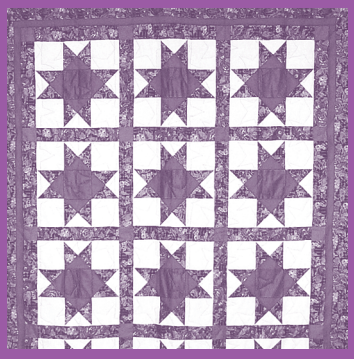
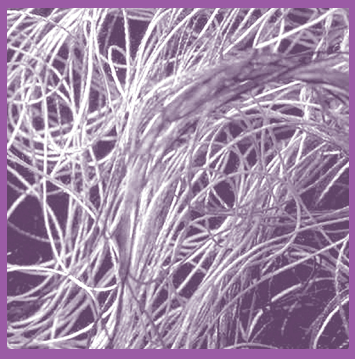
Book 3

Year 10





Food and Textiles Technology

Design and Textiles

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Year 10 Book Three

Design & Textiles

GOVERNMENT OF SAMOA
DEPARTMENT OF EDUCATION

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INTRODUCTION

Talofa,

If you are a secondary school student studying Food and Textile Technology in Year 10, this book has been written for you.

It has been designed to give you information and an understanding of different topics that relate to design and textiles using soft materials.

The first part of this book looks at the global development of textile technology. You will explore how textile technology has been gradually developed since early-man discovered ways of using animal skins as clothing.

You will discover how all fibres are made from long lines of atoms called polymers. In Year 9 we looked at cotton and other plant fibre and learned that they are made from cellulose polymers. Wool and silk, which you will look at briefly this year, are animal fibres made from protein polymer. You will start to see how these natural fibres have been copied in the technological development of man-made fibres. Although they have very good qualities, these two natural fibres are seldom worn in Samoa due to the their cost and our hot climate.

You will find out how the first man-made regenerated fibre called rayon was developed from wood chips and is therefore like cotton. It, too, is made from cellulose polymer. When you read in this book about how synthetic fibres are made you will find out that they are made from synthetic polymers. This group of fibres includes nylon, polyester and acrylic. Raw materials left over from coal or oil production are used for synthetic fibres.

You may not have been aware of all the different substances that are used in the textiles that clothe us. As you take a more in-depth look at textiles you will understand why certain fibres are better suited to some tasks than other fibres. For example, if you were looking for a very strong fibre to make a student backpack from, you would not choose a cotton fabric. As you study the various properties of fibres, you will discover why blending two different fibres together can create a far more versatile textile. You will learn how to care for a range of fibres so you can keep textile items looking good.

Last year we looked at some basic techniques and processes used with textiles. In this book you will extend your skill and knowledge with practical activities that require more advanced techniques and processes.

An example of a design brief to extend your creativity is suggested at the end of the book. Your teacher will continue to guide you through this process so you are ready for Year 11, when you will be expected to work more independently.

To help you learn, each section in the book starts with a list of the important words used in that section. Their meanings are in the glossary at the back.

Enjoy your learning! There are activities throughout the book that you can complete individually or in groups.

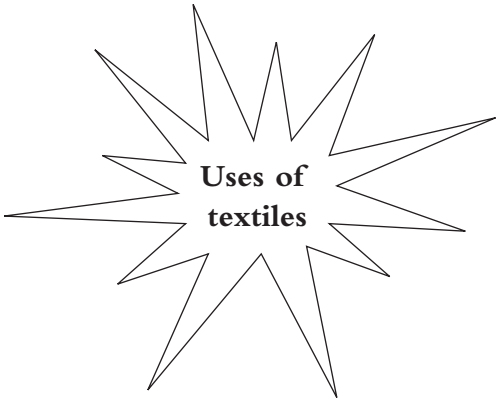
We hope you will experience new and exciting things as you journey through this book exploring more about textile technology.

Uses Of Textiles

Developments in technology continue to increase the use of textiles in our daily lives. Different countries and cultures have different uses for textiles. The use of textiles will depend on the climate, lifestyle and the resources available to people. For example, if you lived in the Antarctic one of the textile resources you could use would be animal skin.

Below are some of the uses of textiles in our daily lives. Can you think of any other uses of textiles in Samoa?

Can you think of any textile items you might need if you moved to a colder climate: *e.g. New Zealand or Australia*?



Furnishings

Curtains, blinds, carpets, mats, cushions, upholstery in offices, hotels and businesses

Medical

Bandages and plasters

Industry

Building materials and ropes

Clothing

Indoor and outdoor, casual and formal

Accessories

Shoes, hats, bags, belts and buttons

Sports

Clothing (such as a wet suit)

Uniforms

To protect the body and for identification

Outdoor equipment

Windsurfing, diving and hiking

Arts and crafts

Canvas for paintings, Ūʻa for siapo

Vehicles

Interiors of cars, trucks, planes and so on

Shelter

Roofing, floor coverings and wall coverings

Unit 1: HOW TEXTILE TECHNOLOGY HAS DEVELOPED

Words to learn:
Durable.
Absorbent.
Elastic.
Properties.

Knowing how textiles have been developed over the centuries helps us to understand why certain fibres have always been popular in Samoa. The textile industry is continually changing or evolving.

The textiles or fabrics used for clothing in 20 years time are likely to be even easier to care for and more comfortable to wear than the ones we use today. The fibre used to make the basic fabric may be the same but there are likely to be new fabric finishes developed. These will improve the look, feel and care of the fabric we wear today. We will look at fabric finishes later in this book.

Diagram 1.1
There are many different fabrics used for clothing.

We will also be looking at the latest textile technology solutions. Courtaulds, a leading world textile company, has been developing new fibres and fabrics since early last century. They recently introduced 'Tencel'. This is a fibre that can be woven or knitted into fabric, producing an easy care alternative to natural fabrics made from cotton or silk fibre.

The discoveries made by textile technologists have revolutionised the way we clothe ourselves today. When you look in history books at pictures of clothes worn in the past, you may have thought how uncomfortable some of them would have been to wear.

Did you know?

Originally underwear was made from woven fabric. This made it bulky and baggy to wear. It was not until knit fabric was developed that under garments became comfortable to wear. Knit fabric can stretch so it can cling snugly to the shape of the body.

Different textiles have different properties, for example, some are more durable, absorbent or elastic than others. Learning these differences helps you make decisions when designing and making your own textile items. For example, if you want to make shorts that are hard-wearing and suitable for working on a plantation, you would need a thick denim type of fabric. For shorts to wear to the beach, a lighter weight cotton fabric would be more suitable.

- Can you remember the name of the weave used in denim fabric?
- Can you remember which fibre is used to make of denim fabric?

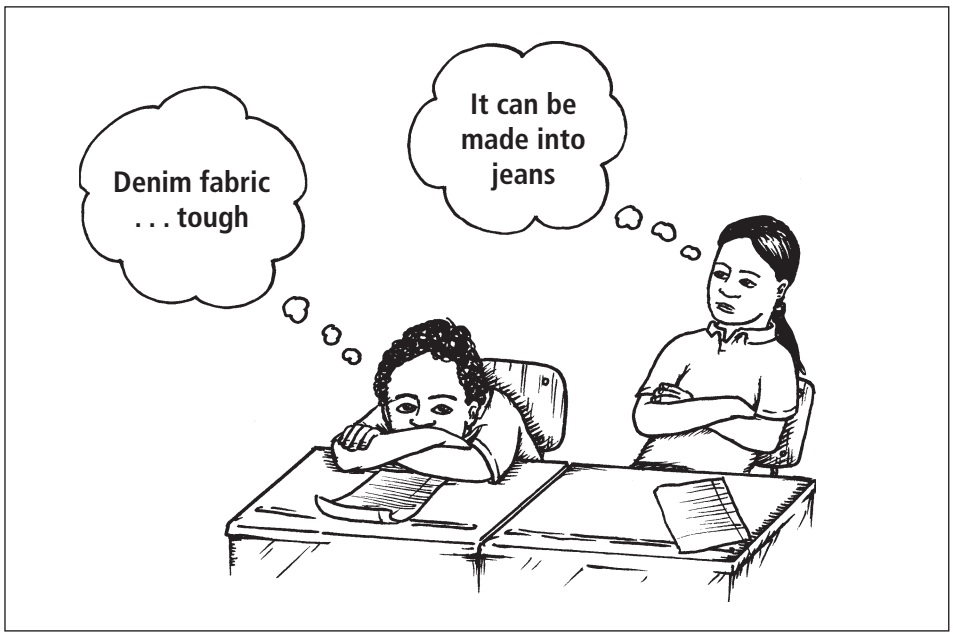


Diagram 1.2
Denim is a thick fabric but it is not too hot to wear.

A Textile Technology Timeline

Before 5000 B.C.	Animal skins were used by early man to make clothing.
5000–3000 B.C.	Spinning, weaving and dyeing were developed. The first evidence of fabric being embroidered and decorated.
3000 B.C.	In Egypt, linen started to be woven into fabric. In India, cotton fibre was developed. In the cold climate of northern Europe, woollen fibre from sheep was starting to be used.
3rd Century A.D.	The textiles industry in England was just beginning. The Romans built their first weaving mill there.
12th Century	Over the next few centuries the textiles industry remained a cottage industry. Silk was being woven and spun in China.
14th–17th Centuries	The textiles industry began to grow. Mostly women did the spinning, and men were in charge of weaving. It was heavy and labour intensive work.
Late 16th Century	The knitting machine was made for the first time (invented).
Early 18th Century	Cotton industry began to grow steadily in England. Machinery was developed which made spinning and weaving less labour intensive.
19th Century	In Europe, Asia and America the textiles industry continued to grow. Further progress was made in printing decorations on fabrics. The sewing machine was invented. Mass-production of clothing and other textile products started.
1907	*Rayon* was invented and used for clothing — especially underwear — because it looked like silk. (Traditionally used to make undergarments for wealthy people.)
1939	*Nylon* was produced and used for stockings and parachute material.
1950	*Elastane fibre*, used in ladies' underwear and elastic, was developed. Today we know this fibre as *Lycra*.
1956	*Acrylic* was developed to look like wool. *Polyester*, another synthetic fibre, became popular.
1970s	Bonded fibres were invented and used in carpet and blanket manufacture.
1956–96	Over 40 new fibres were developed.
1990–2000	The design and manufacture of textiles has accelerated with the advance of computer technology. New hi-tech fibres have been created and developed to meet the increasing requirements of the consumer for 'easy care' and 'easy wear' fabrics. *Tencel* became one of the latest new fibres to be developed.

The timeline will mean more to you if you can see where all the countries mentioned are located on a world map. Your teacher may be able to find a map of the world for your classroom wall.

Textile Technology Used To Create New Fibres

Words to learn:
Cellulose polymers.
Regenerated.
Protein.
Manufactured.
Synthetic.
Resources.
Reformed.
By-products.

When we looked at how textiles were made from cotton, coconut and pandanus in Year 9, we discovered that all these fibres have similar properties because they all come from plants. All fibres are made from long lines of atoms called polymers. Cotton, coconut and pandanus are all made from cellulose polymers. For this reason they are called 'cellulose fibres'. They are grouped together as **natural fibres** with wool and silk, which are known as **protein fibres**. Wool and silk (two fibres that we do not use very much in Samoa) are known as protein fibres because they are made from protein polymers.

This year we will look at another group of fibres which are manufactured from mixtures of natural and synthetic resources. This group is known as **man-made fibres**.

Man-made fibres include two main types:

- Regenerated fibres.
- Synthetic fibres.

If you look back at the timeline on the previous page you will see that **rayon** was the first man-made fibre to be created. Check what year this was.

Like cotton, the basic ingredient in rayon is cellulose which is reformed. You will find out what this means when you study how rayon is made later in this book.

The next technological development in the textile world did not happen until more than thirty years later when the first synthetic fibre, called **nylon**, was created. This fibre had no cellulose in it and was made from the by-products of the coal and oil industry.

We will focus on regenerated fibres first and then look at the synthetic fibres.

Did you know?

Cellulose that is used to make rayon comes from trees. The method used to make rayon is different from the method used to produce coconut fibre in Samoa. Whilst a different method is used we have been using a similar technology for a long time. Can you find out in which century pandanus and coconut were first used for clothing in Samoa?

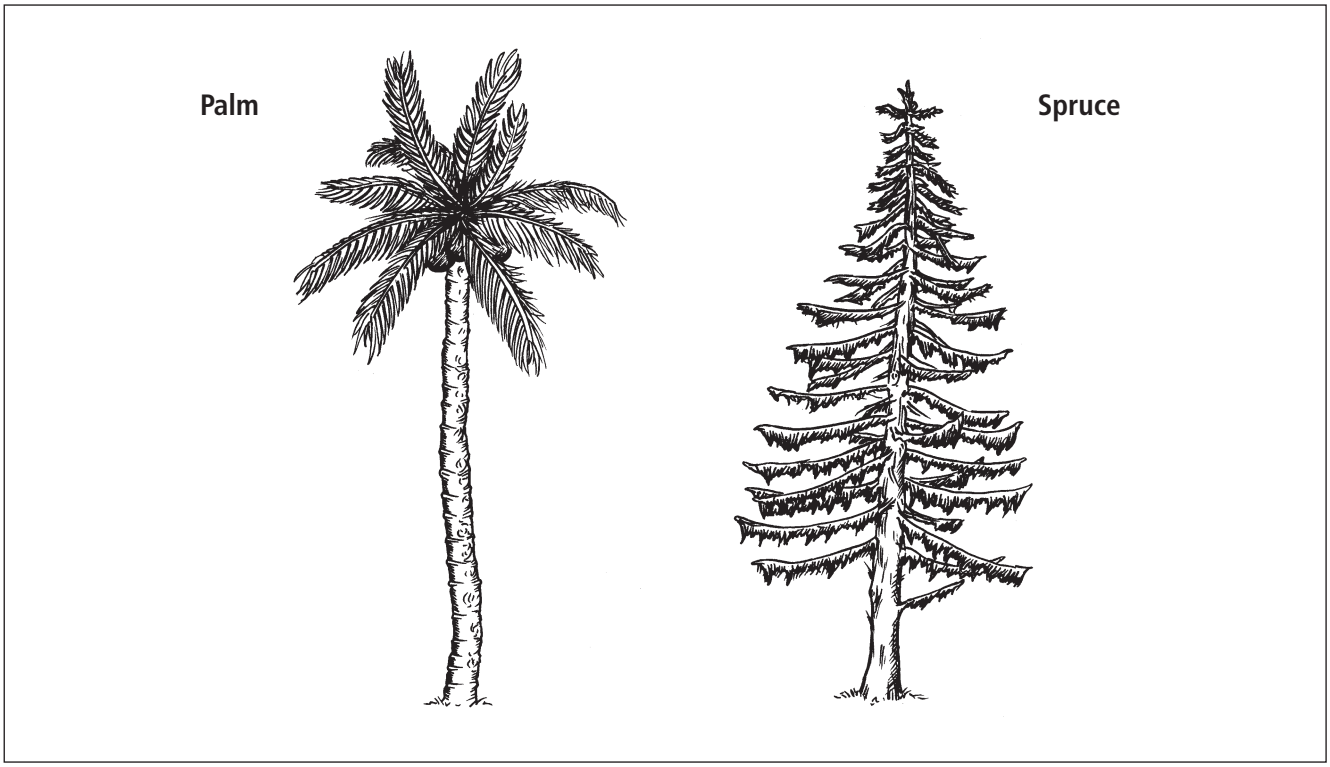
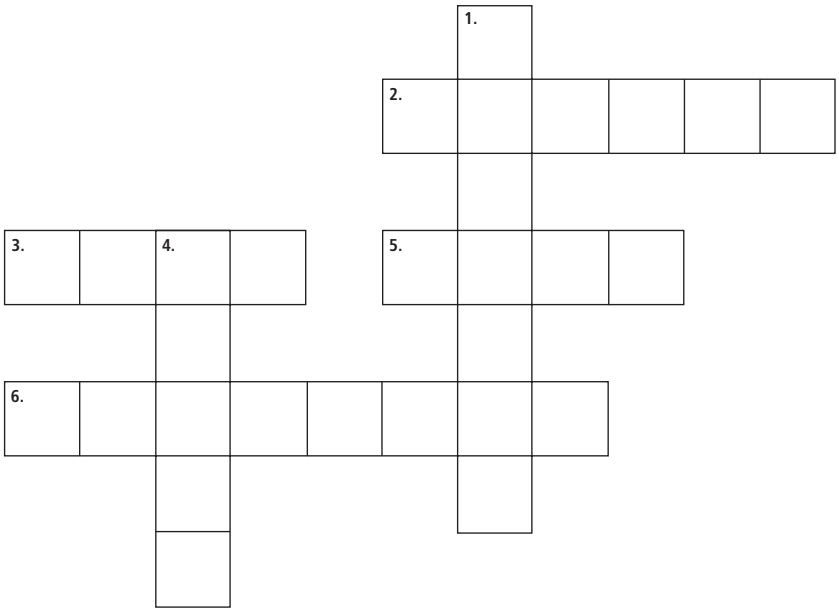


Diagram 1.3
Different types of trees are used to produce different fibres.

Activity 1 Fibres

1. What do you think the word regenerate means? 'Re' means *again*, and 'generate' means *to make* or *produce*. Nylon is a regenerated fibre because _____?
2. Work in pairs and complete the following:
   a. Brainstorm what you can remember from last year about the qualities of cotton. In your exercise book, make a list of the 'good' qualities of cotton fabric and the 'not so good' qualities of cotton.
   b. Rate how suitable cotton fabric is for clothing in Samoa. Use a scale of 1–5 with five being the most suitable. Explain your rating.
   c. Team up with another pair and share your findings.
   d. Discuss any points that you disagree with until you come to a shared understanding.
3. If you were a textile technologist who was asked to improve the care qualities of cotton, what do you think you would have to do?
4 In Year 9 you studied three natural fibres commonly found in Samoa. From the timeline you will see that cotton and wool were in existence since around 3000 B.C. Fill in the crossword on the next page to see how much you can remember about natural fibres.



Clues (across)

2. Most of the clothes we wear in Samoa are made from this fibre.
3. A very expensive fibre used to make clothes for special occasions.
5. The natural fibre used for clothing in climates colder than Samoa.
6. One of the first natural materials used for clothing.

Clues (down)

1. This tree supplies fibres used for various purposes in Samoa.
4. A natural fibre similar to cotton but more absorbent and expensive.

Technology Used To Create Man-Made Fibres

Words to learn:
Invented.
Equivalent.
Empress.
Continuous.
Hatch.
Legend.
Filament.
Staple.
Cocoon.
Lustrous.
Principles.

Before we can understand how the first man-made fibres were invented, we need to look at how the natural fibre silk is produced. Even though we use very little silk for our textile products in Samoa, we do use fabrics that *look like* silk. From the time the Chinese started to produce silk, textile technologists tried to invent a man-made equivalent but they did not manage to do this until last century. Many of the fabrics that you will have seen made into special garments for occasions like White Sunday, weddings and Christenings, are not made of silk but from a type of rayon known as **cellulose acetate**. Silk is very expensive and difficult to look after.

Silk is created by the silk moth. It lays eggs from which the silk worm hatches. Silk worms feed on mulberry leaves. When they reach a certain length each worm spins a cocoon around itself. Each cocoon is about the size of a small chicken's egg. It is this cocoon that gives the textile technologist the material to make the long continuous shiny silk thread. If the cocoons are not gathered up and used for silk production, a silk moth will hatch out of each one and the life cycle of the silk worm will begin again.

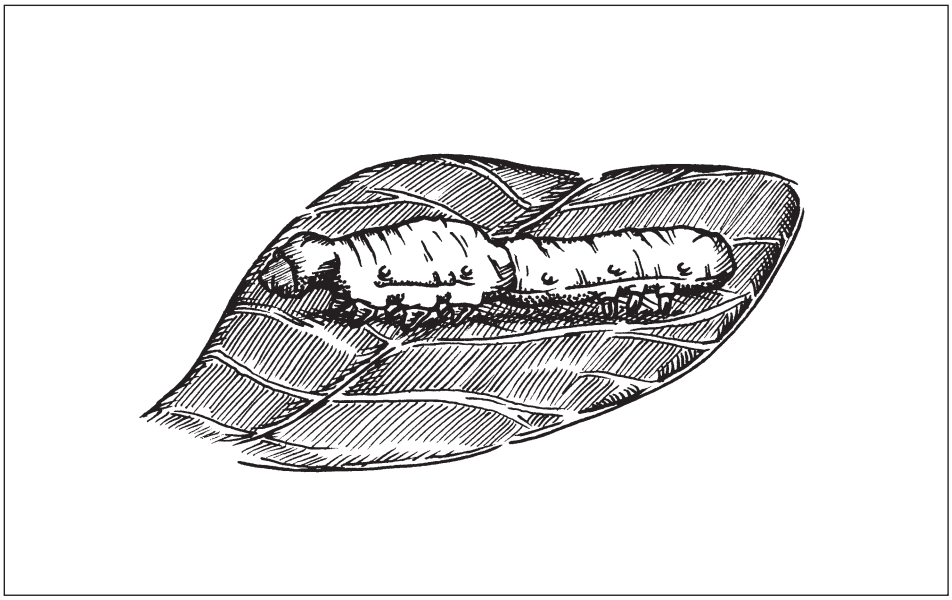


Diagram 1.3
A silk worm.

