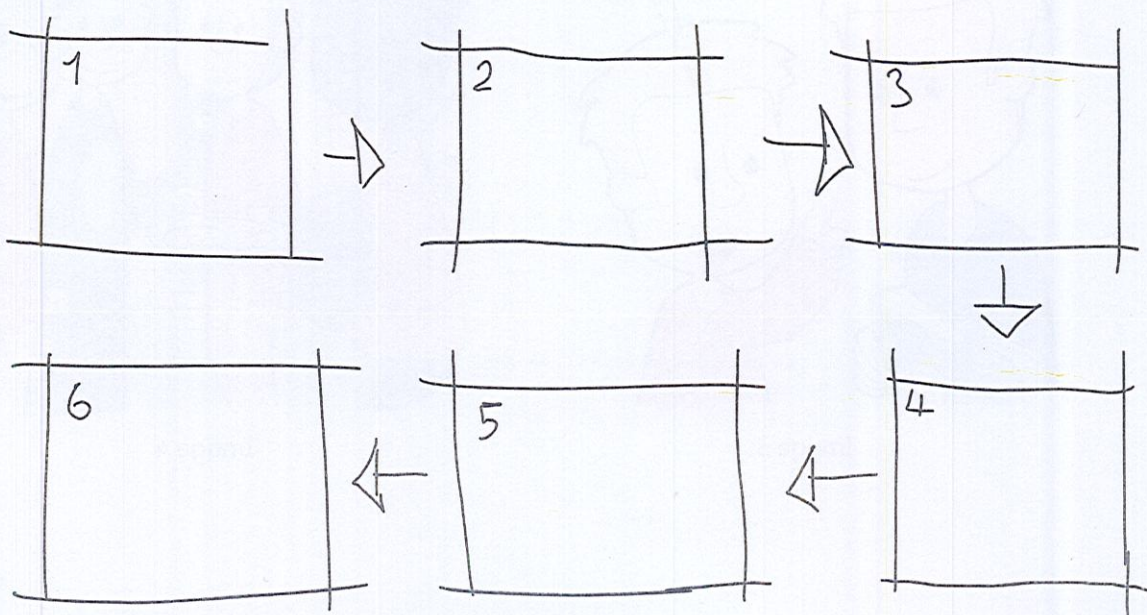


A **storyboard** is a tool that can be used to plan the details for a video. It is a visual way to show how the video will progress, and it helps to show the passage of time. Breaking the video down into specific scenes allows you to think in more detail about what you will need for each scene, and how each scene will lead on to the next.

Discuss how you have used storyboards for other projects in the past, and how they can help when planning a video.

You have used storyboards before, in your computing lessons. Discuss with a group how a storyboard can help you plan a video. Can you say what a storyboard is and what it should contain?

Story Board





Activity 1

With a partner, take a look at the images below, then do the following:

- create a sequence for what might be happening
- guess what the characters might be saying
- predict what happens at the end.

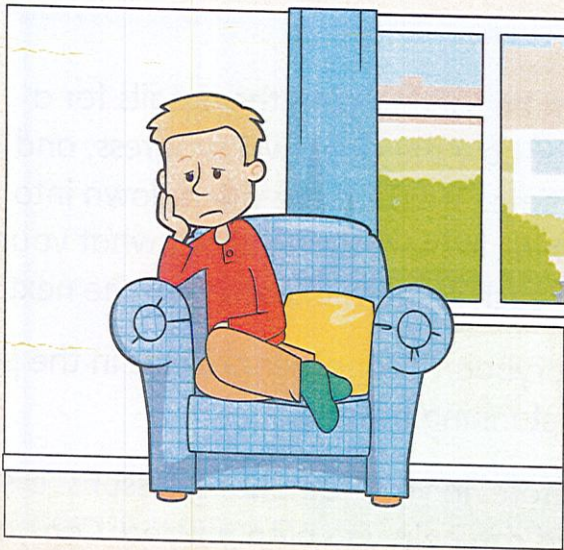


Image 1

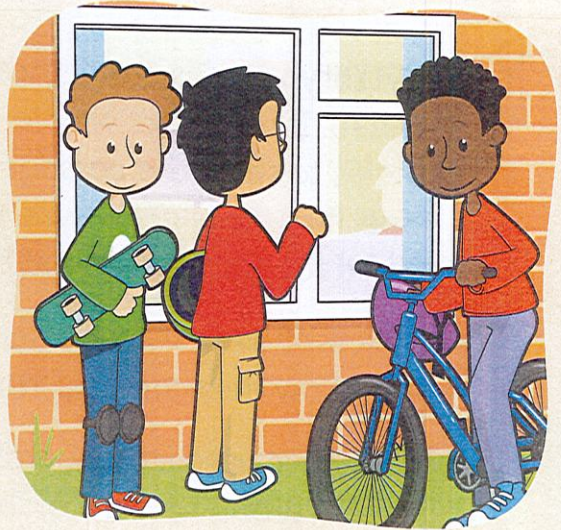


Image 2



Image 3

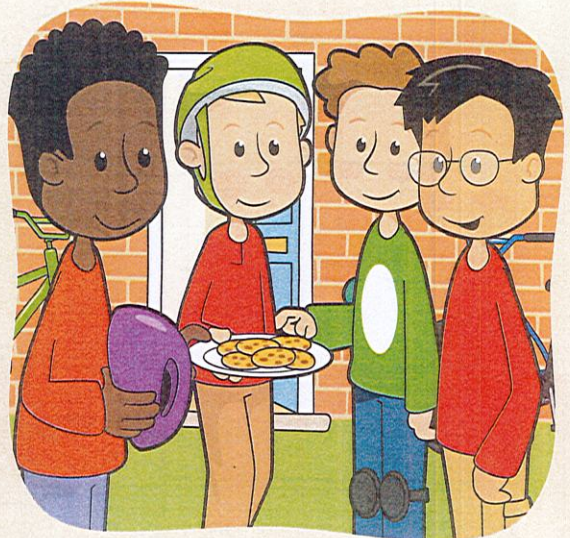


Image 4



When storyboarding any video, it is important to think about where you want the camera to be. Will some camera **angles** be better than others? A storyboard allows scenes to be visualised and makes sure that the audience will be able to see everything they need to in order to enjoy the video.

There are multiple ways in which a camera can be positioned when making a video. Here are a few examples:

- close-up of someone's face
- wide shot of more than one person
- landscape or whole-room shot
- zoom in and out during a scene
- a moving camera shot, known as a dolly shot.

In films and videos, when characters are agreeing with one another, the camera will tend to show both actors in the **shot**. When characters are disagreeing, they tend to show one actor at a time to make it clear that they have different views.



Activity 2

Discuss with a partner why certain camera angles may be better than others. How can you use them to your advantage when producing your video?

In addition to what the camera will see, the following can be added to a storyboard:

- scene headings, to describe the scene
- notes on any physical action required
- the background or location
- the names of the characters
- ideas for transitions – that is, how one scene moves to the next with a simple cut, fade or wipe
- the camera angles that will give the audience the best information
- any camera movements required
- the focus of the scene, such as a particular person or object
- on- or off-screen text
- sounds or musical effects.

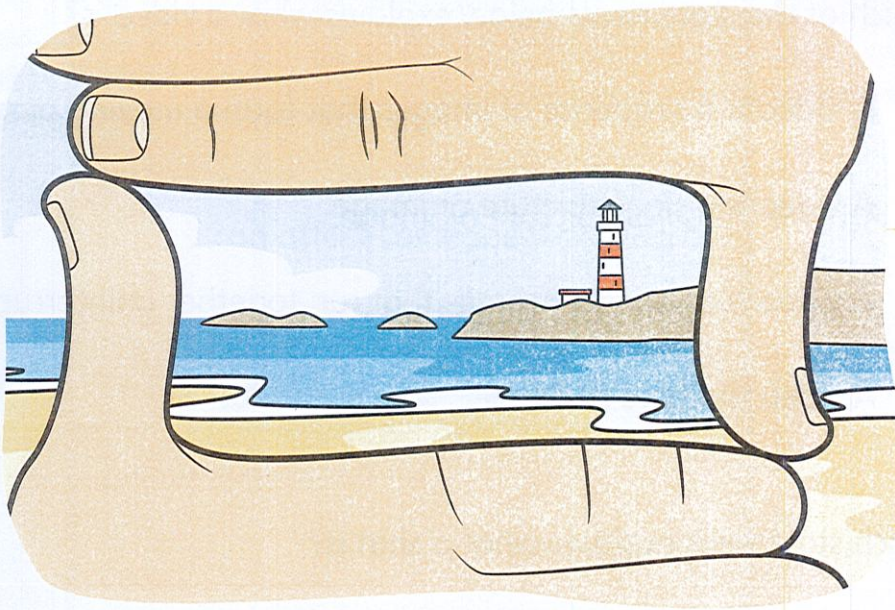


Activity 3

Using the tips and information provided, create your five-minute film storyboard.

Finger-framing is a technique that you might want to include when planning a storyboard.

Finger-framing is when you frame a scene by holding your hands up to create a rectangle with your fingers to represent the screen and look at the scene inside the 'viewing' window your fingers make.



Discuss your storyboard with another group to check that you are ready to shoot your video. Use the advice in this lesson as a checklist to make sure that your storyboard includes everything needed.



I can storyboard my project effectively.



I can suggest filming techniques for a given purpose.



I can plan videos, using a range of filming techniques.



I can review how effective my storyboard is.

Unit 4

Mid-unit assessment

Write your answers in your notebook.

- 1 Which of the statements below explains what a video is?
- A A video is a sequence of images that form a moving picture.
 - B A video is a single picture or image.
 - C A video is a series of frames that run together uninterrupted.
 - D A video is a type of device.

(1 mark)

- 2 Which statement explains what a shot is?
- A A shot is a sequence of images that form a moving picture.
 - B A shot is a single picture or image.
 - C A shot is a series of frames that run together uninterrupted.
 - D A shot is a type of device.

(1 mark)

- 3 Which statement explains what a frame is?
- A A frame is a sequence of images that form a moving picture.
 - B A frame is a single picture or image.
 - C A frame is a series of frames that run together uninterrupted.
 - D A frame is a type of device.

(1 mark)

4 Which statement explains what staging is?

- A Staging is the process of planning out a scene carefully.
- B Staging is a type of software used to record videos.
- C Staging is the process of using a stage in a video.
- D Staging is the process of recording a video.

(1 mark)

5 Explain how sound can affect someone watching a video.

(1 mark)

6 In a video, text may be used to help make information clearer for the audience. There are three main types of text in videos. Explain what each type is.

- a) closing credits
- b) subtitles
- c) title credits

(3 marks)

7 What is a storyboard used for?

(1 mark)

Lesson 6

Shooting a video



In this lesson you will begin shooting your information video.



Key words: aspect ratio, film, finger-framing, focus, pause, prop, re-shoot, review, script, stop, storyboard, white balance, zoom



Tell a partner what **finger-framing** is and why it might be used when creating a video. Give reasons why this can be useful.

Before starting any filming, it is important to review safe practice for video equipment:

- do not take photos of or video anyone without their permission
- ensure devices are charged correctly and free from damage
- use the equipment carefully to avoid accidents
- try to stay in one place when using equipment; if you have to move while holding equipment, check that your route is clear and free from trip hazards before filming
- keep equipment in one place to ensure that parts are not lost.



Using a camera or other recording device

Most people are familiar with the 'pick up and shoot' method of filming, using smartphones, but filming professionally means being aware of the following technical terms.



- **Zoom:** focus closer in or out. Optical zoom will not affect the clarity of your video, but digital zoom may start to affect clarity and can lead to fuzzy images.
- **Aspect ratio:** setting the aspect ratio means changing the size of the frame so that it is suited to the screen you want to view it on, such as a modern, widescreen television.
- **White balance:** adjusting how light is captured. This will enable you to give a more realistic look to your video.
- **Focus:** the main subject, which is clear and sharp rather than fuzzy. This can shift from a person to a landscape, for example. Many devices will allow you to select where you want the device to focus, and if you are using a touch screen, you simply tap the area in the frame.
- **Record, pause, stop, review:** these buttons are usually the same on every device.
- **Tripod:** this provides a stable platform to film from. If you do not have one, you will need to set the camera down on a sturdy surface that will enable you to keep the camera still.
- **Microphone:** device to amplify sound. Most cameras have built-in microphones, but you should note where it is on your device to avoid covering it.



Activity 1

You can use the zoom function in a scene to add visual interest and to focus on a key element. However, controlling the zoom on a camera so the movement in and out is smooth can be difficult. If it is too fast or not controlled well, it can distract the viewer.

Discuss the following scene with a partner and imagine how it could be filmed, first using zoom, and then with multiple shots at different distances.

In a sunny park, children are playing on the swings, slides and other equipment. There is a little girl who is very excited, standing by an ice cream counter, with her hands outstretched. An adult is handing her a huge ice cream. Just as she is taking the ice cream, a bird swoops down, grabs it and flies away.

Rather than filming everything in one go, it is good practice to video a couple of scenes and then check them. This means any reshoots can be included in the next session.

Filming scenes more than once, using different angles and with different lighting, provides more choice when editing later.



Filmmakers will also make changes to the storyboards, scripts and planning as required. Ideas sketched out might not work in real life, or lines of script might need to be changed to reflect how they are spoken or changes to the storyline.



Activity 2

Using the information and tips in this lesson, begin filming scenes based on your planning. Remember, videos are always filmed in a time order sequence and in an efficient way so that similar locations or actors can be filmed together.



Discuss with your group how you have found making your video so far. How much did you complete today? Make a note of what you need to do in the next lesson.

- Was there anything that you found very difficult?
- Did you overcome it, have you thought of a solution, or do you still need help with it?
- Is there anything else you need so that your video will be finished in the next lesson?



I can contribute to a video project.



I can capture images on video, using a range of filming techniques.



I can review how effective my video is.

Lesson 7



Final shooting



In this lesson you will have your final filming day.



Key words: camera angle, sound, storyboard



With your group, recap where you are up to with shooting your video and what you need in order to finish this lesson. It will be helpful to review your notes from the last lesson and your **storyboard**.

A break in filming is an ideal time to review your progress so far and plan any remaining filming. Filmmakers will use this time to ask the following questions.

- How do your filmed scenes compare to the storyboard?
- Do the **camera angles** used grab the attention of the audience?
- Are the recorded voices and **sound** clear in any spoken scenes? Sound effects can be added easily later, but re-recording voices to do this is very difficult to get right.
- Have any background scenes for titles or credits been filmed?
- Is it possible to tell the story with all the scenes that have been planned or filmed so far? Are any extra scenes required?



Activity 1

Play back the scenes that you have created so far and think about the questions above.

With your group, discuss which of the scenes have worked well.

Discuss your reasons for this and write them down in your notebook.

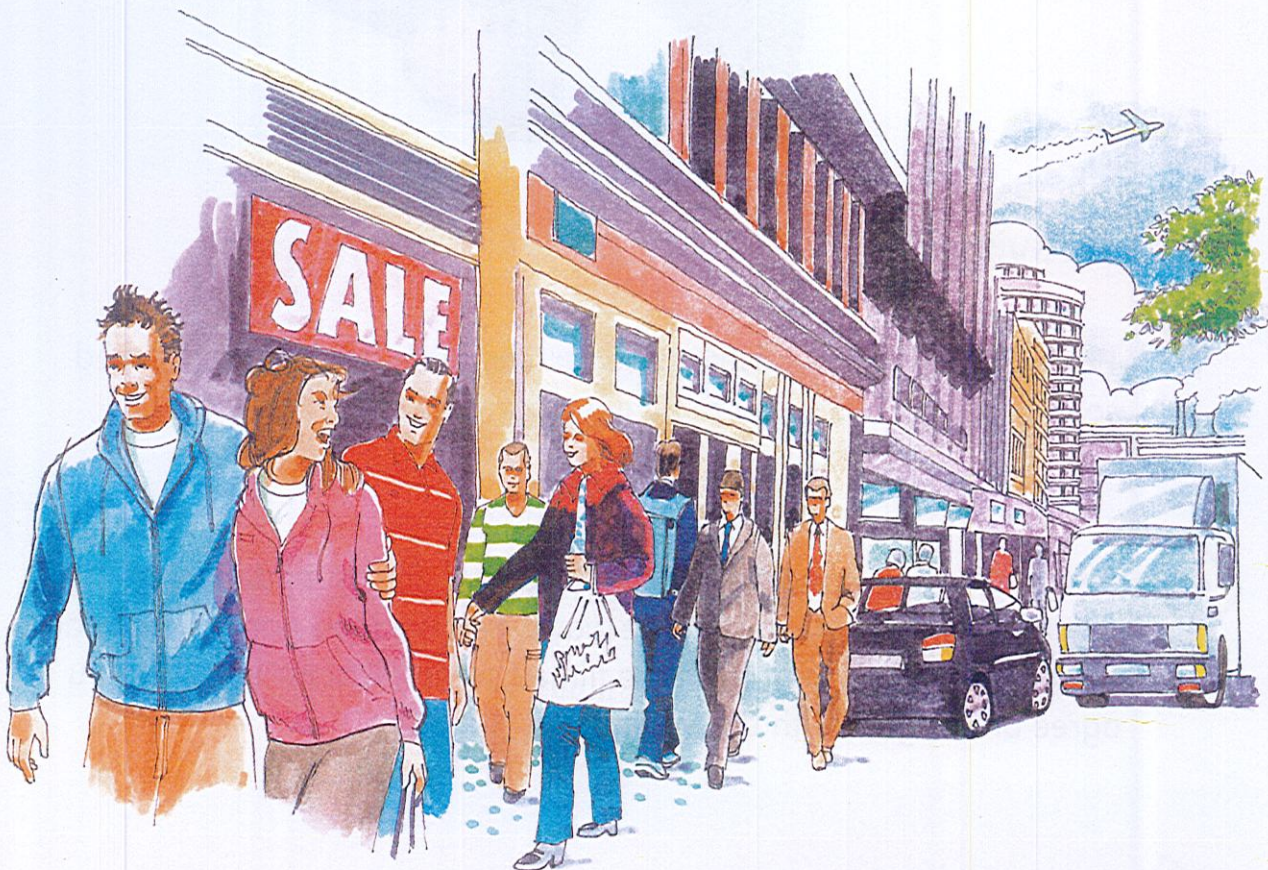


Activity 2

Think about the following scenario.

