Student's Name: Date:

Packaging

Packaging is a very important part of design graphics and lots of work goes into it, but it is usually thrown away without being given a second thought.

Packaging has changed considerably over the years. In the past, many products were not packaged until the 'time of sale' , when they were simply put into a bag or wrapped in paper by the shopkeeper.

Styles of shopping have changed over the years and this has increased the need for packaging. Supermarket shopping means that most products need to be pre-packaged before they go onto the shelves.

Packaging Materials

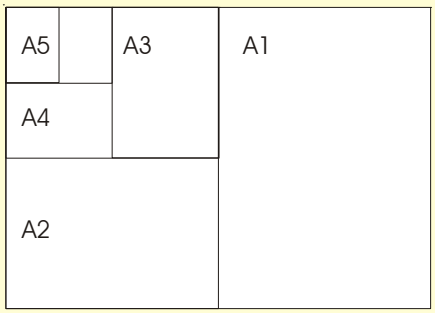
The materials used for packaging have changed a lot over the years. Many items which were once packed in metal boxes or tins are now put into cardboard or paper boxes, due to the rising costs of materials.

The introduction of plastics brought about a major change in package design. Many items are now attached to card with a thin skin of clear plastic film, while others are held onto card by a thin plastic bubble. Some jars and tins have been replaced by sealed plastic trays or containers. These are cheaper to produce, weigh less and can be sealed to keep them airtight. Developments in the field of plastics have greatly influenced package design. Some containers have their designs printed directly onto the plastic which eliminates the need for a stick-on paper label.

Unfortunately the growing use of plastics has led to a range of environmental problems, however recent developments have seen a growth in the use of corn starch base plastics such as PLA, which do not have such a negative impact on the environment.

Paper and Card

Graphic products are often made from paper and boards (card). There is an enormous variety of these, though school can only provide a very limited range. Paper and boards come in a variety of sizes, colours, weights and finishes. The most common sizes are in the metric system: A0, A1, A2, A3, A4 etc. These are based on 'A0' being a square meter.



Types of Paper and Board

It is important to choose the right type of paper and board to achieve the best quality finish. Papers come in various weights as well as sizes. For example photocopying paper usually weighs 80 grams per metre squared whereas a better quality letter paper may be 120 g/m2. Anything over 200 g/m2 is classed as board.

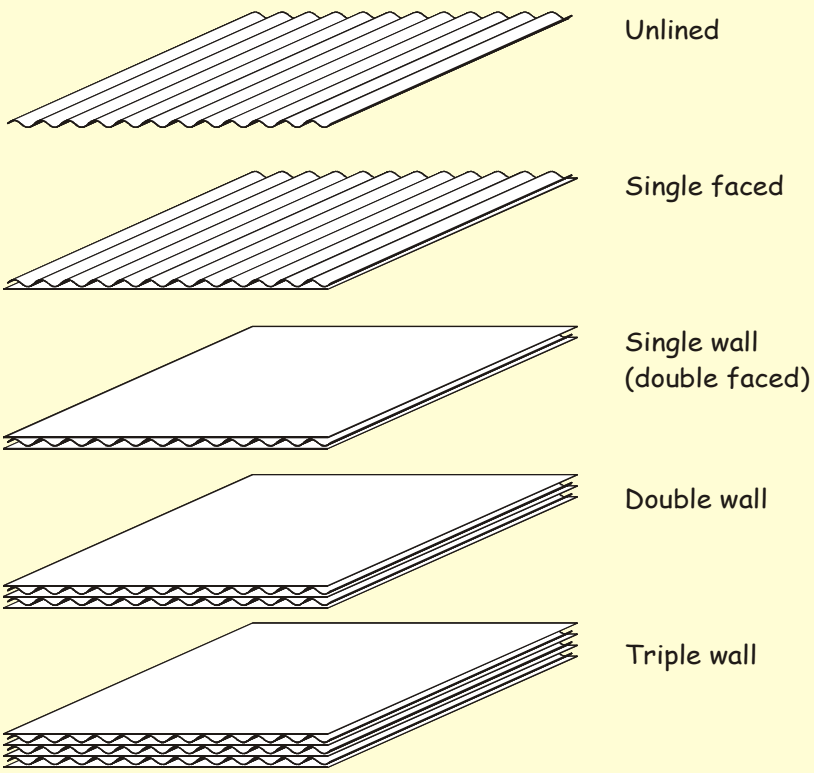
The most common Papers and Boards are as follows;

- Tracing Paper - Transparent, hard and strong, its translucency makes it suitable for tracing fine details, drawn with fine lines. Its strength makes it easy to scrape off errors using a scalpel.

