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

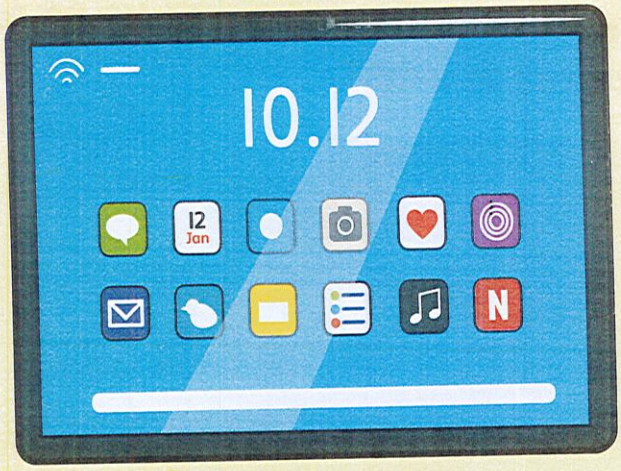
- To understand the key features of different digital devices, including tablets, smartphones, laptops and desktop computers.
- To understand the health and safety issues that arise from using devices and know how they can be minimised.
- To be able to select appropriate digital devices for a given task 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:

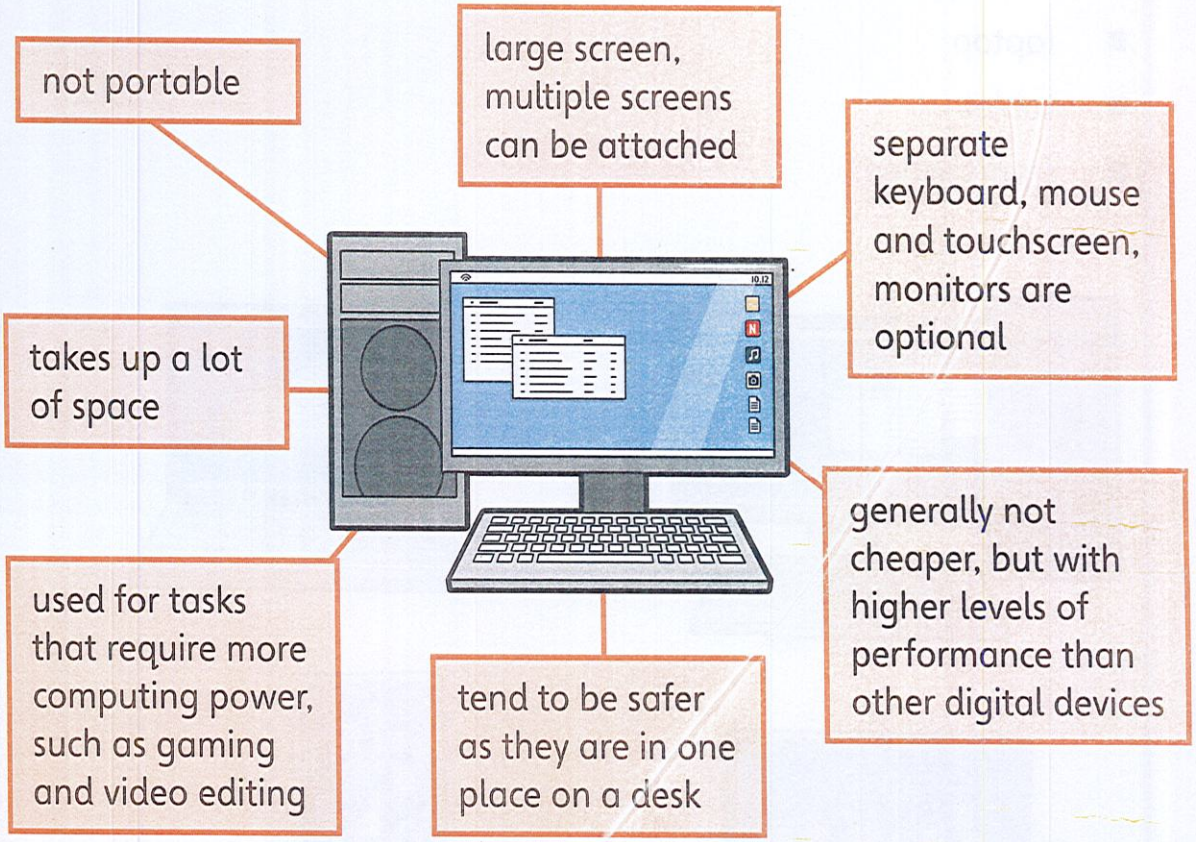
- can run multiple applications, including messaging, creating written and visual documents, taking and editing photos and games
- can be used for work and play, be connected to the internet to access web pages and communicate with other devices
- is portable, has an input and output **touchscreen**, 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.