Did you know?

There is a legend that the first silkworm to be cultivated happened in China when a cocoon fell in the teacup of an empress while she was drinking tea in her mulberry orchard? The hot liquid loosened the gum that held the continuous silk thread together. Imagine how surprised the empress would have been as she pulled this very long continuous shiny thread from her teacup!

The long continuous lustrous silk thread is known as a filament yarn. It produces a shiny surface when woven into fabric. This is because it is a single yarn with no hairy bits sticking out. If we think about how cotton is made we will remember that the cotton boll produces hundreds and thousands of short fibres. These fibres have to be spun together to produce a long continuous thread or yarn. The long yarn that is eventually made out of the fibres will not be shiny because of all the ends of the fibres which have had to be spun together.

It was a French technologist, Count Hilaire de Chardonnet, who first discovered how to make a fibre in a continuous filament to look like silk. This discovery and the process he used to make the first artificial silk established the basic principles used in textile technology today.

Regenerated Fibres

The cellulose in wood is treated to produce viscose rayon. At the end of the process, fibres of pure cellulose are formed. Chemically they are almost identical to cotton. Cotton is 99% cellulose and viscose is 100% cellulose.

However, cotton is a fibre made from short fibres, and viscose rayon is produced as a continuous filament. This is why viscose rayon fabric has a shiny surface and cotton fabric has a dull finish. When viscose rayon was first invented it was very popular for underwear. Being slippery and lightweight meant that outer clothing would sit over it nicely. The disadvantage was that because viscose rayon is made from wood pulp, it tends to act like paper when it gets washed. It becomes softer and needs gentle washing. Underwear needs frequent washing and so rayon turned out not to be the ideal fibre for this use.

During World War II (1939–45) technological practice was being used to develop a fibre that would be strong and light enough to make parachutes. During this work, technologists discovered a way of removing the shine from viscose rayon by adding a powder to it. The powder was a delustrant (from the word parts 'de', which means *take away*, and 'lustre', which means *shine*). When viscose rayon could be made with a dull finish it began to be mistaken for cotton fabric. When you have the chance to visit the shopping centre in Apia or Salelogoga go into the fabric shops and see if you can tell which fabrics are made from cotton and which ones from rayon. Many of the imported men's shirts and women's dresses are made from viscose rayon or acetate rayon rather than cotton. Rayon fabric is a popular alternative to cotton fabric because it is cheaper, but is still absorbent like cotton.

Did you know?

The difference between viscose rayon and acetate rayon (sometimes called cellulose acetate) is that the cellulose is treated with acetic acid to make it look even more like silk?

Fabrics are shiny because of the kind of fibres they are made from. As we said previously, cotton is made from short fibres. We call these **staple fibres**. We can also remove the shine from the continuous filament of rayon fibre by cutting it into short lengths or staples. The staple rayon fibres are then treated in the same way as staple cotton fibres when they are spun into yarn. Cut-up continuous filament rayon fibre can be blended with staple cotton fibres to make a 'cool' fabric or with staple woollen fibres to make a 'warm' fabric.

Activity 2 Fibres

1. Write the following exercise in your book filling out the gaps.

   It is the _____ _____ that gave the textile technologist the long continuous shiny silk thread to copy. This thread is called a _____ yarn. The yarn produced from _____ fibres are called _____.

2 Find out if we could produce silk in Samoa. What resources would we need and which ones are available ?

3. Why have we studied silk before looking at how man-made fibres are made?

4. Explain why rayon is an absorbent fibre.

5. A brainteaser:

   Pele watched in disbelief as she tried to remove nail polish she had spilt down the front of her cellulose acetate dress using nail polish remover. Holes started to appear. Why did this happen?

Unit 2: THE FIRST SYNTHETIC FIBRES TO BE DEVELOPED

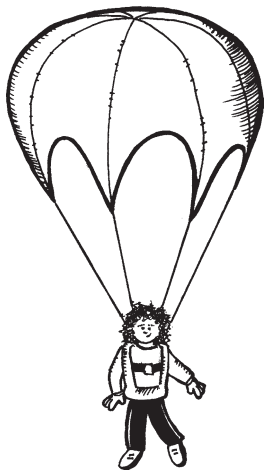
Words to learn:
Expensive.
Role.
Parachutes.
Qualities.
Solution.
Technological practice.
Launched.
Market.
Melting point.
Characteristics.
Susceptible.
Tendency.
Thermoplastic.
Accumulates.
Spinneret.
Polymer.
Molecules.
Static electricity.

Introduction

Silk was a very expensive fibre and was hard to get in Europe at the beginning of World War II. It had been used to make underwear, women's stockings and garments for special occasions. When World War II began silk was used for much more important things!

Did you know?

Silk was the fibre used to make parachutes. In England, during World War II, 1500 parachutes were being made each week. No wonder women in Europe could not buy silk stockings during the war! Discuss with your class why silk would have been a suitable fibre for parachutes.



Thirty years after rayon had been developed a chemist called Wallace Hume Carothers could see that there was a need for a new man-made fibre with qualities similar to silk. He used technological practice to develop a solution. He did not use any natural product like wood pulp as a basic ingredient but instead developed a fibre that was entirely synthetic. It was made from a chemical solution of by-products from the oil and coal industries. This fibre was called 'Nylon' and was launched onto the market in 1939. Because this new fibre was made of chemicals it would melt if it got too hot. A company called Du Pont did a lot of work in New York and London trying to fix this problem. They used technological practice to raise the melting point of the new fibre to 255°C.

Did you know?

The name Nylon is likely to have come from the names of the two cities New York and London.

Since then, other companies have made nylon and given it names like Antron and Tactel. A fibre like nylon can have many different trade names depending on who makes it.

Nylon is made the same way as rayon. This process is described below and in the diagram on the next page.

The ingredients that come from oil and coal are mixed with air and water then two chemicals are added. These react with the other ingredients to form nylon polymer. This is then poured onto trays until is goes hard and is then broken into small pieces and put into a container called a feed hopper.

The feed hopper melts the nylon again and mixes it with another chemical then pumps it through a spinneret that looks just like the sprinkler head on the end of a shower fitting. The liquid comes out in long fine streams into a chamber (a room or tank) of cold air which makes the long filaments solid again. Next the nylon filaments are sent through another chamber that contains steam. This softens the nylon fibre and it is wound onto a spool. The final stage is the stretching and twisting of the nylon filament onto a bobbin. Now the nylon fibre is ready to be used as:

- Bristles in hairbrushes, toothbrushes, brooms, rope and so on.
- Yarn for weaving nylon fabric or knitting fabric for use in homes, industry or clothes.

Nylon is stronger and more elastic than silk but its strength means it is not as soft and pleasant to wear next to the skin. Nylon has a lot of the same features as the textile we call 'plastic' because it is also made from similar chemicals. Just like plastic protects things from the water, nylon does the same. This is why raincoats are often made of nylon and not from natural fibres, which soak up water.

Did you know?

If you wear a plastic raincoat for too long, why will you start to feel as wet on the inside as you are on the outside? Can you think why this happens?

'*I feel as wet on the inside as I do on the outside.*'

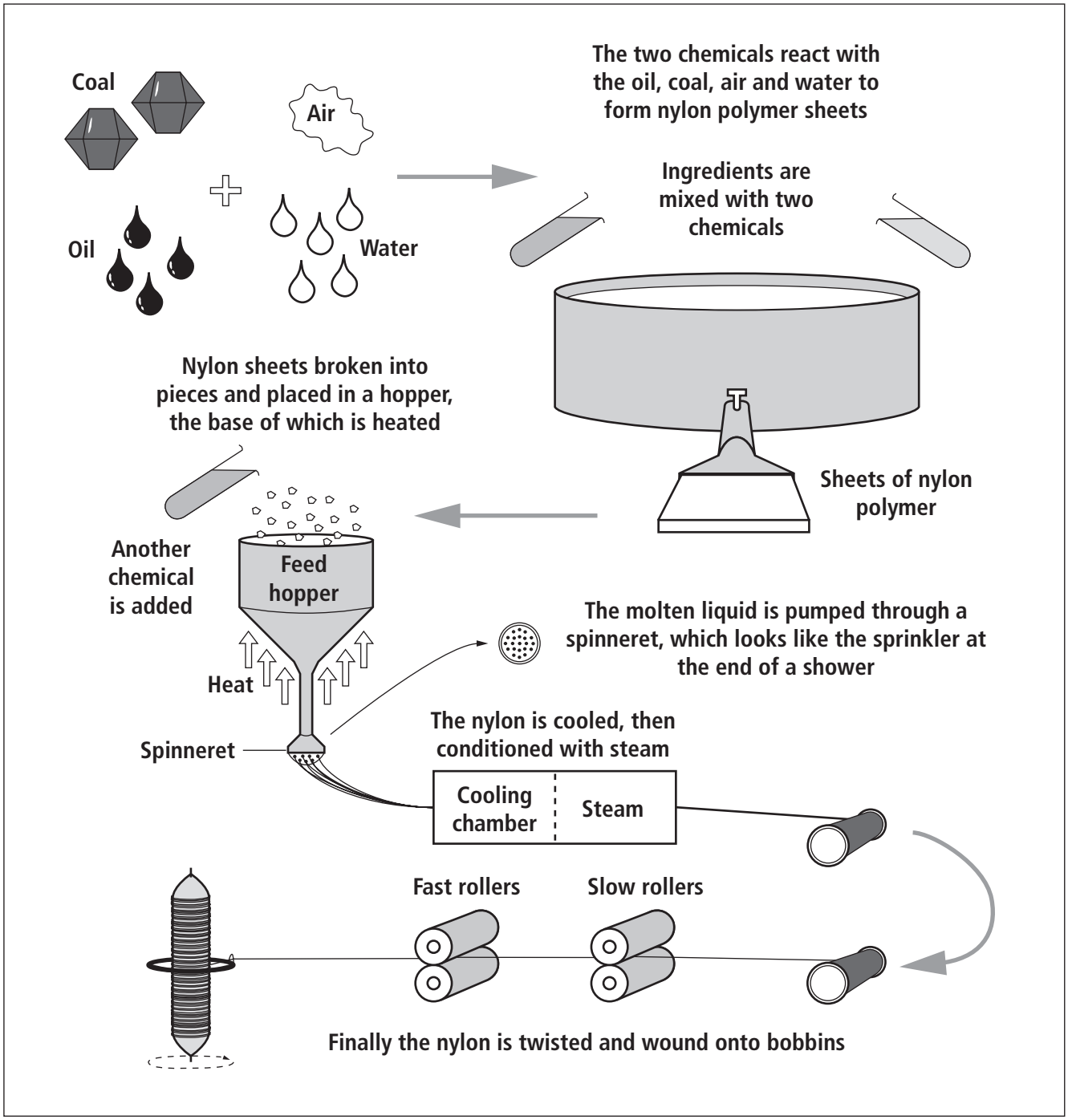


Diagram 2.3
The production process for nylon.

Have you ever worn nylon and felt uncomfortable because it rides up or clings to your body? This is because the chemicals in it gather static electricity. Nylon fabric is likely to get dirty quickly because static electricity attracts dirt and dust molecules to the fibre.

Nylon will still melt if it gets hot enough — after all, it's made from chemicals that have been heated to form liquids! Fibres that react this way to heat are called 'thermoplastic'. All fibres made from chemicals are likely to melt if they get too hot, so it is important that you don't have the iron too hot when pressing fabric that contains synthetic fibres.

Look what happened to Pele's skirt below?

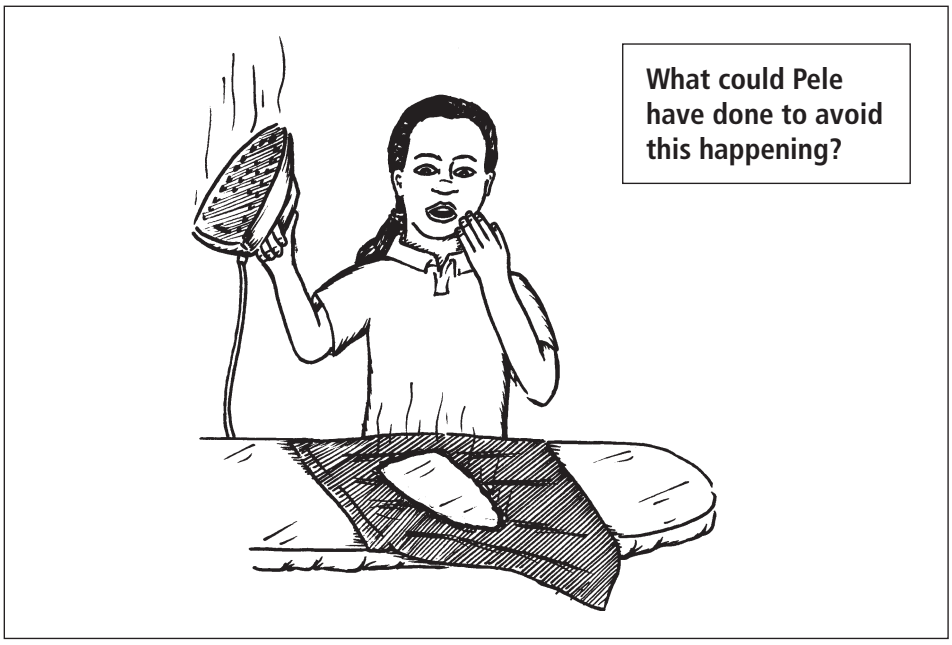


Diagram 2.4
You have to be careful when ironing different fabrics.

Which Synthetic Fibres Were Next To Be Developed?

Words to learn:
Principle.
Solidifying.
Experimenting.
Ingredients.
Resistant.
Perspiration.
Sensitive.
Prone.
Pill.

If you look back at the textile technology time line on page 11 you will see that since the development of nylon there has been a large increase in the development of new fibres. Between 1950 and 1990 there has been an average of one new fibre a year developed.

Once technologists had developed a way to make fibres by passing liquid through a spinneret and then setting or solidifying it into a fibre, they started experimenting using different types of ingredients in different amounts to try and solve other technological problems.

Acrylic

Words to learn:
Mildew.
Resistant.

The next fully synthetic fibre to be developed was acrylic. It is made from by-products of the oil and petrol industry. The first acrylic was given the trade name 'Orlon' and since then other companies have made the same fibre calling it Acrilan or Coutelle or Dralon. Whatever name it is called, all acrylic fibre is developed to look, act and feel like wool.

During production, the long continuous filament can be given a crimp (a crease or fold) to make it act like wool. Like other filament fibres, it is shiny when it first comes out of the spinneret and it has to be treated to give it the same dull finish as wool. Sometimes you can tell if a jumper is made from acrylic rather than wool because it has a slightly shiny surface. Acrylic washes better than wool and is less bulky. It is a good fibre for making slightly warmer clothing that is sometimes needed in Samoa. It will not keep the body as warm or dry as a jumper made of wool. Some people find that wool scratches their skin. Because acrylic is made from a filament yarn it doesn't have all the scratchy bits that stick out on woollen fibres.

Moths like to eat wool because it is a protein fibre. They can leave big holes in woollen garments. But moths will not eat acrylic because they do not like eating chemicals.

The disadvantage of acrylic is that it produces a fabric that tends to rub and pill with wear.

Because it is made from chemicals, acrylic fibre:

- Is resistant to moths and mildew.
- Is strong.
- Doesn't absorb much water or body perspiration.
- Will melt if it gets too hot.
- Develops static electricity.
- Is cheaper than wool.
- Tends to pill.

Activity 1 Wearing Different Fabrics

In a small group, study this picture and work out the answers to the questions below.

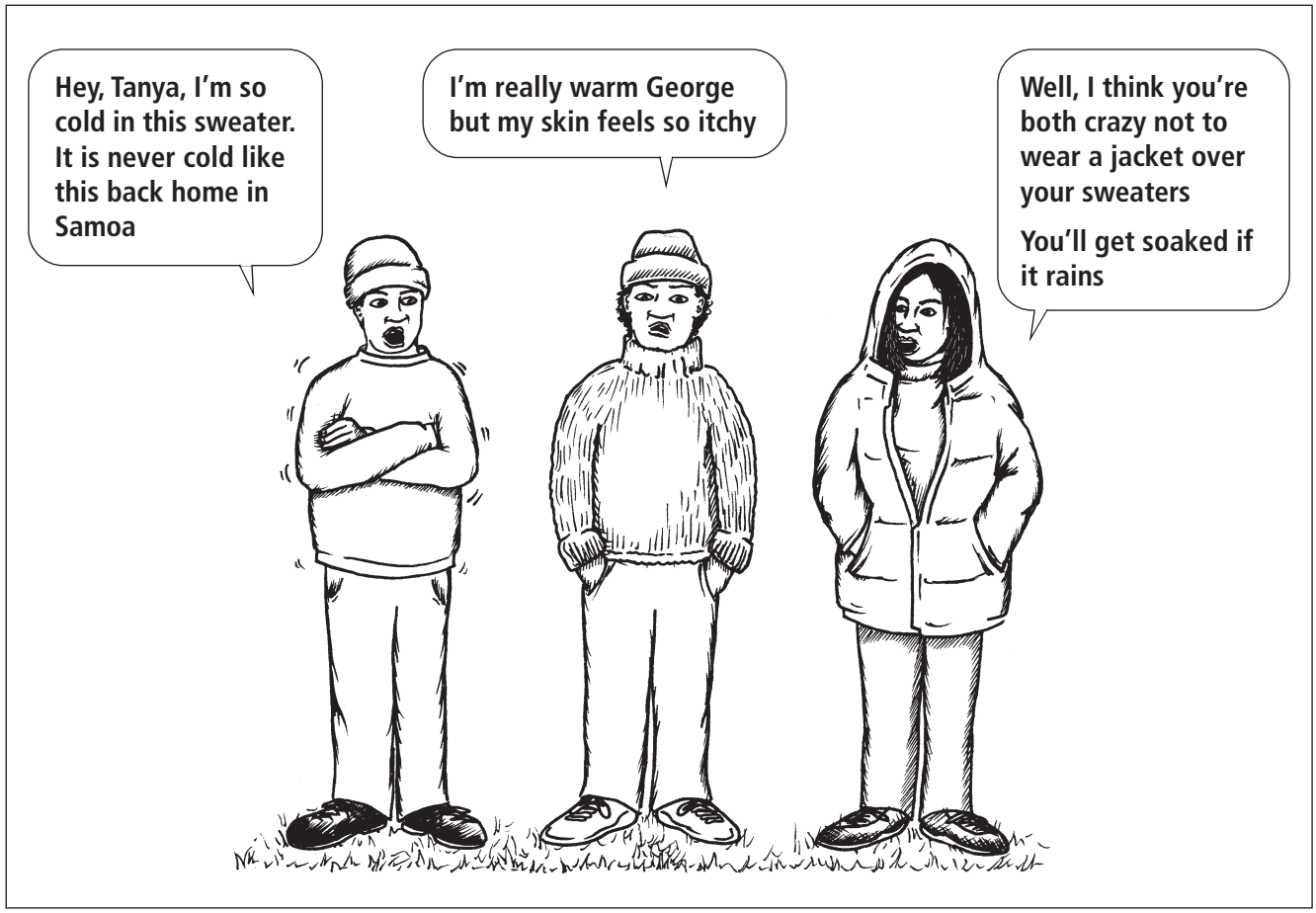


Diagram 2.5
Different fabrics have different properties.

1. Why do you think these three are dressed so warmly to watch the rugby?
2. Which boy is wearing the acrylic sweater? Explain why you chose him.
3. Why is Tama's skin feeling so itchy when it's winter and there are no mosquitoes around?
4. What fibre do you think Tanya's jacket is made from? Why would this protect her from the rain?
5. Which boy will get wetter if it rains? Explain why.

Modacrylic

Words to learn:
Plush.
Velvety.
Treated.
Flame-resistant.

This is a fibre that is specially made to look like fur, or fabric with a deep pile. You won't see this very often in Samoa but if you ever move to a country with a colder climate, you will probably want to wear it! Modacrylic is used to make imitation fur jackets, coats, wigs and carpets that are much cheaper than wool. Many of the soft toys we buy children that have a plush, velvety feel and are made from modacrylic that has been treated to make it flame-resistant.