Packaging

- Corrugated Card - Two or more layers of card with a fluted inner section to add strength with very littles increase in weight. Used for packing objects which need protection during transportation.
- Bleed-Proof Paper - Has similar qulities to cartridge paper but specifically good at 'isolating' water based paints and pens so they don't run into areas where they are not wanted.
- White Board - This is a strong medium whose surface has been bleached to provide an excellent surface for printing. Use on good quality packaging.
- Duplex Board - This provides a less expensive alternative to white board and also a different texture for printing. Used mainly in food packaging since recycled material can't be used for this purpose.
- Cartridge Paper - Good quality surface for pencils, pens and markers. The soft surface can also be used with crayons, pastels, inks, watercolours and gouache. Used for design drawings, sketching etc.
- Layout Paper - A thin fairly transparent white paper which provides a cheap medium for designers to use for sketching and developing ideas.
- Sugar Paper - Coloured paper which has contrasting colours for use in tonal drawings. Different weights and textures are avialable for different activities. Used mainly for display work and mounting drawings.
- Ink-Jet Card - This type of card is treated so that it can be passed through ink-jet printers.
- Cardboard - This is a cheap, recyclable, stiff board with a good surface to print onto. Used for packaging, boxes and cartons.
- Foam core board- is made by sandwiching expanded polystyrene foam between 2 thin layers of card. It is stiff and lightweight and can be used for modelling or mounting posters.
- Foil-lined board is a board with an aluminium lining. It is often used in food packaging.

Types of Corrugated Cardboard (Fibreboard)



Packaging

4U2do (A)

1. Fill in the table below which shows suitable applications for some of the different types of packaging materials.

Material:	*Descritpion:*	*Suitable applications:*
Foam core board		
Corrugated Card		
Duplex Board		
White Board		
Duplex Board		
Foil-lined board		
Ink-Jet Card		

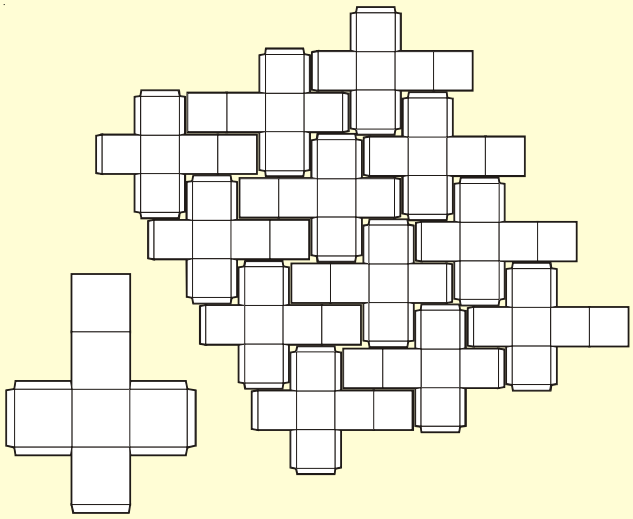
Lamination
Paper and Board can be used with layers of foil and plastic to form a lamination rather like plywood. Many boards are built-up from layers, some giving strength, some the desired surface. Specialist applications might include things such as aluminium layers to ensure that a package is water-tight.

Surface finishes:
Papers such as cartridge can be 'rough surfaced' by being allowed to dry naturally when they are first laid down in pulp form. They can also be polished with spinning rollers or given a shiny top laminate.

Special surface treatments include: high quality stationery being embossed to give raised lettering or logos; menu cards in restaurants being coated with plastic film to make them easy to clean and glossy finishes applied to expensive brochures to make them look and feel stronger and more attractive.

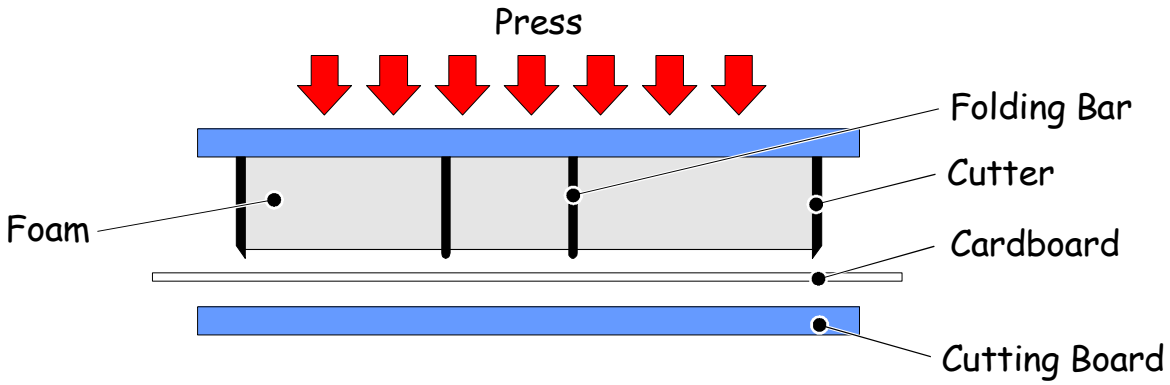
Nets:

