



**KIBWORTH MEAD  
ACADEMY**

# Design and Technology Revision Booklet



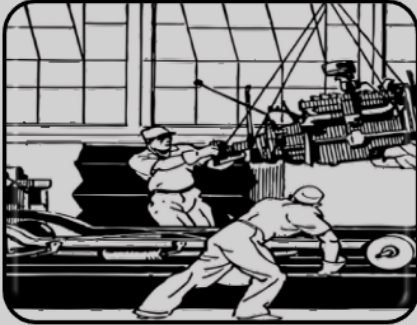
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Teacher: \_\_\_\_\_

TARGET

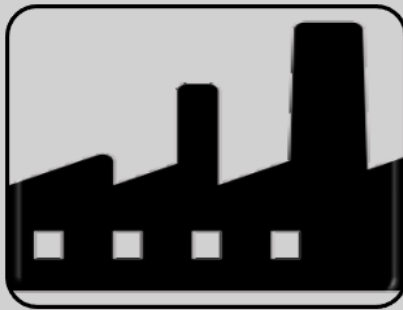
*Work Hard, Be Kind, Be Proud.*

# New and Emerging Technologies

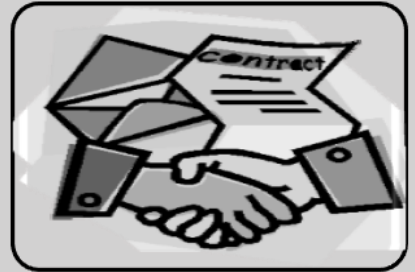
Complete these brain dumps by writing as much as you know about the following topics.



Production techniques and systems



Industry



Enterprise

Describe what the carbon footprint is of a product.

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# New and Emerging Technologies

Complete these brain dumps by writing as much as you know about the following topics.



Sustainability



People

What is **fair trade** and why should customers look for their logo?

What is **the Forest Stewardship Council** and how do they help prevent deforestation?

# New and Emerging Technologies

**Automation**   **Crowd funding**  
**Co-operative**   **Technology Push**  
**Market pull**   **Inclusive design**

1. Explain what automation is and give an example?

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2. What are the consequences of increased use of CAM and CNC?

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3. Give an example of rapid prototyping?

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4. What is crowd funding?

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5. What is fair trade?

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6. Explain how co-operatives work?

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7. List the advantages of CAD and CAM.

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8. What is lean manufacturing?

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9. Explain the difference between technology push and market pull.

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10. Give an example of inclusive design.

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11. Give an example of exclusive design.