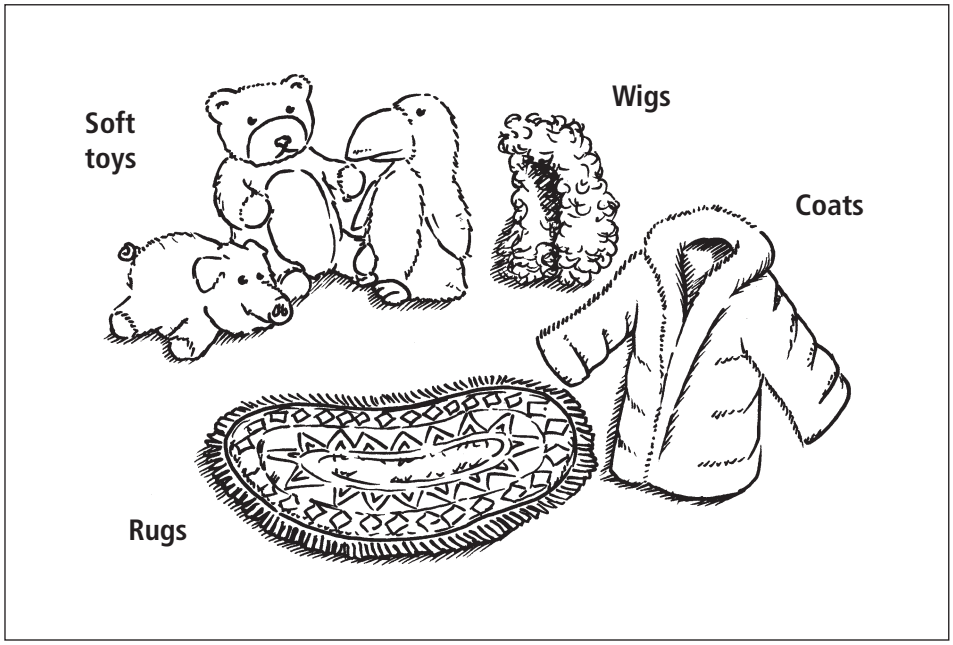


Diagram 2.6
Modacrylic and its uses.

Polyester

Words to learn:
Origin.
Versatile.
Lingerie.
Wadding.
Snagging.

Polyester was the next synthetic fibre to be developed. It is like the other synthetic fibres because it is made from coal. It is a popular fibre for clothing and household items because it can be made to look like cotton fibre but does not crease as much. Like the other synthetic fibres, it is does not attract mildew and moths. Polyester, like nylon and acrylic, does not soak up water or perspiration very well so it is not a very comfortable fibre to wear in hot climates like Samoa. However, polyester is slighty more comfortable than nylon to wear on a hot day.

Polyester is one of the most useful fibres to be developed. By using different construction methods, it can be made into a wide variety of fabrics in many different weights. It is used to make dresses, skirts, blouses, shirts, business suits, lingerie, sportswear, curtain linings, curtains and blinds, white wadding to go into cushions and sewing thread.

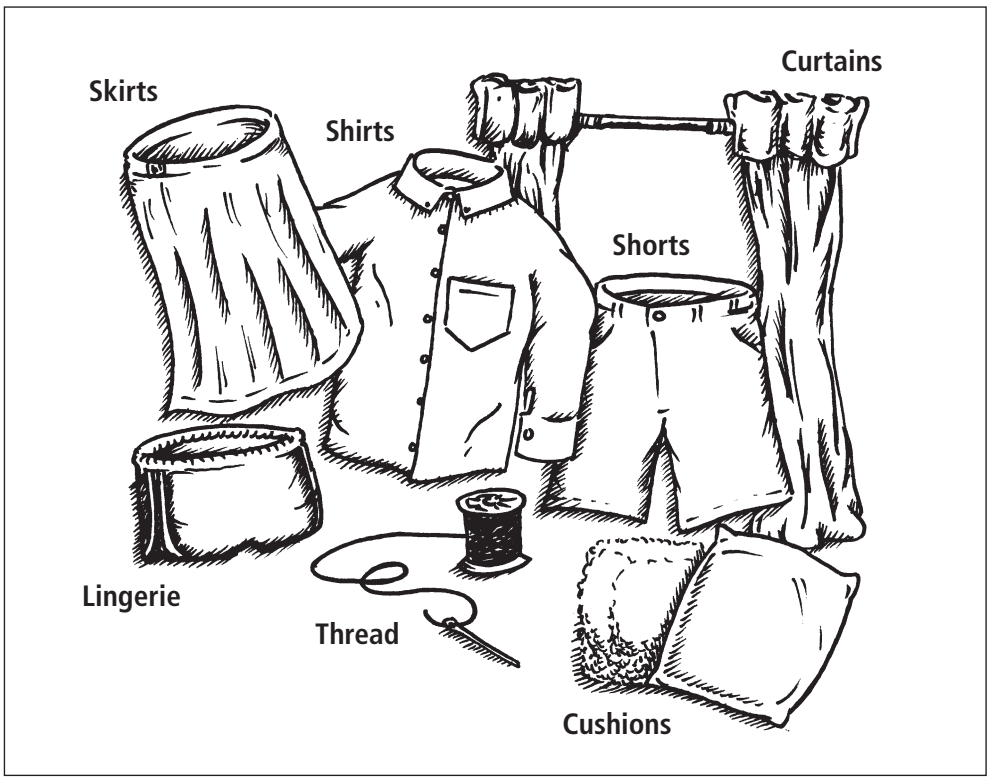


Diagram 2.7
Polyester and its uses.

Polyester is the perfect thread for sewing any fabric. It does not snap as easily as cotton thread and because it is a filament yarn it passes through fabric smoothly without snagging or making holes .

Polyester is known by trade names such as Dacron, Terylene and Trevira.

Lycra

Words to learn:
Elastomeric.
Durable.
Imitate.
Sensitive.

This is one of the most recently developed important textile fibres. It is also known by other trade names like 'Spandex'. It belongs to the group known as elastomeric fibres. These fibres are all like rubber in their stretch-and-snap-back properties. The good thing about lycra is that it is long-lasting (durable), resistant to chemicals, oil and sunlight, and is lightweight.

These are what make elastomeric fibres so suitable for swimsuits and garments such as bras. These fibres can can be damaged by suntan oils and sunshine. They are especially sensitive to damage by chlorine bleaches. As long as they are rinsed well after use they will last for a long time.

Metallic

Words to learn:
Frequently.
Sparkle.
Film.

This fibre is most often used in garments for evening wear. It has a sparkle and shine and is used to produce glittery fabrics for wear on special occasions. It needs special care because it is a weak fibre. It is nonabsorbent and loses its shine unless coated with polyester film. It is heat sensitive, so cannot be washed or ironed at high temperatures.

Tencel

This is the latest technological development in fibres for clothing. It is strong, and does not shrink or wrinkle. It holds creases well and can be used for garments that need to be pleated. Tencel is absorbent, not like other synthetic fibres. It is being used more and more in a wide range of fabric textures like denim, chambray and suede cloth and also in different weights for blouses, dresses and jeans. Fabrics made from Tencel are machine washable in warm or cold water. They can be tumble-dried or drip-dried and if you wash them carefully they need less ironing than many other fabrics. Like other synthetic fibres, Tencel will melt if it gets too hot.

Activity 2 Differences Between Fabrics

1. Copy and complete the following chart from what you have learned so far:

Fabric	Good qualities	Poor qualities
Cotton		
Silk		
Rayon		
Nylon		
Lycra		
Acrylic		
Polyester		
Tencel		

2. Your teacher may set the following questions up as a 'Bus Stop' activity. You will work in groups of three or four to answer all the questions. Each question will be written up onto a large sheet of newsprint and passed round the class room. Every group will start with a different question to answer in the time your teacher gives you. When the time is up you have to pass your question onto the next group. By the end of the activity, every group will have answered each of the questions.

   When you have finished the teacher can put all your question sheets up on the wall. You will have the chance to discuss all the answers and then write a correct response in your book for each of the questions.

a. What are the disadvantages of silk as a fabric?

b. Why is nylon, rather than plastic, used as a textile for umbrellas?

c. Which fibre is more absorbent — Nylon or Rayon? Why?

d. What is the main disadvantage of rayon fabrics?

e. Why does mould grow on fibres like cotton and linen?

f. Why should you wash garments made from synthetic fibres in warm water instead of hot water?

g. Why would modacrylic be such a perfect fibre for children's soft toys?

h. What type of sewing thread do you think you should use if you are making a garment from polyester fabric? Explain the reason for your choice.

Unit 3: PROPERTIES OF TEXTILES

Words to learn:
Characteristics.
Properties.
Thermoplastic.
Elasticity.
Absorbency.
Resistance.
Inflammability.
Durability.

Introduction

Different fibres have different properties (qualities or features) that make them suitable or unsuitable for certain tasks. For example, you wouldn't make a child's toy out of fabric with flammable fibres and you wouldn't make an umbrella out of cotton fabric!

Learning the properties of fibres helps us to choose what fibre would be most suitable for our different needs. Look at the chart on pages 29–31 to see the main types of properties in all fibres. The chart reminds us of the properties that all fibres have in varying amounts.

Fibre and source	Properties and characteristics	Typical fabrics and uses	Care
Cotton From seed pod of cotton plant	Stronger when wet than when dry. Absorbent. Draws heat from body by absorbing perspiration. Creases easily. Easy to dye. Shrinks unless treated.Mildew grows on cotton if damp and left for a long time. Weakens and eventually rots in sunlight.	Made into versatile fabrics in different weights. Can have a different texture depending on weave used. Ideal for clothing in warm temperatures. Can be made into fabrics like corduroy for colder weather. Can be made into denim fabric for work and casual clothes. Cotton is used for bed sheets, clothes and towels.	Cotton fabrics can be washed by hand or machine. Use hot water if they have been preshrunk, or cold water if not preshrunk. Bleach can only be used on white cotton fabrics. Dry cotton fabrics in the shade to prevent the colour fading. Iron while damp to remove creases.
Linen From flax plant	Stronger than cotton. Absorbent. Draws heat from body by absorbing perspiration. Creases easily. Has difficulty absorbing dye. Some tendency to shrink and stretch when washed. Mildew grows on linen if left damp for a long time.	Can be made into light-weight or heavier fabrics. Used overseas mainly for expensive clothing, and items like table cloths in hotels or altar cloths in church.	Tends to shrink when washed. Needs much ironing to remove creases. Often treated with starch to make the fabric stiff again.
Silk From cocoons of silk worms	Strong and absorbent. holds in body heat. Crease resistant. Dyes easily. Produces good results when used for Batik or tie-and-dye. An expensive alternative to cotton. Resists mildew and moths. Weakened by sunlight and perspiration.	A luxury fabric available in many weights. Used for dresses, shirts, blouses and linings.	Usually dry-cleaned. If washable, is usually done by hand in mild suds. Avoid chlorine bleach. Iron at a low temperature.
Wool From fleece of sheep	Not a very strong fibre, but very absorbent. Holds in body heat. Creases fall out. Dyes easily but can be attacked by moths. Needs careful laundering unless treated.	Fabrics of many weights, textures and constructions such as crepe, flannel, fleece, garbadine, melton, tweed and jersey. Used for sweaters, dresses, coats and suits.	Suits and coats need dry-cleaning. Woollen sweaters can be washed in warm water. The same temperature water is needed for washing and rinsing. Do not wring.

Fibre and trademarks	Properties and characteristics	Typical fabric and uses	Care
Viscose Rayon	Not as strong as cotton. Absorbent. Dyes easily. Creases easily. Shrinks or stretches unless treated.	Can be made into fabrics of different weights with a shiny or matt finish. Can be made to look like silk but will not feel as soft. Used for dresses, shirts, blouses and linings.	Becomes much weaker when wet. Needs careful hand washing in warm or cold water. Needs ironing at moderate setting to remove creases.
Acetate Rayon	Similar to viscose rayon but it does not crease as much.It also builds up static electricity and is less absorbent.	Makes a fabric with deep lustre and excellent draping qualities. Used for lingerie, dresses, blouses and linings.	Does not become as weak as viscose rayon but still needs care when washed. Iron at a low to moderate heat as fabric melts if temperature is too hot.
Nylon Antron Tectel	Strong. Does not absorb moisture and holds in body heat. Does not crease easily. It builds up static electricity and can pill. Resists mildew and moths.	Can be made into fabrics of various weights and textures. Used for lingerie, swimwear, work uniforms that require frequent washing.	Can be washed by hand or machine. Use fabric softener to reduce static electricity. If drip-dried, it should not need ironing.
Acrylic Acrilan Courtelle Dralon	Reasonably strong but can lose shape. Does not absorb moisture easily and holds in most body heat. Builds up static electricity and can stretch with wear. Resistant to mildew and moths.	Usually made into fluffy fabrics to look like wool, often with pile construction.	Can be washed by hand or machine. Use fabric softener to reduce static electricity. Dry flat to prevent stretching and stop creasing.
Metallic	Has a sparkle and shine and is used to make glittery fabrics. A weak and non-absorbent fabric.	Used in garments for evening wear.	Wash carefully in cold water by hand. Ironing can spoil the look of the fabric.
Lycra Spandex	Fibres have lightweight stretch-and-snap-back properties. Does not absorb moisture easily and holds in most body heat.	Used for swimsuits and garments such as bras.	Suntan oils and sunshine can cause the fabric to wear out, so always rinse swimwear in clean water after use.

Fibre and trademearks	Properties and characteristics	Typical fabric and uses	Care
Modacrylic SEF	Does not absorb moisture easily and holds in most body heat. Builds up static electricity but is resistant to mildew and moths. Melts if heated but can be treated to make it flame resistant.	Deep-pile fabric made to look like fur. Used for coats, soft toys, carpets and wigs.	Usually needs dry cleaning.
Polyester Dacron Trevira	Does not absorb moisture easily and holds in most body heat. Does not crease with normal wear.Builds up static electricity. Has thermo-plastic qualities, so it can be pleated.	Can be made into lightweight fabrics that look like cotton, or into slightly thicker fabric that looks like thin woollen fabric. Used for shirts, dresses, suits, sportswear, thread filling for cushions (*e.g. Crepe, double knit*).	Hand or machine wash in cold or warm water. Drip-dry to avoid ironing. Use fabric softener to reduce static electricity.
Tencel	Absorbent, unlike other synthetic fibres. Is strong, and resists shrinkage and wrinkling. Holds creases well and so can be used for pleated garments.	It is being made to look like a wide range of fabrics that have always been popular for summer clothes (*e.g. Denim, Chambray and suede cloth*).	Machine washable in warm or cold water. Drip-dry to avoid ironing.

Properties Of Fibres

Look at the fibres listed in the left hand column in the chart below. Each one has different amounts of each property listed. The amounts have been measured and given a number from 0–5.

Zero means that the fibre has very little of the property listed, and five means the property listed stands out. For example, cotton is very stong (strength of 5), but not very flammable (flammability of 1).

Activity 3 Information On Fibres

Words to learn:
Inflammability.
Absorbency.
Elasticity.
Crease resistance.
Warmth.
Strength.
Durability.
Resistance to mould.

Use the information on the chart below to answer these questions:

1. Which fibre would you recommend for a jacket or jumper to be worn in a cold climate?
2. Which fibre has the highest total score for all properties and would be suitable for clothing in Samoa?
3. What do all the synthetic fibres have in common?
4. What do all the natural fibres have in common?
5. Why do you think Viscose Rayon and Acetate Rayon are more absorbent than Nylon and Polyester?

Fibre	Strength	Flammability	Warmth	Elasticity	Crease resistance	Resistant to mildew	Water absorbency
Cotton	5	1	2–3	4	1	1	5
Linen	5	1	2–3	0	0	1	5
Silk	4	3	4	4	2	1	5
Wool	1	2	5	5	5	3	5
Acrylic	3	3	4	5	5	5	3
Nylon	5	4	0	5	5	5	0
Polyester	5	4	1	4	5	5	0
Viscose Rayon	2	5	0	1	1	1–2	5
Acetate Rayon	2	3	1	2–3	2	3	4
Lycra	5	1	1	5	5	5	1

Thermoplastic And Flammable Fibres

Words to learn:
Flammable.
Chemical.
React.
Elements.

Earlier in this book you learned how some fibres were made from chemicals that had been heated to form liquids — these fibres are called 'thermoplastic' fibres. Thermoplastic fibres melt when they get hot. This is why it is important to only use a warm iron on synthetic and regenerated cellulose fibres.

Anyone wearing any clothing made of a thermoplastic fibre such as nylon or polyester needs to be very careful around fires or heaters because the fibre will melt and stick to the skin, causing serious burns or death.

Activity 4 Flammable Fibres

Work in groups of three or four and discuss these questions. Write your answers in your exercise book and be ready to report back to the class.

1. Why do accidents involving clothing getting burnt and melting onto the skin not happen very often in Samoa?
2. Think about the type of clothing that Samoan people would have to wear in a colder climate: *e.g. If they moved to New Zealand*. List the properties they would need in the clothing they required.
3. Look at the picture on the next page and explain why this Samoan child living in New Zealand during the winter could be 'at risk'.

Can you work out why? Your teacher may be able to organise a 'burning test' so you can compare what happens when you set fire to a small sample of woollen fabric and acrylic fabric. (Do not try this on your own — it can be dangerous!) Burn only a small piece of fabric and use tongs to hold it. Observe the answers to the following questions:

- Is there a flame or does it melt?
- Is there smoke or fumes?
- Is there a strong smell? Does it remind you of anything?
- How quickly does the fabric catch on fire and burn?

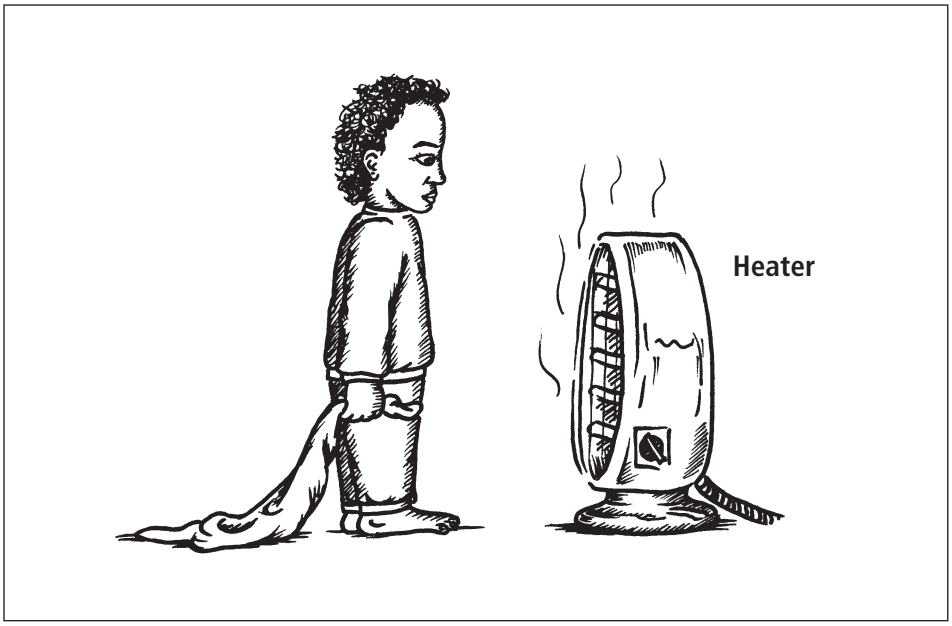


Diagram 3.1
This child needs to be watched carefully by his parents.

Did you know?

One of the safest fibres to wear in the winter is wool.

If someone gets badly burnt in a fire one of the ways of putting out the flames is to wrap them in a woollen blanket. If you can't carry out the burning test, the information in the chart on the following page should help you find an answer.

4. Do the following speaking exercise with a partner. One person is A, and the other person is B. Take turns.

A	**B**
Name two fibres that smell the same when burned.	Name three fibres that have a similar ash.
Explain how linen and silk burn in a similar way.	Explain how polyester and acrylic burn in a similar way.
Compare the smell of burning cotton with the smell of burning acrylic.	Compare what remains when cotton and nylon have burned.

What Happens To Fibres When They Are Burned?