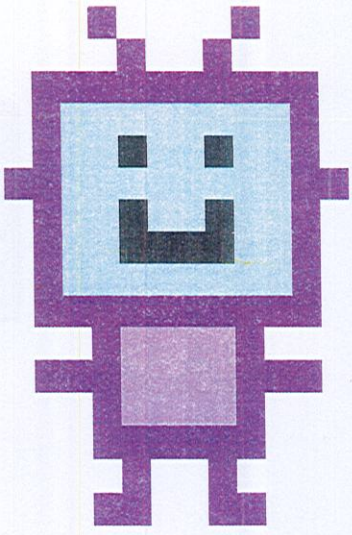
Each device has its own advantages and disadvantages, depending on when and where it is used. A smartphone is great for working on the move, but a desktop computer is more suitable if you normally work in one place.

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

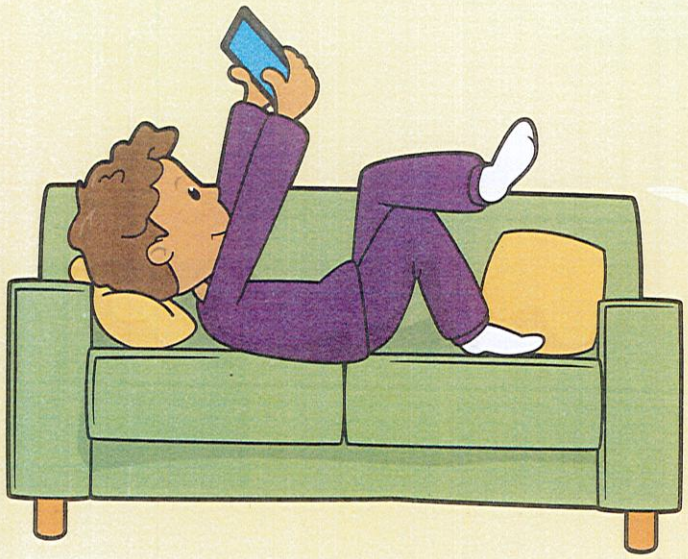
Luis is using his device to communicate with friends from school about some homework. He didn't realise that he had stayed in this position for 20 minutes.

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.