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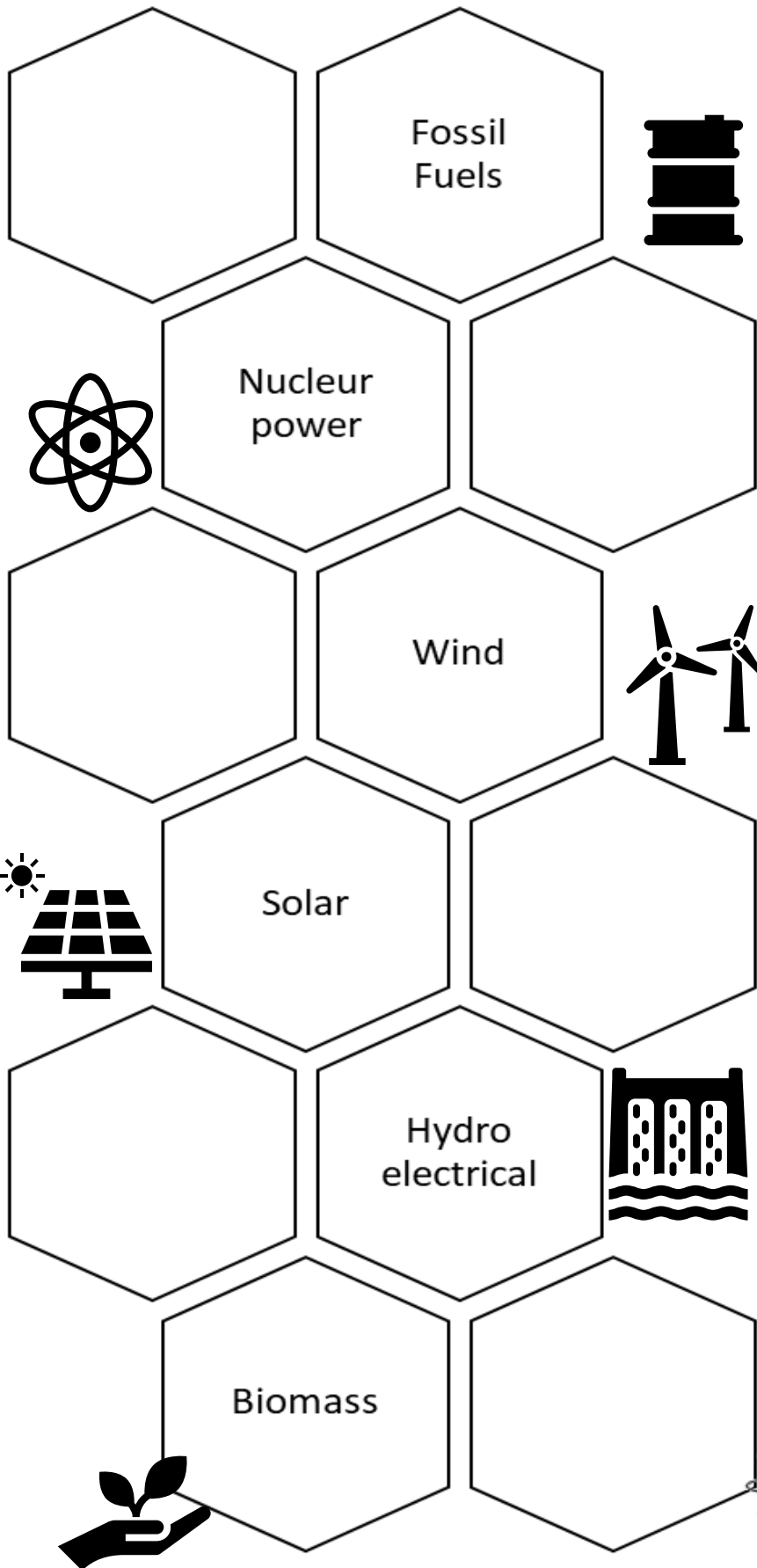
12. How can designers reduce waste when designing and making new products?

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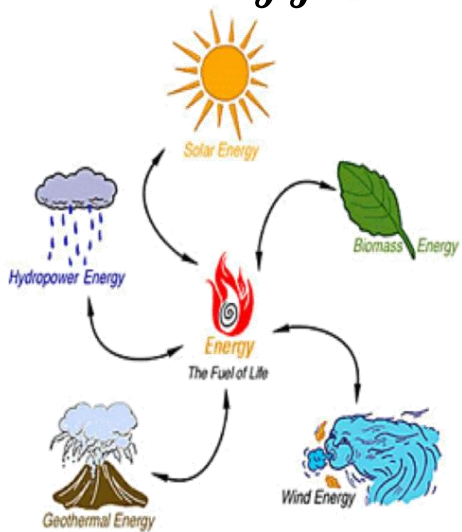
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# Energy Generation & Storage

Take notes from your revision guide, for the following topics

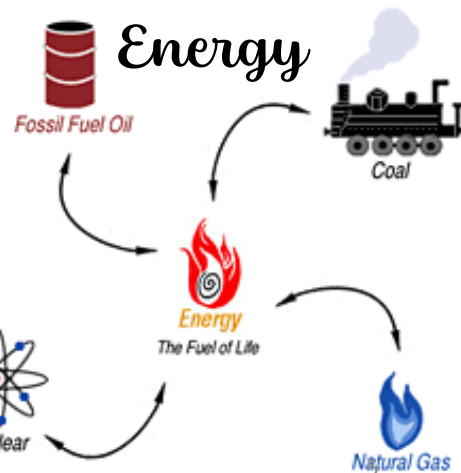


## Renewable Energy



Finite	Non-finite
Renewable	Sustainable
Eco	Replenished Oil

## Non-renewable Energy



# Developments in New Materials



**Modern Materials** - Constantly being developed to meet specific applications. They are developed through inventing or improving processes.

