MODULE 1

Design process skills

UNIT 1.1

Introduction

Week 1: Our module for this term deals with the question, 'What is Technology?', the design process, graphical communication, and levers. You will learn about dimensioning and quantity, lettering and figuring, and designing and drawing materials. This includes colour, patterns, shading, painting, textures and shadows.

At the end of the term you will complete a informal assessment task. All the lessons covered in this term **provide** you with the necessary skills and content knowledge to complete the task.

Some **emergency situations** will be investigated where people from an accident scene use the Jaws-of-life. You will also investigate the needs that appear from these situations. Your task will be to make a working model of a hydraulic-syringe powered, linked-lever rescue device from simple materials that will be suitable for people to use in an emergency situation. Also, you will learn new words and think about the environmental issues that affect how you complete your task.

Week 1
Lesson 1

Definition: What is technology?

How many times have we heard the term *technology* in our everyday lives? To some of us it represents things such as electronic gadgets, computers, cars, cell phones and sound systems. To others it is about how things work.

Technology is a way of thinking. It is all about using what is known to **solve** problems and make life easier and more exciting.

It is about designing something and then making what has been designed. In doing so, the knowledge and ideas of the product are tested in practical ways, and improved until the best solution is found.

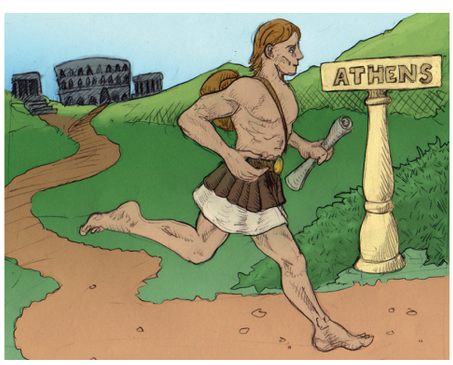
The products of technological thought are the foundation of wealth creation and employment generation.

Activity 1: What is technology?

To understand the different ideas people have about technology, take a survey in your class or school campus to find out what technology means to each person. Ask the question: 'What is technology?' Record their answers and discuss these in class during your Technology period. In a group, discuss the differences and similarities in the answers that you receive, and make your own judgement about what people think technology is.

Activity 2: The use of technology

Study the pictures below and state which of these you would describe as showing the use of technology. Record your answers in your exercise book.



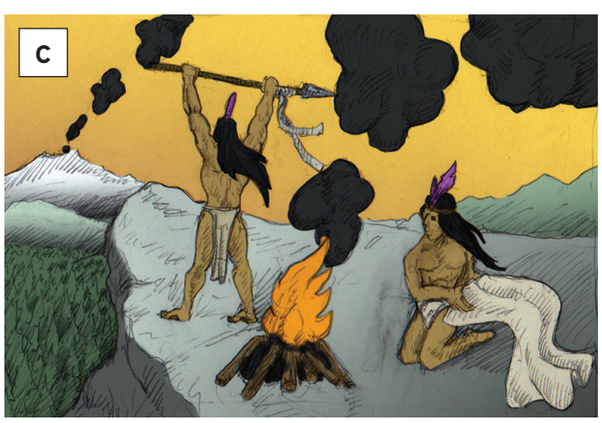


Figure 1.1

Scope: Who makes use of technology in the 'world of work'?

Activity 3: Technology at work

Record your answers to the following question in your class exercise books: Look at the previous pictures and note who makes use of technology in the 'world of work'?

The development of a technology task: The design process

In this lesson you will learn about the design process, and how to use it to solve technological problems. In any study of technology education, you will come across the phrase *the design process* (also known as *the technological process*). It is through *the design process* that technology creates and develops products and solves technological problems.

Introduction: needs and wants

For a technological process to happen there must be a need or a want for its development. It may be a basic need for living, like housing, clothing, food or transport. There may be a need to solve a problem that you are experiencing, like making a picture frame for a photograph of your family out of cardboard.

Your need can be identified as a problem to be solved. This forms your design brief. The design brief is a clear description of the problem to be solved, together with the constraints and specifications that limit how you make it.