There is too much background noise in a scene. It is difficult to hear fully what the characters are saying.

Would it be best to reshoot the scene or edit the video? Discuss this with your group.





Activity 3

Having analysed your footage so far, complete the filming required so that you can move on to editing your video.



A famous actor was once quoted as saying, 'film is made in the editing room', meaning that the way a film is edited and ordered can be completely different from the filmed scenes. Discuss whether you agree or disagree with this statement.



I can contribute to a video project.



I can plan changes that might need to be made to my video project.



I have learned about the importance of editing a video.

Lesson 8

Video editing



In this lesson you will edit your video.



Key words: credits, crop, edit, music track, narration, splicing, split, splitting, titles, transition, zoom



Imagine the following scenario.

Maryam was at the park and used her sister's mobile phone to video some older children playing a game. Her sister asked her to delete the video and said that it was wrong to make it.

Discuss the following questions with a partner.

- Was Maryam's sister correct?
- Why/why not?

Video editing is the process of piecing together a video so that it follows a logical order, with a clear beginning, middle and end. There are many video-editing applications available, on both desktop and portable devices, but generally they follow the same principle of using layers.

Layer-based editors allow individual video and audio clips to be arranged on-screen using drag-and-drop. Once in place, the following editing tools can be used to create the final video.



- **Crop:** this involves taking chunks out of the video to shorten the video sequence.
- **Splicing video together:** two video segments are joined together.
- **Splitting video:** a video sequence is split up into two or more pieces, to remove unwanted sections or grab ones that are wanted and rearrange them.
- **Transitions:** effects that are added when one video sequence runs into, joins or overlaps another video sequence.
- **Digital zoom and video effects:** zooming in or doing a close-up in a scene, or using a special video effect to add interest. These depend on the software used, but often include fading, changing colours and filter effects.
- **Editing the audio recording, in camera:** this can include adjusting the volume and adding audio effects. Audio effects might include echo or changing the pitch of an actor's voice.
- **Titles and credits:** these need to be created and added to the beginning and end of your video.
- **A music track or narration:** these can add to and link up the scenes in your video.



Activity 1

Choose three of the video editing tools described and explain to a partner how you plan to use them in your video. Try to include the reason for the edit. Here are some examples.

- 'The actors stop talking and nothing happens, so I will crop the end of the clip.'
- 'I want to add a fade between two scenes as they are in different places.'
- 'The actor is in a big room, so I want to add an echo to the voice.'



Activity 2

Using the tools described and the advice given so far, do a first edit of your film. Keep referring to your planning and storyboard.

Nowadays, you can edit a film using your smartphone or your laptop, but the technology required to do this has not always been portable. This photo shows media communication students editing a film in Germany in 2003.





Discuss with your group the criteria for a 'good' information video.

- Is it suitable for the audience?
- Does it use appropriate, clear language?
- Does it show the subject clearly?

Then discuss these questions.

- How far did you get with your edit?
- What have you got left to do?
- What will you prioritise in the next lesson?
- Do you need assistance from the teacher or a peer?

Make a note of your answers in your notebook so that, in the next lesson, you understand clearly what you need to get done.



I understand how to edit videos.



I can explain how to improve a video by reshooting and editing.



I can select the correct tools to edit my video.



I am aware of safe and responsible practice when making videos of other people.

Lesson 9



Review and final edit



In this lesson you will review your work and produce a final edit.



Key words: feedback, final edit, peer review, recap



Review the list you made at the end of Lesson 8. **Recap** your checklist and then decide what jobs you are going to start with so that your video will be finished by the end of this lesson.



Activity 1

Think of five ways that you can edit a video. Write these down in your notebook, and compare your list with a partner.

Final edit means the process of finishing a video, including any reshoots and last additional elements.

Use the following checklist of requirements and techniques to help you make sure that you have done everything, but keep in mind that not every video will use every technique.

Planning the video

- Have you written short planning description?
- Have you written a script of the lines an actor or a narrator will say?
- Have you created a storyboard, outlining each scene, the camera angles and other useful information?

Shooting the video

Have you used a range of the following techniques to create interest?

- close-ups (of someone's face or an object)
- wide shots (of a landscape or a whole room)
- pan shots: move the camera gently from right to left or left to right across a scene
- zoom: focus in or out
- dolly shots: move the camera to follow the action.

Editing the video

Have you used a range of the following tools to cut out the unnecessary bits and improve the final video?

- split shots: break a single shot into one or more smaller shots
- crop a shot: trim the beginning and/or end
- sound or sound effects: music or effects can be added to help tell the story or add interest
- transitions: use these between shots or segments that do not follow on from one another

- splicing: join together two or more video segments to make one longer section
- create opening titles
- create end credits
- any additional special effects: these may include adjusting the colour or reframing.



Activity 2

Create the final edit of your film. It can be difficult to stop editing as you will always keep finding things to change. Be confident, however, about stopping before your time runs out.



As a class, think of different ways that you could use technology to share your videos safely online and showcase it to others, including family and other students.



I can explain how to improve a video by reshooting and editing.



I can select the correct tools to edit my video.

Lesson 10



Safe and responsible use of videos



In this lesson you will create some guidelines for online safety when using videos.



Key words: online comments, online safety, permission, personal information, share, upload



Choose and discuss one of the following questions with a partner.

- When you find a video clip online, who owns this content? How do you know who the owner is?
- When you find a video clip on social media, who owns this content? How do you know who the owner is?

Share your thoughts with the rest of the class.



When you **share** a video online, you are putting it into the public arena, which can lead to many different issues. Here are some of the main issues that you may face when you **upload** videos to a website.

Permission issues

When you are making a video, your friends may give you **permission** to *take* a picture or shoot the video. This is not the same as asking for permission to *share* the image or video online. It is always best to check if everyone in the video agrees to it being uploaded. It is important to do this *before* you upload and share the content.

Personal information issues

When you share videos online, you might accidentally also share **personal information**, which you may have overlooked. For example, while posting about your birthday and showing the cards you received, you might accidentally broadcast your address and the date of your birth. Uploading a video while on holiday tells everyone that you are not at home. It is safer to upload videos and photos when you have returned from your holiday.

Online comments

Most sharing websites will allow others to comment on your video. While some people will be positive, you may encounter some negative comments. If **online comments** are shown publicly, it is usually best to turn off comments. This will stop both the positive and negative comments, but negative ones can lead to bullying behaviour. It will therefore prevent people you don't know making contact. If you do have comments turned on, you should be able to set them to only allow your friends or a group of people you know to comment.

Parents' permission

There are age limits on video-sharing websites, and they should only be used with your parents' permission. Your parents can also help you to make sure that you have the correct settings applied to your video.

THE NEWS

Bullied Student Video Goes Viral

By Writer _____

"cyberbullying"



Activity 1

Read the following statements with a partner.

Joke: This is something that is meant to be funny in its own right or to trick others so that it makes someone laugh. It is not meant to be harmful or cause upset.

Bullying: This is one-sided and repeated, intentional harm. On one side is the victim and on the other side is someone causing the harm.

Discuss and think about any scenarios where **joking** might become a **bullying** incident, or where bullying started off as a joke at first.

If you upload to and use a video-sharing site but are under the legal age required to use it, the site's owners may not be helpful if problems arise.



Activity 2

Using what you have learned in this unit and the tips in this lesson, create a list with the heading 'Video content **online safety** guidelines' that can be shared with all students. Include tips for these key areas:

- permission
- personal information
- use of comments
- legal requirements.

For example:

When you load a video to a sharing website, make sure that comments are turned off.



Show your peers your 'Video content online safety guidelines' and discuss any similarities between your list and the lists that they have put together. Hopefully, you will all agree on the guidelines that you have written.

Next, discuss two things that you have done well in the unit and one thing you would like to improve on.



I can describe appropriate ways to behave towards other people online and why this is important.



I can give examples of how bullying behaviour can happen online.



I can understand and describe ways that other people can be bullied on a range of media, including video-sharing sites.

Unit 4

End-of-unit assessment

Write your answers in your notebook.

- 1 Before you start filming, there is an important step you need to complete. Which of these steps must you do before you start filming?
- A Make sure that you have the newest device possible.
 - B Check that you have permission from the people you are about to film.
 - C Ask your parents if you are allowed to use the device.
 - D Always use the flash when you are filming to ensure that your video is well lit.
- 2 You can set the aspect ratio on many devices. What is the aspect ratio?
- A The aspect ratio is a colour filter that you can apply to your video.
 - B The aspect ratio is a type of recording device to ensure that your images are clear.
 - C The aspect ratio is the size of the frame you are recording to.
 - D The aspect ratio is a type of recording device to ensure clear sound.

(1 mark)

(1 mark)

- 3 Which of these items could be used to help keep your device still when recording your video?
- A tripod
 - B microphone
 - C printer
 - D keyboard
- (1 mark)
- 4 Which of these statements about zoom is true?
- A Optical zoom will lead to fuzzy images if used too much.
 - B No type of zoom will lead to fuzzy images if used too much.
 - C All types of zoom will lead to fuzzy images if used too much.
 - D Digital zoom will lead to fuzzy images if used too much.
- (1 mark)
- 5 Explain what is meant by the term 'splicing' when it is used to talk about editing a video clip.
- (1 mark)
- 6 Explain what is meant by the term 'splitting' when it is used to talk about editing a video clip.
- (1 mark)
- 7 Explain why someone might use the 'cropping' feature when editing a video clip.
- (1 mark)
- 8 Explain what a 'transition' is, and when it might be used in a video.
- (1 mark)

- 9 What is a 'final edit'? (1 mark)
- 10 What special effects could be added to your video and why? (2 marks)
- 11 Explain how cyberbullying could make users feel if they received negative comments about a video they posted online. (1 mark)
- 12 What is meant by personal information? (1 mark)
- 13 Give three examples of personal information that you should keep to yourself. (3 marks)
- 14 Write your top three rules to follow when sharing content online. (3 marks)
- 15 When you are filming a scene for a video, you can use different camera angles. Which statement explains what a pan shot is?
- A an app you can use to take photos
 - B recording while moving horizontally
 - C recording while moving vertically
 - D recording in a fixed position
- (1 mark)

16 When you are filming your video, how many times should you plan to record each scene?

- A a few times and from different angles, to see which works best
- B once, and it should be done perfectly if you have planned it properly
- C twice, from opposite angles
- D an unlimited number of times, only moving on when you are completely happy with the scene

(1 mark)



Read the sentences. Do you agree? Think about what you have learned.

- I understand why staging is important when making a video.
- I can focus my planning of a video to suit an intended audience.
- I can explain how sound can affect the mood of members of an audience when they are watching a video.
- I can select and use appropriate sounds to create a suitable mood for a video..
- I can explain why text is used in videos.
- I understand the purpose of a script.
- I can write a script and include how to use text in a video.
- I can contribute to a group project.
- I can storyboard a project effectively.
- I understand how to edit videos.
- I can give and receive feedback.

Unit 5

Health and safety

In this unit you will learn about the positive and negative impacts of using computer technology. You will gain a deeper understanding of the features of different devices and when to use certain devices to meet the needs of specific projects. You will learn how to stay safe when using technology, including the general health and safety aspects that may arise from using equipment. You will apply this knowledge to produce a short video to highlight an aspect of health and safety.

Finally, you will research how waste from technology can be an environmental risk and how this can be reduced. You will work to create information materials to persuade people to be more environmentally friendly users of technology.

Key objectives

-  To understand the key features of different digital devices, including tablets, smartphones, laptops and desktop computers.
-  To understand the health and safety issues that arise from using devices and know how they can be minimised.
-  To be able to select appropriate digital devices for a given task or project.
-  To select, use and combine appropriate software applications.
-  To understand the environmental impacts of technology (energy use and resources) on society.

Lesson 1



Main features of computing devices



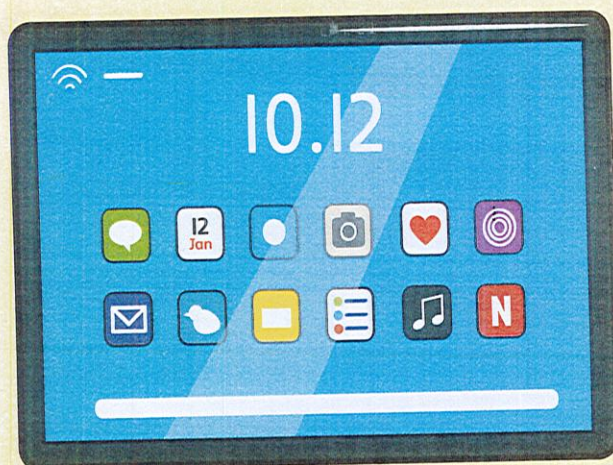
In this lesson you will investigate the common features of popular computing devices.



Key words: desktop, keyboard, laptop, smartphone, tablet, touchscreen



Here is an example of a tablet.



This is a multi-role device because it has a range of functions. For example, it:

- can run multiple applications, including messaging, creating written and visual documents, taking and editing photos and games
- can be used for work and play, be connected to the internet to access web pages and communicate with other devices
- is portable, has an input and output **touchscreen**, speaker outputs and camera and microphone inputs
- can be controlled by touch, speech, **keyboard** and mouse.

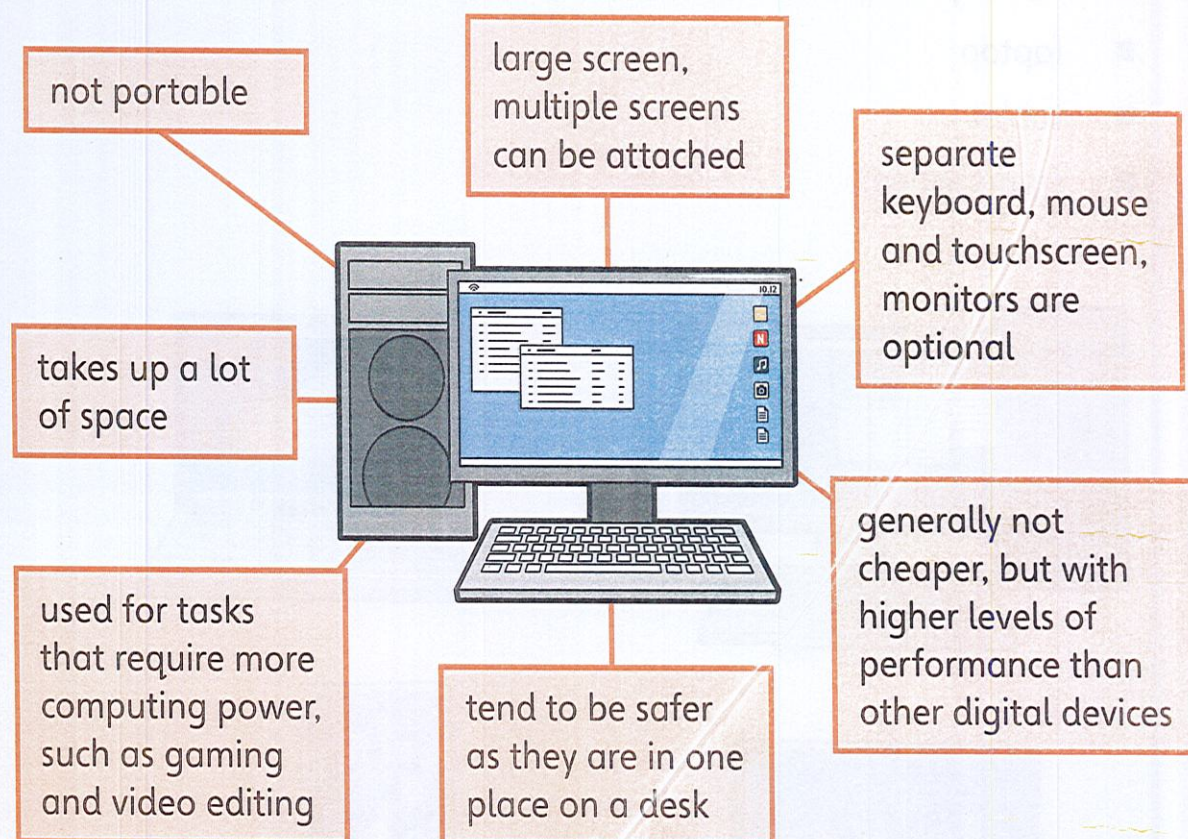


Activity 1

Discuss with a partner how we use tablet computers, and agree an advantage and a disadvantage of using them for a long period of time.