Material Name	Properties	Uses
Graphene A single layer of carbon atoms		
Titanium A metal that has historically been difficult to extract, refine and process.		
Metal Foam A metal injected with air whilst in a liquid state.		



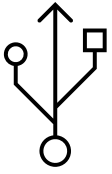
**Smart Materials** - The properties of smart materials change in response to external stimuli such as stress, temperature moisture or PH.

Material Name	Properties	Uses
Shape Memory Alloys		
Thermochromic Pigments		
Photochromic Pigments		



**Technical Textiles** - Technical textiles manufactured for their functionality rather than aesthetics.

Material Name	Properties	Uses
Kevlar		
Nomex		
Conductive Textiles		



# Electronic Systems and Components



COMPONENT NAME	SYMBOL	INPUT , PROCESS OR OUTPUT	WHAT IT DOES
Switch			Allows current to flow through when pressed
Light dependent resistor		Input	
Thermistor			
Microcontroller			Specific task eg. Timing, counting.
Speaker			
		Output	

**A designer has come up with a new torch design. Which system would be the most environmentally friendly to power the torch?**

- Use mains electricity
- Use solar panels to recharge batteries
- Use rechargeable batteries
- Use wind-up clockwork system

**Explain the reasoning behind your answer**

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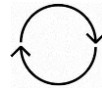
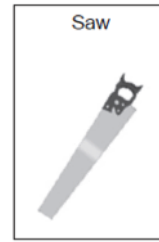
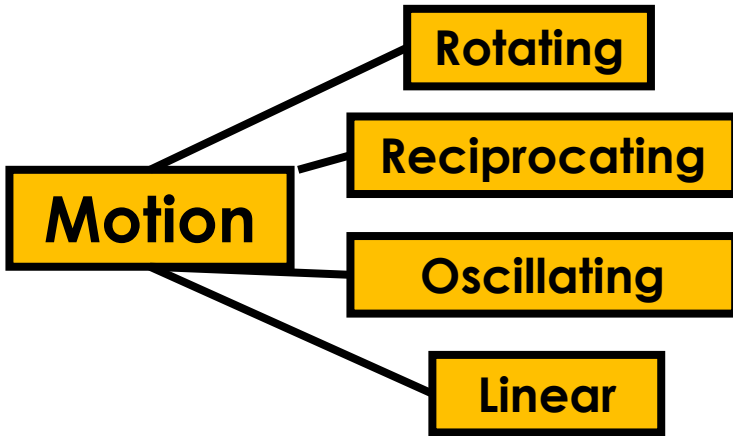
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# Mechanical Devices

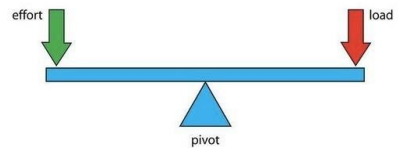
## Motion Match up Task



## Levers Mind Map Task

### What are they?

Below is an example of a first order lever. Draw examples of second and third order levers below.