In this module, you are going to learn about the design process. This process is about identifying problems, designing possible solutions, making the product, evaluating the product and communicating your findings by recording your work in a project portfolio.

The design process involves the following basic steps:

Investigate: Find, use and **acknowledge** information for the design process.

Design: Write and draw a design brief with **specifications** and **constraints**. This will include your **initial** idea sketches. Then choose the best design and select materials for it.

Make: Draw plans of the design process, develop the manufacturing **sequence**, which is the order in which you will make your item or model. You may next make the item or model.

Evaluate: You need to evaluate both your design stage and your final product.

Communicate: You need to present your **solutions**. To do this, **compile** all notes and drawings of the design process into a project **report** in your exercise books.

Design considerations

UNIT 1.2

Week 1
Lesson 2

Fitness-for-purpose

When you design something for someone, or even for yourself, there are certain questions that you need to ask yourself. These explain whether or not your design considerations fit the purpose for which they will be used:

- Who is it for?
- What is it for?
- Will it do the job?
- Is it cost effective?
- Is it safe?
- Is it easy to use (**ergonomics**)?
- Does it look good (**aesthetics**)?
- Will it affect society?
- Will it affect the **environment**?

The stages or steps are illustrated below.

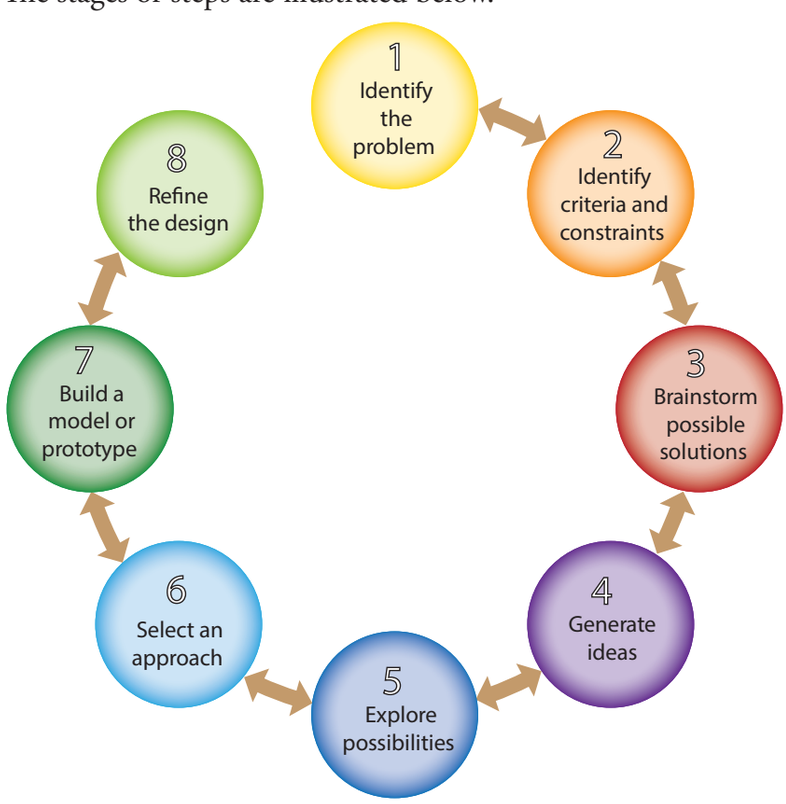


Figure 1.2: Steps in design considerations

Did you know?

Anthropometrics and Ergonomics
Anthropometrics is the study of the human body and its movements, and includes measuring the shape and size of people. These measurements are used in the design process. Such measurements are taken for furniture, eating utensils, sporting equipment and clothing.
Ergonomics
Ergonomics is the study of people and how we live in our environment. It looks at how we use and design our objects, systems, structures and environments so that we can be safe, efficient and productive in our workplace.

Figure 1.3

Did you know?

A **bookmark** is a strip of leather, plastic or card used to mark a place in a book.