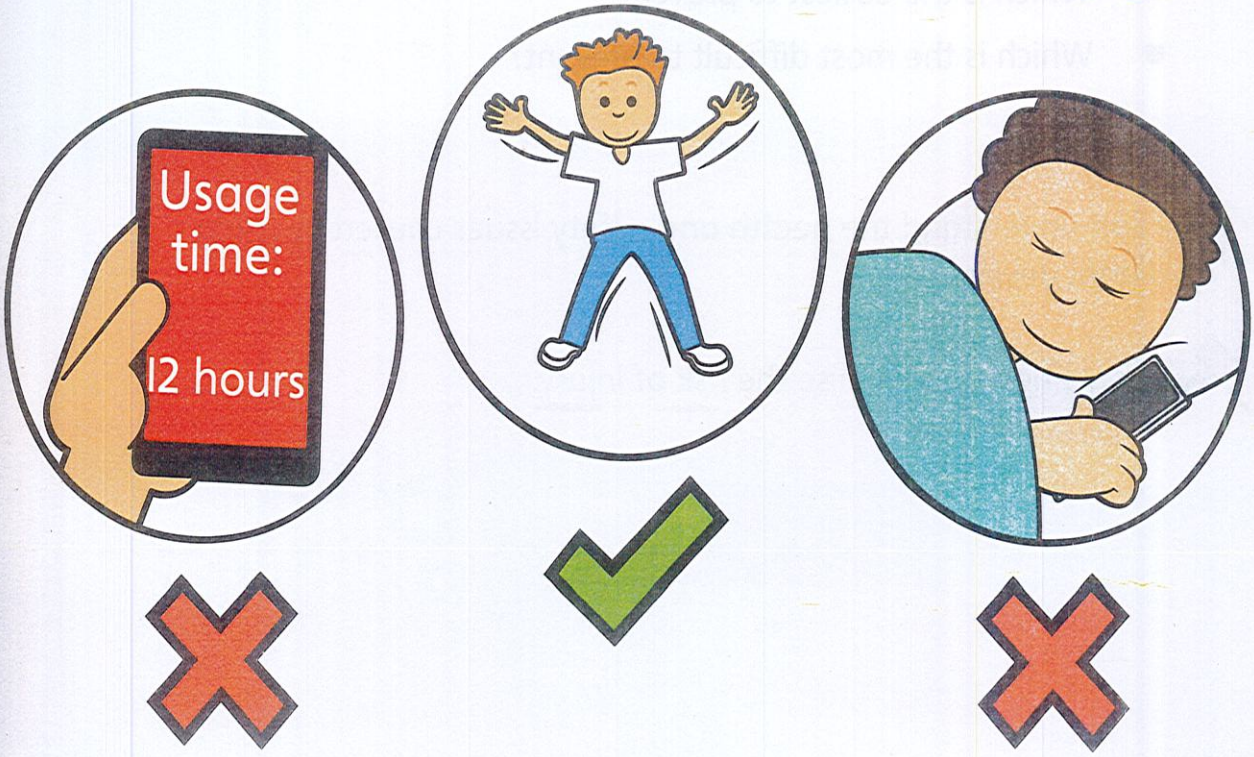


Extended use of digital devices can lead to health problems. These are the main body areas that can be affected.

- **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

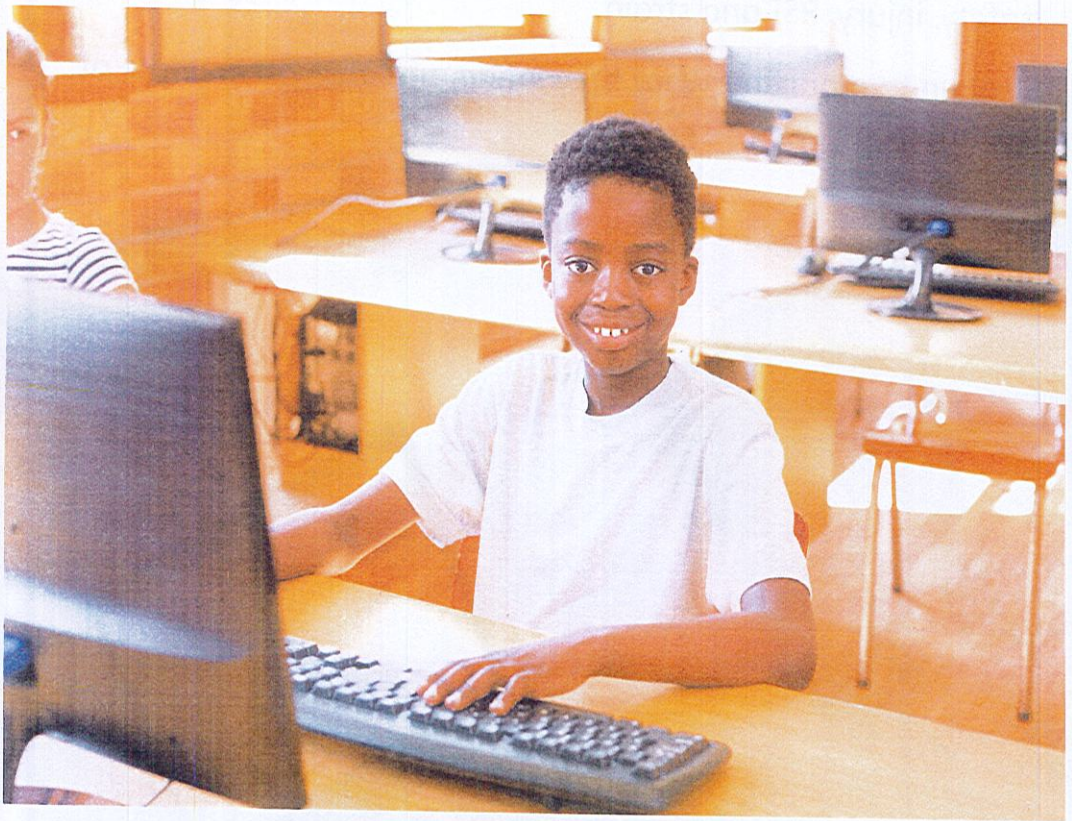
Here are some of the keywords we considered in Lesson 2: health and safety, injury, RSI and strain.