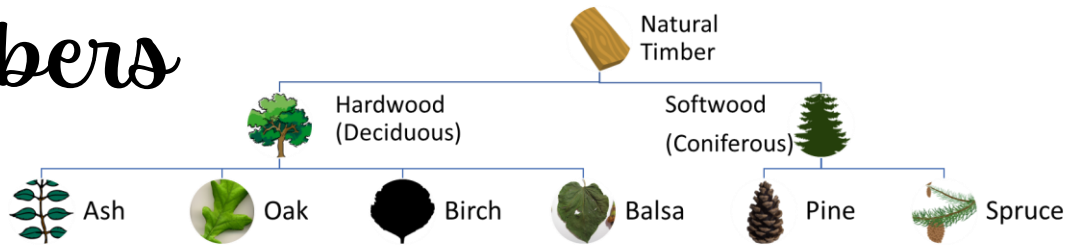
First Order Lever

Second Order Lever

Third Order Lever



# Timbers



Hardwoods	Properties	Uses

Softwoods	Properties	Uses

## Man Made Boards - Plywood.

In the space below, use notes and sketches to explain the process of how Plywood is made.

1. What are the two types of seasoning used to dry natural timber?

\_\_\_\_\_

# Timbers

## Raw material to processing product diagram




Using notes and sketches, explain how trees are turned into usable timber. Step 2 and 5 have been done for you.

- 1)
- 2) The logs are transported to the sawmill...
- 3)
- 4)
- 5) The cut planks are seasoned using one of two different methods...

## Questions

1. Write a detailed method of applying a finish to a timber. Think about the following... defects, sanding, dust, application, and types of paint.
2. What are the stock forms of timber? Give an example of a standard stock for timber.

# Timbers

Man-made Boards	Physical Properties	Working Properties	Uses	Standard stock forms
MDF 				
Plywood 				
Chipboard 				

## Questions

1. MDF and chipboard are not aesthetically pleasing man-made boards. How can we improve the appearance of this material?

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2. Use notes and sketches to explain how MDF is made.

# Metals

Explain the difference between ferrous and non-ferrous metals.  
Describe the characteristic properties of a variety of metals



## Ferrous Contains Iron

- **Low Carbon Steel**
- Characteristics and properties
- Uses
- Advantages
- Disadvantages



## Non Ferrous – Corrosion resistant

- **Aluminium**
- Characteristics and properties
- Uses
- Advantages
- Disadvantages



## Common alloys – mixture of metals

- **Stainless Steel**
- Characteristics and properties
- Uses
- Advantages
- Disadvantages



## Ferrous Contains Iron

- **Cast Iron**
- Characteristics and properties
- Uses
- Advantages
- Disadvantages



## Non Ferrous – Corrosion resistant

- **Copper**
- Characteristics and properties
- Uses
- Advantages
- Disadvantages



## Common alloys – mixture of metals

- **Brass**
- Characteristics and properties
- Uses
- Advantages
- Disadvantages

What is a metal ore?

# Polymers Source & Processing

**Stage 1:** Most polymers are made from **crude oil**, although some can be made from substances found in plants. Crude oil is extracted from the ground and taken to a refinery. But where are they extracted from?



Give two examples.

.....  
 .....



**Stage 2:** **Crude oil** is refined into usable products. This process separates the heated crude oil into many different compounds or fluids. Some of the fractions can be linked together to make polymers.

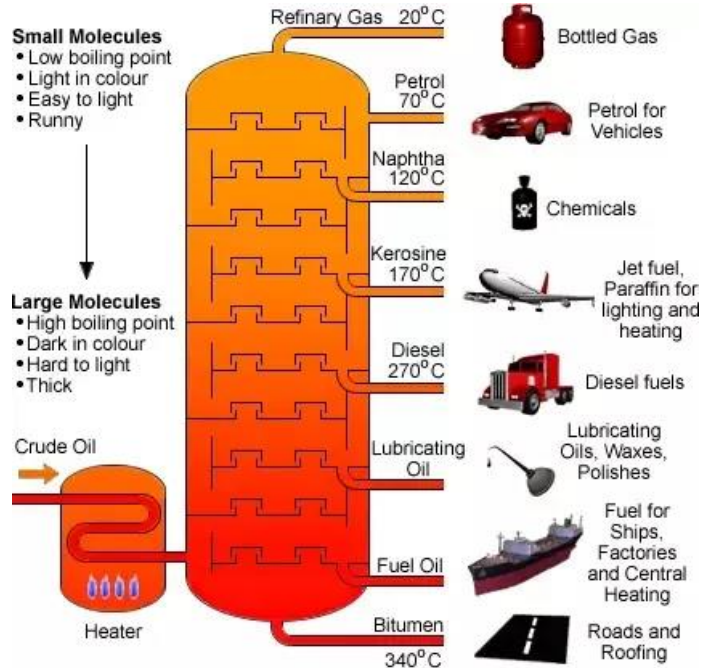
What is this process called?