In this lesson you will investigate the features of popular digital devices, such as **smartphones**, **laptops**, **tablets** and **desktop** computers. You will need to research the devices and look at the key features.

Here is an example of a mind map for a desktop computer.



Research tips from previous units:

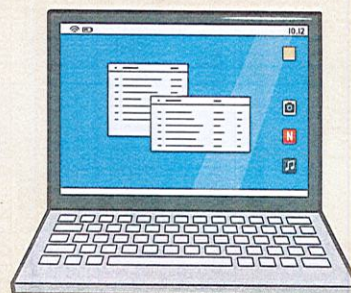
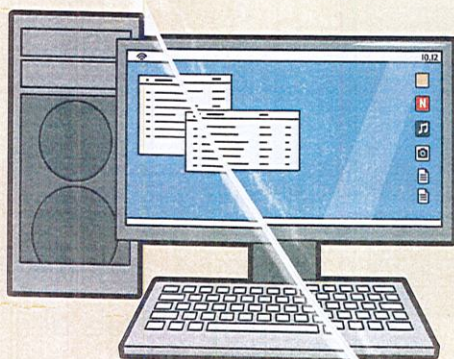
- be safe and responsible when searching online
- use advanced search techniques
- use child-friendly search engines.



Activity 2

For each of the following devices, research and note the key features that they offer:

- desktop computer
- laptop
- tablet
- smartphone.



Each device has its own advantages and disadvantages, depending on when and where it is used. A smartphone is great for working on the move, but a desktop computer is more suitable if you normally work in one place.



Activity 3

Describe an advantage and a disadvantage of each of the devices that you have researched.



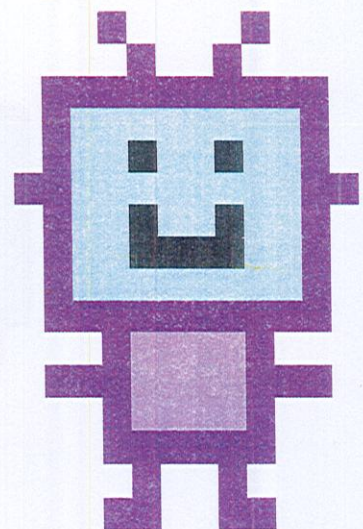
Imagine that you want to use a digital device for a project that involves taking a picture, editing it and posting it to your class blog. Discuss with a partner which devices you could use, then decide which would be the best choice and why.



I understand the key features of different devices.



I can select appropriate digital devices for a specific task.



Lesson 2



Can you get an injury from using digital devices?



In this lesson you will investigate some of the injuries that can occur when you use a digital device.



Key words: health and safety, injury, RSI, strain



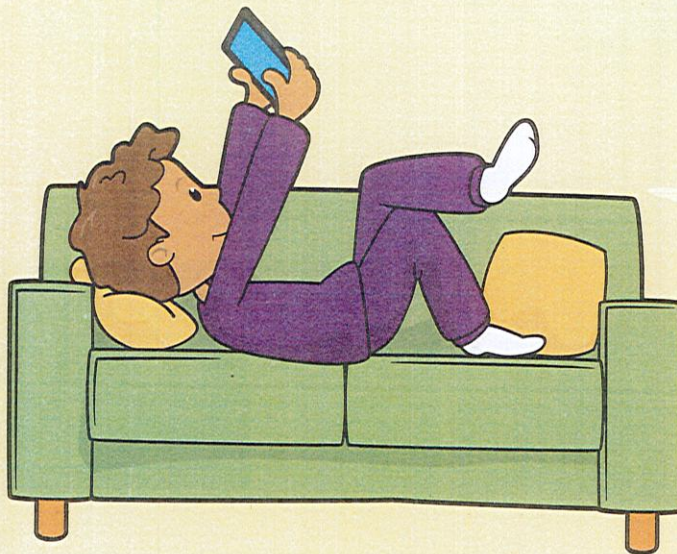
Luis is using his device to communicate with friends from school about some homework. He didn't realise that he had stayed in this position for 20 minutes.

How do you think Luis would feel when he had finished and finally stood up?

What areas of the body might have felt different?

Have you ever experienced this before?

Discuss your ideas with a partner.

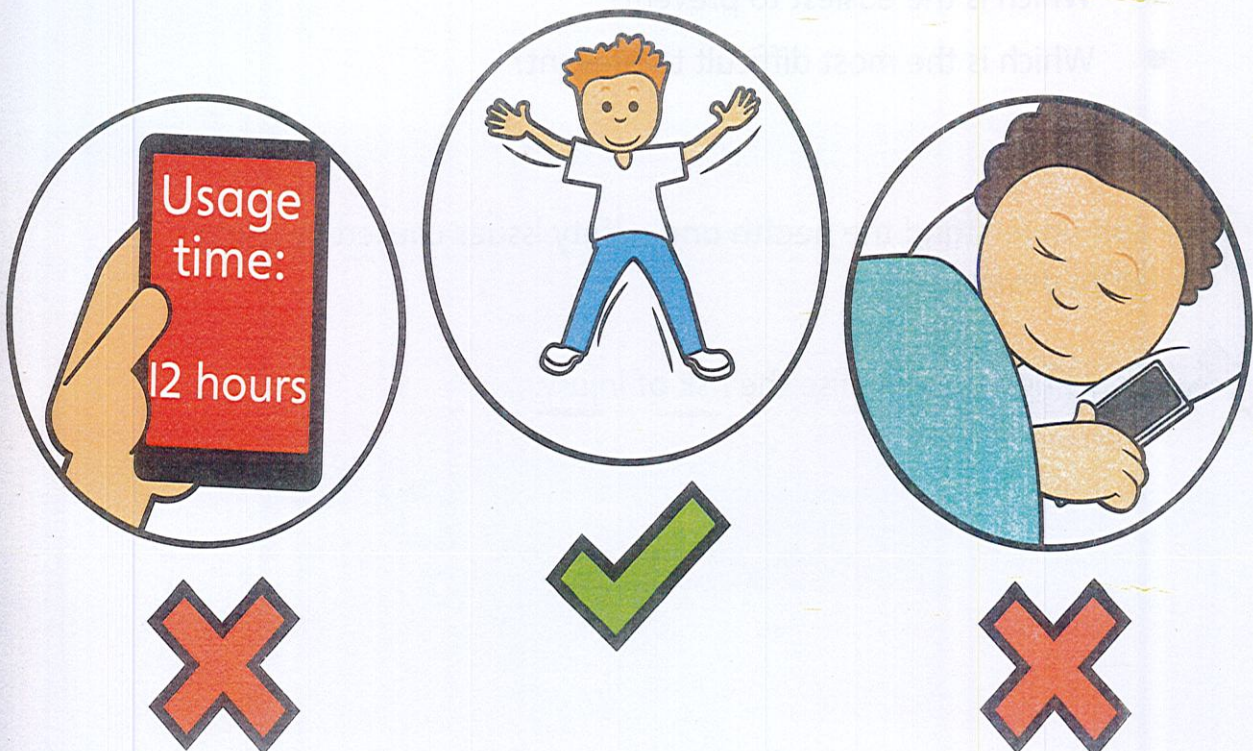


Extended use of digital devices can lead to health problems. These are the main body areas that can be affected.

- **Brain:** using devices too close to bedtime interferes with the body's sleep and recovery patterns.
- **Eyes:** prolonged staring at screens can lead to eye strain, dry eyes and tiredness.
- **Neck and shoulders:** looking at devices that are not set at the correct angle, and a lack of movement can lead to **injury** and muscle **strain**.
- **Back:** back pain can be caused by poor seating positions and a lack of movement.
- **Wrists:** using a keyboard or mouse for a long time, or having the desk at the wrong height can lead to repetitive strain injury (**RSI**).
- **Legs:** sitting in the same position for too long can cause health problems.

It is possible to prevent injuries while using these devices. Try the following:

- avoid using any device for too long
- keep active, with regular exercise and movement away from the device
- avoid using devices before you go to sleep.





Activity 1

Discuss with a partner how you could try to avoid injuries when using the digital devices that you researched in Lesson 1.



Activity 2

Research the medical names for the injuries or conditions that may be caused when using digital devices. Can you find some information about how many people are affected by these conditions? Does it vary depending on their age?



Present your findings to a group, focusing on one body part, how the injury is caused and how it can be avoided.

When all the members of your group have finished their presentations, answer the following questions.

- What did you find was the most commonly occurring health issue?
- Which is the easiest to prevent?
- Which is the most difficult to prevent?



I can understand the **health and safety** issues caused by using digital devices.



I know how to minimise the risk of injury.



Lesson 3

Planning your video about using digital devices safely



In this lesson you will plan a video about using digital devices safely. You will choose a device to focus on and create a storyboard and shooting script.



Key words: adjustment, injury, portable, script, storyboard



Here are some of the keywords we considered in Lesson 2: health and safety, injury, RSI and strain.

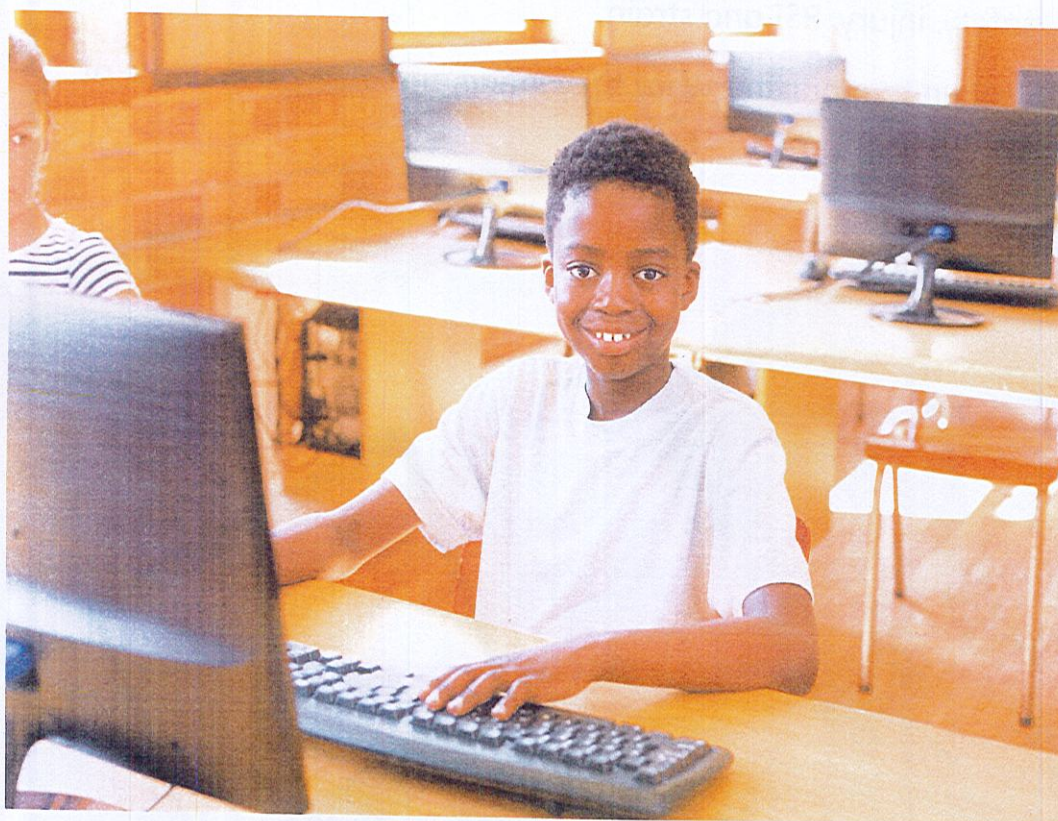
Explain to a partner what they mean and give an example of each one.



When you work at a desktop workstation, often the screen, desk, chair, keyboard and mouse are all positioned in the right place. Many of them come with height and angle **adjustments** so that you can keep a straight neck and back while looking at the screen.

The key points for using a desktop computer properly are:

- you should be in a comfortable typing position
- your knees should be angled at around 90 degrees
- the top of the monitor should be level with your eyes
- your back should be firmly supported
- the screen should be about an arm's length away
- your mouse should be at a comfortable distance with your arm able to rest at 90 degrees.



As digital devices have become more **portable**, this has led to an increase in the possible risks of **injury**. This is because we use them in different situations where our body is not always in the best position.



Activity 1

You should plan a video that is up to one minute long, showing how to use a digital device safely.

Here's an example of a plan:

Title: How to use a laptop properly

Plan: Go through the tips on how to use a laptop properly:

- screen in the proper position
- cables placed so that they are not trip hazards
- good ventilation around the device
- take breaks.

Make a video of an example for each tip to illustrate good practice.

Show things to avoid doing when using a laptop:

- bad working position
- causing trip hazards
- using a laptop while walking
- resting a laptop on a surface that will block its fans
- not taking any breaks.

Plan your own video, using a **storyboard** and **script**.

Decide which digital device you want to cover, then carry out research and make notes about the key information to show in your video so that people will know how to use the device safely. Think about how you want to get the information across. Think about the setting – where will your video take place? Are your actors going to speak or will you have a narrator?

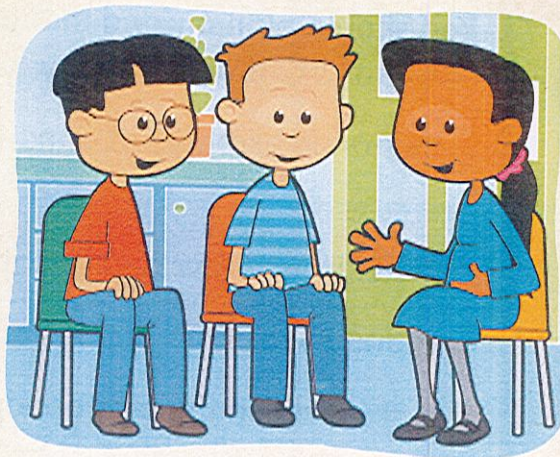
The plan you make in this lesson will be used in Lesson 4.



Activity 2

Now, get in to groups of three and discuss your ideas with members of your team. You should listen to one another's ideas and which devices you have all chosen.

Are the tips useful? Suggest any that haven't been mentioned if you think they should be included.



Discuss with a partner one way to stay safe using a desktop computer, laptop, smartphone or tablet. You should try to explain your ideas with a reason, such as:

Screen at correct
height = less neck
strain

Then regroup with your team and make a list of the things that you need to do, ready for the next lesson.



I can plan a video about using devices safely.



I know how to use devices safely to prevent injuries.

Lesson 4



Filming and editing your video



In this lesson you will set about filming and editing your video about the safe use of digital devices.



Key words: close-up, crop, edit, framing, health and safety, pan, prop, script, splicing, storyboard, transition, wide shot, zoom



In your groups, discuss what role you will each play in the making of your video today, and how you are going to contribute to the task.



As you will remember from your work in Unit 4, you should think about the following points when you set out to make your video.

When filming, think about:

- **framing** the action
- **close-ups, zoom, wide shots, pan** shots and dolly shots
- what people might say or any text that needs to be displayed on the screen
- any **props** that you might need.

When editing, think about:

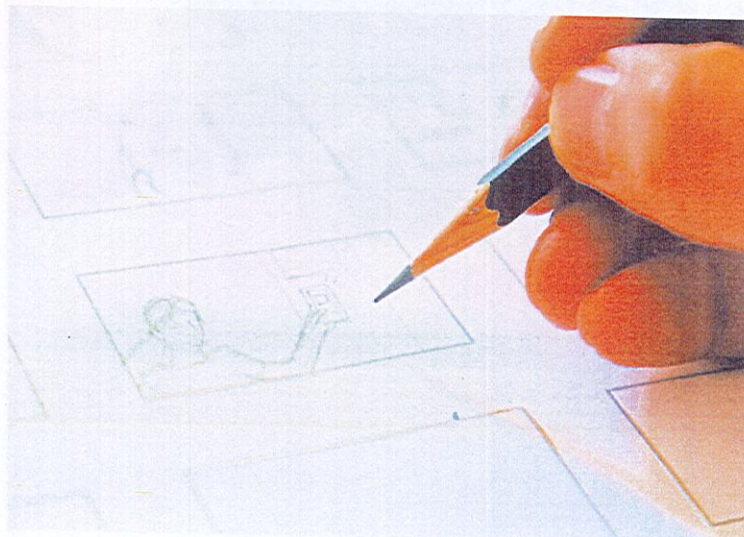
- **cropping, splicing** and splitting video
- adding **transitions**
- zoom and video effects
- adding narration and/or music.

If you are unsure about any of these points, revisit Unit 4.



Activity 1

Start your video filming and editing. Use your **storyboard** and **script** from Lesson 3 to keep your video focused on the **health and safety** issues that come up when using digital devices.





Review each other's films and make a list of the common ways the group found to reduce the risk of injury. Write a 'Top five ways to minimise risk when using devices' list in your notebook.

Top five ways to minimise risk when using devices

1

2

3

4

5



I can plan, shoot and **edit** a film.



I can contribute to a project.