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**.

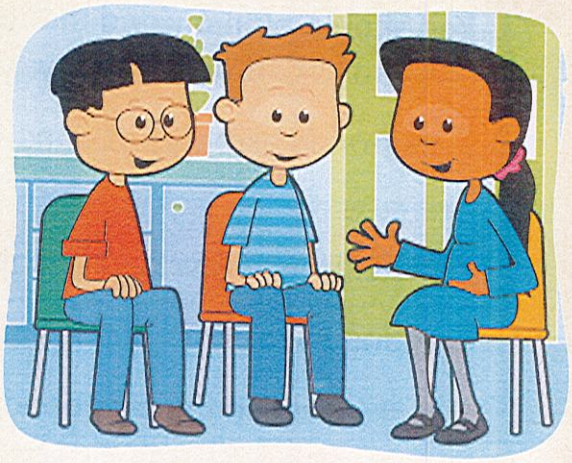
Decide which digital device you want to cover, then carry out research and make notes about the key information to show in your video so that people will know how to use the device safely. Think about how you want to get the information across. Think about the setting – where will your video take place?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

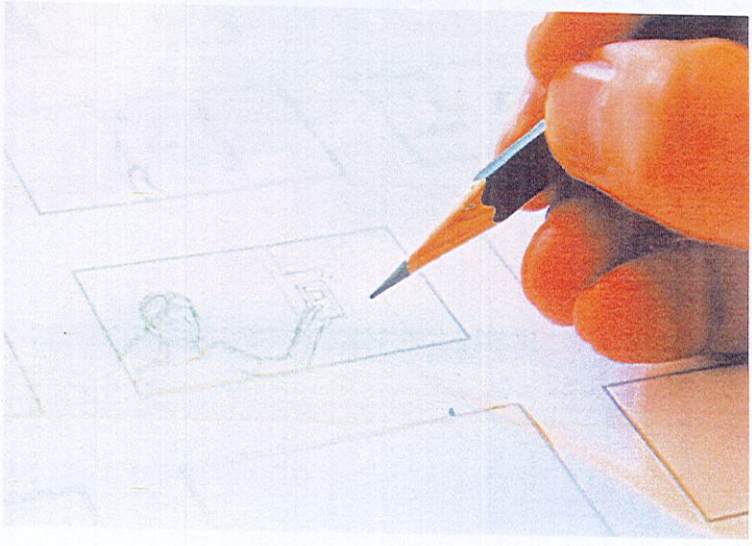
When editing, think about:

- **cropping**, **splicing** and splitting video
- adding **transitions**
- zoom and video effects
- adding narration and/or music.

If you 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:

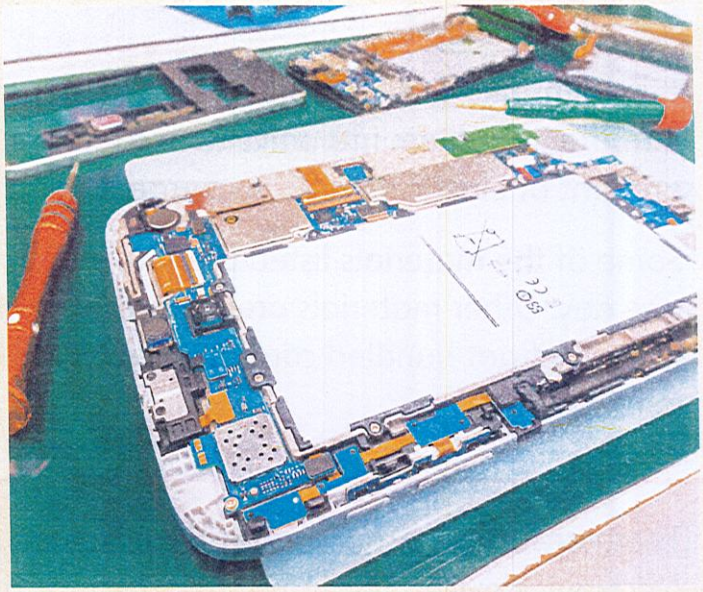
- they like to have the latest models to keep up with other people
- some will not work with, for example, the latest computer games, so they have to upgrade
- devices are susceptible to breaking if they are dropped or knocked, and generally stop working permanently if they are submerged in water
- they 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?