F..... D.....

Why is this process **unsustainable**?

.....  
 .....

Other fractions may need to be broken down into smaller molecules. These fractions are called "**cracking**". These chemicals can then be polymerised.



**Stage 3:** A company will not be able to buy liquid polymer. Imagine having a truck that had to be kept hot enough to stop the polymer from becoming solid?

Instead, the polymer manufacturing companies make the polymer into standard **stock forms**.

What does the term standard stock form mean and give examples in your answer.

.....  
 .....



# Polymers

Complete this table	Definition	Examples of...
Thermosetting polymer		
Thermoplastic polymer		

## Exam questions

1. Explain the difference between a thermoforming polymer and a thermosetting polymer? (4)
2. What raw material of plastics usually made from? (1)
3. What is a finite resource? (2)
4. Name 3 uses of polypropylene.(3)

Match the polymer recycling symbol with the use



### Other

ketchup  
3 & 5 gallon water bottles  
some juice bottles

### Polypropylene

ketchup bottles  
yogurt and margarine tubs

### Polyethylene Terephthalate

soda bottles  
water bottles  
shampoo bottles  
mouthwash bottles  
peanut butter jars

### Vinyl

clear food packaging  
shampoo bottles

### Low Density Polyethylene

bread bags  
frozen food bags  
squeezeable bottles (mustard, honey)

### High Density Polyethylene

milk, water and juice jugs  
detergent bottles  
yogurt and margarine tubs  
grocery bags

### Polystyrene

meat trays  
egg cartons  
cups and plates

# Manufacturing Processes

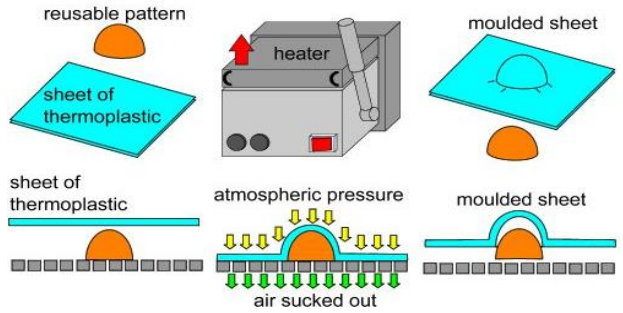
Name the process and explain the diagram

Polymer process name:

What type of polymer is used for this process?

Complete the steps of the process below:

- 
- 
- 
- 
- 



Standard stock form used

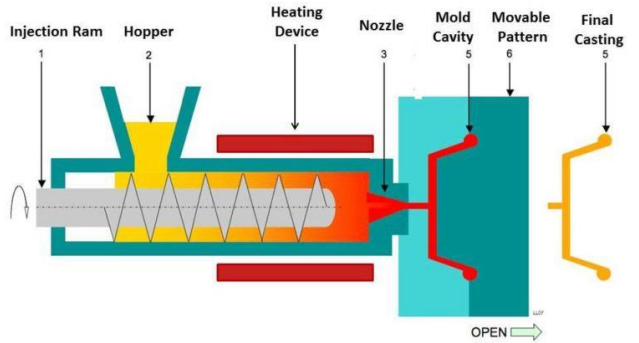
Example of product made

Polymer process name:

What type of polymer is used for this process?