Lesson 5



Digital devices and the environment



In this lesson you will investigate the environmental issues involved with recycling digital devices.



Key words: copper, energy cost, e-waste, gold, hazardous, iron, lead, plastic, recycle, refurbish, ruthenium, steel, toxic, upgrade



When you **recycle** items, materials are collected and sifted through to see if they can be reused. This results in less rubbish going to landfill sites. Materials that can be recycled are manufactured into new products, which can help to reduce waste and the use of scarce resources. Some recycling processes also save energy and help the environment.

With a partner, make a list of materials that you believe can be recycled.

Discuss whether digital devices can be recycled or not. Write down the points you agree on in your notebook.



Advances that have been made in technology have not only increased the numbers of devices available but also extended their use across the world. New models are released on an annual or even more frequent basis, and complex devices may be difficult to repair. This means that some devices are thrown away because they have stopped working, but other times simply because users have bought a newer model.

The term '**e-waste**' means electronic waste. This consists of devices that no longer work and cannot be **refurbished**. A refurbished device is normally one that has been repaired and is sold at a lower cost than a new one.



The main reasons people give for changing their digital devices are:

- they like to have the latest models to keep up with other people
- some will not work with, for example, the latest computer games, so they have to upgrade
- devices are susceptible to breaking if they are dropped or knocked, and generally stop working permanently if they are submerged in water
- they wear out – buttons stop working, disk drives wear out or fill up, and the costs of repairs can sometimes be more than a new device.

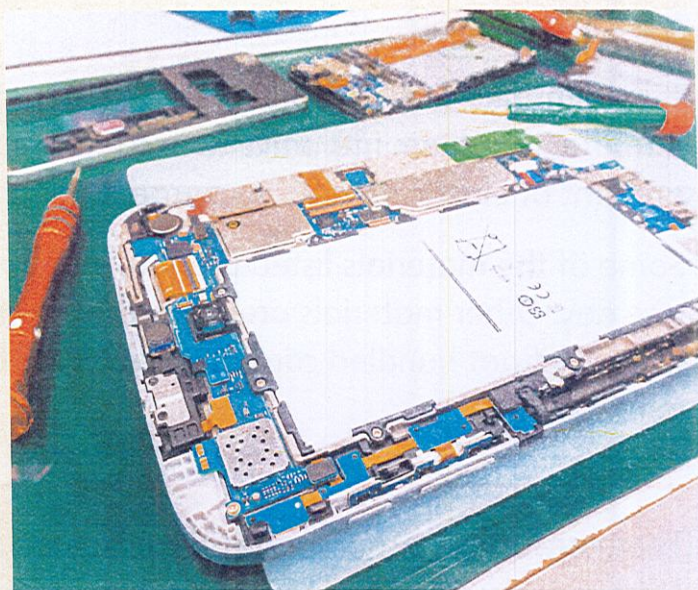


Activity 1

Which of the materials listed below can you find in the image?

- plastic
- glass
- metal
- cardboard

Discuss with a partner and make a note of whether any of these materials can be recycled.



Here are the main materials that you can find inside computing devices:

- **ruthenium** for hard drives
- **gold** for contacts and connectors
- **lead** for soldered joints on circuit boards
- **copper** for circuit boards and connecting cables
- **plastic** for covering wires, knobs, buttons, casings
- **iron/steel** for casings and screws, hard drives.



Computing devices have an **energy cost**. This is the energy used to get the raw materials from where they are found, and to make the device. For example, energy is needed to mine gold from the ground, refine it and transport it to the factories to be made into the contacts and connectors that can then be used in the circuits.

It is estimated that the energy used to mine the materials, refine and manufacture them into parts to make a smartphone is about 70 times the amount of electricity used to charge it for a year.

Some of the materials listed are rare, which means that they might run out one day. Other materials are **hazardous** or **toxic**, causing health problems in humans if not handled carefully. Therefore they should not be processed as general waste.

There are lots of organisations that collect, recycle or refurbish unwanted electronic devices. Recycling these items properly or finding a new home for them helps to reduce e-waste.



Activity 2

It is important to promote good recycling and reuse habits so that when they buy new devices people are aware of the dangers of e-waste.

Write an email that could be sent from an e-waste prevention organisation to people of all ages. Use the information in this unit and some additional research of your own to decide what to say.

Here is a plan for your email.

- Why is there an e-waste problem?
- Describe some of the rare and hazardous materials used in modern digital devices.
- What are the environmental impacts of not reusing or recycling devices properly?
- How many smartphones are sold each year?
- How long is a modern digital device designed to last?



Share your email with a partner, and see if you have both have included similar information. Give feedback in the form of two stars and a wish to each other. Your stars are two things that you liked about your partner's email, and the wish is something that they could do differently or something else they could include to make the email better.



I understand the environmental impact of technology.

Unit 5

Mid-unit assessment

Write your answers in your notebook.

- 1
 - a) Give two positive features of a desktop computer.
 - b) Give two negative features of a desktop computer.

(4 marks)

- 2 Which of these multi-role devices is the least portable?

- A desktop computer
- B laptop
- C tablet
- D smartphone

(1 mark)

- 3 What do the letters 'RSI' stand for?

- A repetitive system input
- B responsible strain impact
- C repeated stretching injury
- D repetitive strain injury

(1 mark)

- 4 Explain how you might injure your neck using a tablet device.

(1 mark)

- 5 Write three key things that will help to minimise your risk of injury when using a desktop computer at a workstation.

(3 marks)

6 What is e-waste?

(1 mark)

7 Explain why there may be increased e-waste as devices become more technical and advanced.

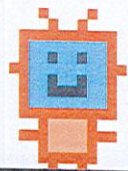
(1 mark)

8 Gold can be found in most modern devices, such as smartphones, laptops and tablets. In these devices, gold is used:

- A for connectors and contacts inside the device
- B for decoration outside the device
- C as a way to keep the prices high
- D in the screens of new devices

(1 mark)

Lesson 6



The life cycle of a smartphone



In this lesson you will investigate the life cycle of a smartphone.



Key words: environment, e-waste, recycling, toxic

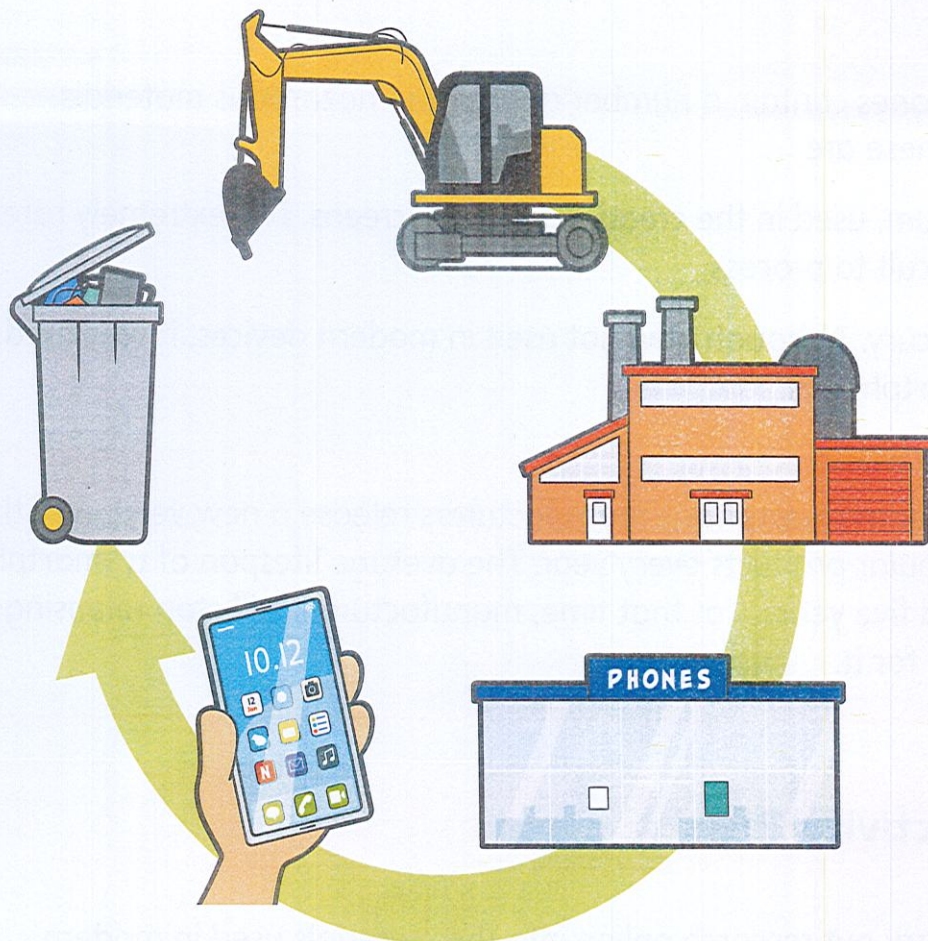


A lot of **recycling** of waste is done in the Global South. Which countries do you think this refers to? Can you think why this might happen? Discuss your ideas with a partner.



The life cycle of a smartphone

Think about the smartphone, one of the most common digital devices on the planet. The typical life cycle of a smartphone often looks like this.



Many people believe that when **toxic** materials are recycled, it happens in a nice, modern factory. That is not the case for all **e-waste**. The European Environment Agency estimates that between 250 000 and 1.3 million tonnes of used electrical products are sent to the Global South, such as West Africa or parts of Asia, to be stripped down. Many of those recovering the raw materials from these devices are poorly paid, and materials that are toxic will be processed in dangerous conditions that will cause harm to the local people and damage their **environment**.



Activity 1

Think about other common pieces of technology. Discuss with a partner how their life cycles may follow the same path as a smartphone.

Smartphones contain a number of rare and hazardous materials. Two of these are:

- indium, used in the creation of touchscreens. It is extremely rare and difficult to process
- mercury. Although now not used in modern devices, it was used in older smartphones.

Most modern smartphone manufacturers release a new version of their most popular products every year. The average lifespan of a smartphone is around five years – at that time, manufacturers will stop releasing new software for it.



Activity 2

Carry out research online into the materials used in modern smartphones. Doing this will help you in the remaining lessons in this unit too. Find out about:

- two rare materials that can be recycled from old devices and used again to make new smartphones
- two examples of hazardous materials used in the production of smartphones.



In the next lesson you will be thinking about ways to reduce e-waste. Discuss the following questions with a partner.

- How can we try to prevent people from disposing of phones, devices and computers that still work?
- Is recycling a good thing if we cannot recycle safely?
- What ways of prompting safe and responsible recycling could we try at school and home?



I understand the environmental impacts of technology (materials, e-waste and recycling).



I know some of the risks that come from recycling e-waste.



Lesson 7



Reducing e-waste



In this lesson you will investigate how to reduce e-waste.



Key words: emissions, e-waste, recycle, reduce, reuse



Discuss with a partner where and how a lot of **e-waste** is recycled. What potential issues are there with this approach to recycling?



To help slow the amount of e-waste that is created every year, everyone should follow three rules.



Reduce the quantity of electronics we buy.



Reuse the electronics we have – give them to someone else to use and find out about other options.



Recycle the electronics we no longer need – convert them into something else.



Recycling can have many advantages for our environment. For example, if all the precious metals from our old devices can be recycled, there will be less of a need to mine for new materials.

The lifespan of digital devices can be extended so that recycling is delayed for as long as possible. We can make our devices last longer in the following ways.

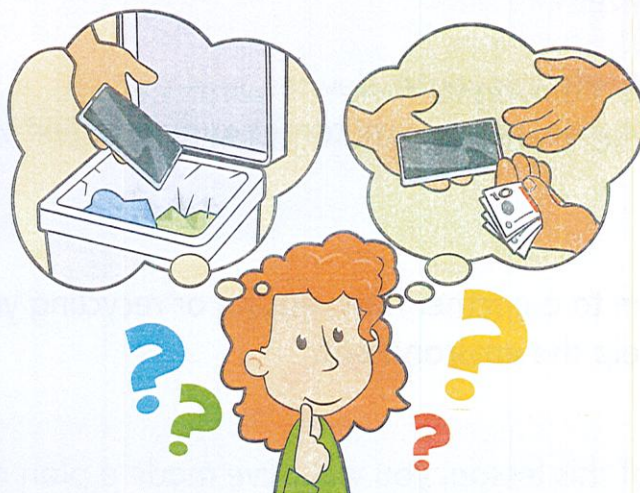
- **Donate our old devices:** some people can't afford new ones.
- **Sell our old devices:** other people may be looking out for them.
- **Protect devices from damage:** smartphones last longer with cases and screen protectors.
- **Use cloud storage more:** getting rid of or lessening the need for hard drives and other storage devices.
- **Be more energy efficient:** turn off devices when they are not being used, reducing emissions
- **Repair broken devices:** often specialist stores can repair devices so you can continue to use them.
- **Stream rather than own:** this reduces the need for physical copies and storage devices.

Always keep in mind when storing files online or streaming entertainment that there is still a physical device somewhere that needs power and maintenance.



Activity 1

Write an open letter to your peers to help persuade them to try to extend the life of their devices.



Activity 2

Working with a partner, come up with a list of four different devices that you each own or use at home. For each one, come up with a sensible way to increase its lifespan.



Discuss with a partner the following questions.

- Have the lessons in this unit changed the way that you think about the devices you use? If so, how?
- Is there anything more that manufacturers can do to help?



I understand the environmental impacts of technology (materials, e-waste and recycling).



I know how to reduce e-waste.

Lessons 8 and 9

Planning a leaflet



In this lesson you will plan and research a leaflet about reducing e-waste.



Key words: copyright, devices, environment, e-waste, leaflet, paraphrase, plagiarism, target audience, text wrap

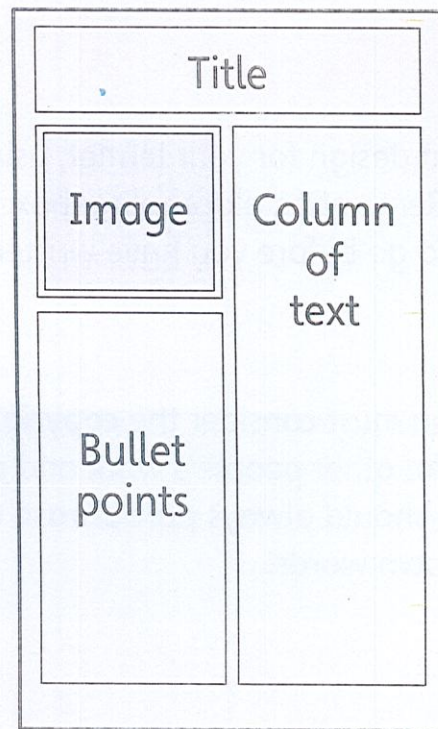


Explain to a partner how reusing or recycling your old **devices** can help the **environment**.

By the end of this lesson, you will have made a plan and gathered information so that you are ready to produce a **leaflet** about reducing **e-waste** from digital devices. You can also choose the application that you want to use to make the leaflet.

Your leaflet should be aimed at adults – your **target audience** – as they buy such devices, but it should also be of interest to younger people. Here are some things to consider when planning any leaflet.

- What layout will you choose? Landscape or portrait?
- How should the images and text be positioned?
- How can 'white space' (areas of the leaflet that do not contain anything) help with the design?
- What sorts of fonts and font effects are appropriate for the audience?
- What style of images, photos or graphics are most appropriate? Will text be above, below or to the side of the images?
- Will it grab the attention of the target audience?



Take a look at lots of existing leaflet designs to get some great ideas for how to lay out your leaflet.

Presentation, word processing or desktop publishing software often contain templates. These can be useful for ideas, even if you don't use them. If 'leaflet' isn't listed as a template, try synonyms for leaflet, such as: flyer, advertisement, brochure, bulletin, circular or pamphlet.





Activity 1

Sketch out a layout design for your leaflet, using the information given as a guide. Remember, placeholder boxes can be used to show where things are to go before you have written the text or found the image.

As discussed in Unit 4, you *must* consider the **copyright** for the information you are using. You cannot take other people's work and pretend that it is your own – that is **plagiarism**. You should always **paraphrase** the research you have found and write in your own words.



Activity 2

Local governments have a duty to ensure that everyone knows how to recycle digital devices, and they should make it easy for everyone.

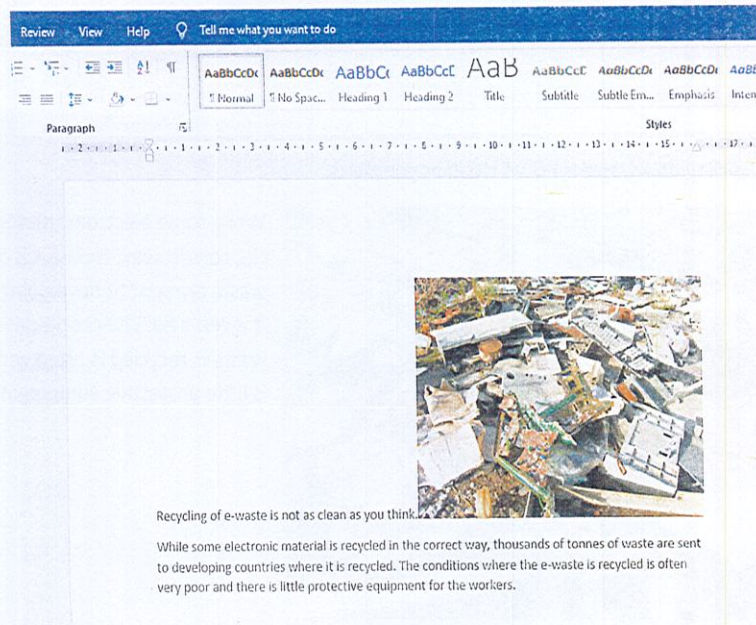
Companies should take responsibility for their products. If they are creating a lot of waste, they need to make sure that customers are rewarded for recycling their old devices.