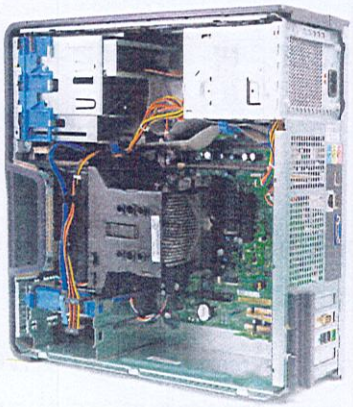
- plastic
- glass
- metal
- cardboard

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

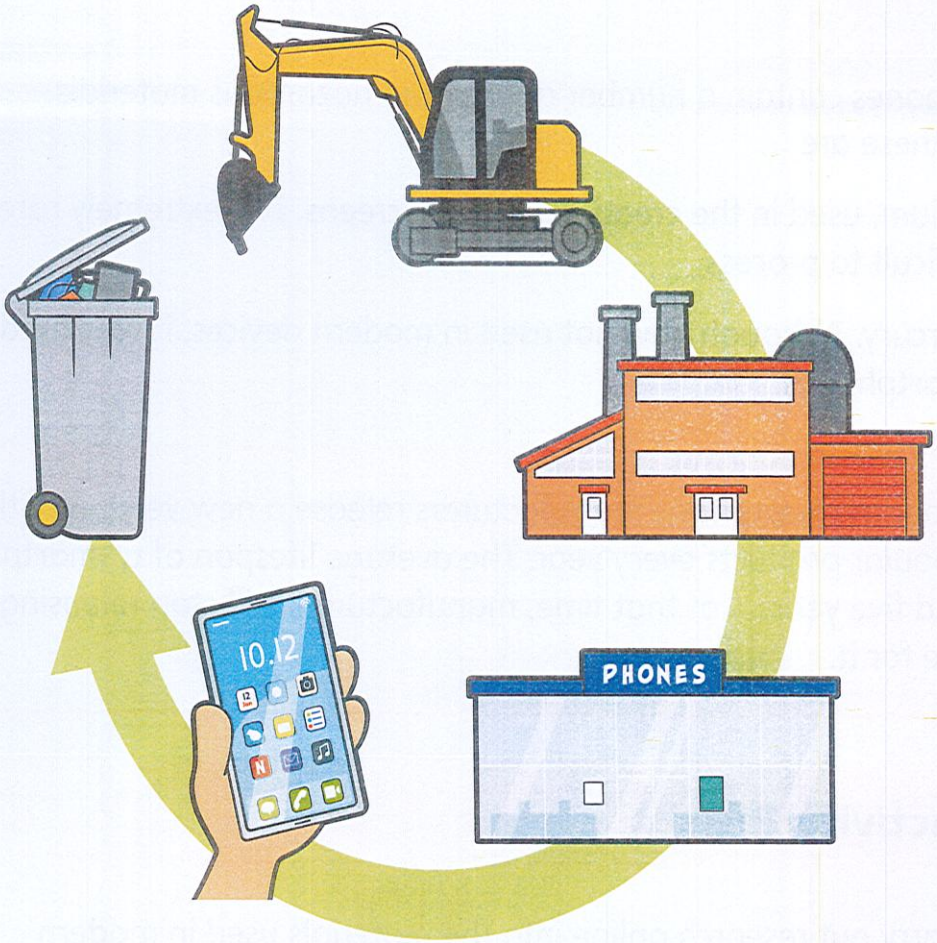
In this lesson you will investigate the life cycle of a smartphone.

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.