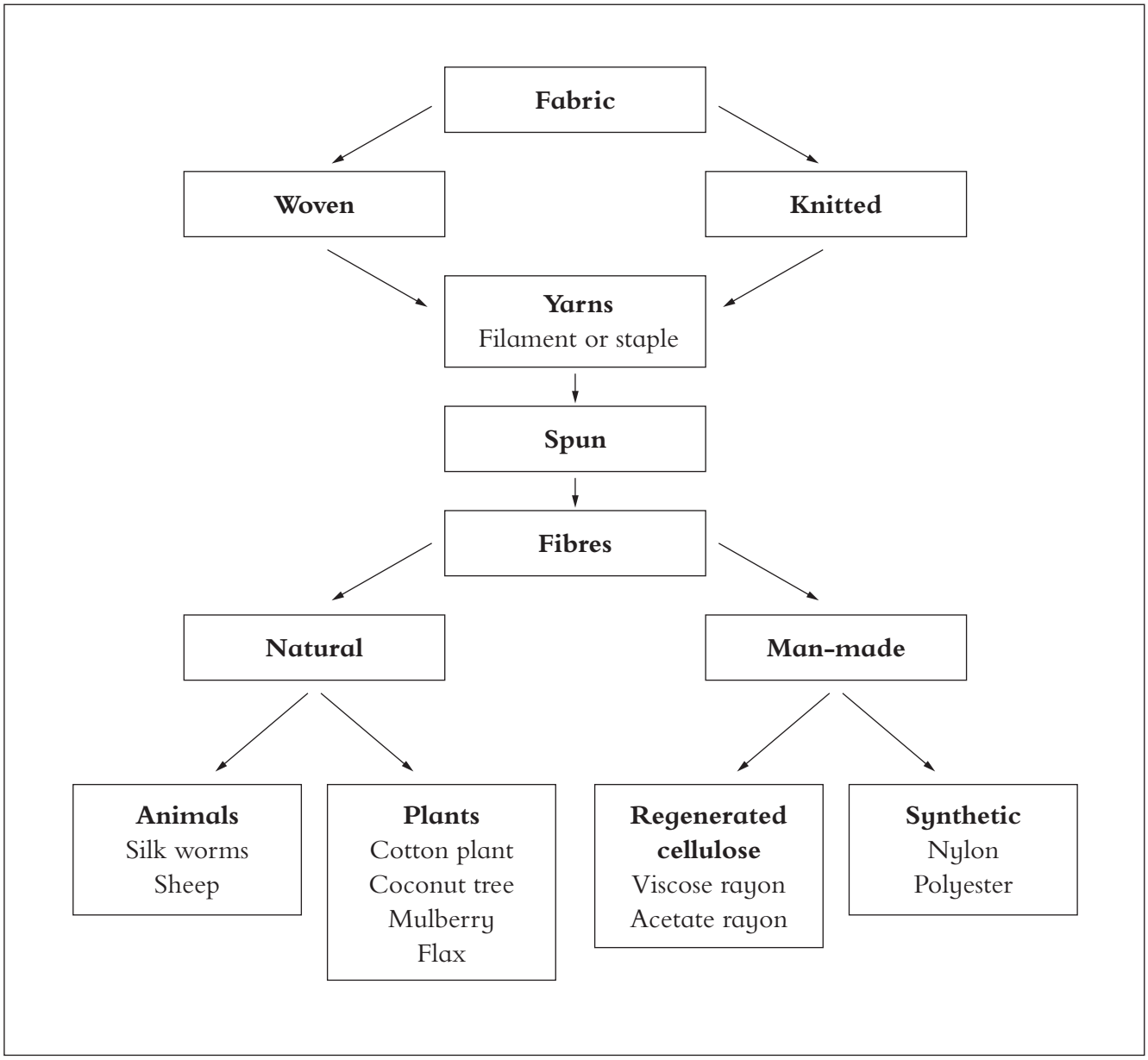
Words to learn:
Smoulder.
Aromatic.

Study the following chart carefully and use it to help you answer the questions on the previous pages.

Fibre	Burning/flame	Smell	Ash or residue
Cotton/Viscose Rayon	Burns quickly, producing a yellow flame.	Like burning paper.	Burns to a greyish-white ash.
Linen	Burns easily producing a yellowy orange flame.	Like burning grass, hair.	Burns to a grey ash.
Silk	Burns inside the flame. Does not flare up.	Like burning hair or feathers.	Burns to ash.
Wool	Burns slowly inside the flame. Smoulders, does not flare up.	Like burning hair or feathers.	Produces a black bead that crushes easily once cold.
Acetate/Rayon	Burns slower than viscose rayon.	A vinegar smell.	Melts to a hard, shiny, black bead.
Nylon	Shrinks away from the heat of flame, melts, drips and produces a yellow flame.	A smell like celery.	Produces a white, creamy coloured hard, round bead.
Polyester	Melts and shrinks away from the reddish flame, and melts on the edge.	A smell like string.	Produces a hard round bead, darker in colour than nylon.
Acrylic	Burns then melts in a reddish flame.	Perfume-like smell.	Produces a hard black bead.

Fibres Become Fabrics

To remind us of the work we did last year on how fibres were made into fabrics, study the chart below.



Activity 5 Mix And Match

Using the charts on pages 29–31 your teacher will create a mix and match activity. This activity will help you learn the different characteristics or properties of fibres, their appearance, uses and care needs.

Your task will be to work in groups of three and four and try and match the name of each fibre with its:

- Properties.
- Typical fabrics and uses.
- Care needs.

When you finish, check your answers by using the chart in this book. Talk in class about why we might get confused about some of the fibres.

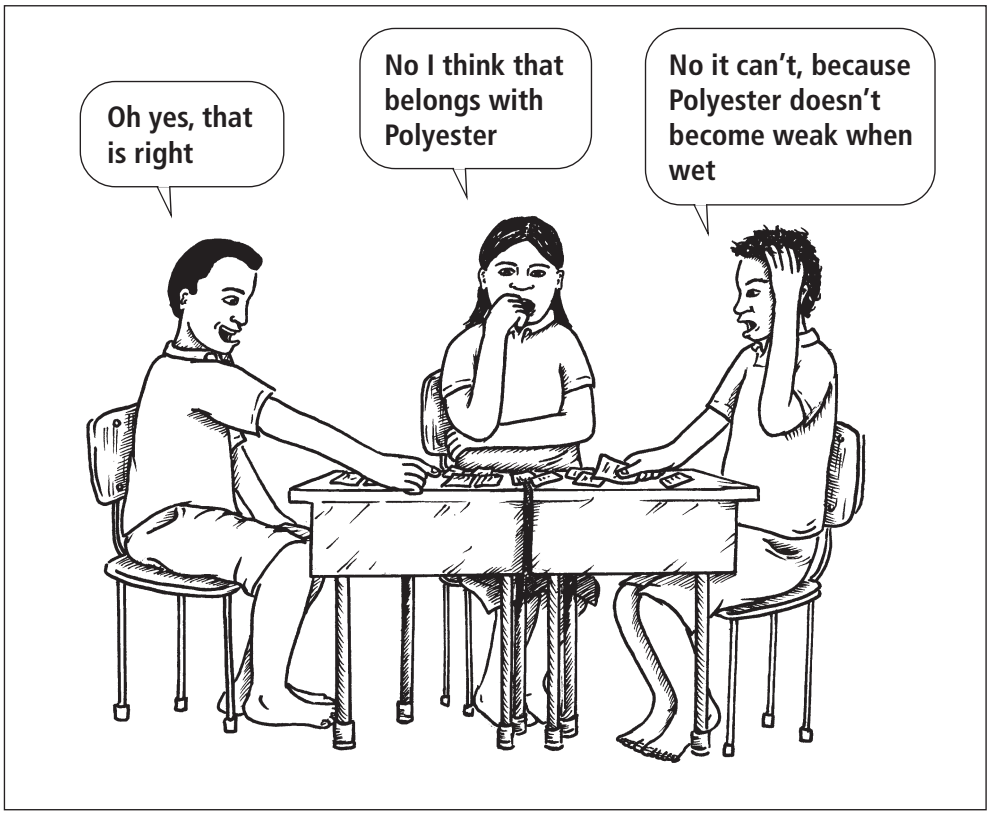


Diagram 3.2

Fibres have different properties.

Activity 6 Line Up For Durability And Strength

Make large cards for each of the different fibres. Write the name of each type of fibre on a separate piece of card using large letters. Each person will take a different card.

Now imagine there is a line right down the middle of the classroom floor. One end of that line has writing that says: 'very strong and durable' and at the other end it says: 'delicate and weak'.

You have to come forward one at a time and put your card on the part of the line that you think describes your fibre the best. If anyone disagrees, he or she can come up and move your card saying why they want to move it.

To make it more difficult the teacher may make up cards that have the different trade names used for the same fibre: *e.g. Nylon, Antron and Tactel.*

You can repeat this activity, using the same cards, to look at:

- Strength when laundered.
- Crease resistance: i.e. One end of the line reads, 'does not crease easily' and the other, 'easily creased'.

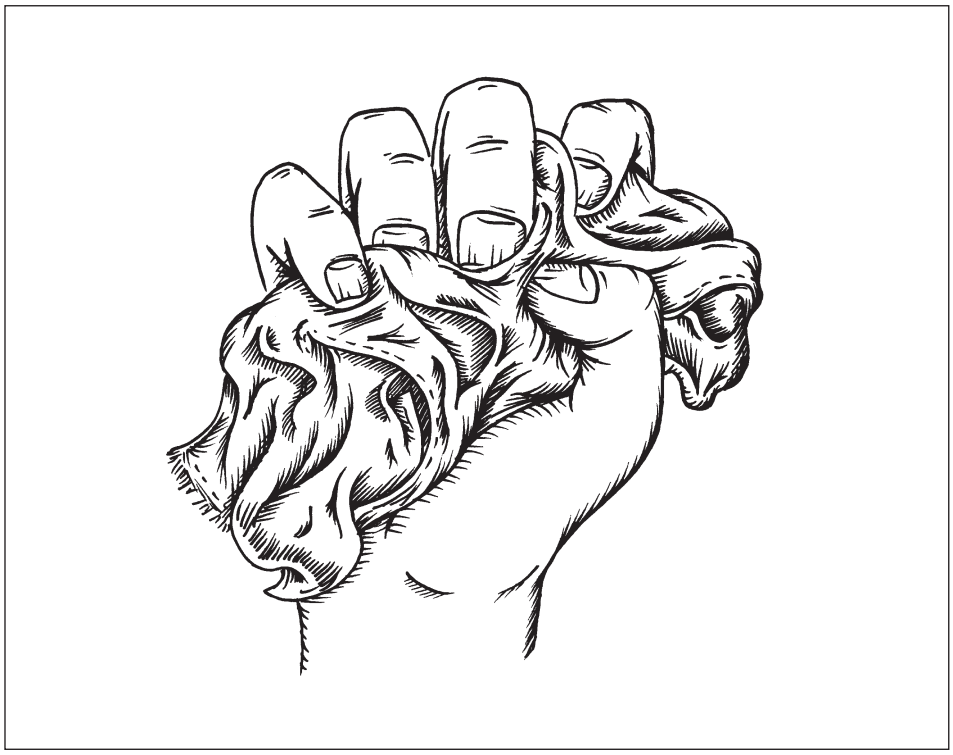


Diagram 3.3
Crease-resistant fabric has many uses.

Activity 7 Similar Fibres

For this activity you will be given one of the cards used for the line up. Your teacher will call out a property or quality of fibres and you will have to form groups with other students who have cards showing similar fibres:

1. Needs ironing because it creases badly.
2. Can be pleated because it is thermoplastic.
3. Can be attacked by moths because it is a protein fibre.
4. An expensive fibre to use for clothing because it is labour intensive to produce.
5. Dissolves in nail polish remover.
6. Keeps you dry when it rains.
7. Nice to wear in the hot weather because it absorbs body perspiration.

Help your teacher think of some more properties the fibres on your cards could be grouped under. Each time your teacher gives you a different instruction check to make sure that:

- The people standing together are in the right group.
- There isn't anyone outside the group who should be in it.

Several times during this activity your teacher will ask you to swap your fibre card with another person. This way you will learn about a range of different fibres.

Making Fabrics By Blending Different Fibres Together

Words to learn:
Combined.
Blending.

Did you know?

You can improve the properties of a fibre? The way to do this is to combine (blend) it with another fibre (or fibres) when it is spun into yarn. Combining good qualities reduces the effect of the less useful ones.

A good example of this is when cotton is combined with the fibre polyester. Cotton has the good properties of being very absorbent and good to wear in the summer but its bad property is that it creases badly. Polyester's good property is that it does not crease like cotton, but its bad property is that it does not absorb moisture. Blended together, the good qualities make a fabric that is good to wear in summer and does not crease.

The blending of different fibres is being used more and more to produce easy-care fabrics that have all the properties that make them pleasant to wear. Sometimes fibres are blended to reduce the cost of a fibre. A good example of this is wool mixed with acrylic. As we have learned, acrylic is made from chemicals so is quite cheap to produce but wool is expensive because of the cost of gathering the fleece and then turning it into a yarn. The two fibres combined produce a reasonably warm fibre that is less scratchy on the skin than pure wool, easier to wash because it won't shrink so easily and is cheaper to buy.

- From what you have learnt about fibres can you think of a disadvantage of blending wool and acrylic?

Activity 8 A New Fabric

Look at the properties of cotton described on page 29 and the properties of polyester on page 31. Write an advertisement to put in the Samoan News to sell a newly imported polyester and cotton fabric suitable for making shirts, blouses, skirts or dresses. In the advertisement make sure you tell the customers about the good properties of cotton/polyester fabric.

The Qualities Of Textiles

Textile technology is a continuing process, not just discovering new fibres but also improving the properties, characteristics and qualities of the ones we already have.

Terms like *properties*, *characteristics* or *qualities* are all words used to describe how a fibre will perform when made into a textile. If you go back to the chart on pages 29–31 you will see that textiles are used for a wide range of purposes in our daily lives. The use of the textile product helps a designer select the most suitable fabric.

Here are some words that can describe the performance of a textile:

strong	flexible	hard-wearing	non-iron
non-slip	stiff	fluffy	stripy
stain resistant	flecked	flammable	waterproof
resilient	rough	shiny	thermoplastic
hairy	flameproof	plain	washable
easily cleaned	hard	insulating	dark
scratchy	windproof	checked	easy to iron
dull	easily dyed	crunchy	quick to dry
lustrous	furry	see-through	crease resistant
stretchy	coloured	soft	warm to touch
patterned	absorbent	smooth	

Activity 9 Properties

1. Work in groups of three or four to explore the properties, characteristics or qualities you would want for a textile that was going to be used to make (hint: use the list of words on page 40 to help you):

   a. Your school shirt or blouse.
   b. A T-shirt for playing sport in.
   c. A formal jacket for a business person.
   d. A suitcase.
   e. A hat for church.
   f. A lavalava for the beach.
   g. A romper suit for a baby.
   h. A backpack for school.
   i. A blanket for use in hospital.
   j. Seat covers in a car.

Unit 4: TECHNIQUES AND PROCESSES USED TO MAKE TEXTILE ITEMS

Words to learn:
Permanent.
Computerised.

In Year 9 we looked at how we can use the sewing machine to make simple textile items. We also looked at how hand sewing can be used to make stitches. It is quicker to use a sewing machine but if there is no machine available then hand sewing can be good.

Write the answers to these questions in your exercise book:

1. Which hand stitches did you use last year that could have been done more neatly by a sewing machine?
2. Which construction stitches could have been carried out more neatly by hand sewing?

Tips to make hand sewing easier

Hand sewing is much easier if you follow some general rules. If you are right handed, follow these steps. If you are left handed, stitch from left to right, or turn the fabric around to make stitches that go from left to right.

Hints on making hand sewing quicker:

- Cut sewing thread at an angle, using sharp scissors — never break or bite thread.
- Hand-sew with a fairly short thread. For permanent stitching have your thread about 45 to 60 centimetres long (18 to 24 inches). The thread can be longer for basting or tacking.
- Only use double thread for buttons, snaps and hooks and eyes.
- Choose a hand needle that is right for the thread and fabric. A fine needle is best because it is easier to work with and doesn't damage the fabric. Use a short needle for single stitches like hemming and a long one for long stitches such as tacking. Don't use a rusty needle because it will be hard to pull through the fabric and can make holes in it.

Diagram 4.1
You need to make sure your needle is right size and not too blunt.

Choosing the right thread

- Use white or a light coloured thread for tacking so it will show up against the fabric. Dark thread can leave marks on a light coloured fabric.
- For permanent hand stitching, the thread should match the fabric unless you want a contrasting colour as a design feature.
- Polyester thread is the easiest to use for hand and machine sewing but you can also use cotton threads and cotton/synthetic threads.

In Year 9 we found out how to do tacking, running, backstitch and hemming by hand. This year we will learn how to do a range of other stitches including fancy stitches used to decorate fabric. The decorative hand stitches are known as embroidery stitches. The stitch we are looking at now is called **buttonhole stitch** and it is both functional and decorative. You will find out later in this book how it is used for appliqué.

Modern electric sewing machines will make buttonholes with a flick of a switch. Some sewing machines are even computerised and can create many different machine embroidery stitches. In Samoa, electricity is expensive and sometimes not available, so people will use a hand machine. If you know how to sew some stitches by hand, you will have learned a very useful skill.

Activity 1 Buttonhole Stitch

- Work from right to left with the point of the needle towards you and the edge of the fabric away from you.
- Fasten the thread and bring it out above the edge.
- Make a loop with the thread from the last stitch you made to the left, then down to the right.
- Put the needle in from the underside of the fabric, keeping the looped thread under both the point and eye of the needle.
- Pull the needle out through the fabric, then away from you to put the purl of the stitch on the edge of the fabric. You can make the depth and the spacing large or small depending on the fabric and the purpose of the stitch. For hand-made buttonholes, make stitches 3 mm (1/8 in) deep with no space between.

Hand Stitching

Your teacher will give you the chance to practise buttonhole and other hand stitches. Remember to stick any samples you make into your exercise book so you can refer to them if you need to use these technique in any of your design briefs.

Pattern Making And Tailor Tacking

On the next page are two pattern pieces for the bodice front and skirt back of a woman's puletasi. You will see that the skirt of the puletasi has a back zip and two darts. How do you think the front of the puletasi would look? How has the skirt been changed from the way we would traditionally make it?

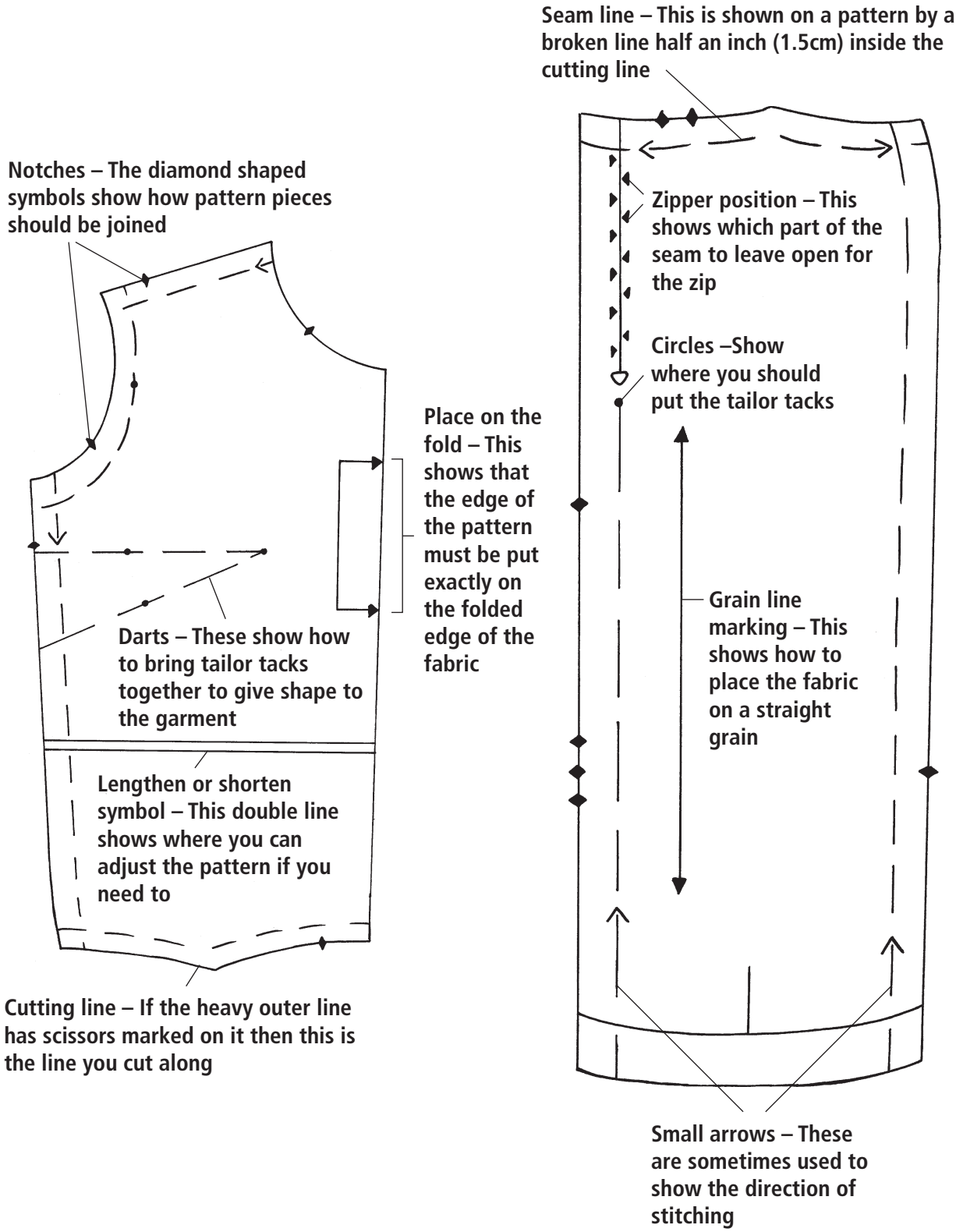


Diagram 4.2
The different parts of a pattern.

Activity 2 Working With Patterns

Words to learn:
Seam finishes.
Seam allowance.
Technique.
Fray.

When you have studied all the symbols, your teacher may be able to give you a pattern piece for the back of a pair of boy's shorts and the front of a shirt so you can practise what you have learnt by using different pattern pieces.

Last year we learned that sewing seams is a process used to join together two or more pieces of fabric. We also discovered a way to use simple techniques to neaten seams on fabric of average thickness.

The choice of a seam depends on:

- The type of garment being made.
- The type of fabric being used and how thick it is.