Discuss with a partner who you agree with more.

Using the research you have already done in this unit, and gathering any additional information you might need, start creating your leaflet. Add the text, images and relevant graphics. Remember, you can choose the most appropriate software for this task.

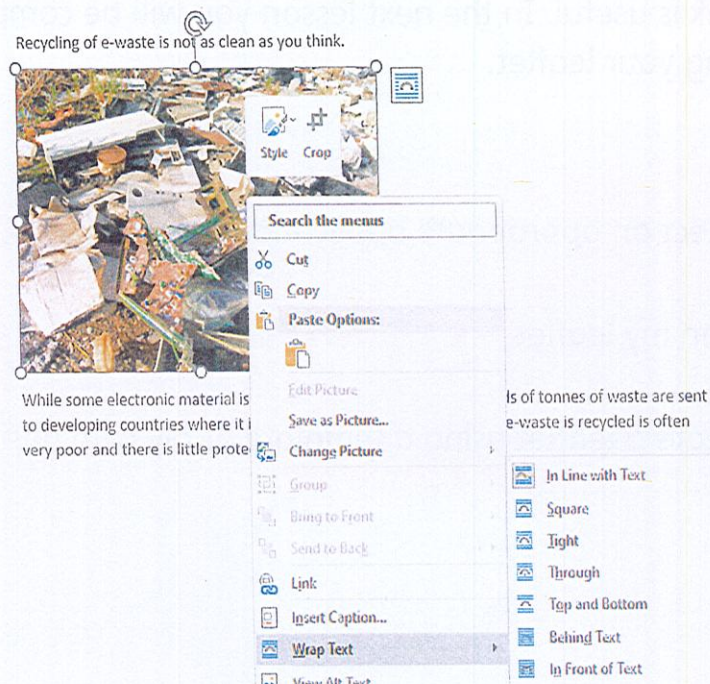
Positioning an image

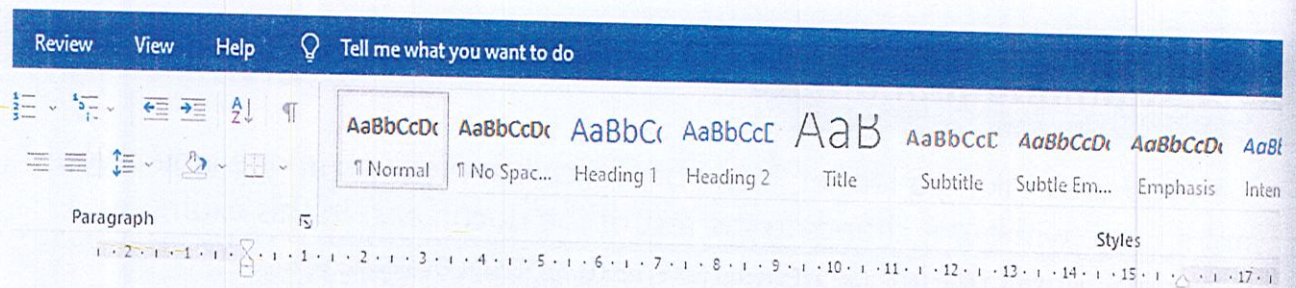
When you are making a leaflet, it can be difficult to place an image where you want it to go without it changing the rest of the document. In this example, the student wants the image next to the text, not covering it up.



To place the image where it needs to go, the student should right-click on the image and look at the **text wrap** options.

By selecting 'square' and moving the image, the text and the image are in the correct positions.





Recycling of e-waste is not as clean as you think.



While some electronic material is recycled in the correct way, thousands of tonnes of waste are sent to developing countries where it is recycled. The conditions where the e-waste is recycled is often very poor and there is little protective equipment for the workers.



At the end of the lesson, feed back to a partner about what you have both achieved in the lesson. Explain your ideas for your leaflet, showing the plan you have made, and listen to any feedback that you think is useful. In the next lesson you will be completing and reviewing your leaflet.



I can select an appropriate application for a task.



I can plan my leaflet.



I can create a leaflet using a template or my own design.

Lesson 10



Completing a leaflet on e-waste, presenting it and receiving feedback



In this lesson you will complete your leaflet on e-waste and present it to your peers for feedback.



Key words: peer review



With a partner, discuss whether you both have the following in your leaflets:

- headings and subheadings
- suitable images and text
- factual information
- tips on how to reduce e-waste
- a good balance of text and images
- some statistics.

At the end of this lesson you will have finished your leaflet, and you will **peer review** one another's work.



Activity 1

Complete your leaflet and use the checklist above to make sure that you have covered everything.



When you are giving feedback, you will use two stars and a wish. Your stars are two things that you liked about your peer's leaflet, and the wish is something that they could do differently or something else they could include to make the leaflet better.



Activity 2

Have a look at your peer's leaflet and give them feedback in the form of two stars and a wish. When you have received your feedback from them, you should write it down in your notebook. If time allows, return to your leaflet and try to make some of the improvements that have been suggested.



Thinking about the unit as a whole, ask yourself the following questions.

- What do you think you have got better at?
- Are there any areas that you need to practise?
- How do you feel now about e-waste?
- Are you confident about what you can do to help the waste situation by reducing, reusing and recycling?



I can make a leaflet.



I can present my leaflet.



I can carry out a peer review of other leaflets.

Unit 5

End-of-unit assessment

Write your answers in your notebook.

- 1 Where is a lot of e-waste recycled?
(1 mark)
- 2 Explain what hazards are involved in recycling e-waste.
(2 marks)
- 3 Give four suggestions of how we can reduce the amount of e-waste that we produce.
(4 marks)
- 4 Give an example of how you can reuse a tablet device instead of throwing it away.
(1 mark)
- 5 How can using cloud storage for storing files help reduce e-waste?
(1 mark)
- 6 Which of the following is NOT required when planning a document?
 - A position of text boxes
 - B spelling and grammar tools
 - C page orientation
 - D position of images or graphics
(1 mark)

7 When you are designing a leaflet, you need to consider many things.

- a) What is meant by the term 'target audience'?
- b) Explain what a font is.
- c) Which app would NOT be appropriate for creating a leaflet?
 - A publishing application
 - B presentation application
 - C word processor application
 - D spreadsheet application
- d) Why should you save your work regularly when you are working on a project?

(4 marks)

8 What does 'page orientation' relate to?

- A whether the document is shown portrait or landscape
- B the font and style choices
- C the background colour
- D the content theme of the document

(1 mark)

9 Why would a student need to use the text wrap feature when positioning a picture?

- A to position the text around an image properly
- B to change the font in the document
- C to change the colour or size of an image
- D to change the colour or size of the text

(1 mark)

10 Explain what is meant by plagiarism.

(1 mark)



Read the sentences. Do you agree? Think about what you have learned.

- I understand the key features of different devices.
- I can select appropriate devices for a specific task.
- I understand the health and safety issues involved with using devices.
- I know how to minimise the risk of injury.
- I can plan, create and edit a video about using devices safely.
- I can contribute to a project.
- I understand the environmental impact of technology.
- I know how to reduce e-waste.
- I can plan, design and create a leaflet.

Unit 6

Programming (part 2)

In this unit you will expand your understanding and use of algorithms and programming. You will write algorithms to solve a variety of problems and then program them in Scratch. You will test your programs and give feedback to your peers about their work. Programs will include more use of variables and repetition to draw shapes. You will use the coordinate features to specifically guide your sprite to accurately draw shapes in user-specified areas.

Throughout the unit you will use your debugging skills to check your work and use logical reasoning to predict the behaviour of the algorithms and programs.

Key objectives

-  To understand how to create an algorithm to solve a particular problem (including controlling or simulating physical systems), making use of algorithmic constructs (sequence, repetition, selection, variables).
-  To understand the purpose of a given algorithm and use logical reasoning to explain how a simple algorithm works.
-  To understand how to identify and correct errors in algorithms.
-  To be able to decompose a problem into smaller subproblems.
-  To be able to locate and fix errors (bugs) in a program.
-  To be able to use sequencing, repetition, selection and variable constructs in your programs.
-  To understand how to use variables.
-  To understand how to write code that accepts and responds appropriately to user input.



Lesson 1

Designing, testing and repurposing an algorithm



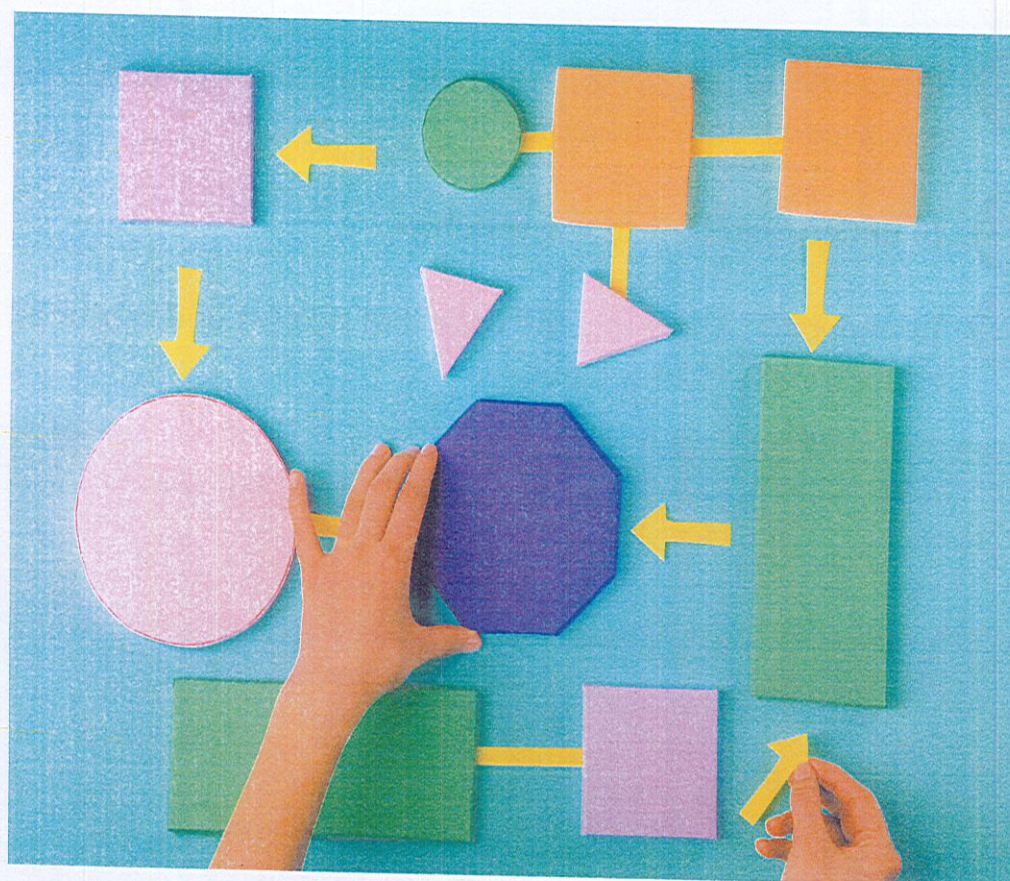
In this lesson you will repurpose an algorithm to suit different conditions.



Key words: algorithm, logical reasoning, repurpose, test, variable



With a partner, discuss whether an **algorithm** can be written in any order. Can you give an example of why this would/would not work?



When you **repurpose** an algorithm, you are changing part of it to suit new conditions, but you need to study them properly first so that you know which part you need to change.

For example, here is an II-line exercise algorithm:

IF the teacher says jump THEN

Do 1 star jump

IF the teacher says left THEN

Put your left hand on the ground

IF the teacher says right THEN

Put your right hand on the ground

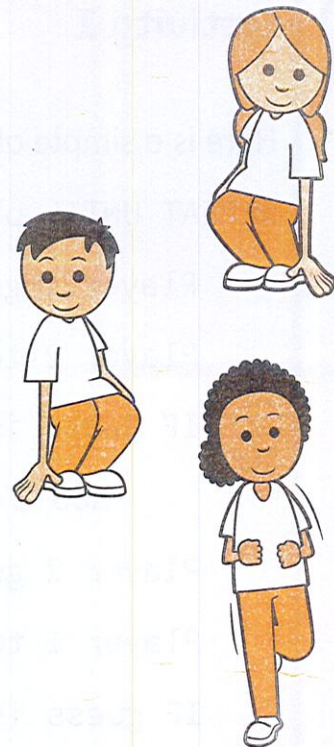
IF the teacher says hop THEN

Repeat unit next command

Hop on one foot

IF the teacher says down THEN

Do 5 push-ups



To repurpose this algorithm, we do not need to change all of it or rewrite it from the beginning. We look for and change only the required command, the rest remains the same.

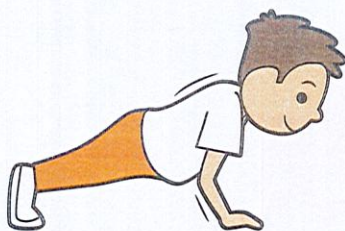
For example, we want to change the algorithm to 5 star jumps and 10 push-ups. If we look at the original algorithm, these commands appear on lines 2 and 11, so we only need to change these lines to repurpose the algorithm:

Line 1 remains the same

Line 2: Do 5 star jumps

Lines 3–10 remain the same

Line 11: Do 10 push-ups





Activity 1

Here is a simple algorithm for a coin toss game:

REPEAT UNTIL player 1 or 2 reaches score of 5

Player 1 guess head or tails

Player 2 toss coin

IF guess is correct THEN

Add 1 to player 1 score

Player 2 guess head or tails

Player 1 toss coin

IF guess is correct THEN

Add 1 to player 2 score

END game

Explain to a partner what is happening in this coin toss game. How is the person who tosses the coin decided? Who guesses first? Who starts the game?





Activity 2

Rewrite the coin toss algorithm to allow each player five throws. The winner is the one who scores the most correct guesses. Note, in this case, there might be a draw (five correct guesses each). After writing your algorithm, **test** it with a partner and correct any bugs.

In this example, a score **variable** has been used, which will keep and adjust the scores as the game is played. The scores of players 1 and 2 start with a value of 0. Remember a variable can store both text and numbers.

For example, a weather website may have a statement like this:

In **Lisbon** the weather is **sunny** and the temperature is **16** degrees Celsius.

The bold terms are variables. These can be edited to display any city, weather and temperature.



Think about a shop. Every product will have its own price – these are variables. The till will collect all the variables and then add them up to display the total amount due.



Activity 3

Extra challenge: change the algorithm of the coin toss game again so that the game counts down from a score of 5 to 0, with each player losing a point if they score incorrectly. The first person to hit 0 loses.

After writing your algorithm, test it with a partner and correct any bugs.



Logical reasoning is the process of applying rules, such as the commands in an algorithm, to understand a problem. Can you understand why it is important when writing or reading algorithms?

Can you think of any other variables that you see every day?



I understand the purpose of a given algorithm.



I can use logical reasoning to explain how an algorithm works.



I can repurpose an algorithm to solve new problems.



I understand how to use variables.

Lesson 2



Creating an algorithm using loops



In this lesson you will add loops (repeats) to your algorithms to reduce the number of steps in them.



Key words: coding, condition, loop, output, repeat, variable



With a partner, think of where you or others may have used **variables** in real life.

Consider the start of a simple step-by-step algorithm to take the register for a class of students:

- 1 Read first name on register
- 2 Mark present or absent on register
- 3 Go to next name in list

AND, SO ON...

There are three lines for one student. Imagine if the class has 30 students – this will quickly become a very long algorithm with lots of repeated lines.

A solution to having such a long algorithm would be to use **loops**.

Loops were covered in Unit 2 – they reduce the size of the algorithm and the chance of mistakes.

In **coding** we sometimes call loops '**repeats**', but they mean the same thing!

This would be our new version of the register algorithm, including loops:

REPEAT UNTIL reach the end of the list

Read name on the register

Mark present or absent in the register

Note that we have used a 'REPEAT UNTIL' statement, which is an example of a **condition** that stops a repeated action. We could have used 'REPEAT 30 times' if we had 30 students in the class:

REPEAT 30 times

Read name on the register

Mark present or absent in the register

Both achieve the same **output**, so it can be up to the programmer to decide which they prefer to use. However, it is worth noting that the second version will need to be constantly updated as the number in the group changes, whereas the first version will adjust automatically.



Activity 1

With a partner, come up with real examples of the following:

- algorithms that repeat until a condition is met
- algorithms that have a fixed number of repeats.



If you think about an algorithm that uses counting, it's important to remember:

- variables sometimes need to be reset to their starting position
- variables don't always start at zero, especially if counting down.



I can edit and repurpose algorithms to solve new problems.



I understand the importance of variables in an algorithm.



Lesson 3

Programming an algorithm that contains variables



In this lesson you will create a program with loops and variables.