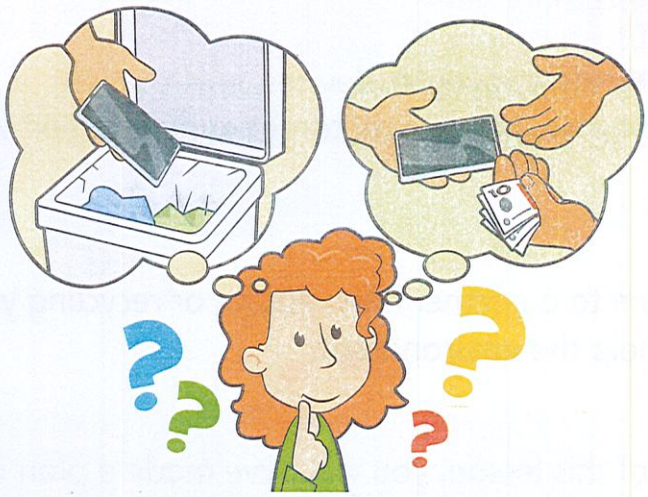
The lifespan of digital devices can be extended so that recycling is delayed for as long as possible. We can make our devices last longer in the following ways.

- **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.

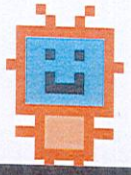
Discuss with a partner the following questions.

- 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.

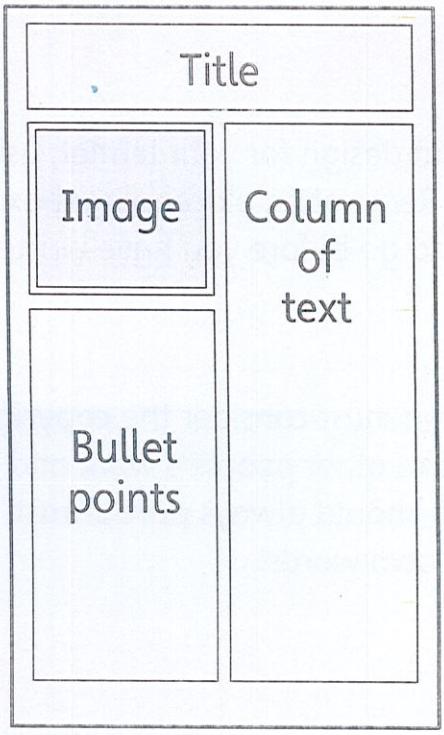
Key words: copyright, devices, environment, e-waste, leaflet, paraphrase, plagiarism, target audience, text wrap

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.

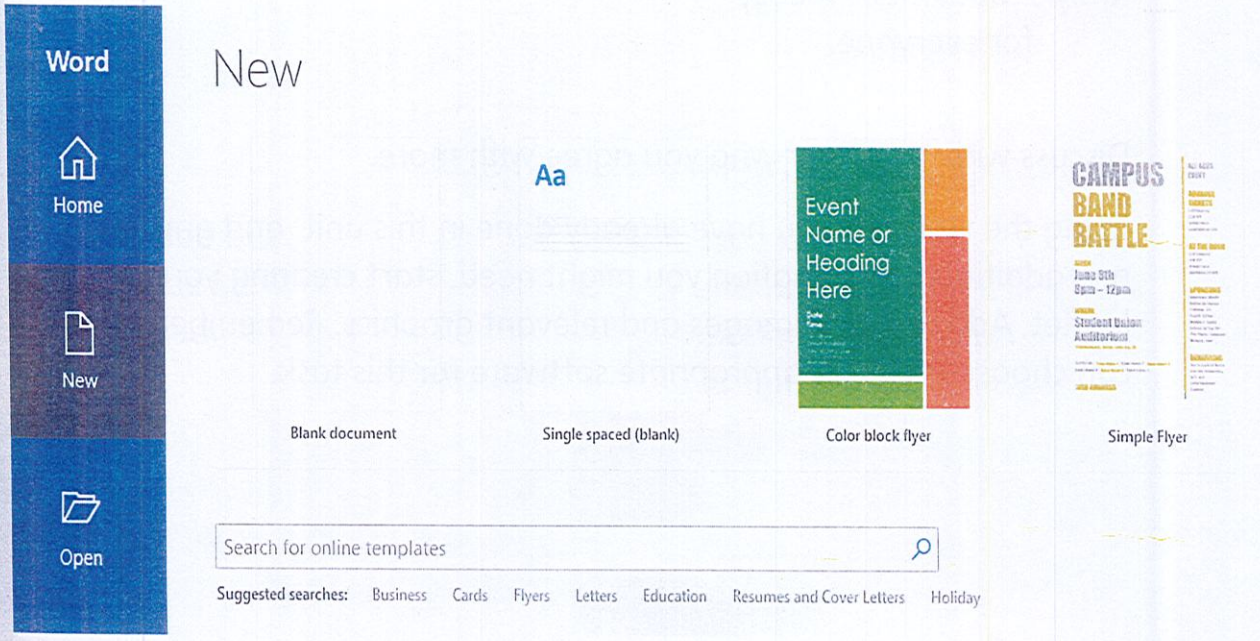
Your leaflet should be aimed at adults – your **target audience** – as they buy such devices, but it should also be of interest to younger people. Here are some things to consider when planning any leaflet.