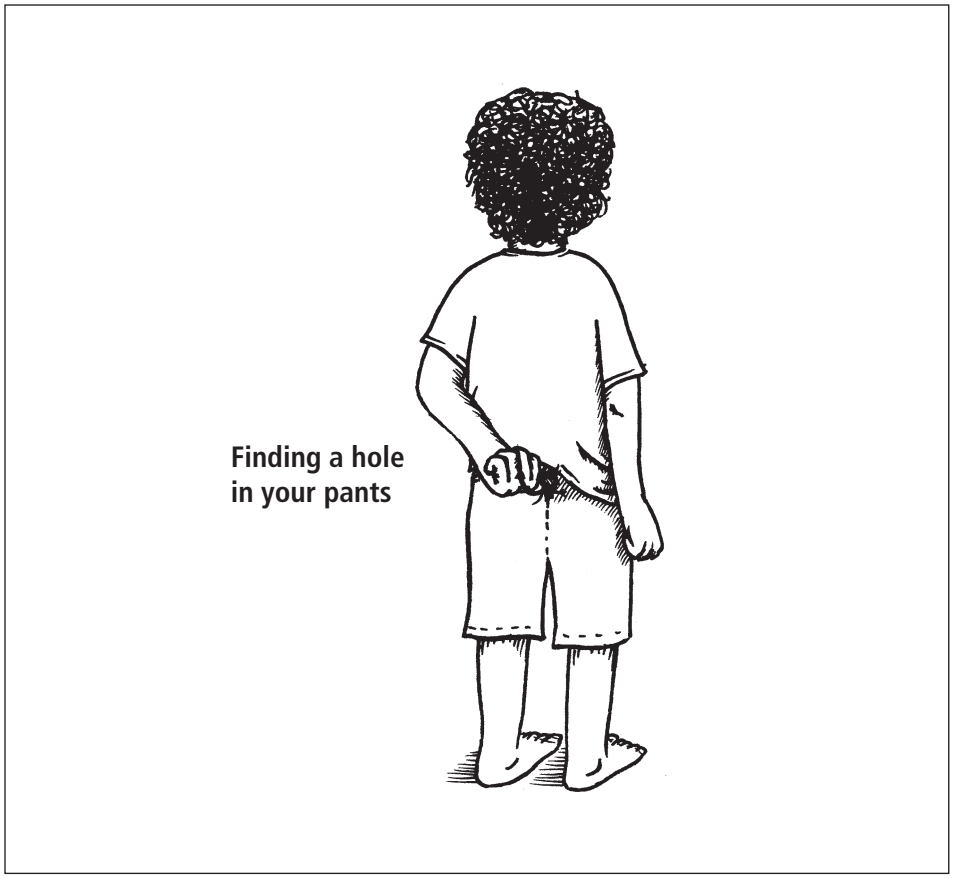


Diagram 4.3
Certain parts of clothing need very strong seams.

A seam finish is any technique used to make a seam edge look neater and/or keep it from fraying. You don't have to neaten seams but this will make a textile item last longer, for example the seams of any cotton shorts will fray with wear and washing.

To decide what sort of seam finish is best, think about:

1. The type and weight of the fabric. Does it fray a lot, a little bit, or not at all?
2. The amount and type of wear and care the garment will receive. If it will be worn and washed often, the seams will need a durable (lasting) finish.
3. A lined garment or item does not need any finishing at all unless the fabric frays a lot. Can you explain the reason for this?

Machine Neatened Or Turned And Stitched

Turn the edge of the seam allowance under by 3 mm (1/8 inch). If the fabric frays easily, double this width (6 mm (1/4 inch)). Press the fabric and then stitch along the edge of the fold.

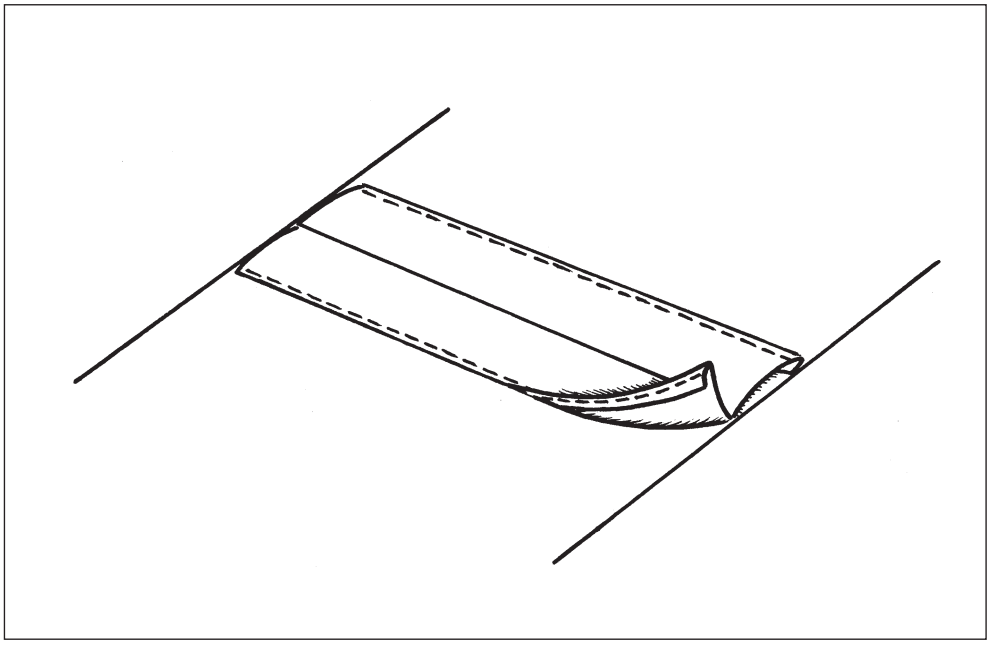


Diagram 4.4
Machine neatened seam.

Zigzagged

Set the machine stitch for medium width and short length (about 1.5 mm or 15 per inch). Stitch just inside the raw edge of the seam allowance. Carefully trim back the edge of the seam to the zigzag stitch. This is one of the quickest and best ways to finish a fabric that frays. If the fabric is lightweight and frays very easily, turn the seam allowance edge under and zigzag over the turned edge. A zigzagged finish can be used on a knit fabric but be careful not to stretch the seam edge or it will ripple.

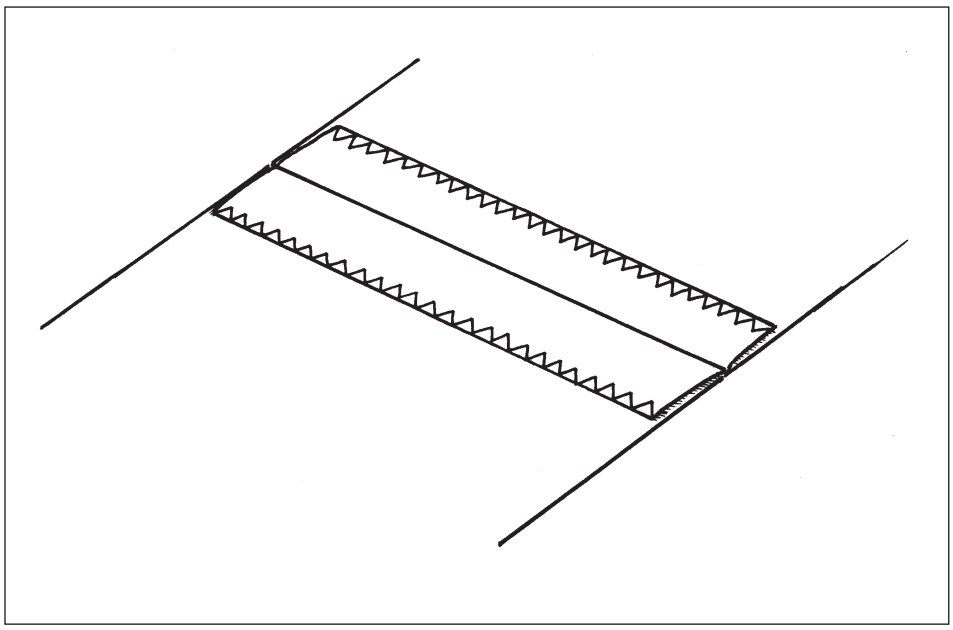


Diagram 4.5
Zigzagged seam.

The Flat-felled Seam

This is a very strong seam so it is often used for sports clothing and children's wear. Because it is made on the right side of the garment it is also decorative. Be careful to keep the seam width the same all the way along, and keep every seam on a garment the same width.

Making a flat-felled seam
Put the wrong sides of the fabrics together and stitch on the seam line. Press the seam open then to one side. Trim the inner seam allowance to 3 mm (1/8 inch). Press under the edge of the outer seam allowance 6 mm (1/4 inch). Stitch this folded edge to the garment. Be careful to press similar seams in the same direction, for example seams on the outsides of trouser legs should run the same way.

Did you know?

The flat-felled seam is sometimes used on our jeans? Why do you think this seam would be so suitable?

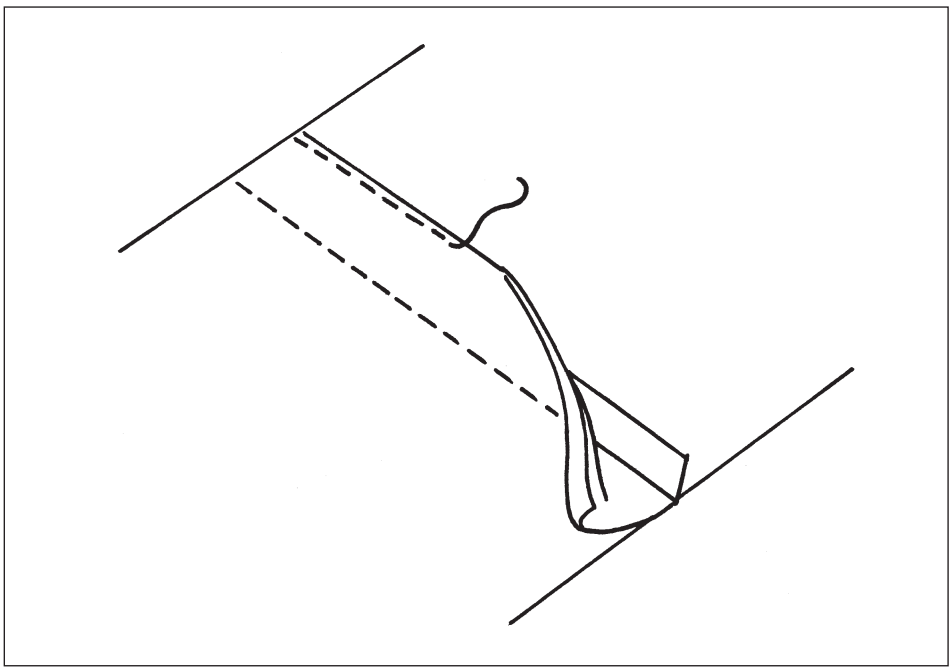


Diagram 4.6
The flat-felled seam.

The Overlock Stitch Seam

To make this stitch you will need an overlocking machine or a very modern sewing machine with an overlocking feature. You may have seen one of these machines if you know anyone who sews for a job.

The overlocking stitch is a combination of straight stitching and oversewing in one action. These seams are particularly suitable for knit or stretch fabrics. Can you explain the reason for this?

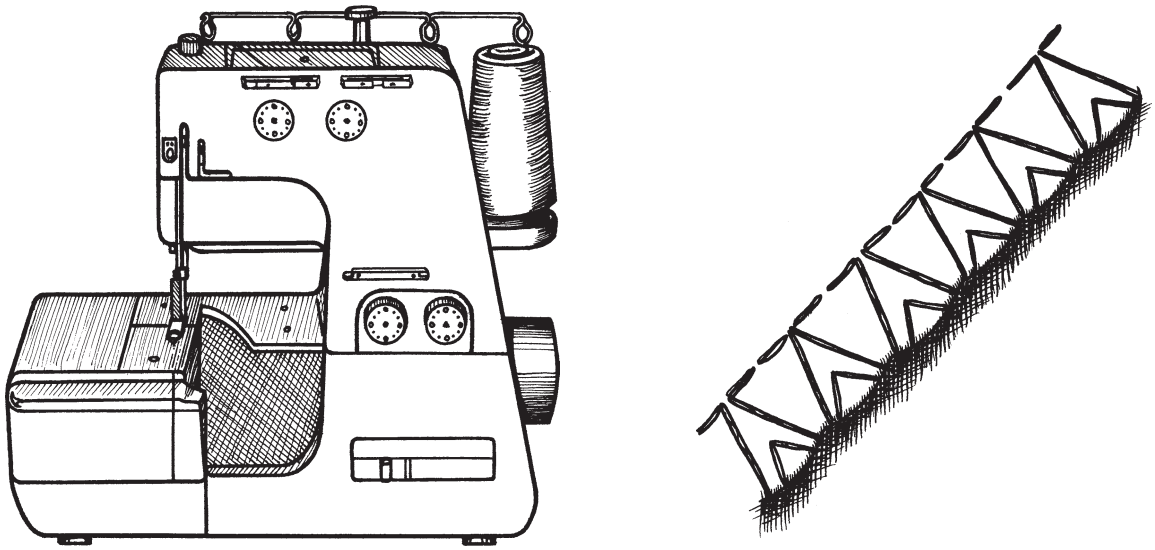


Diagram 4.7
An overlocker and an overlock stitch seam.

Tailor Tacks

1. Make these where they are marked on the pattern. Use a long length of double, unknotted thread.
2. Take a small stitch through the pattern and both layers of fabric.
3. Draw the needle and thread through, leaving a 2.5 cm (one inch) end.
4. Take another stitch at the same point, leaving a 2.5–5 cm (one to two inch) loop.
5. Cut the thread, leaving a second 2.5 cm (one inch) end.
6. When all the symbols have been marked with tailor tacks, lift the pattern off the fabric. Be careful you do not pull off the thread markings.
7. Gently separate the fabric layers until the thread loops are straight. then cut the threads.

Making Darts

Darts are used to put a shape into a flat piece of fabric so it will fit our body shape. They are mostly used at the bust, back, waist and hips. It is important to put them in the right place or else the garment will not fit properly.

Use tailor tacks to mark the position of the dart accurately on the fabric before removing the paper pattern. (You will have to make small holes in the paper pattern to move the marks on to the fabric.) Use the tailor tacks to match the sides of the darts. Tack along the sewing line. Machine sew from the wide end of the dart towards the point and keep a length of stitching at each end of the dart to make sure it does not come undone. Press the dart on the side of the fabric.

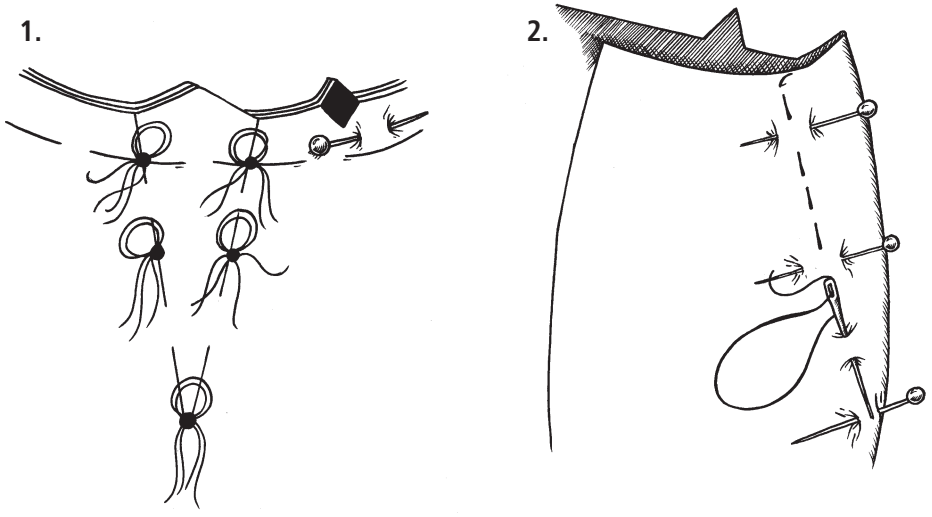
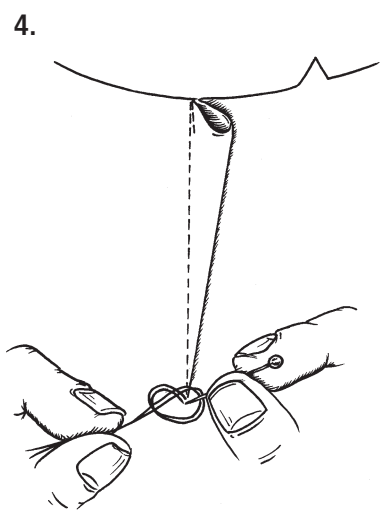
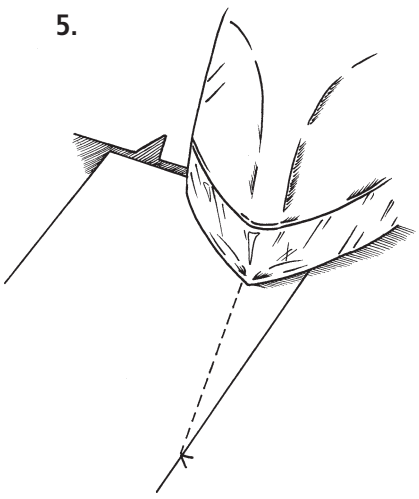


Diagram 4.8a
Making darts.

3. Stitch from the wide end to the point of the dart; make the last few stitches parallel to and a thread's width from the fold. Cut the thread, leaving 10 cm ends



4. With thread ends together, form a knot



5. Extend the dart and press flat as it was stitched. Iron it towards the point, being careful not to go beyond it, as this may crease the garment

Diagram 4.8b
Making darts.

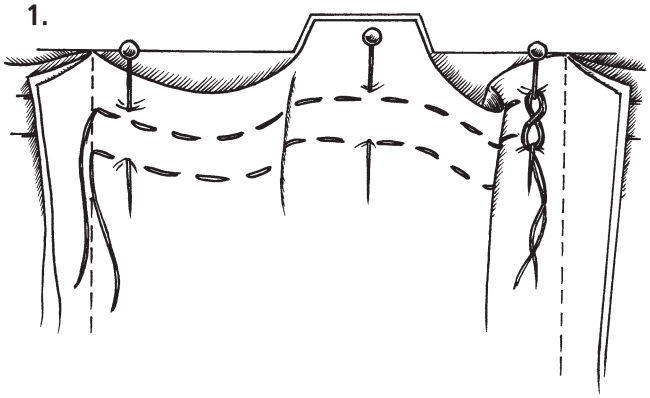
Gathering

We use gathering to make a long piece of fabric fit onto a smaller piece, for example putting a full skirt onto a waistband or putting cuffs onto the bottom of a full sleeve. Gathering is done after the construction seams have been stitched, seam finished and pressed.

How to gather

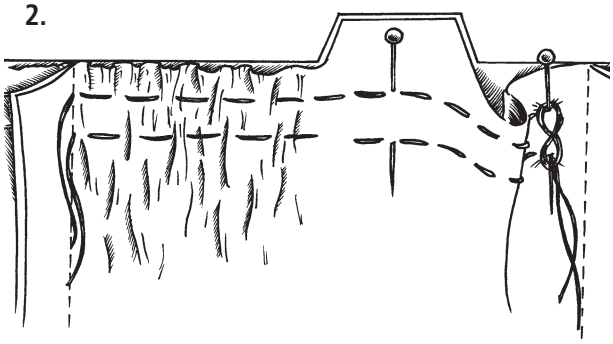
1. Sew two rows of long (usually stitch length four) machine stitches 1.3 cm and 1.8 cm from the edge of the fabric.
2. Gently pull the two rows of stitches up until the gathered edge is the same length as the edge of the fabric it is being sewn onto. Anchor the bobbin threads at one end by twisting in a figure-eight around pins.
3. Adjust the gathers so they are even and use plenty of pins to hold the folds in place.
4. With the gathered side up, stitch the seam on the seam line. Make sure you hold the fabric on either side of the needle so the gathers will not be stitched into little pleats.
5. Seam finish the edge with a zigzag or overedge stitch, or apply a stay.

1.



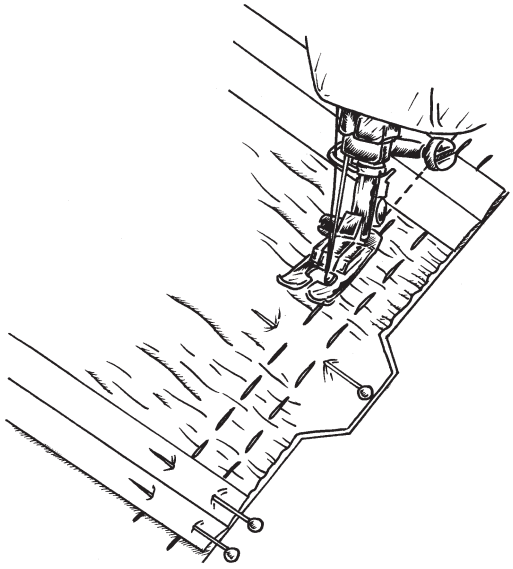
Gently pull the two rows of stitches up until the gathered edge is the same length as the edge of the fabric it is being sewn onto. Anchor the bobbin threads at one end by twisting in a figure-eight around pins

2.