Key words: average, conditional, loop, program, repetition, variable



Here is an algorithm that uses **repetition**:

Pen down

Forward 150

Right 120

Forward 150

Right 120

Forward 150

Right 120

Discuss what shape this algorithm might make with a partner. Can you write this algorithm using **loops**?



Activity 1

Program the algorithm from the lesson opener, using Scratch. Use the repeat block if possible.

The algorithm below has been created in response to a request from a family that own an orchard. It is an example of an algorithm that uses repeated elements and **variables**. First of all, it asks how many trees there are, and then for each tree, how many fruit there are. It can then be used to calculate the **average** number of fruit per tree for the orchard:

Set **trees** to zero

Set **fruit_total** to zero

Count number of **trees**

REPEAT as many times as **trees**

Count number of **fruit**

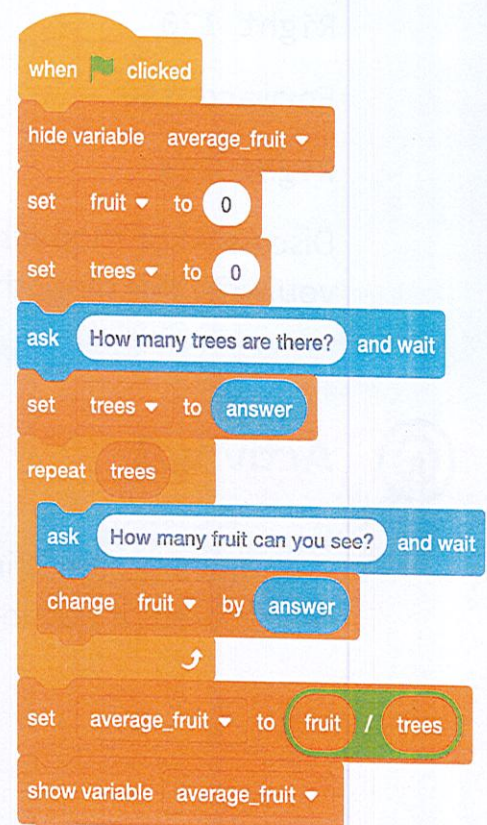
Add number to **fruit**

Average_fruit = **fruit** / **trees**

DISPLAY **average_fruit**

The orange section is the repetition – a **conditional** selection which stops a repeated action. The variables have been coloured blue.

Here is how the algorithm can be recreated using Scratch. Note how the average number of fruit has been calculated in the second to last block using the division mathematical operator.





Activity 2

When moving from a written algorithm to a Scratch **program**, you will often need to add extra lines or blocks to get the required outcome.

Identify the additional blocks that have been required in the program shown, and discuss with your partner why they are needed.



Discuss with a partner how Scratch can use the 'ask' block, and use the results to assign to a variable.

Come up with three other uses for collecting variable data in this way.



I can create a program.

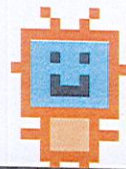


I can include variables in my program.



I can debug my program.

Lesson 4



Repurposing an algorithm



In this lesson you will repurpose your program from Lesson 3 to meet a new challenge.



Key words: debug, logical reasoning, modify, repurpose, variable



Discuss this statement as a group. Do you agree with Jorge or Raffi? Explain why.

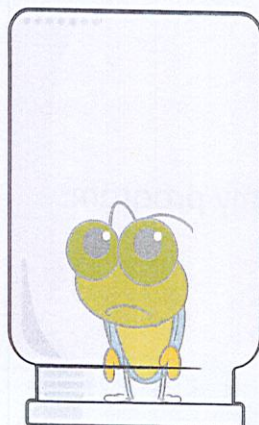
Jorge

Repurposing an algorithm means changing part of it, but keeping most of it the same. You need to understand the algorithm to know what it is that you need to change.

Raffi

Repurposing means that you write a brand-new algorithm because the original doesn't work.

Before you start to repurpose any program, you need to make sure it is complete, and the code has been **debugged**.





Activity 1

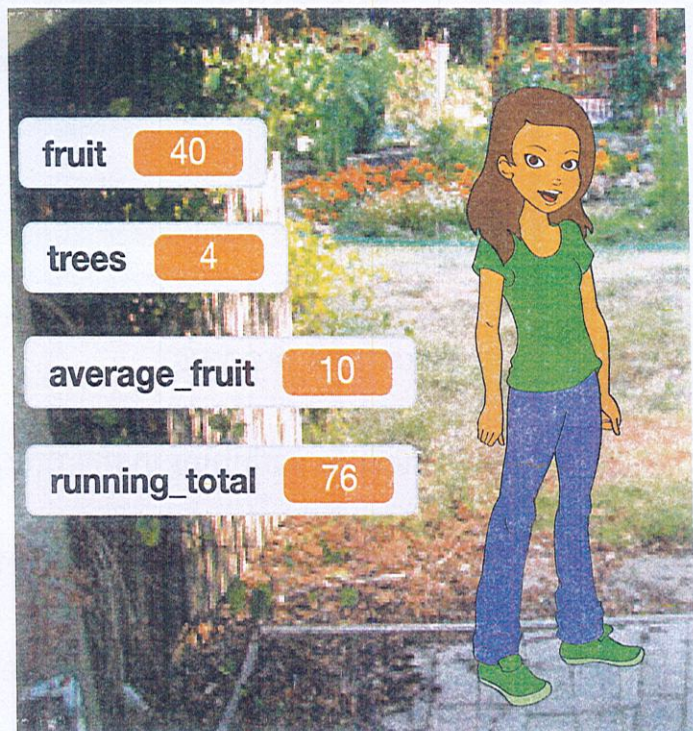
Create a working version of the Scratch program in Lesson 3. When you have finished, check the program works by debugging it with a partner and **modify** the code if you spot any bugs.



How to modify your program to contain a running total

As fruit is picked, the family would like to see a running total that keeps increasing. Therefore, we will need to add a new **variable**. The new variable should be visible on screen and should not reset when the program is started. Otherwise, the data stored in that variable (the running total) would be deleted.

After running for a few days, the total could look like it does in the image to the right.





Activity 2

Think about how you might repurpose your program so that it will keep a running total of the number of fruit picked from day-to-day and week-to-week. All new counts from each day should be added to the current total and then the ongoing total.



Discuss with a partner how you will accommodate the additional challenge in your program. Check each other's ideas and see if they would work by using **logical reasoning** to predict the outcome of the algorithm. Share any changes that you think are necessary with each other.



I can create a program.



I can include variables in my program.



I can modify my program to meet new challenges.



I can use logical reasoning to predict the outcome of an algorithm.



Lessons 5 and 6

Programming a timer



In this lesson you will learn how to program a timer.

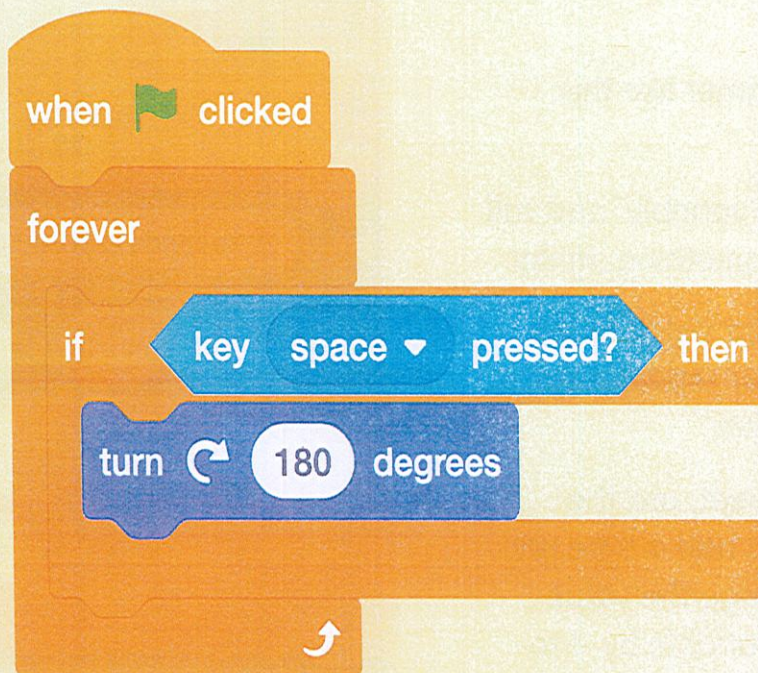


Key words: countdown, decompose, timer, variable



Have a look at this code and discuss with a partner how the 'forever' loop works.

What other types of loops can you think of?



A useful **variable** to use in any program is a **timer**. You can use timers to count up or down. We can **decompose** programming a timer into two subproblems:

- 1 to create and show a variable called 'timer'
- 2 to use it to cause an action after a certain amount of time.



Activity 1

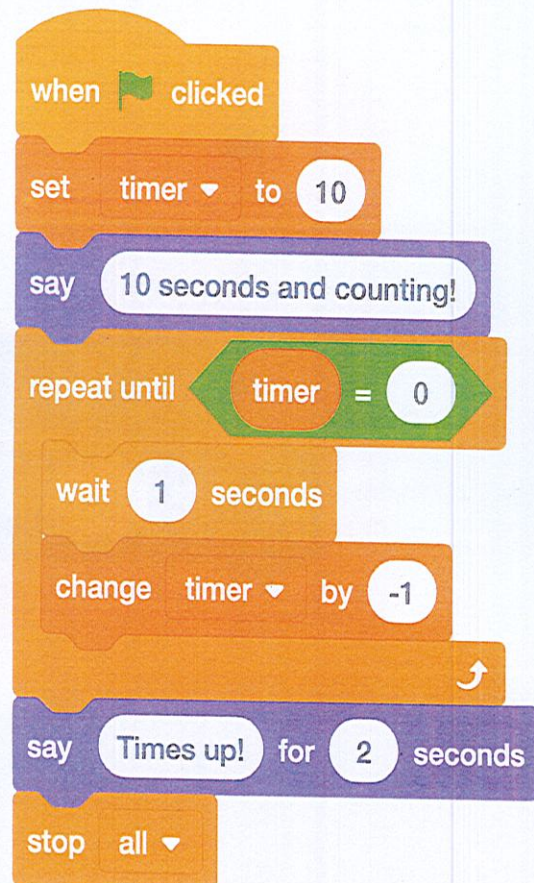
Discuss with a partner three possible uses for a **countdown** timer within a Scratch program.

How to add a timer to a program

The example shown is a ten second countdown timer.

When creating a timer like this, you can:

- create a new 'variable' and call it 'timer', or something similar
- use the 'repeat' block to set a final value or repeat a set number of times
- within the repeat, use the 'wait' block to add a time gap and then change the value of the timer variable by -1 to create the countdown
- add an end-event once the countdown has completed.





Activity 2

Create your own version of a Scratch timer.

Try to incorporate one or more of the following extra elements:

- change the speed of the countdown timer
- have the sprite say the countdown
- play a sound when the counter reaches zero
- animate the sprite as the countdown runs down.

Save your programs carefully when using Scratch. A good habit to get into is to save multiple versions of your program after making a number of changes.



Discuss with a partner what you have achieved in this lesson.

- Did you manage to complete the challenges and repurpose your programs?
- Was there anything that you struggled with?
- Are you confident in using variables in programs?
- How could you improve your programs?



I understand how timers work in Scratch.



I can decompose a problem into smaller subproblems.



I can include a timer in my program.

Unit 6

Mid-unit assessment

Write your answers in your notebook.

1 What does repurposing an algorithm mean? Choose **two** options.

- A deleting the whole algorithm to suit a new purpose
- B modifying parts of an algorithm to suit a new purpose
- C rewriting the whole algorithm to suit the new purpose
- D using the same algorithm in a new purpose

(2 marks)

2 A variable is:

- A a store of data
- B a type of device
- C a type of selection
- D a type of command

(1 mark)

3 What could be used to help reduce the size of an algorithm?

- A repetition
- B selection
- C collision detection
- D variables

(1 mark)

4 Here is part of an algorithm.

Start

Loop forever

Set timer to zero

Move 10 steps forward

IF touching the edge THEN

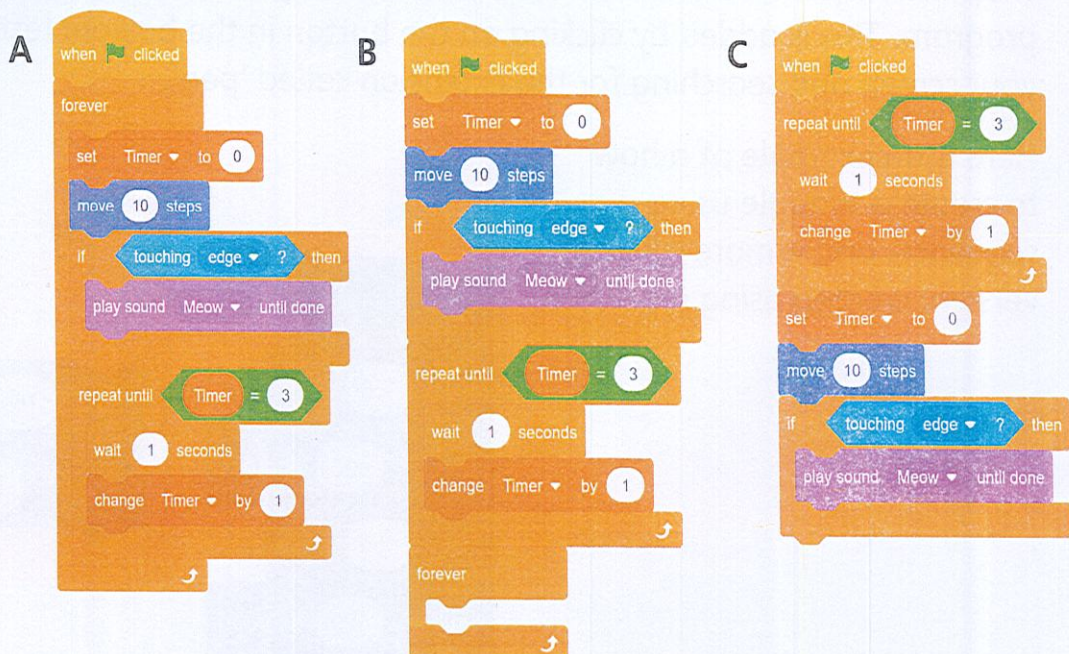
Play sound Meow

Loop until timer is 3

Wait one second

Add one to timer

- Explain what will happen in this algorithm.
- How many variables are there in this algorithm?
- Which code represents the algorithm above?



(3 marks)

Lesson 7



Writing an algorithm to draw 2D shapes



In this lesson you will write an algorithm to create a program and make your sprite draw 2D shapes.



Key words: coordinates, 'erase all' block, extension, glide, modify, pen tool

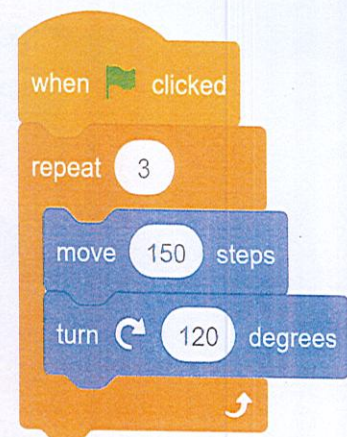
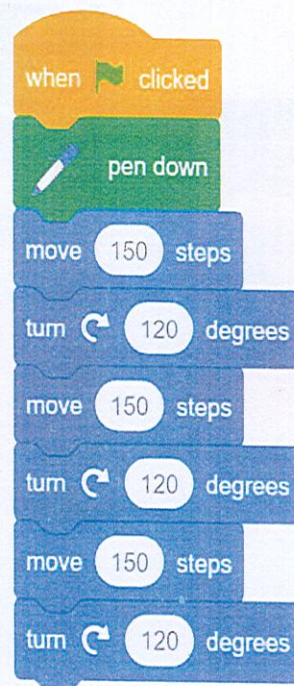


Discuss with a partner how different 2D shapes can be drawn in Scratch.

- What do you need to consider about the shape's properties?
- Can you remember any Scratch blocks that you need to use?

In Unit 2 and previous years, you will have used Scratch to create simple 2D shapes. The pen tool used to draw on screen requires an **extension** to the program. This is added by clicking on the button in the bottom left corner of your screen and searching for the extension called 'pen'.

Here is an example of a how to create a triangle using a sequence, and a more efficient version, created using repetition.





Activity 1

James said that this code draws a triangle in Scratch.

Is he correct? Why/why not?

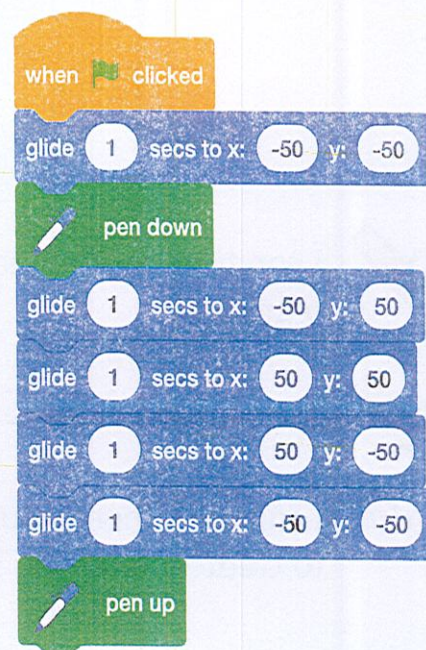


When creating drawings using the pen tool, think about the following:

- increasing the number of steps increases the size of the shape
- the turn angle can be either clockwise (right) or anticlockwise (left)
- all of the drawing on the screen can be erased using the 'erase all' block
- the line thickness can be changed by changing the size of the pen
- the colour of the pen can be changed using the 'change pen colour' and 'set pen colour' blocks.