Nets are two dimensional shapes which can be cut from flat sheet material and folded into three dimensional products. They can be surprisingly complex- even for products which look quite simple. Nets require accurate geometrical drawing and a lot of modelling to ensure that they will work well.
In industry nets are arranged on sheets with minimal gaps between them in order to minimise waste like the one shown opposite. (This is called a tessellation pattern).



Die cutters are used to press out the shape while creasing bars are used to create the folds.

Die Cutter



Common Plastics used in Packaging

The most common plastics used in packaging are as follows;

- Polyvinyl Chloride (PVC) - Used for shampoo type bottles, blister packs
- High Density Polyethylene (HDPE) - Used for Detergent bottles, bottle caps etc. Can withstand extreme cold.
- Low Density Polyethylene (LDPE) - Used for carrier bags, washing up liquid bottles etc. Can withstand extreme cold.
- Polystyrene (PS) - Used for yoghurt pots etc.
- Polypropylene (PP) - Used for squeezy bottles. It is resistant to heat (up to 120° C) and so is used for oven ready meals etc.
- Polyester (PET) - A stiff tough plastic which is used for fizzy drinks bottles because it keeps the fizz in and smells out. Can also withstand extreme cold.
- Polylactide (PLA) - this is a bidegradebale plastic made from wheat starch. Used for disposable shopping bags, nappies etc.

4U2do (B)

2. What is lamination? How can this be used in packaging?

3. List some of the surface finishes that can be applied to papers and cards.

4. Fill in the table below which shows suitable applications for some of the different types of packaging materials.

Material:	*Code:*	*Properties:*	*Suitable applications:*
High Density Polyethylene			
Polystyrene			
Low Density Polyethylene			
Polyvinyl Chloride			
Polylactide			
Polypropylene			
Polyester			

Bar Codes and the use of Technology

The increasing use of technology has affected package design. Most items on sale in the shops now have a bar code printed on them. This is a series of black and white stripes with a row of numbers printed beneath. It is 'read' by a light pen and the information is passed to a computer where it can be linked to information about the product, such as price and also used in stock control. This is used to work out how many items have been sold, how many are left in stock and when to re-order. In some cases even the re-ordering is done automatically.

QR codes are a '2D' development of barcodes which can contain much more information.

Packaging and the environment

Each year the packaging industry in Britain alone uses over 3 million tonnes of paper and card, 400,000 tonnes of plastic and 900,000 tones of tinplate. Packaging costs the average British family over £100 per year. Most of this is thrown into the dustbin and ends up in land-fill, with only a relatively small amount recycled for future use. Consumers are becoming more aware of this and compnies are now starting to reduce the packaging on their goods.

We shall look at 'design and the environment' in more depth at another time, however in this booklet we will just briefly mention three of the six 'R's for sustainabile design.

- **Reduce:** We should reduce the amount of plastics and all other materials used every day. Designers should not over-package products but develop innovative ways to use less materials
- **Reuse:** We should reuse as many products as possible, from carrier bags to bottles. This is an important way to prevent waste.
- **Recycle:** When a plastics product has reached the end of its useful life it can be recycled in three ways; as materials for new plastics, as chemicals or as fuel.

You may well have seen a symbol on some plastic goods which consists of the recycle logo, some initials and a number. This indicates what the plastic is so that it can be easily sorted for recycling. You can't simply recycle all plastics together as they would contaminate each other.



(Generally if the number is 7 this means that the item cannot easily be recycled.)

Functions of Packaging

Packaging performs a variety of different jobs. A well-designed package should protect the goods while they are being moved around. It should keep any loose parts together whilst still allowing them to be taken out easily. Some packages need to communicate a variety of information about the product such as ingredients on technical information about the product. Other packages are designed to 'promote' or make the product look appeal in order to encourage people to buy it. For different products one function may be more important than another but you should consider them all when designing.