- 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.

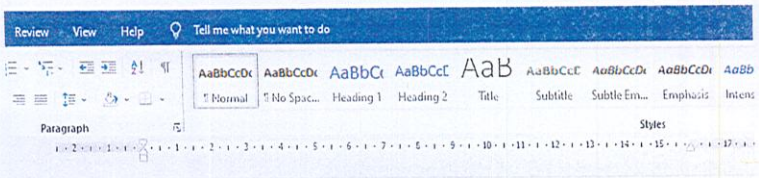
Companies should take responsibility for their products. If they are creating a lot of waste, they need to make sure that customers are rewarded for recycling their old devices.

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.

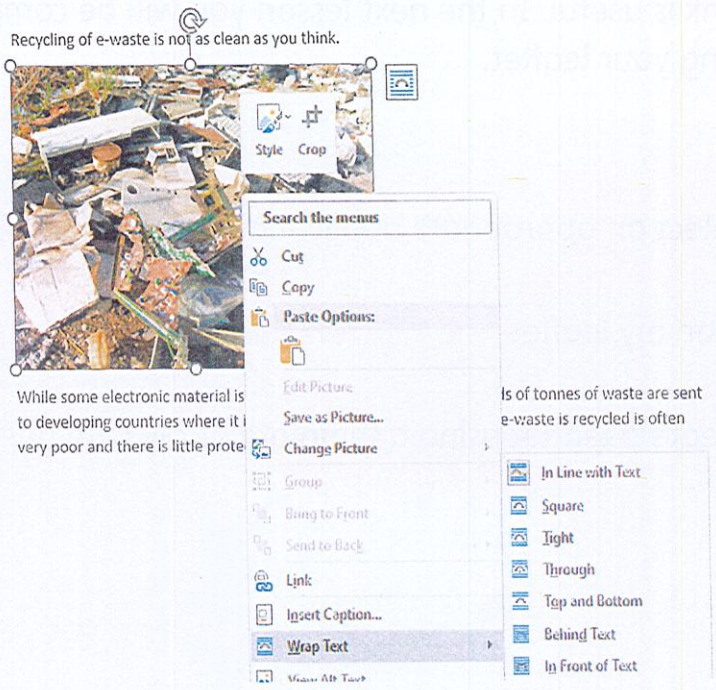


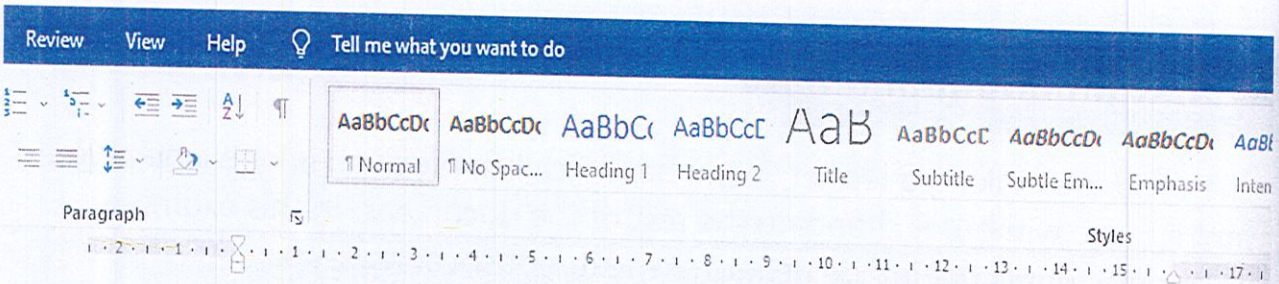
Recycling of e-waste is not as clean as you think.

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.

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.





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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.