Complete the steps of the process below:

- 
- 
- 
- 
- 



Standard stock form used

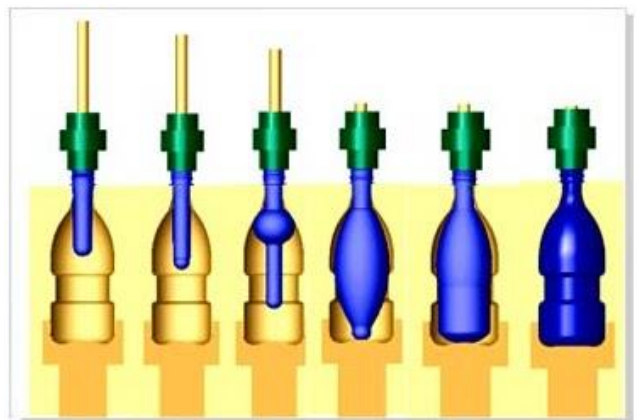
Example of product made

Polymer process name:

What type of polymer is used for this process?

Complete the steps of the process below:

- 
- 
- 
- 
- 

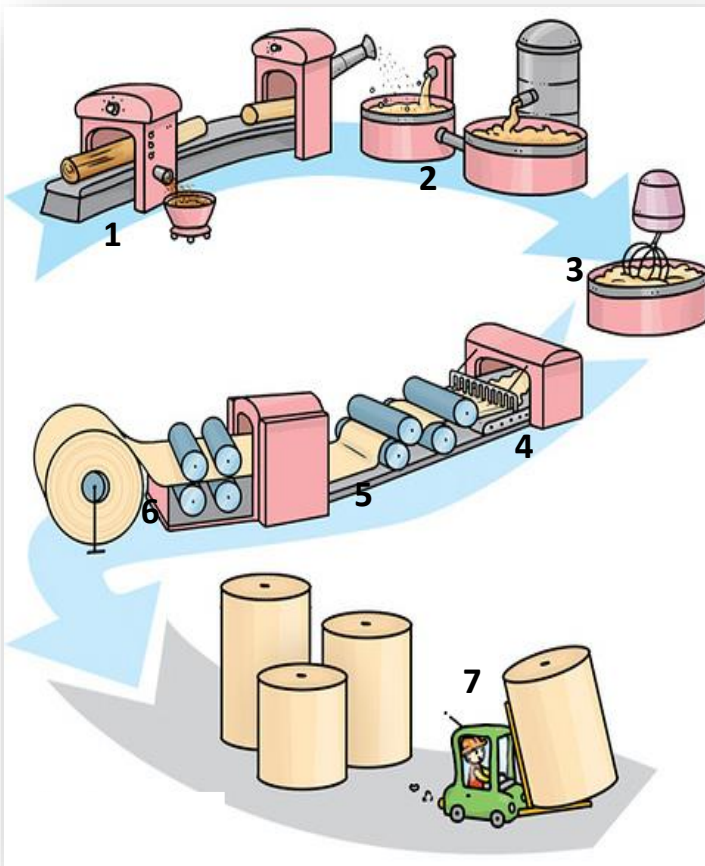


Standard stock form used

Example of product made

# Papers and Boards

Describe the 7 stages of paper making using these pictures



What is GSM?

What does it stand for?

Brain Dump: Name as many papers and boards as you can.

Exam question: Analyse and evaluate the choice of corrugated card for a pizza box (4 marks).

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# Textiles

Yarn - Knitted - Woven - Warp - Weft - Natural fibre - Synthetic fibre

Natural textile	Physical/Working properties	Uses

Synthetic textile	Physical/ Working properties	Uses

Blended textile	Physical/Working properties	Uses

1. Name 3 different types of fabric construction.

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2. What is a yarn?

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3. Name a finish that can be applied to a fabric.

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4. List 3 characteristics of knitted fabrics.

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5. List 3 characteristics of woven fabrics.

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6. Where do Natural fibres come from?

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7. Where do synthetic fibres come from?

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8. What are the properties and uses of Cotton?