You may want your sprite to **glide** across the screen and draw at the same time. To do this, you can program the drawing in a different way, using the 'glide to' block. This block uses screen **coordinates** to draw the shape, which need to be calculated beforehand. Remember the centre of the screen is $x = 0$, $y = 0$.

The adjacent example uses the glide block to create a simple square with four equal sides. The glide block also includes a seconds variable, which is used to control the speed.





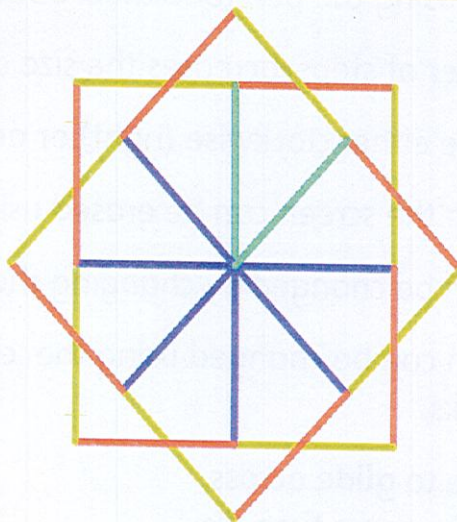
Activity 2

Use the glide block to create a simple triangle. You will need to calculate three coordinates before creating the program.



Discuss with a partner how you could **modify** your program to draw five, six or more shapes.

- How could you modify your program to draw a rectangle?
- Can you think how the following squares were drawn and what the code might have looked like?



I can turn my ideas into an algorithm and use this to create a program.



I can make my sprite draw 2D shapes.



I can use other features, like changing the size and colour of the pen to create interesting shapes.

Lesson 8



Modifying a program to create multiple shapes on screen



In this lesson you will learn how to modify your 2D shape program so that more than one is drawn.

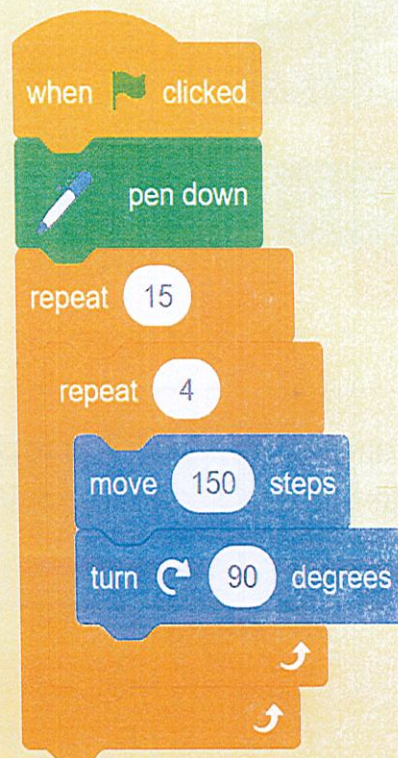


Key words: modify, repeat



Look at the Scratch program and discuss this statement with a partner.

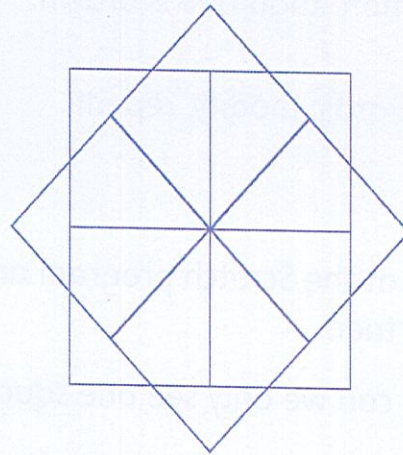
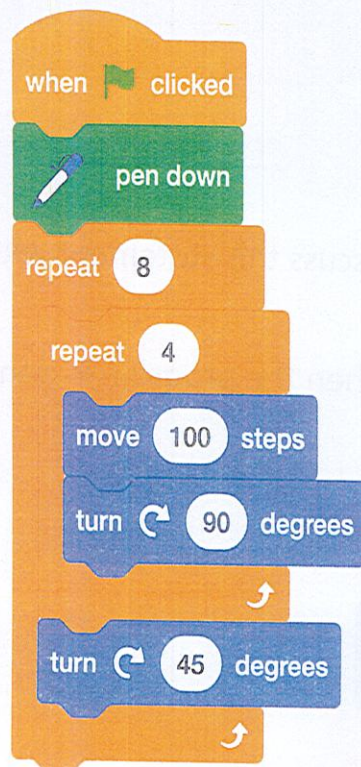
‘Why can we only see one square when the program is done?’



Drawing more than one square

Repeating the same drawing in the same place means that only one shape will be visible when the program ends. To draw multiple shapes, a turn or change of position needs to be added.

This example creates eight squares with a 45 degree turn after each shape is created.



When experimenting with angles, work within a factor of 360. For example, a 45 degree angle fits into a complete 360 degrees eight times, creating eight shapes.



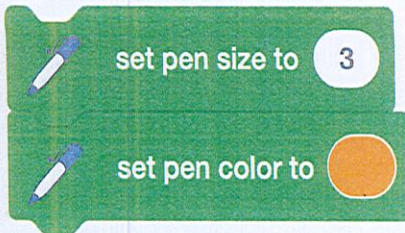
Activity 1

In your pairs, create a basic shape pattern using repetition. Remember to save the programs so that you can repurpose them easily in the future.

Adding colour to your shape

A shape doesn't need to be one colour: each side can be different. The example below shows how to create a multi-coloured square.

Blocks to add a thick, coloured line can be added to the start of the program, before the repeat sections.



Adding the 'change pen color' block just before the first line of the square is drawn means it will change as each line is repeated.



Activity 2

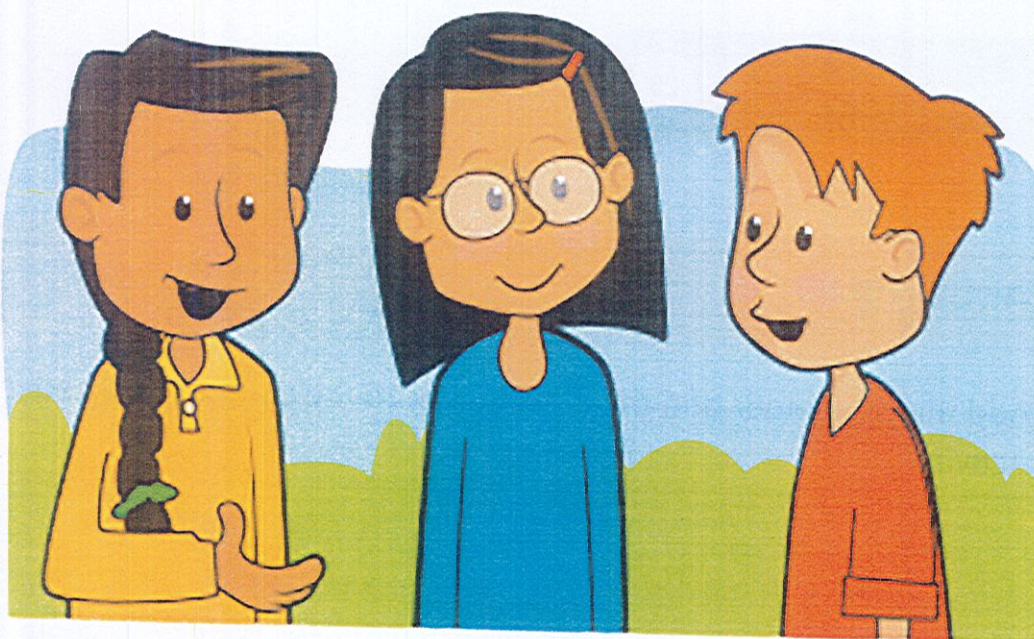
Add the pen colour and thickness blocks to the program created in Activity 1.



Discuss the following with your partner:

- Were the shapes drawn as expected?
- How did the angle used change the pattern?
- How could you **modify** the code to draw a mixture of rectangles and squares?

- ✓ I can repurpose my program to solve a new problem.
- ✓ I can debug my program.
- ✓ I can use repetition in my program.
- ✓ I can use other features, such as changing the size and colour of the pen, to create interesting shapes.



Lesson 9



Drawing shapes using coordinates and repurposing your program



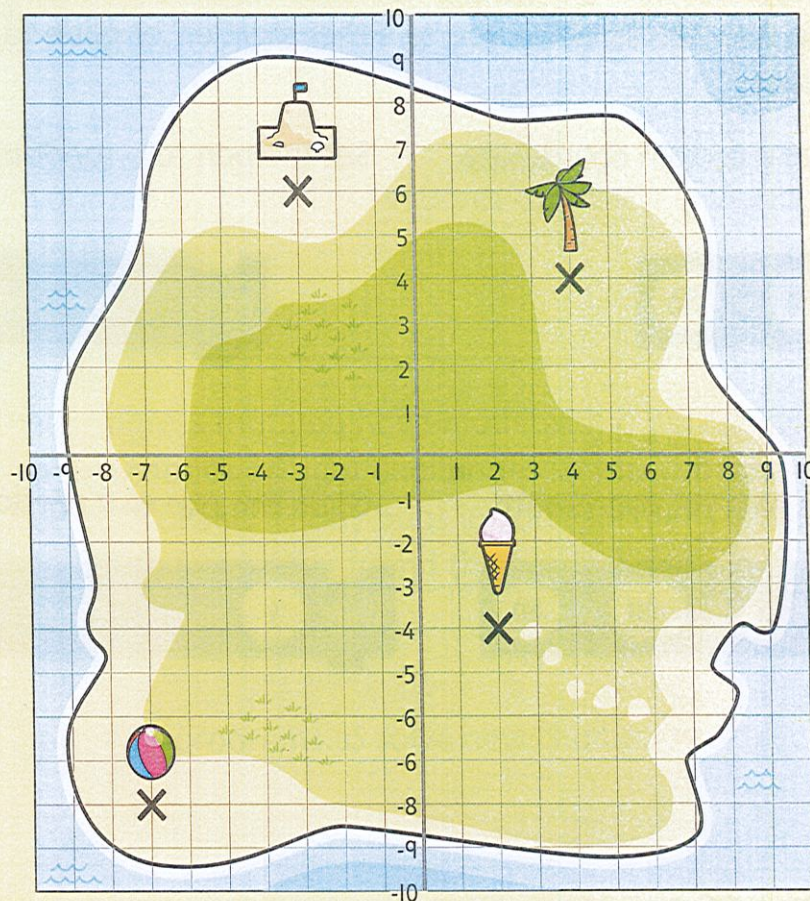
In this lesson you will learn how to draw shapes using coordinates.



Key words: coordinates, position, random



What are the **coordinates** of the following? Write them in your notebook.



ball (.....,)

palm tree (.....,)

ice cream (.....,)

sandcastle (.....,)

Remember, when positioning sprites in Scratch, the centre of the screen is at **position** (0,0).



Activity 1

Check with a partner. Can you give coordinates to each other and point to the same position on the graph on page 247?

Moving to fixed or random coordinate

By default, shapes created in Scratch will start at the centre of the screen. The following four blocks allow you to either start at, or glide to, a fixed or **random** position.

Set the pen at a certain coordinate.

go to x: 50 y: 50

Set the pen to a random coordinate.

go to random position ▼

Glide the pen to a set coordinate.

glide 1 secs to x: -50 y: 50

Glide the pen to a random coordinate.

glide 1 secs to random position ▼



Activity 2

Choose one of the following challenges. Discuss with a partner how to reuse and modify the program examples throughout this unit.

Challenge 1:

Modify your program to draw a user-entered number of squares in random positions.

Challenge 2:

Modify your program to draw squares at coordinates that the user gives.

Challenge 3:

Modify your program to draw a set number of squares at coordinates that the user gives.

Challenge 4:

Modify your program to draw squares at fixed coordinates to create a grid pattern.



Share the progress that you have made with a partner and give each other feedback on your challenges so far. You should identify and offer solutions to fix any bugs in your partner's work. Discuss which challenges you have found the hardest and why.



I can repurpose programs to solve new challenges.



I can debug programs.

Lesson 10



Using shapes to represent an object



In this lesson you will use shapes to represent objects, such as flowers or buildings.



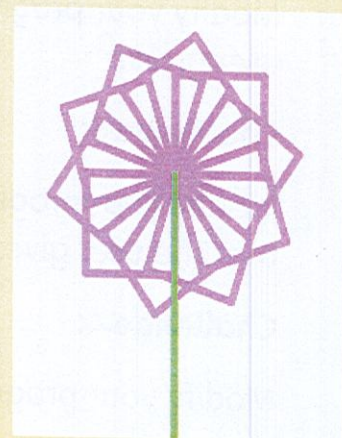
Key words: complex, coordinates, decompose, repeat, subproblem



Look at the Scratch image.

With a partner, discuss:

- What shapes have been used to create the image?
- What blocks have been used?
- What suitable step and angle sides might be used?



The programming taught in this unit can be combined to create a **complex** shape, for example a flower. Additional elements of the flower, like the stem and leaves, can also be added.

You should **decompose** the problem into smaller **subproblems**:

- **repeat** blocks can be used to draw the flower head and add different colours for the petals
- a **rectangle** could be used to create the stem, which starts at certain **coordinates**
- leaves could also be added.

When planning your algorithm, consider each part in turn:

- What shape would be good for a flower head?
- How many repeats are needed for a complete circle?
- Does the pen need to be lifted when changing coordinates?

- What range of colours do you want to have when changing the petal colours?



Activity 1

Design a complex pattern of your own to create in Scratch. It could be a flower or another design of your choice, such as a building.

Share your design with a partner and decompose it into smaller program elements.



Activity 2

Create your design using Scratch. Work with your partner to help debug each other's programs.



Discuss with a partner what you have enjoyed the most in this unit.

- Is there anything you are particularly proud of?
- Why are you proud of this work?
- What features did you use?
- Did you learn any skills that you may want to use in the future?
- Have you made any programs to draw images at home?

Listen to each other's thoughts and then think about what you would like to spend more time learning.



I can decompose a problem into smaller subproblems.



I can locate, modify and fix errors (bugs) in a program.



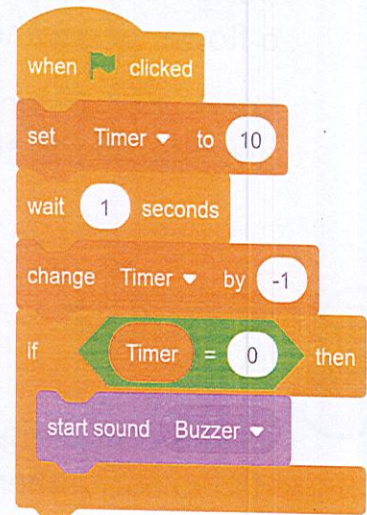
I can use repeat blocks to create patterns using 2D shapes.

Unit 6

End-of-unit assessment

Write your answers in your notebook.

- I Here is a part of program in Scratch that includes a timer for a game. It is not working as intended.



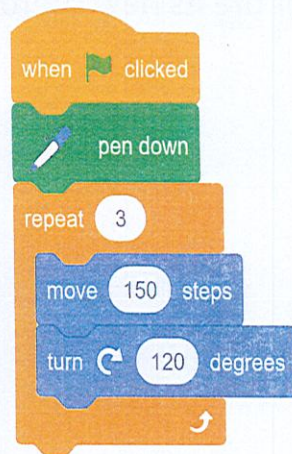
- a) Which statement describes how the program should run?
- A The timer counts up to 10, then it will play a sound.
 - B The timer counts down from 10 to 0, then it will play a sound.
 - C The timer counts up to 60, then it will play a sound.
 - D The timer counts down to 10, then it will play a sound.
- b) Explain what will happen when this program is run and where the bug is.
- c) Which option would make the program run as it should?
- A wrap a 'repeat 10' block around all blocks after the 'set timer to 10' block
 - B change the 'wait' block to 10 seconds
 - C wrap a 'forever' block around all blocks after the 'set timer to 10' block
 - D change the 'change timer by -1 to -10

(4 marks)

- 2 Describe the main difference between the 'go to' and 'glide' motion blocks.

(1 mark)

- 3 What shape would be drawn if the following program is run?



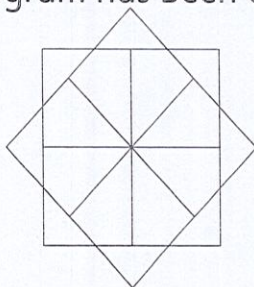
(1 mark)

- 4 When creating a repeating shape pattern, how many degrees should the repeated turns add up to?

- A 90
- B 180
- C 270
- D 360

(1 mark)

- 5 A program has been created to draw the following image.



- a) What shape has been repeated in this program?
- b) How many times has the shape been repeated?