Activity 4: Designing a bookmark

This activity is a practical investigation. Think back to a time when early man decided to move large objects around the countryside, or how the Egyptians moved large stones around to build the pyramids. In pairs, consider the question: how do you think they managed to do this? Make notes of the points that you come up with. Hint: Try to move a pile of books on your desk using pencils.

Figure 1.4: Examples of bookmarks

Each time I read a book, I keep looking for scrap pieces of paper to insert as a bookmark. This looks untidy and disorganised. I need a good, attractive bookmark that will solve my problem. You are going to design and make a bookmark in your class. Bookmarks come in different shapes, sizes and materials, so we do not want everyone's bookmark to look the same. Be original and design with your head and heart. You may need to design a logo or pattern for your bookmark that will make it **unique** and easy to identify. The design should be:

- original
- colourful
- attractive
- interesting and unique
- an appropriate size to suit a book.

You could give it to your mum, dad, siblings, or favourite friend or teacher as a special token of appreciation, or you could use it yourself.

Identifying needs and problems

Technology happens as an answer to a human need.
Ask yourself:

- What can you do with a bookmark?
- Why do we need the bookmark?

A checklist for a design brief

Criteria	Yes	No
It is a short, clear statement of what must be done.		
It describes the problem and not the solution.		
It describes who will use it.		
It describes where it will be used.		
It describes the benefit of a solution.		

Activity 5: The design brief for your bookmark

Write a design brief that will state clearly what you are required to do to solve the problem with the books. In the design brief, you will be writing about how you intend to solve the problem. Always start your design brief with, 'I am going to design and make...'. Record this in your exercise books or portfolio.

Refer to websites that your teacher suggests to find more ideas for bookmark designs.

Plan and make the design

Careful planning is important at this stage, as it will prevent you from making mistakes and wasting valuable materials.

Activity 6: How to make the bookmark

In this activity you will think of possible solutions to your bookmark problem in order to make the bookmark. The following questions may help you to make what you have designed.

- What tools have you chosen to complete your design?
- What materials have you chosen?
- What processes will you follow until your design is completed?

What you need:
You will need a ruler, pencil, material (cardboard, plastic, leather), felt pens, paint, scissors, glue, utility knife, paper punch, stencils, mathematical instruments for design, and a desk on which to work.

Evaluate the design

This step involves evaluating your finished product using the instructions given in the design brief. Think of any changes that you would make to these now that your design is finished. If so, why would you make these changes?

Activity 7: Evaluating your bookmark

Evaluating and testing is an important part of the design process. You should be critical of your own work and change your design if you think it is necessary.

- Is it aesthetic?
- Is it ergonomically designed?
- Does it fit the purpose for which it is designed?
- Can the design be improved on to meet all the **instructions** required?

Record your answers in your exercise book.

Communicate

Good communication should be carried out during all five steps of the design process.

Activity 8: Presenting your bookmark to the class

In this activity, you are expected to present your solution for the bookmark and your logo design to the class. Explain why you decided on particular **features** for your bookmark, such as its size, colour and font in this case. This should be presented in words and with graphic drawings. You will record your progress in your exercise books.

Activity 9: Your bookmark's design

Design considerations: Fitness-for-purpose

In this activity, after completing your project and presenting it to the class, you are expected to answer the following questions:

- Who is it for?
- What is it for?
- Will it do the job?
- Is it cost effective?
- Is it safe?
- Is it easy to use (ergonomics)?
- Does it look good (aesthetics)?
- Will it affect society?
- Will it affect the environment?

Record your answers in your note book. Also make use of peer assessment in this activity to ascertain the accuracy and efficiency of your product.

Project portfolio

Your exercise book is used to keep the notes that you made on the steps you took to develop solutions for each capability task. Your teacher will give you an example of a Project portfolio and what it should include for each capability task.

HOW ARE YOU DOING?

Your teacher will give you a grid. Write the following sentences in the left-hand column.

a. I can name the five main steps in the design process.
b. I know the order of the five steps in the design process.
c. I understand what a design brief is.
d. I understand what I need to do in each step of the design process.
e. I can explain what I need to do in each step of the design process.