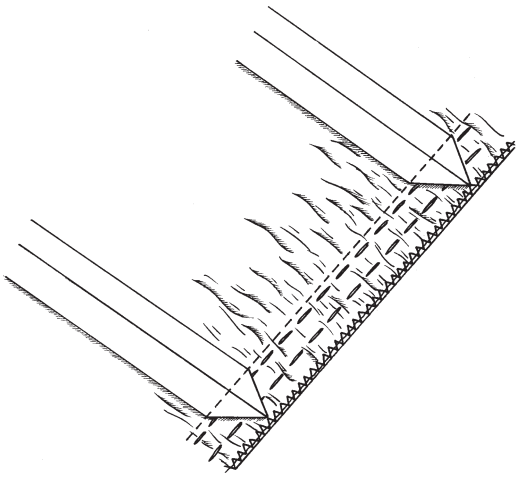
Adjust the gathers so they are even and use plenty of pins to hold the folds in place

3.



With the gathered side up, stitch the seam on the seam line. Make sure you hold the fabric on either side of the needle so the gathers will not be stitched into little pleats

4.



Trim the seam allowance and zigzag the gathered edge and straight edge together to neaten

Diagram 4.9
Gathering.

Bias Bindings

Bias strips are lengths of fabric cut on the true bias (diagonally at a 45 degree angle to the lengthwise or crosswise grain). To cut the bias strips, first find the true bias by folding the fabric diagonally so that a straight edge and the crosswise grain are parallel to the lengthwise grain. Press the fabric along the diagonal fold, open it out and use the crease as a guide to cut out parallel strips 2 cm wide.

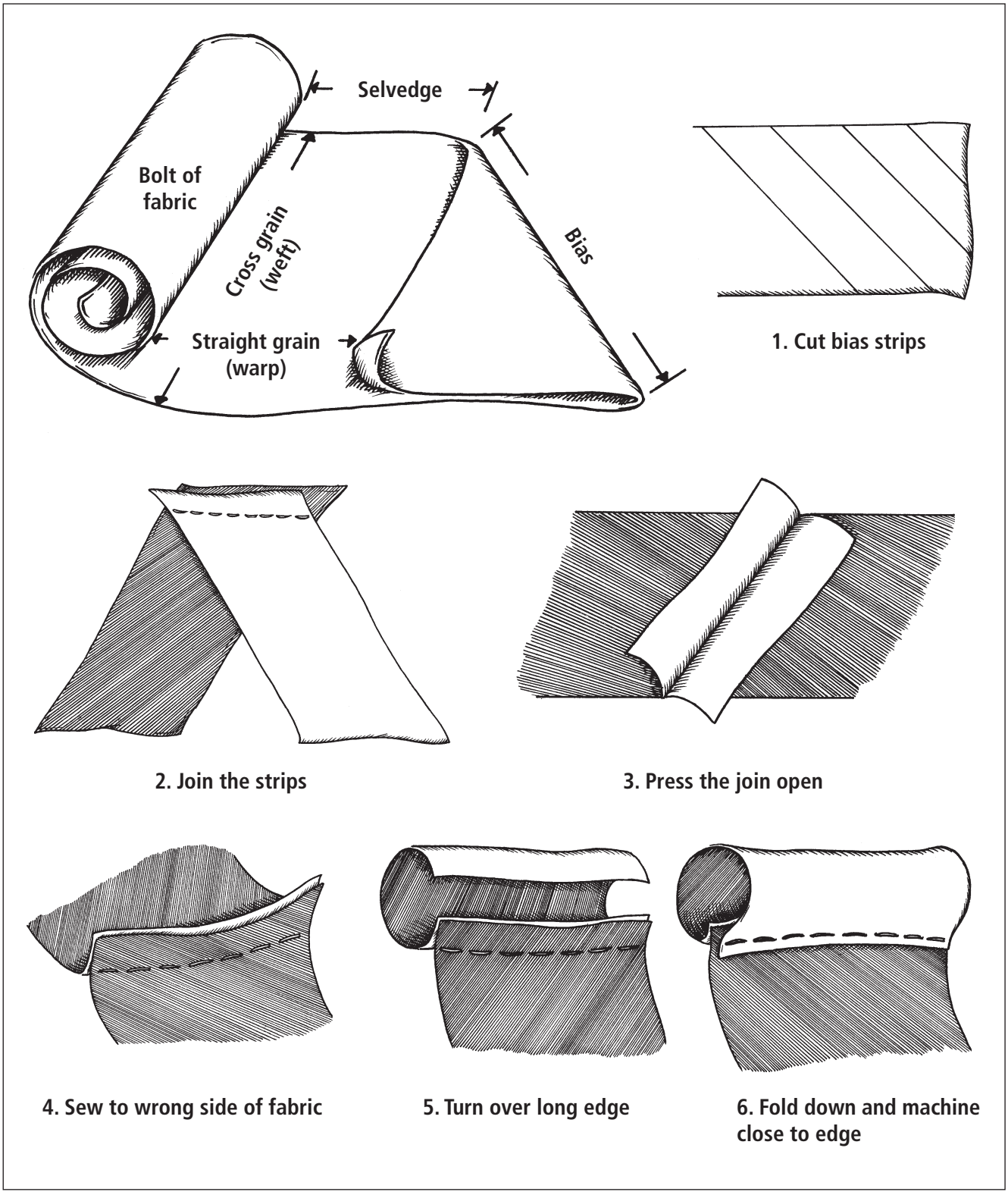


Diagram 4.10
Bias bindings.

How to join the bias strips

1. Cut off the ends so they are on the straight grain.
2. Mark 6 mm (1/4 inch) allowances along the length of the bias strip.
3. With the right sides together, pin two strips with the seam lines matching. The strips should form a 'V' exactly like you can see in the diagram below, with the seam ends lined up.
4. Stitch and press open the seam.
5. Trim the corners of the seam allowances that are sticking out so that they line up with the edge strip. Join as many strips as you need.

Activity 3 Practise Stitching

Your teacher will give you some fabric samples so you can practise:

- Making tailor tacks.
- Cutting and joining bias strips.

Put your samplers in your exercise book and write how you did each textile process.

Unit 5: APPLYING SURFACE DECORATION

Words to learn:
Embroidery.
Incorporating.
Horizontal.
Reverse.

Introduction
Decorating fabric with fancy stitching has been around for almost as long as fabric has been used. Many different types of stitching have been developed around the world over hundreds of years. There are many possible ways of adding embroidery to textile items. Sometimes it is added with other methods of decorating fabrics such as appliqué or patchwork. This year you may be able to explore these methods of fabric decoration

Buttonhole Stitch

One of the most useful embroidery stitches is buttonhole stitch. This has already been described earlier on page 43. It is often used with appliqué.

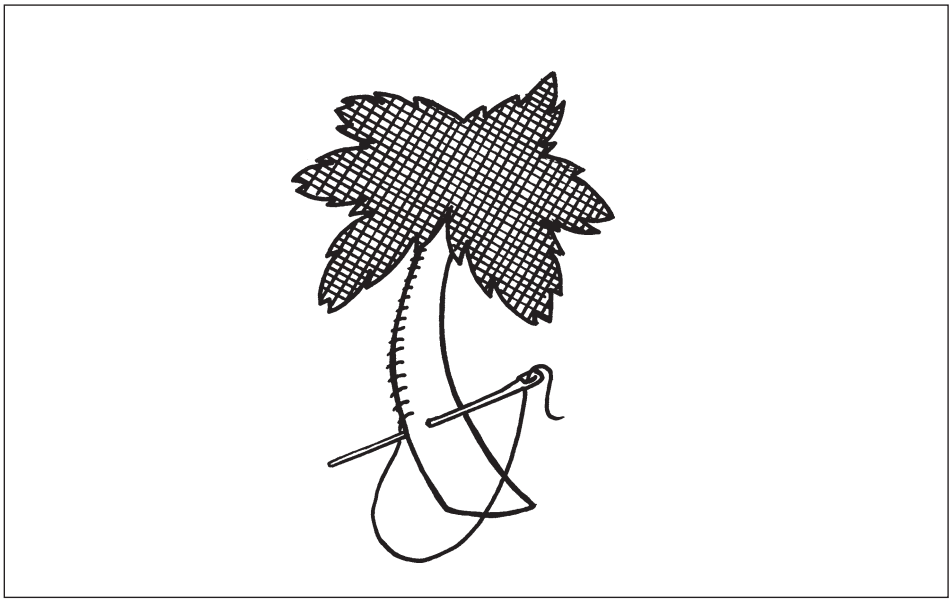


Diagram 5.1
Using buttonhole stitching to attach a patterned piece of fabric.

Cross-stitch

Most people start embroidery by learning how to do cross-stitch. Sometimes cross-stitch is used to cover a fabric completely. You can use cross-stitch to create a picture in embroidery thread.

1. Working from top to bottom with needle pointing left, make a row of small horizontal stitches spaced as far apart as they are long: *e.g. Two threads along and two threads high.*
2. Pull the thread firmly but not tight until you get a row of diagonal stitches.
3. When the row is finished change direction, working stitches from the bottom to the top. The thread crosses in the middle of the first diagonal stitch creating an 'X'.

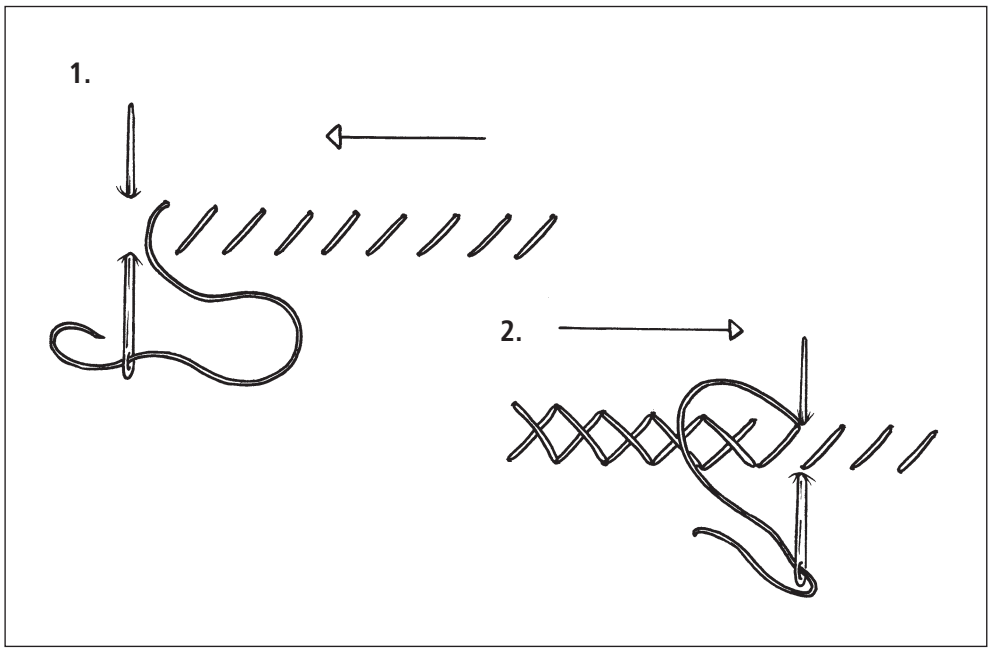


Diagram 5.2
Using a cross-stitch.

The Stem Stitch

The stem stitch is a decorative stitch used to embroider along straight lines.

1. Thread a needle with two strands of embroidery thread 50 cm long.
2. Begin with a double stitch.
3. Keep the thread on one side of the needle as you sew. Count over four threads of fabric, put in the needle and count and pass it back under the four threads.
4. Pull the needle through the fabric and count over that stitch and forward for another four threads. Put the needle in the fabric and come back under the four threads.
5. Continue in this way, going forward over four more threads each time, and then coming back under those four threads.
6. Finish with a double stitch.

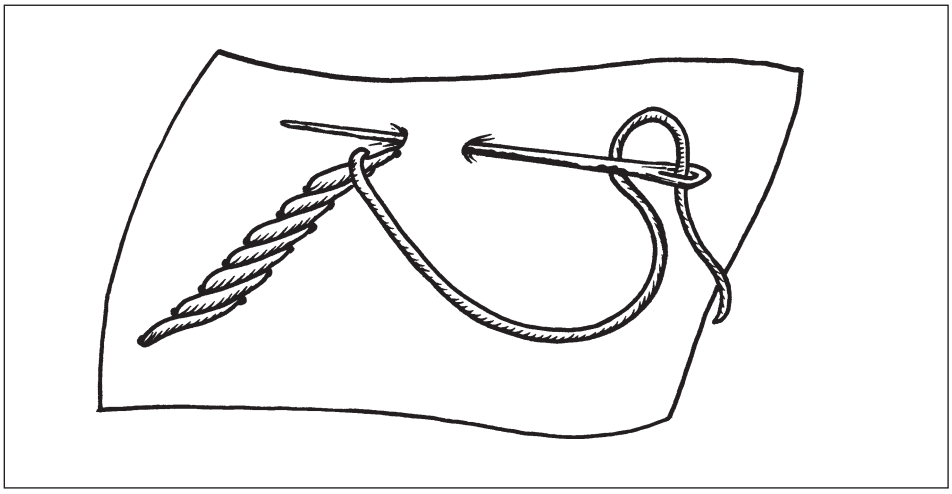
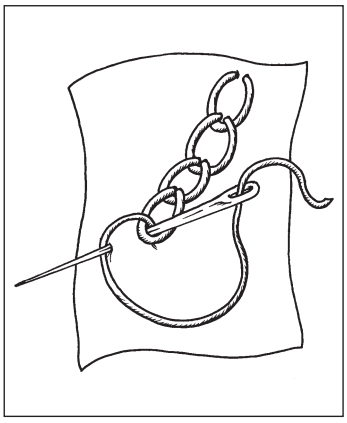


Diagram 5.3
A stem stitch.

The Chain Stitch



The chain stitch is another decorative stitch used to embroider along straight lines. It looks like a series of chains linked together.

1. Begin with a double stitch.
2. Pull the thread to the left and around to make a little loop like a chain link. Put the needle in where you started and come under about four threads. Keep the looped thread under the point of the needle as the needle is pulled through the fabric.
3. Loop the thread around again. Hold it down with your left thumb. Put the needle into the end of the last loop and come forward under four threads again.
4. Carry on in this way, finishing with a double stitch.

Activity 1 Embroidery Stitches

Your teacher may be able to give you the chance to explore some of the embroidery stitches described in this section. You may decide to combine them with one of the other two surface decorations that we will look at next.

Appliqué

Appliqué is the technique of cutting out pieces of fabric and stitching them to a background, usually to make a picture. It was originally developed as a way of making a garment last longer. It can also make an expensive material go further.

Appliqué is often used together with quilting to make covers for beds or cushions. It can be just as attractive used on smaller textile items like bags, children's clothing, T-shirts, or shorts.

Appliqué shapes can be tacked into place on the base fabric with long running stitches, or attached with fusible (able to be melted) fabric and a hot iron. The pieces can then be stitched firmly with slip stitching or decorative stitches such as a buttonhole stitch. Another way of stitching appliqué pieces on is to use a zigzag setting on a sewing machine to cover the raw edges.

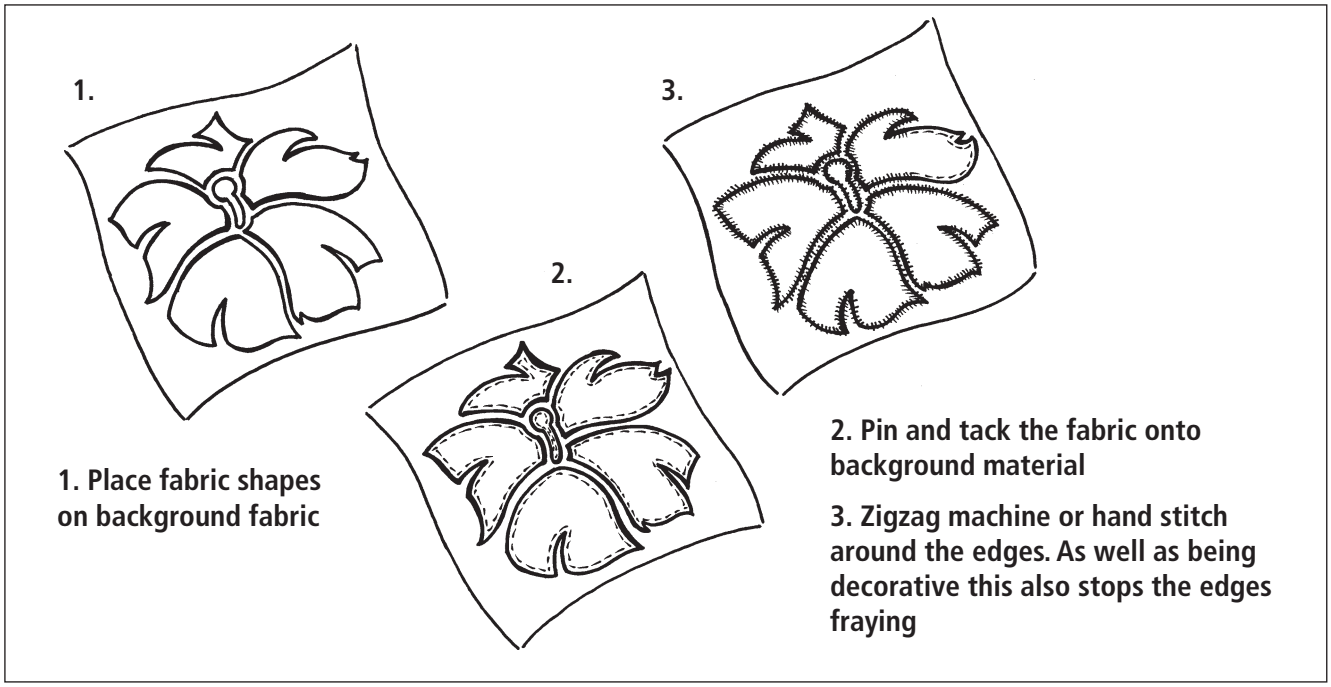


Diagram 5.5
Appliqué.

You need to choose the right kind of fabrics for the method of appliquéing you are going to use. If you plan to turn the edges of pieces under before stitching (which you may need to do if the project will require regular washing), then fabrics from natural fibres such as cotton, silk and wool are best because they crease easily, making them easy to fold.

Patchwork

Words to learn:
Economical.
Construction.
Irregular.

Patchwork, also known as piecing, is the technique of sewing small pieces of fabric together to create a larger piece, which can then be made into decoration for clothing, cushions, wall hangings — almost anything!

Traditionally, patches of fabric were worked in blocks. Blocks are repeated sets of shapes that form a design when they are stitched. Simple repeated block patterns using squares, rectangles or diamonds are economical to put on material. 'Crazy' patchwork uses shapes that fit together in an irregular but economical way.

Because it is made like a jigsaw, every tiny bit of fabric can be used so there is no waste. Cotton is the best fabric for patchwork because it is easy to handle and wears well.

Piecing the patches together is usually done by hand because you have to be very accurate to use paper templates that are all the same shape.

Did you know?

Back in the 19th Century women would cut up their love letters to use as paper templates for their patchwork shapes? They would often leave the cut up letters attached to the material and they wouldn't want to wash the finished quilt in case they washed away their lover's words!