(2 marks)

- 6 What are the x and y coordinates at the centre of the Scratch screen?

(1 mark)

- 7 A sprite starts at the centre of a screen and is moved 25 units to the left and 18 units down. What are its new coordinates?

A $x = -25, y = -18$

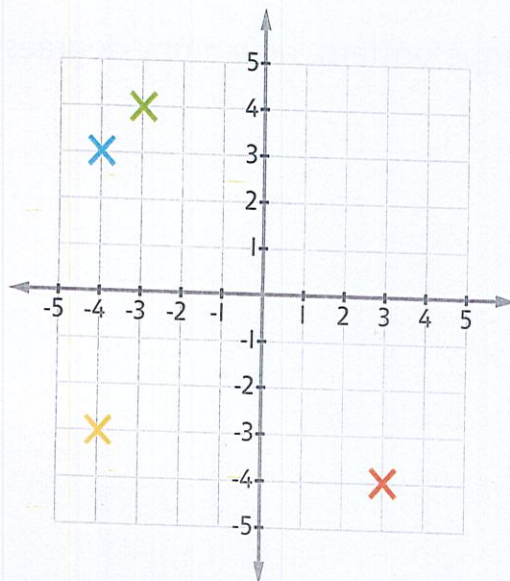
B $x = 25, y = -18$

C $x = 18, y = -25$

D $x = -18, y = -25$

(1 mark)

8



What colour cross is at position $(-4, 3)$?

A red

B green

C brown

D blue

(1 mark)



Read the sentences. Do you agree? Think about what you have learned.

- I can understand the purpose of a given algorithm.
- I can use logical reasoning to explain how an algorithm works.
- I can repurpose an algorithm to solve new problems.
- I understand how to use variables.
- I can create a program which includes variables such as scoreboards and timers.
- I can debug my programs.
- I understand how timers work in Scratch.
- I can decompose a problem into smaller subproblems.
- I can make sprites draw 2D shapes.

Glossary

access	to find information, especially on a computer
adjustment	a small change
advanced search	use of options that help you find more specific results from a search engine
advanced search technique	a tool for carrying out an advanced search, such as phrase searching and wildcards
algorithm	a step-by-step sequence of events or instructions used to carry out a task or to solve a problem
alpha testing	testing that is carried out in-house by the programmers or in-house testing team
alphanumeric	using letters and numbers
analyse	to examine or think about something carefully, in order to understand it
angle	a position from which you look at something or photograph it
anonymity	when other people do not know who you are or what your name is
appropriate	correct or suitable for a particular time, situation or purpose
aspect ratio	the height and width of an image or screen, expressed as a ratio (e.g., 4:3, 16:9)
atmosphere	the feeling that an event or place gives you
audience	a person, or group of people, who watches a film, video, etc.
average	a single number taken as representative of a list of numbers, usually the sum of the numbers divided by how many numbers are in the list
axis	either of the two lines of a graph, by which the positions of points are measured
background	an area that is behind the main thing that you are looking at, especially in a video, picture, etc.

beta testing	testing carried out by users outside a company, such as potential game players or professional testers
block	a function in social media platforms that allows you to stop someone from seeing your activity and stops you from seeing theirs
bookmark	a tool for storing the information about where you were on the WWW, so that you can find it again easily by clicking the link in the web browser
budget	the money that is available to an organisation or person, or a plan of how it will be spent
camera	a piece of equipment used to take photographs or make films, videos or television programmes
camera angle	the specific position in which a camera is placed to record a scene in a film, video, etc.
cell	single area within a table or spreadsheet that contains text or data
close-up	a photograph or part of a film, video, etc. in which the camera seems to have been very close to the picture it took
closing credits	the names and roles of the people involved in the making of a film, video or television programme, shown at the end
code	a set of instructions that tells a computer what to do
code of conduct	an agreed set of rules for how a group of people should behave, for example, when using technology
coding	the act of writing instructions that tell a computer what to do
collate	to gather information together, examine it carefully, and compare it with other information to find any differences
column	a vertical collection of cells in a table, spreadsheet or database
command	an instruction to a computer to do something

complex	1. consisting of many different parts and often difficult to understand 2. a complex filter or query in a database is one that uses two or more criteria rather than a single criterion, for example, brown hair and blonde hair
condition	a statement that a program can decide is true or false; the answer to a condition decides what happens next
conditional	1. a conditional selection in programming is one that decides what happens next when a particular condition is met 2. a conditional filter or query in a database is one that uses operators, for example, between and less than
coordinates	a set of numbers that give the exact position of a point on a map, computer screen, etc.
copper	a soft reddish-brown metal that allows electricity and heat to pass through it easily, used to make electrical wires, water pipes, etc.
copyright	the legal right to be the only producer or seller of a book, play, film or record for a specific length of time
countdown	the period of time before something happens, such as a spacecraft being launched, when someone counts backwards until the event happens
credits	the names and roles of the people involved in the making of a film, video or television programme
criteria	the standards that you use to judge something or make a decision about something; the plural form of criterion
criterion	a standard that you use to judge something or make a decision about something; the singular form of criteria
crop	to take out parts of video to shorten the video sequence
cyberbullying	the activity of sending internet or text messages that threaten or insult someone
data	information in a form that can be stored and used, especially on a computer

database	a large amount of data stored in a computer system so that you can find and use it easily
database management systems (DBMS)	systems used to create and manage databases
debug	to remove the mistakes (bugs) from a computer program
decompose	to break down large tasks into smaller, manageable parts
desktop	a computer that is small enough to be used on a desk but which is not a laptop
devices	things made to do a specific job; often electronic objects (e.g., smartphones, tablet computers)
edit	to make changes to a video, program, document, etc.
emissions	gases or other substances that are sent into the air
energy cost	the energy used in making the device and to get the raw materials from where they are found
entertainment	things, such as films, television programmes, performances, etc., which are intended to amuse or interest people
environment	the natural features of a place, for example, its weather, the type of land it has, and the type of plants that grow in it
'erase all' block	a block in Scratch used to erase a drawing
error	a mistake
e-waste	discarded electrical or electronic devices; short for electronic waste
extension	a block in Scratch that allows a program to interface with hardware and information outside Scratch
feedback	advice, criticism, etc. about how successful or useful something is
field	an amount of space in a database made available for a particular type of information
film	to use a camera to record a story or real events

filter	a tool in database software that allows only certain, specified information to be displayed
final edit	1. the process of making the final changes to a video 2. a finished video, to which no more changes are needed
finger-framing	when you frame a scene by holding your hands up and making a rectangle with your fingers and looking at the scene inside the 'viewing' window
focus	the clearness of the picture seen through a camera
forever loop	a set of operations in a computer program that are continuously repeated for all future time
format	to arrange the information in a table, spreadsheet, etc. into a particular design
frame	an area of film that contains one photograph, or one of the series of separate photographs that make up a film or video
framing	the process of making sure that everything you want to appear in your video is visible in the camera's viewfinder, and is presented in the way you want
glide	to move smoothly and quietly, as if without effort
gold	a valuable soft yellow metal that is used to make coins, jewellery, contacts and connectors in computing devices, etc.
hazardous	dangerous, especially to people's health or safety
health	the general condition of your body and how healthy you are
health and safety	a term used to refer to how healthy and safe an activity is for the person performing it, for example, when using technology
hyperlink	a word or picture in a website or computer document that will take you to another page or document if you click on it
IF... THEN...	a statement in programming that contains code that will run only if certain conditions are met, for example, if something is true or false
impact	the effect or influence that an event, situation, etc. has on someone or something

index	a catalogue of web page URLs and key words used to return results of an internet search
information	facts or details that tell you something about a situation, person, event, etc.
injury	damage to part of your body caused by the unsafe use of devices, for example, sitting for long periods of time in a position that causes strain to your neck, back, etc.
input	an action performed by a user (e.g., of a computer game) that makes something else happen
instruction	a command given to a computer to carry out a particular operation
interact	to affect or be affected by someone or something else
interaction	a process by which two or more things affect each other
iron	a common hard metal that is used to make steel; used in hard disks, casings and screws
keyboard	a board with buttons marked with letters or numbers that are pressed to put information into a computer
keywords	words that you use to search for information on the internet
laptop	a small computer that you can carry with you
lead	a soft heavy grey metal that melts easily; used to solder joints on circuit boards
leaflet	a small book or piece of paper advertising something or giving information on a particular subject
learning	knowledge gained through reading and study
leisure	time when you are not working or studying, and can relax and do things you enjoy
logical reasoning	a process of thinking carefully about something in order to make a judgment
loop	a set of operations in a computer program that are continuously repeated

moderate	to review messages and posts on social media networks and other websites to ensure that they comply with the rules of the network or website; messages and posts that break the rules will be removed
moderator	someone who reviews messages and posts on social media networks and other websites to ensure that they comply with the rules of the network or website; sometimes done by specialist software
modify	to make small changes to something in order to improve it and make it more suitable or effective
mood	the way that a place, event, book, film, etc. seems or makes you feel
movement	when someone or something changes position or moves from one place to another
music track	a piece of recorded music that is played over a film, video, etc.
narration	a spoken description or explanation that is given during a film, video, etc.
negative value	a number that is less than zero, representing a particular location on a graph or grid, indicated by a minus sign
notation	a system of written marks or signs used to represent something such as music, mathematics or an algorithm
online	on the internet
online comments	opinions posted on the internet in response to online content such as videos, articles, etc.
online safety	staying safe when using the internet, for example, avoiding cyberbullying and protecting your privacy
open and closed questions	open questions do not have a definite answer; closed questions have a definite answer (e.g., yes or no)
outline	a high-level summary of a scene or sequence of scenes that you intend to include in your video, written as part of your planning process

output	something that happens in response to something a user (e.g., of a computer game) does; the result of a program
pan	if a film or television camera pans in a particular direction, it moves in that direction and follows the thing that is being filmed
paraphrase	express in a shorter, clearer or different way what someone has said or written
pause	a button on a video camera that makes it stop playing or recording for a short time
peer review	when students at the same level assess each other's work
pen tool	a feature (extension) in Scratch that allows your sprite to draw words, images, etc.
permission	if you have permission to do something, you are officially allowed to do it
personal information	information that can identify who you are, for example, your name, address and date of birth
phrase search	an internet search that uses double quotation marks (" ") around a search term to limit the search results to that whole phrase
phrase searching	the act of using a specific phrase to search for information on the internet
physical networks	groups of people who interact with each other in the real world, for example, members of a club or a sports team
plagiarism	when someone uses another person's words, ideas or work and pretends they are their own
plastic	a light, strong material that is produced by a chemical process, and which can be made into different shapes when it is soft
plus sign (+)	it instructs the search engine to only include web pages containing a range of keywords
portable	able to be carried or moved easily
position	location, for example, of a set of coordinates on a grid
positive value	a number that is greater than zero, representing a particular location on a graph or grid

presentation	a document made up of slides containing text and images on a particular subject
primary key	the field in the table that is unique and is used to link multiple databases together
program	a set of instructions given to a computer to make it perform an operation
programming	the activity of writing programs for computers
prop	an object used in a film, video, etc.
quadrant	a section of a graph or grid equal to one quarter of the whole graph or grid
query	a function in database software that enables you to search for specific information
quotation marks (" ")	used in internet searches to find an exact phrase rather than individual keywords
random	happening or chosen without any definite plan, aim or pattern
recap	to repeat the main points of something that has just been said or done, or achieved so far
record	information about someone or something that is written down or stored on computer so that it can be looked at in the future
recycle	to put used objects or materials through a special process so that they can be used again
recycling	the process of putting used objects or materials through a special process so that they can be used again
reduce	to make something smaller in size, amount or number
refurbish	to repair something
reliable	someone or something that is reliable can be trusted or depended on
repeat	(verb) to do something again (noun) an instruction in a program to do something again

repetition	doing the same thing many times, for example, when a program repeats an instruction
report	1. (noun) a written or spoken description of a situation or event, giving people the information they need 2. (noun) a tool in social media networks that enables you to identify inappropriate posts or comments 3. (verb) to identify an inappropriate post or comment on a social media network
repurpose	1. to use something in a new way that is different from its original use, without having to change it very much 2. to change a part of an algorithm but keep most of it the same
requirements	something that someone needs or asks for, or something that must be done
research	the activity of finding information about something that you are interested in or need to know about
re-shoot	to film again, for example, a scene in a video
result	something that happens or exists because of something that happened before
reuse	to use something again
review	a button on a video camera that lets you review a recording
rotated	turned with a circular movement around a central point
route	a way from one place to another
RSI	(repetitive strain injury) pains in your hands, arms, etc. caused by doing the same movements many times, especially by using a computer keyboard or mouse
ruthenium	a hard, silvery-white metal, used in hard drives
scene	a single piece of action that happens in one place in a film, video, etc.
scoreboard	a board on which the points won in a game are recorded
Scratch	a visual coding application that uses colourful blocks

screenplay	the words that are written down for actors or speakers to say in a film or video, and the instructions that tell them what they should do
screenshot	a picture of what is on a computer screen at a particular time, which can be saved and put into a document or printed out
script	the written form of a film, video, speech, etc.
search	to find specific information in a database
search engine	a computer program that helps you find information on the internet
sensing block	a block in Scratch that is used to detect things, for example, the location of the mouse-pointer
sequence	the order that something happens or exists in, or the order it is supposed to happen or exist in
share	to upload a video to the internet for other people to watch
shot	a series of frames in a film, video, etc. that run together uninterrupted
smartphone	a mobile phone that is also a small computer and can connect to the internet
social media	ways of sharing information, opinions, images, videos, etc., using the internet, especially social networking sites, particularly with people you share an interest or connection with, and to send messages to them
social network	a website designed for people to share information, opinions, images, videos, etc.
social networking	the use of the internet to make information about yourself available to other people, especially people you share an interest or connection with, and to send messages to them
sort	to display data in a particular order, for example, alphabetically
sound	the audio track that plays over your video
sound effects	sounds produced artificially for a film, video, etc.
soundtrack	the recorded music and other sounds in a film, video, etc.

speech	spoken language rather than written language
splice	to join two video segments together so that they form one continuous piece
splicing	joining two video segments together so that they form one continuous piece
split	to divide a video sequence into two or more pieces to remove unwanted sections or to rearrange them
splitting	dividing a video sequence up into two or more pieces to remove unwanted sections or to rearrange them
spreadsheet	a computer program that can show and calculate financial information
sprite	an on-screen character in Scratch
square	a shape formed by four straight equal sides and 90° angles at the corners
staging	the careful planning of every shot in a video
steel	strong metal that can be shaped easily, consisting of iron and carbon; used in casings and screws, and hard disks
stop	a button on a video camera that enables you to stop recording, or playing back a recorded scene
storyboard	a visual plan of a presentation or other media project
strain	a minor injury to the neck, back, wrists, etc. that can be caused by, for example, repetitive movement or sitting in an unnatural position for too long
string	any combination of characters (letters, numbers and symbols) displayed by a computer program
subproblem	one part of a problem that has been broken down into smaller elements in order to solve it
subtitles	the on-screen written translation of words spoken in a foreign film, video, etc.; also used to interpret sign language for people who don't understand it

table	a list of numbers, facts or information arranged in rows across and down a page
tablet	a computer that you can carry with you which has a touch screen and does not have a separate keyboard
target audience	the group of people for whom a digital or physical product is designed
technology	machines, equipment and ways of doing things that are based on modern knowledge about science and computers
test	to use something for a short time to see if it works in the correct way
test plan	a structured plan for testing specific elements within a program, computer game, etc.
text wrap	a tool for allowing text to be arranged in different ways in relation to an image
timer	an instrument that you use to measure time, when you are doing something such as playing a computer game
title credits	the names and roles of the people involved in the making of a film, video or television programme (e.g., actors, director), shown at the start
titles	the name of a film, video, etc. displayed on the screen, usually combined with the title credits
touchscreen	a type of computer screen that you touch in order to tell the computer what to do or to get information
toxic	containing poison, or caused by poisonous substances
transition	a technique for moving from one scene to the next in a film, video, etc., such as 'fade out', where one scene fades to another
unacceptable behaviour	behaviour that is so wrong or bad that you think it should not be allowed
unbiased	unbiased information, advice, etc. is fair because the person giving it is not influenced by their own or other people's opinions

unformatted	an unformatted database table is one in which only the data has been entered; it needs to be formatted before you can run queries, etc.
upgrade	to update a piece of software, computer game, etc. so that it works properly on a newer device
unintended results	outcomes of an algorithm that are not meant to happen, caused, for example, by an error in a sequence
upload	move information or programs from a computer to a network so that other people can see it or use it
user guide	instructions for someone playing a computer game explaining the aim of the game and the basic controls
user requirements	the things that are needed or desired by someone using a service
variable	a place where a program can store a specific piece of information, for example, someone's name or their score in a computer game
white balance	a function in a camera that matches the colours being photographed or filmed to the real-life light sources, so that white objects appear as white
wide shot	a camera angle that shows the subject of a scene (a character, object, etc.) and its surroundings; the opposite of a close-up
wildcard search	an internet search that uses an asterick (*) to find an incomplete search term, for example, when you don't know how to spell a whole key word
wildcards	see wildcard search
zoom	a function on a camera that allows you to make the subject of an image smaller or larger in the frame; zooming out makes the subject seem closer to the camera and zooming in makes the subject seem further away

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