Complete the grid and tell your teacher to which questions you answered no.

MODULE 2

Communication skills

UNIT 2.1

Introduction to graphical communication

Week 2: In order to design your bookmark using drawing instruments, you need to know a bit about graphic communication. You will learn about lines and when and how they are used.

Week 2
Lesson 3

At the end of this lesson, you should know and understand the following:

What you will learn about:

- Introduction to graphical communication.
- Purpose of graphics: to develop ideas and communicate ideas.
- Conventions: outlines (thick/dark), construction lines (thin/feint), hidden detail (dashed) scale, dimensioning.
- Sketching: freehand sketching.
- Working drawings: two-dimensional drawing of one face of an object using conventions (dark lines, feint lines, dashed lines, **dimensions**, scale).

Communication means the **transmission** of ideas, experiences or messages between people. You communicate when you talk to someone, write or draw pictures. We will look at graphic communication.

All drawings that you will be doing should be drawn on paper with a bordered sheet and a title strip.

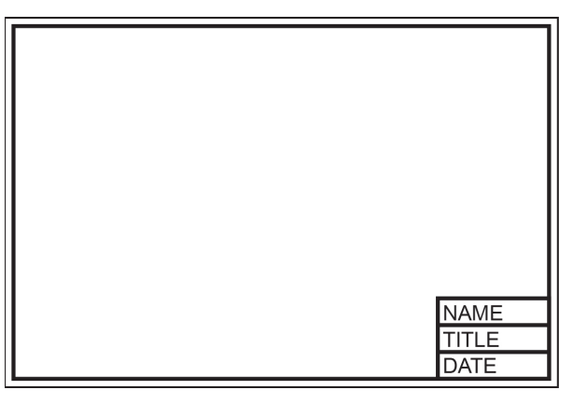


Figure 2.1: Illustration of a typical drawing board

Purpose of graphics

The purpose of graphics is to develop ideas and communicate them. Communication by pictures and by drawing is called **graphic communication**. People such as engineers, technicians, graphic designers and **architects** use drawings to explain how things work (such as machines). An example of a **tailstock** on a **lathe** is drawn in the illustration on the next page, which will then allow an engineer to make the object.

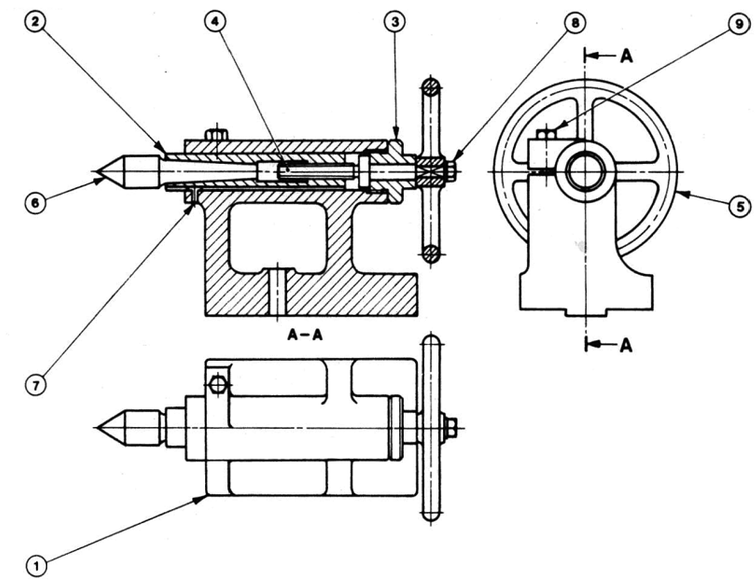


Figure 2.2: A tailstock

Other uses for graphic communication include advertising on **billboards** and magazine layouts.

Figure 2.3: A billboard

This represents a special type of drawing called a 'technical drawing'.

Activity 10: Survey on the purpose of graphics

Conduct an online survey with your classmates at your school to find out what they think is the purpose of graphics. Design an online survey sheet on which you write the questions and ask the classmates to complete the survey online. Record your answers and discuss them in a class group chat.