Protection

Most goods need to be protected while they are in transit. This means protection on the way to the shops, as well as from the shop to our homes. The packaging of eggs is a good example. Eggs are often transported in rigid trays made from papier-maché. These boxes give the eggs some degree of protection, keep them together and allow a little space for displaying information such as the size of the eggs and the name of the company responsible for packing and distributing them. Televisions, hi-fi equipment and computers all need to be packed in such a way that they do not get damaged in transit. They are usually placed in some sort of foamed plastic protection, such as expanded polystyrene, before being put into a strong cardboard box.

Containment

Some packaging needs to keep a number of individual parts of a product together to stop them from being lost. Lego kits are sold in sets of individual components which need to be assembled to make the finished item. It is very important that the package contains all of the parts but it is also important that the user can get to them when required. Paper tissues are packed in a box which automatically dispenses them. Each time one is used another is made ready for use.

Communication

Communication is very important in packaging. Important information about the handling and storage of products may be shown on the outside of packages. Symbols or pictograms are often used to give important instructions. These can show that the product is breakable and should be handled with care, that the product must be protected from moisture, which way up boxes should be kept or how many boxes can safely be stacked on top of each other.
Other packages might show technical information about the product itself.

Selling

Many packages are actually designed to 'promote' or sell their contents. They may show what the product can do or give details of a special offer or bargain price in order to make it look attractive to the customer.
Packages may help to sell the product if they show what it looks like. Many packages have a clear plastic window in them which enables the contents to be displayed.
Other forms of packaging which allow the contents to be seen are blister packs and skin packs. 'Blister packs' consist of a piece of clear plastic moulded to the shape of the product. The blister is placed over the product and then attached to a backing card. 'Skin packing' is very similar except that a very thin clear plastic film is draped over the product and attached to the card by a method similar to vacuum forming. Both of these types of package allow the product to be seen easily and the backing card provides an area which can be used to advertise, promote or communicate any other information required about the product. Where a 'window' or blister pack would not give enough protection, a photograph or illustration may be used to show the product. This allows the use of strong, simple packaging and is often used to package large, bulky items.

4U2do (C)

5. What is a Bar Code and what can it be used for?

6. How can designers help reduce the negative impact of packaging on the environment?

7. What are the four main functions of packaging? Use examples to 'illustrate' your answer.

8. Find out what the symbols opposite indicate and write down their meanings in the spaces provided.

9. You are to design and make the packaging for a small piece of electronic equipment, such as an MP3 player, mobile phone , digital camera etc.
The final package should be no bigger than 200mm x 150 mm x 100mm.
The packaging should be aimed at a specific 'user group' eg. "teenage boys" and you will need to think carefully about this 'group' when you are designing.

Your teacher will give you the hand-in-date for the project.
You will be expected to produce-

(i) An initial Brief,
(ii) Relevant Research Work including Analysis of the information you gather.
(iii) A suitable set of Design Criteria,
(iv) A range of Design Ideas - these should include 3D drawings of the package designs along with their nets.
(v) Development drawings for one of your designs including a 2D CAD drawing of the final design.

You will be expected to manage your time effectively in order to meet the deadline so take notes on what you are told and ask if there is anything that you do not understand, or if there is any other information you require.







































Packaging

AQA General Certificate of Secondary Education

Design and Technology: Product Design

Unit 1 Written Paper

To help you prepare for the written exam

Q. 1 Identify the card or board which is most suitable for packaging hot food. [1 mark]

A Duplex board
B Foam core board
C Foil lined board
D Solid white board

Q. 2 When using marker pens students find the ink stains other pages. Which term should be looked for when selecting the paper to avoid this? [1 mark]

A Bleed proof
B Cartridge
C Layout
D Tracing

Q. 3 When packaging is cut out 'nesting' is used to ensure that minimal material is wasted. A piece of material measures 60mm by 40mm. A triangle pattern measures 18mm (height) by 18mm (base). The first triangle has been placed on the material. Repeat the triangle pattern to ensure that as many as possible fit on the material. [1 mark]

Q. 4 Calculate the amount of material wasted when producing the shapes you have drawn above. Assume no material is wasted when cutting. [3 marks]

Q. 5 State two reasons why corrugated cardboard is used as packaging for cooked pizzas. [2 marks]

Exam Advice

Packaging Questions are very likely to appear on the exam.
You will need to know the functions of packaging, the materials used and also how packages are produced commercially.

List of CGP Revision questions:

E12 Using Materials Efficiently

Packaging