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# Industry & Manufacture

Describe the different types of manufacture and give an example for each.

**One Off**

**Batch Production**

**Scales of  
manufacture**

**Mass Production**

**Continuous Production**

**Describe how a jig is used.**

**What does JIT mean? Explain what it is.**

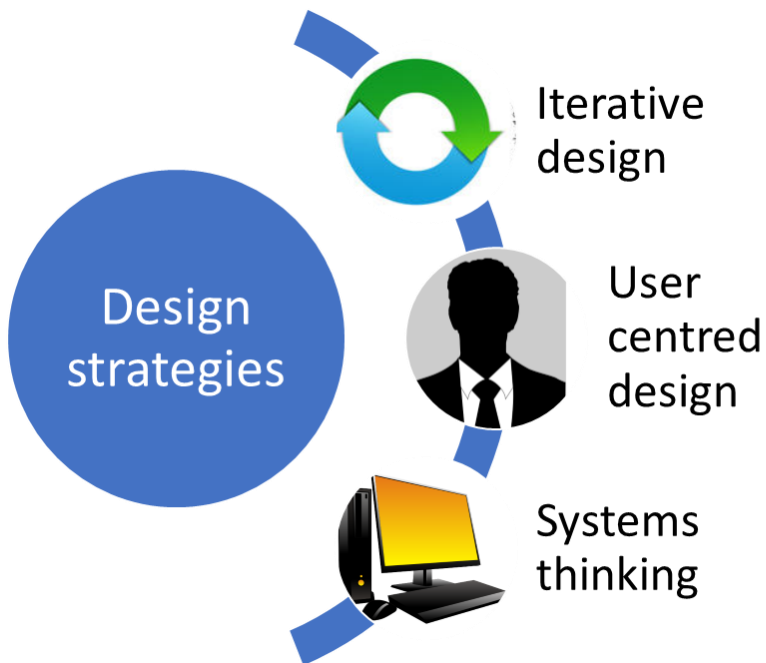
**What does QC mean? Explain what it is.**

**What is tolerance?**

**Name two production aids.**

# Design Strategies

Fill in the meaning and advantages:



Three large dashed rectangular boxes for taking notes on the meaning and advantages of each design strategy.

What do you know about these Companies?



Alessi

Dyson

Apple

# Designers

What do you know about these designers?



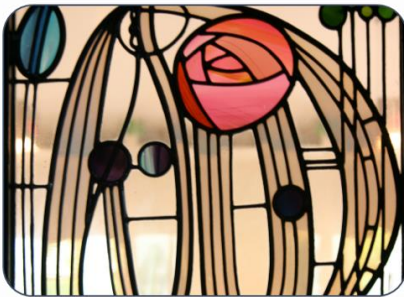
Marcel Breuer



Harry Beck



Norman Foster



Charles Rennie  
Mackintosh



Gerrit Reitveld



Phillipe Starck

# Designers

Create a detailed profile of your chosen designer or company to prep for exam.

**Bio / Background**

**Existing Product/s**

**Styles and Features**

**Concept / Philosophy**

**Inspiration**

**Sketch of an existing product,  
annotated**

**Why is their work iconic?**

**Important dates**

# Ecological, Environmental and Social issues

What is deforestation?



What is Carbon Footprint?



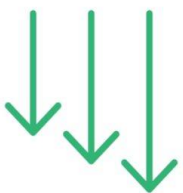
What is oceanic pollution?

What is Atmospheric pollution?

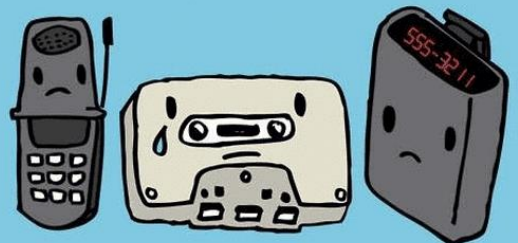
How can designers reduce pollution?