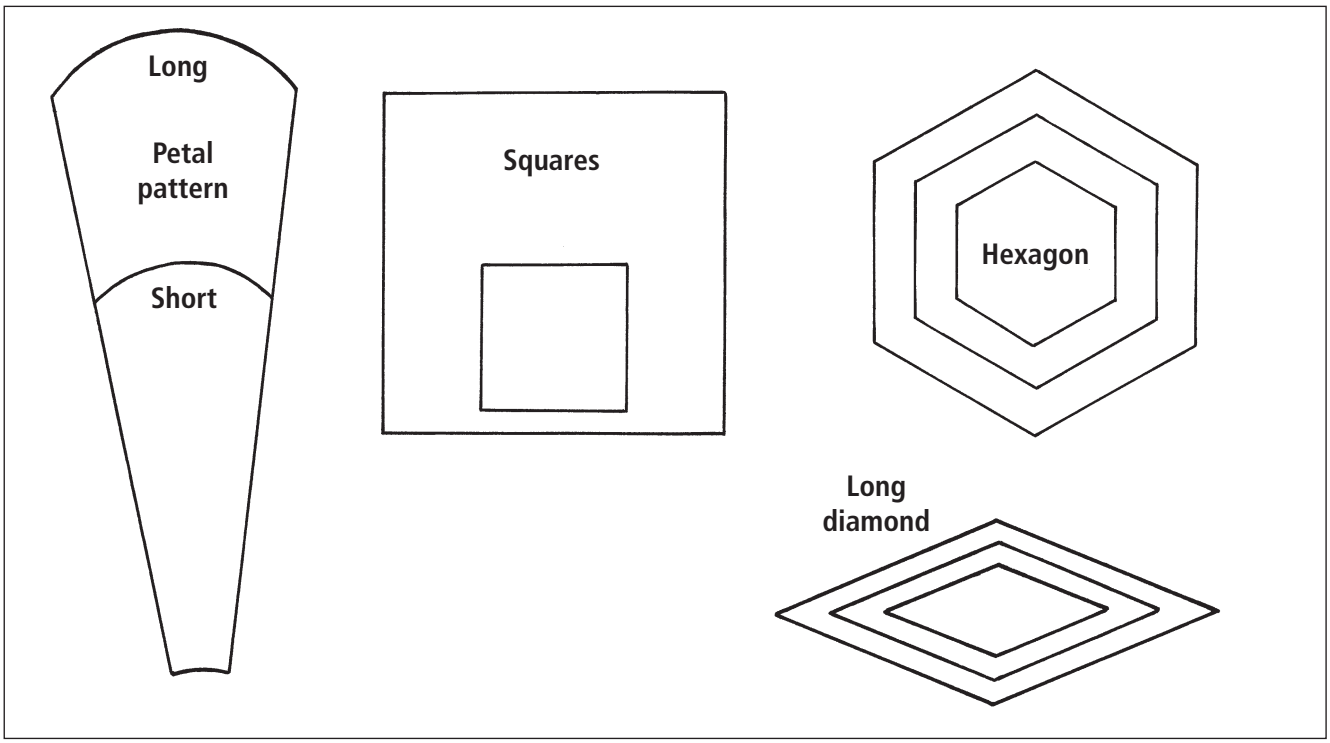
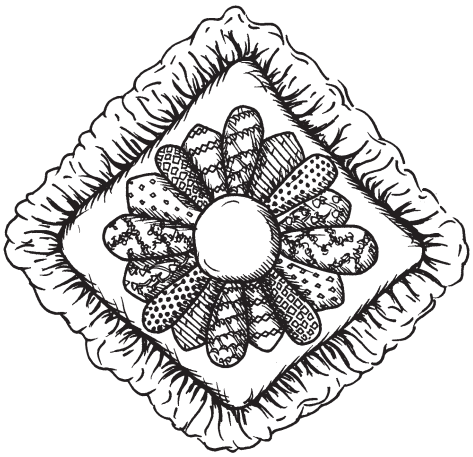
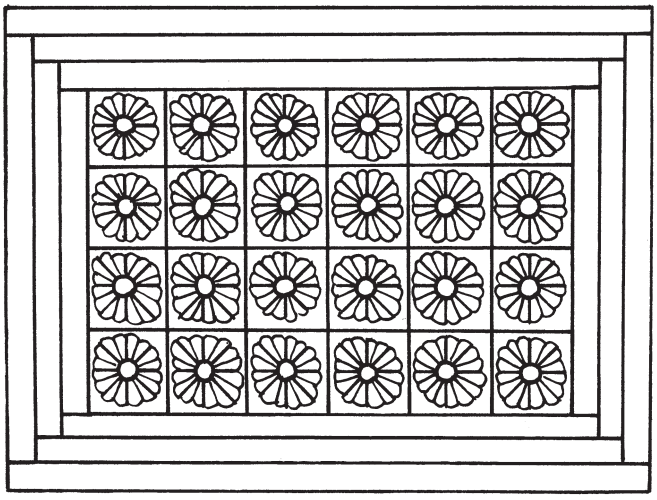


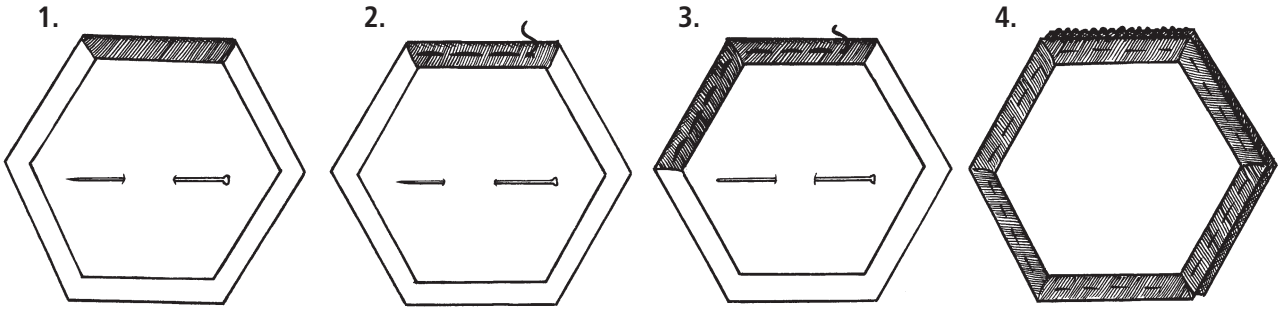
Diagram 5.6
Patchwork templates you could experiment with.



Petal pattern used on a cushion



Petal pattern used on a blanket



1. Place paper template in the middle of fabric patch on wrong side with two sides on the straight grain. Fold seam allowance over the paper so fold lies tight against the paper

2. Begin tacking a stitch through two thicknesses of fabric and one of paper, about one third of the way along the first side of the shape. Do not tack too finely

3. Fold the fabric over the second side of the shape. Place a tacking stitch through the fold at the corner and bring up one third the way along the second side. Continue around the patch in this way, finishing on the wrong side

4. Place two pieces of patchwork with the right sides together and neatly slip stitch along one edge

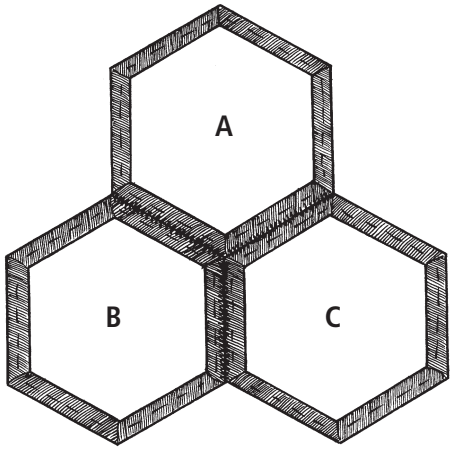
5. Open out A and B, which have been joined, and this time join one side of C to A and one side to B

6. Carry on joining patches together until they form a honeycomb pattern

7. You can make your patchwork bigger by adding more patches around the outside of the honeycomb shapes, or you can make several of these honeycomb shapes and join them together

Diagram 5.7a
Constructing a patchwork.

5.



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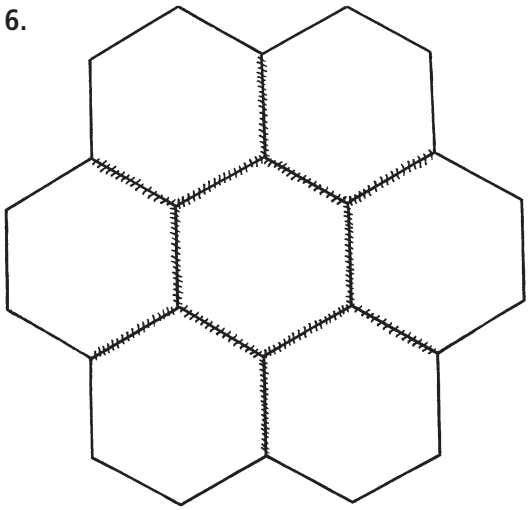
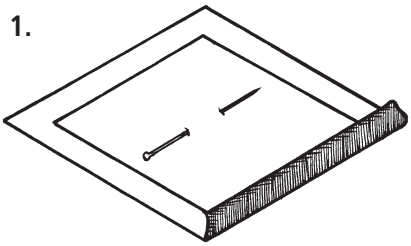


1.



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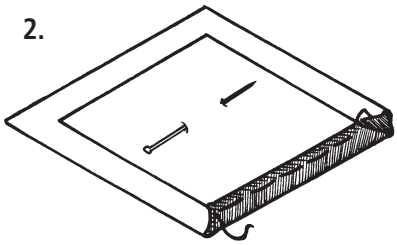

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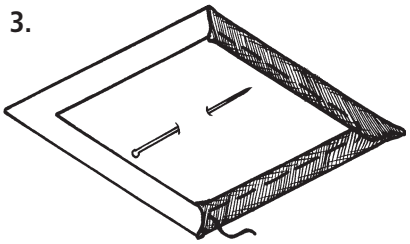


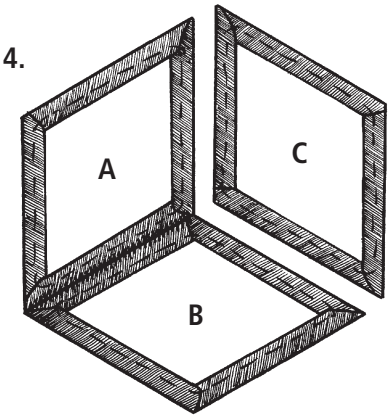
1. Place the paper template in the middle of fabric patch on wrong side. two sides on the straight grain. Fold the seam allowance over paper so fold lies tight up against the paper

2. Begin tacking as shown and fold the fabric over at the top point so that the fold runs parallel to the edge of the paper but does not overlap. Do not stitch the fold yet

3. Fold the seam allowance with its folded point over the paper as shown, and continue tacking. Repeat the double fold at the bottom point. Fold and tack the last side.

4. Join two patches together as shown. Open out A and B, which have been joined, and this time join one side of C to A and one side to B

4.



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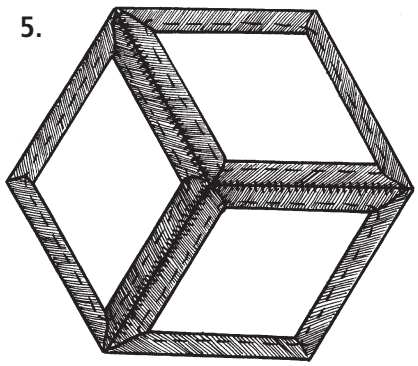


5. By carefully selecting and using three fabrics that go from being very light in colour to dark, a three dimensional affect can be created

Diagram 5.7b
Creating a patchwork.

Activity 2 Surface Decoration

The design brief on page 66 will ask you to use surface decoration, so you will have the chance to use embroidery stitches, appliqué or patchwork.

Exploring Technological Practice

To design and make textiles products you need to know:

- The properties of different textiles so you can choose the right fabric for the task.
- How to make or use a pattern (including changing a pattern to suit your needs).
- How to join fabric.
- How to neaten fabric to stop it fraying.
- How to decorate fabric.

Last year you looked at how fabrics were constructed and in the first part of this book you explored the different characteristics of fibres. You have learnt how to use a commercial pattern, the sewing machine, how to carry out hand sewing and some ways of being creative by using surface decoration. With all the knowledge you have about textiles you can now make decisions about the most suitable type of fabric to use for different practical projects.

You will also have a good idea of how skilled you are at making textile items. When you are given a technological problem to solve you should be able to choose a practical project that will develop your knowledge without choosing a project that is far too hard for you to complete.

In industry, manufacturers find out what people want to buy before they produce a design brief. For example a clothing manufacturer may come up with the idea of designing a pair of unisex shorts (shorts that both men and women can wear). These shorts may be good for outdoor activities like running, cycling or walking. But the manufacturer will want to find out if people will want to buy the product before starting to develop it. (Look at stage one of the chart on page 64.)

When they know what customers want, they create a design brief that will say clearly what the specifications of the brief are. 'Specifications' means any particular things that the product must be able to do. For example, the shorts in this design brief have to be waterproof but also suitable to wear in hot weather. Why could this be a difficult specification for the technologist to meet?

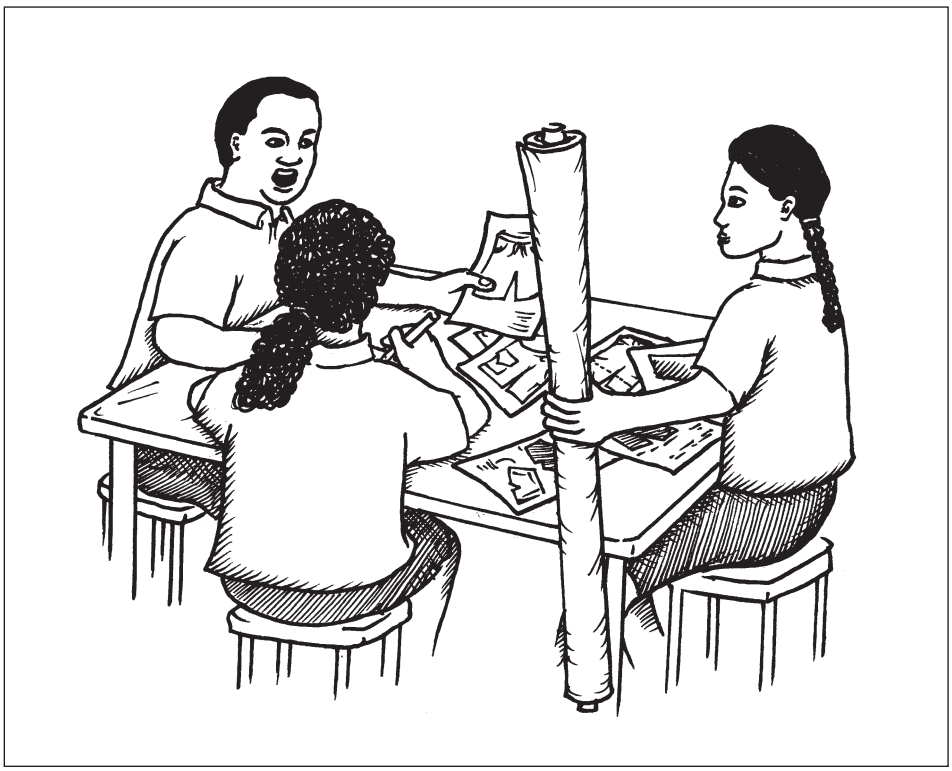


Diagram 5.8
Discussing design specifications.

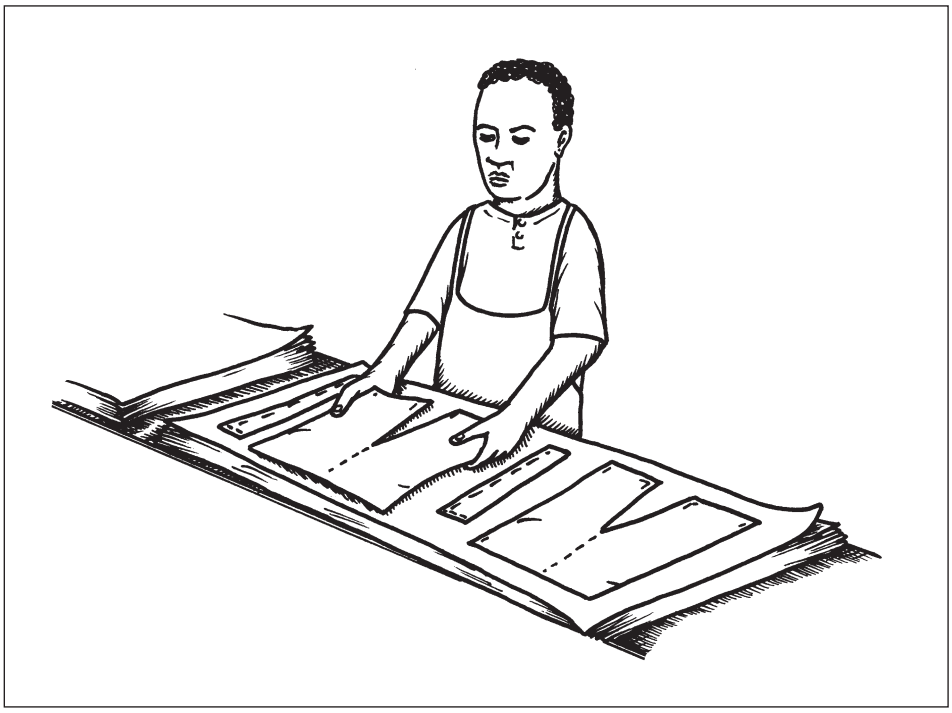
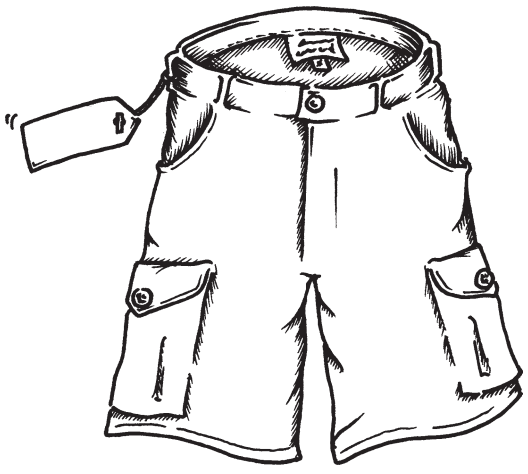


Diagram 5.9
Laying out a pattern.

Following through with a design brief

Design concept for shorts is proposed

1. Market research is carried out to find out what design features might be important for the shorts
2. The design brief is produced and design specification ideas are drawn up: unisex, waterproof and suitable for tramping in hot weather
3. Different sample designs are made and evaluated against the specifications
4. Suitable textiles are investigated and tests are carried out to check for water resistance and absorbency
5. A pattern is developed which suits the type of fabric
6. The specifications for the shorts are used to evaluate the proposed design, textiles and accessories required
7. Any changes are carried out and a production schedule is set
8. Shorts are manufactured and checked throughout production
9. Shorts are ready for retail. Reports from the sale of shorts determine further alterations before further runs



Activity 3 Creating A Carrier

Your teacher will give you a design brief to work on that will follow similar steps to the way industry works. You will be assessed not just on your final product (called your 'technological solution') but also on the process you use to arrive at your solution. This process is called 'technological practice'.

Below is an example of how this process could work if you were given the design brief: **Create a carrier**.

You will see that the student is told what the design brief and specifications are from the beginning. This is an easier way to work when you first start using technological practice. As you get more experienced you will work out your own design brief.

Why We Should Use A Design Brief

In the past, students were told what textile item they had to make. Often, everyone made the same textile item in similar fabric because of the limited resources available. By working this way, the teacher would know that everyone in the class could carry out the same techniques and processes with textiles successfully. It also meant that students did not take any responsibility for individual learning. We all learn new skills and knowledge better when we want to find something out for ourselves. To be successful in today's society you have know how to solve problems for yourself.

A **design brief** is usually one or two sentences that describes:

- The sort of thing you will make.
- Who it is for.
- Where it will be used.

Writing a specification

As well as having a design brief, it is also important to have a **specification** for your product. This will tell you:

- What the product has to do.
- What it should look like.
- Any other important details such as materials to be used.

When you start using technological practice you will be given the specifications but when you are more experienced you will be expected to produce your own. Remember, you can't measure the success of your technological solution unless you have specifications to evaluate it against.

Design Brief: A Technological Solution

This design brief is called a **creative carrier**. Your teacher may decide to use it as it is or change it to something more suitable for your class.

The local tourist centre would like you to produce a bag for sale to visitors. It has to pack into a suitcase so they can take it home at the end of their holiday. It needs to use surface decoration and send a message about the environment in Samoa.

Before you get started, there are things you are going to have to find out:

- Is the carrier going to be suitable for the tourist, the person who will use it?
- What do they want and need? For example, what are they likely to put in the carrier while they are on holiday and when they get home?
- Where are they most likely to take the carrier when they use it?
- What is the load it might have to carry — how heavy, how bulky or how fragile are the contents likely to be? What do tourists put in their carriers?
- How do tourists like to carry their bags? How far will they carry the bag? What about the tourist's other needs? The carrier should be something the tourist will value and give them happy memories of their time on holiday. The design on the bag also needs to be attractive and acceptable to most people.
- What are the tourist centre's needs? What do they hope to get from selling these carriers?

You will need to investigate and record your findings. The design of this carrier will depend on all these things.

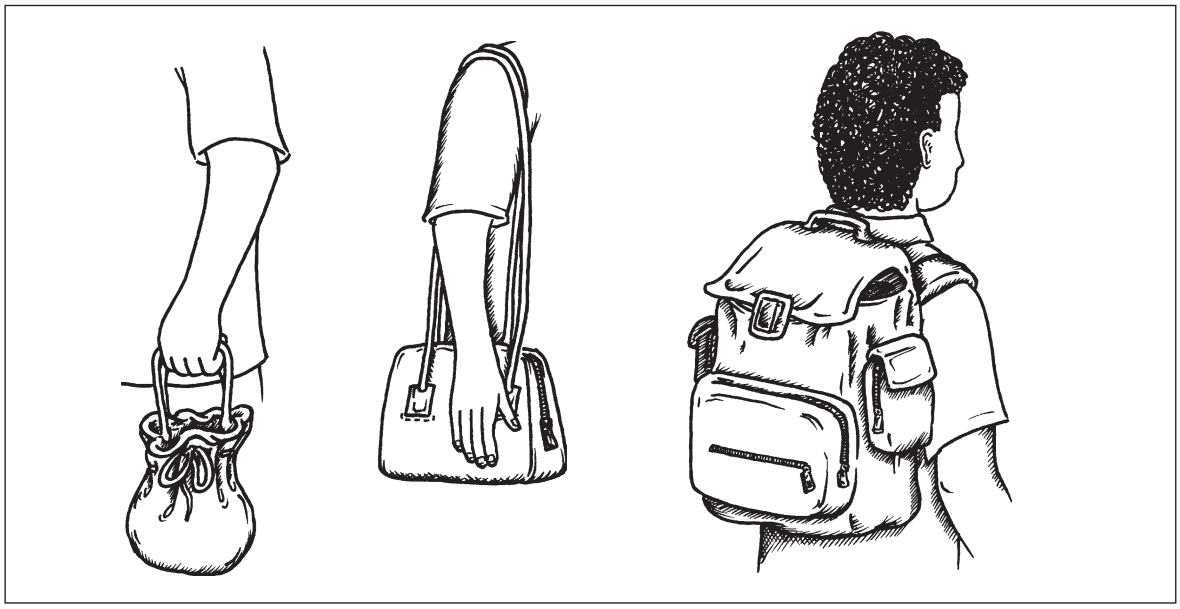


Diagram 5.10
There are many different types of bags.

Will The Carrier Meet The Tourist's Other Needs?

Technologists need to understand that when an item is designed it is not just meeting a person's physical needs of Soifua maloloina. The carrier also needs to connect with the person's spiritual and emotional needs.

People of different cultures, and even people within the same culture, have different views on what is visually pleasing. Fashion and changing styles influence what people like. It is important for the technologist to be aware of differences in people's taste. The aesthetic appeal of your product is its beauty and how people feel about that.

The challenge for a technologist is to produce a carrier that can address all aspects of Soifua maloloina. Brainstorm your ideas about all these questions (you could do this as a class). Record your findings in your exercise book and transfer them to your storyboard.

- What type of designs could be used to promote the environment in Samoa?
- Which method/s of surface decoration would be most suitable for your design?
- Look around at all the things that represent life in Samoa. Sketch your ideas.

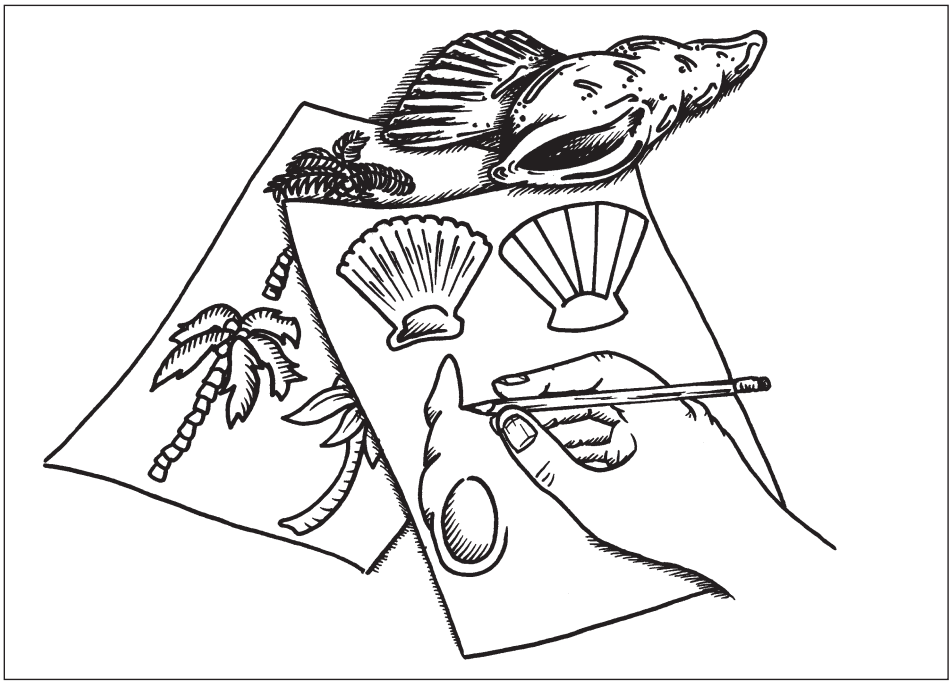


Diagram 5.11
Environmental ideas.

Decide which colours and textiles would be most suitable to use
If you have some colouring pencils or felt tips you may be able to show the colours you would like to use. The colours should be appropriate for the aesthetic appeal you want your carrier to have. Remember to have some alternative ideas in case you cannot find material in the colour you would like.

Designing it to look right

You will need to do some research and get ideas about different types of bags. You could do this by looking in the newspaper, in magazines and at the type of bags used by people on television and in the movies. You could look at the bags that people in your village use. If you see any tourists in Samoa you could look at the kind of bags they use.

Draw the ideas you see around you and make notes about their design features next to your drawings. By adding your own comments you will find it easier to work through the process of coming up with a solution and will show your teacher that you are using technological practice to solve your design brief. Have a look at the sketches and comments below to get some ideas.

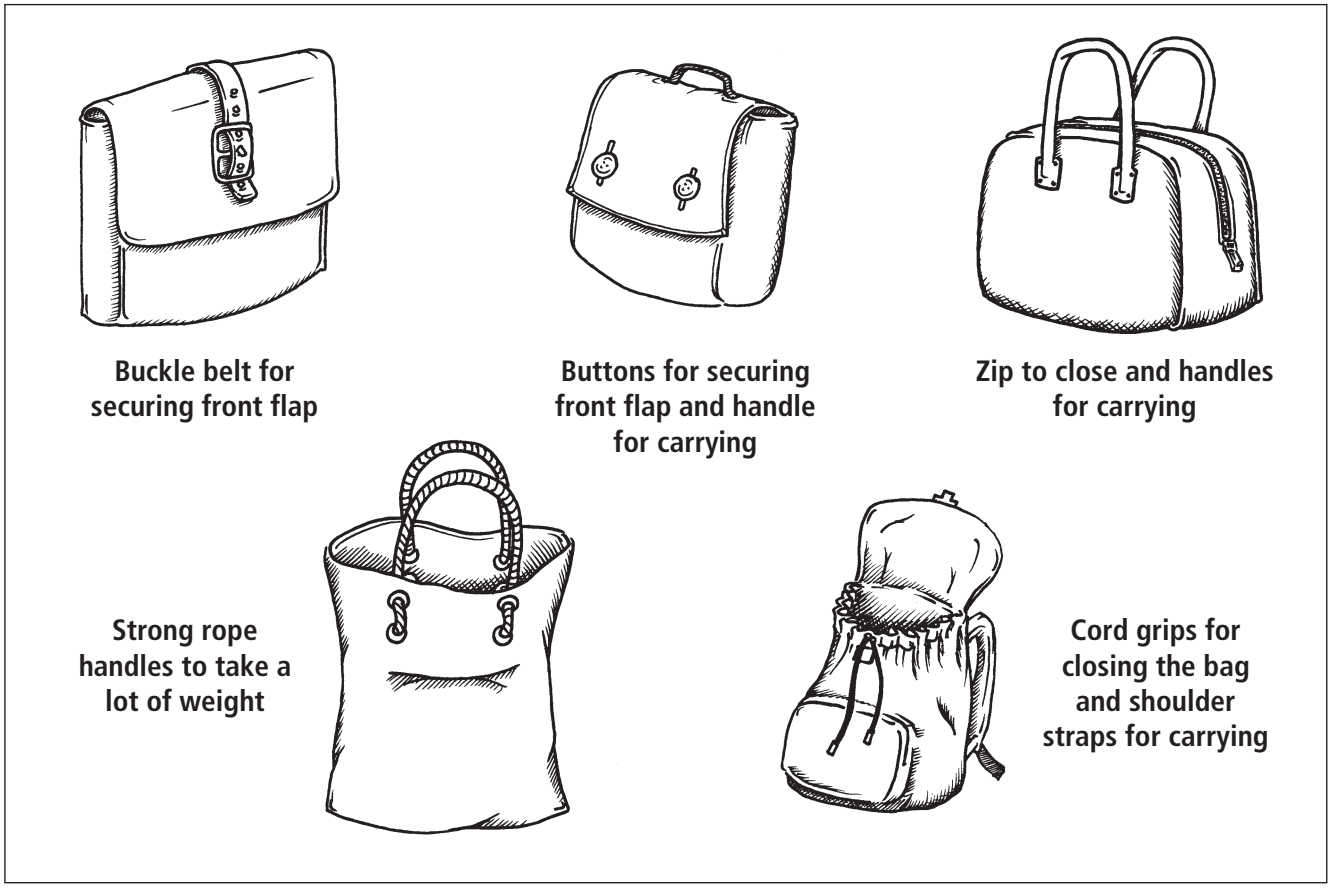


Diagram 5.12
General bag design concepts.

Choosing the materials and parts

What materials are available? How strong are they? Are they expensive or cheap? How much does the tourist centre expect to sell the bags for? Is the material you are exploring able to be packed into a suitcase without being spoilt?

Explore ways of finding out these things. If you find new information, go back and add this to the specifications. Check that you can get the materials and parts that you need. What type of materials will you need for your surface design?

Designing it to work well

Use writing and drawing to show how your design will work. Use working models and samples to get the details right. These are called 'mock-ups'. Your mock-ups can be used to work out how to make the pattern for your carrier.

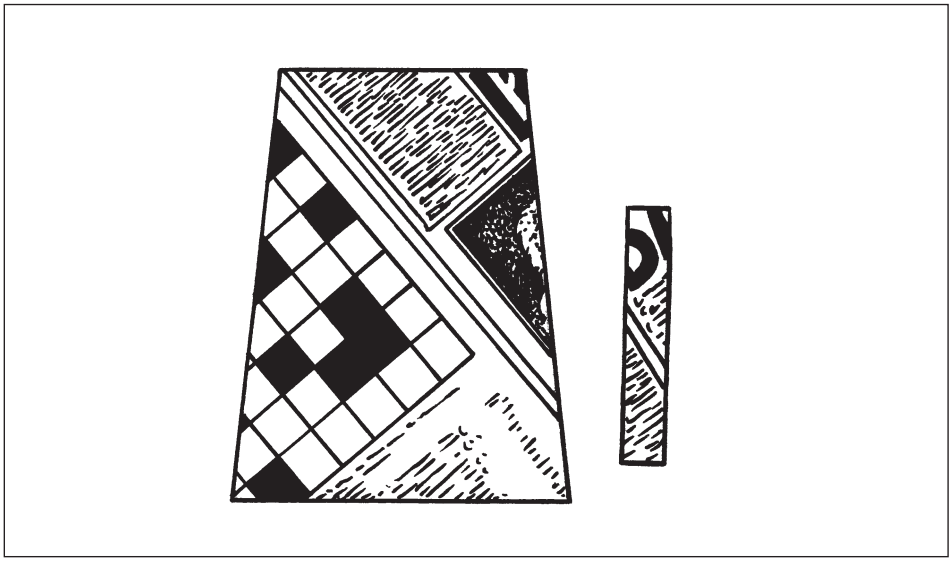


Diagram 5.13
You can make a mock-up out of anything — even old newspaper.

Choosing the tools and equipment

Make sure you have the equipment you need and know how to use it properly.

Planning the construction

Work out the main steps for making the carrier. Which way of making it do you prefer? Do you need to check with your teacher how many lessons you have to finish the brief? Should this information have been in the specifications? Add it if you need to.

At what stage of construction will you apply your surface decoration? Record the steps for your teacher to check.

Making your bag

Don't rush. Follow your plan. Remember to evaluate carefully as you work through the construction part of this practical project. You may think of ways to make your design better. Write these down, but check that your changed design still meets the specification.

Evaluating your end product

Test your final product to find out how good it is. How will you do this? Maybe you could develop a questionnaire to use with people you know, if you can't talk to tourists. Ask people how they feel about the different aspects of your carrier such as:

- Its strength.
- How useful it will be.
- How well the surface design has been carried out and how much people like its appearance.
- How creative it is.
- How well made it is.
- The suitability of the materials chosen for the carrier.

Present their evaluations as a star diagram.

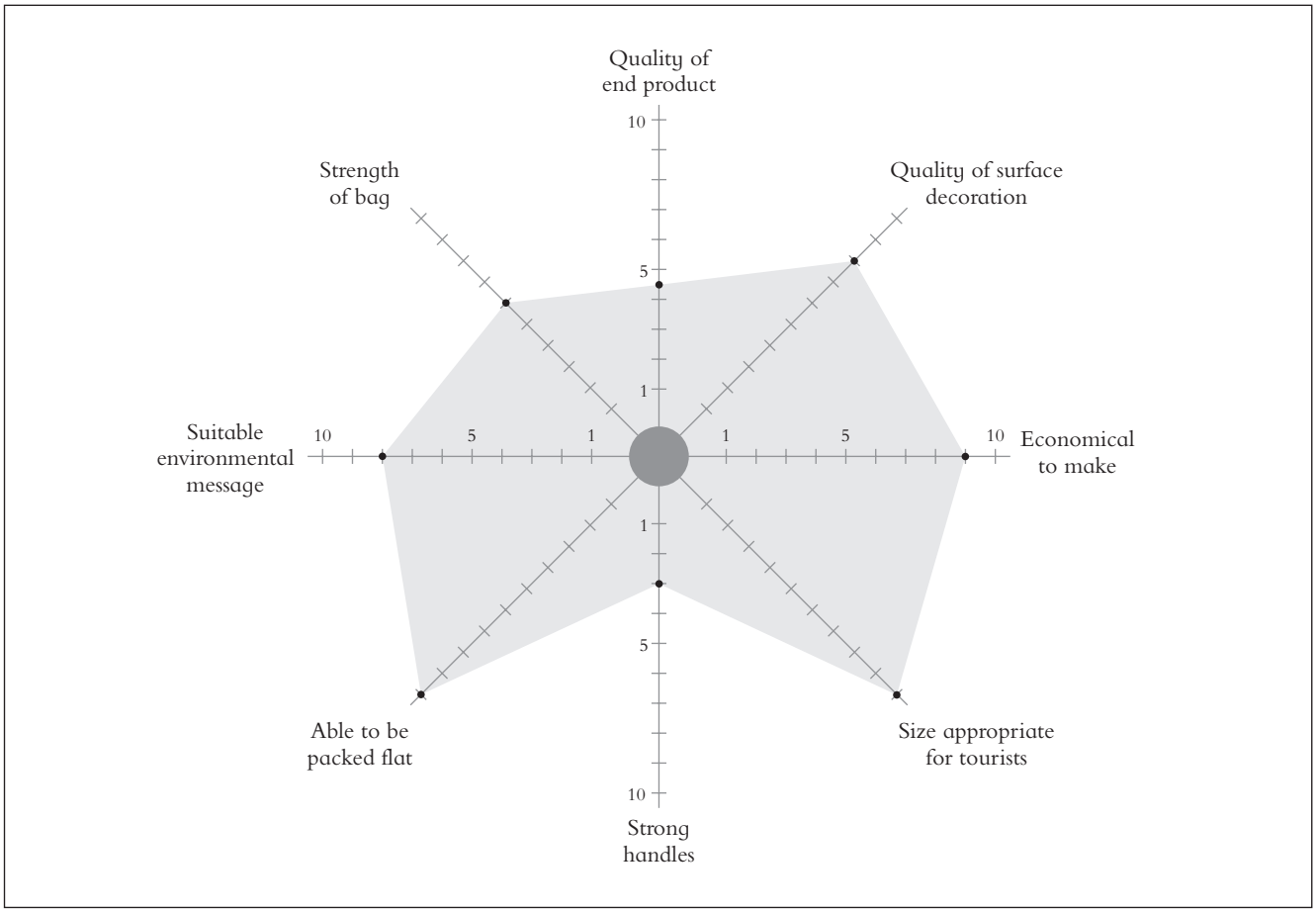


Diagram 5.13
Evaluating your product.

Present Your Technological Solution On A Story Board

Imagine that you became famous because of your design and people wanted to know how it all happened! Describe:

- How you came up with your ideas.
- How you developed them.
- How you decorated and made the carrier.
- How well it meets the brief and specifications you were given.

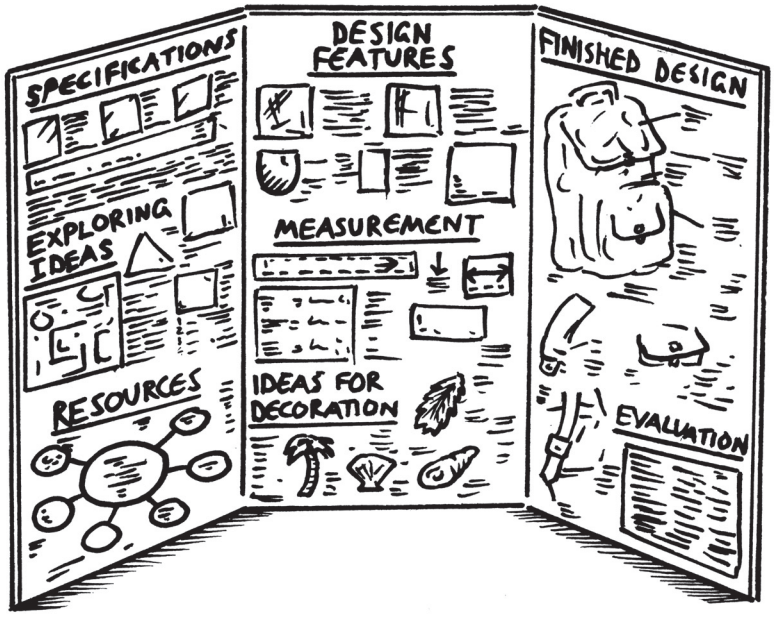


Diagram 5.14
Presenting a design project on a story board.

YEAR 10 GLOSSARY

Word/phrase	Meaning
Absorbency	How easily fabric soaks up liquid.
Absorbent	Able to soak up liquid.
Accumulates	Gradually increases.
Advances	Improvements; moves forward.
Alterations	Changes made to the original of something; adaptations; modifications.
Blending	Joining; mixing; blending.
By-products	What is left over from a production process.
Cellulose polymers	Long lines of atoms that make up plant fibres.
Chemical	Made from a scientific mixture of elements and compounds.
Cocoon	A silky case that an insect spins to protect itself.
Computerised	Made or designed by a computer.
Continuous	Unbroken.
Differences	Things that are not the same.
Durability	The ability to last for a long time.
Durable	Long-lasting.
Economical	Cheap; not using too much of something.
Effective	Successful; useful; helpful.
Elastic	Able to stretch.
Elasticity	How much something is able to stretch.
Elastomeric	These fibres are all like rubber in their stretch-and-snap-back properties.
Equivalent	The same as; equal to.
Evaluated	Assessed or judged to see how well something works or looks.
Expensive	Costly.
Experimenting	Trying out different ways of doing things.
Filament	Threads, strands, strings, fibres.
Film	A thin coating or layer.
Flame-resistant	Will not burn very easily.
Flammable	Burns easily.
Fray	Unravel; become ragged on the edge.
Hatches	Comes out of the egg.
Horizontal	Level.
Inflammability	How easily something burns.

YEAR 10 GLOSSARY

Word/phrase	Meaning
Informed	Wise; sensible; based on knowledge.
Ingredients	Parts that go into a mixture.
Invented	Designed for the first time.
Investigate	Look into; explore; inspect.
Irregular	Not regular shape or size; uneven.
Labour	Work.
Labour intensive	Takes a lot of people and work to make it.
Launched	Introduced.
Lingerie	Women's underwear.
Lustrous	Shiny; gleaming.
Manufactured	Made (by machine); produced in a factory.
Market	The business world where things are bought and sold.
Melting point	The temperature needed for something to melt.
Mildew	Mould; tiny plants that grow on things when they get damp.
Mock-ups	Working models and samples.
Modifications	Changes; alterations; amendments.
Molecules	Tiny particles; small groups of atoms.
Origin	Where something comes from; its beginning.
Originate	To start off; to begin.
Parachutes	Equipment made from fabric and shaped like an umbrella that is used to slow the fall of a person or thing.
Perspiration	Sweat.
Pill	Form into little balls on the surface of the fabric.
Plush	Very soft and smooth.
Polymer	A chemical compound (mixture).
Principles	Main beliefs about something.
Production	The process of making something.
Promote	Give publicity to something.
Properties	Features, qualities, characteristics.
Protein	Made from a living thing of animal origin.
Qualities	Features, properties, characteristics.
React	Change in some way when combined with other chemicals.

YEAR 10 GLOSSARY

Word/phrase	Meaning
Resistance	Being able to resist something.
Resistant	Not affected by something.
Resources	Things that are available to be used.
Responsibility	Being in charge and having to make sure that something is successful.
Seam allowance	The amount of fabric that can be used for the seam.
Snagging	Getting small tears by being caught on things.
Solidifying	Turning from liquid into a hard form.
Solution	A liquid form; a way of working out a problem or difficulty.
Sparkle	Glitter; gleam.
Spinneret	A machine that spins filaments of synthetic fibre.
Static electricity	Electricity that doesn't move or flow through something.
Synthetic	Man-made; not natural.
Technique	Way; method of doing something.
Technological practice	The process used to develop a final product called your 'Technological Solution'.
Technological solution	A final product, developed after using the process called 'Technological Practice'.
Tendency	What something is likely (inclined) to do.
Thermoplastic	Fibres that will melt if they are heated.
Treated	Processed or managed in a certain way.
Velvety	Feeing soft like velvet.
Versatile	Can be used in lots of different ways.
Wadding	Soft material used for filling or padding.