**Planned obsolescence is...**

- producing consumer goods that rapidly become obsolete and so require replacing
- The ability to be repaired or reused
- Meant to be recycled



NOW WE'RE JUST SOMEBODY



THAT YOU USED TO KNOW.

# Ecological, Environmental and Social issues



What is **FSC**? What do they do as a organisation?

.....  
.....  
.....

Give examples of FSC **products**.

.....  
.....

## Life Cycle Assessment

What is the purpose of a life cycle assessment?

.....  
.....  
.....

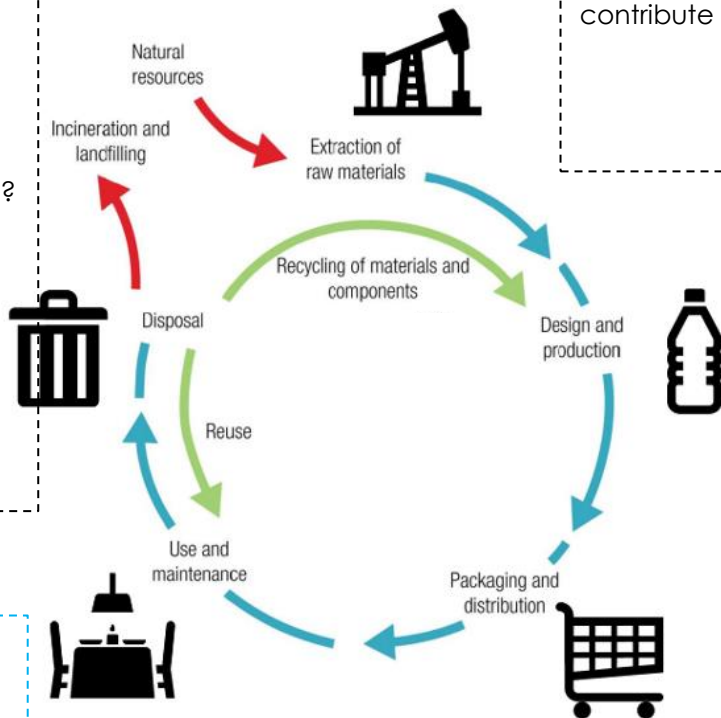
**Annotate the diagram** below linking to a material and an example of a product. One has been completed for you. Questions are used as prompts for notes.

What are the two ways products are disposed of?

What does the term planned obsolescence mean?

What materials are extracted?  
*E.g Metal extracted from rock is called ore.*

How does extraction of raw materials contribute towards co2 emissions?



What manufacturing processes are used to make a standard stock form?

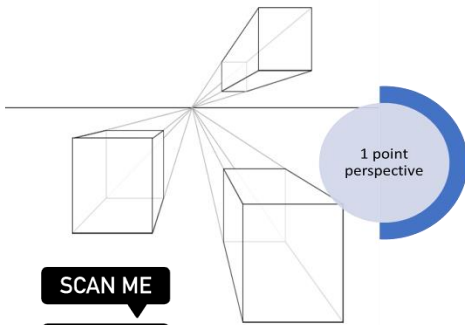
What manufacturing processes transform a standard stock form into a product?

Use of product can damage the environment e.g electrical products used electricity generated by fossil fuels, and paint can give off harmful toxins.

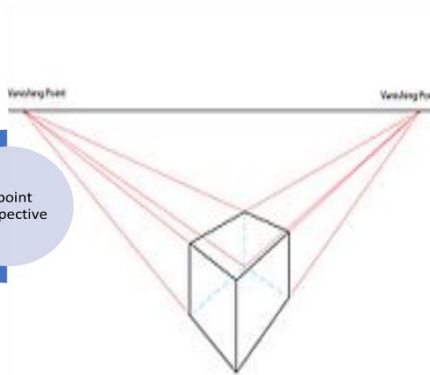
How can suppliers reduce on carbon footprint when transporting products?

# Technical drawing

Know the different types of technical drawing and how to do them



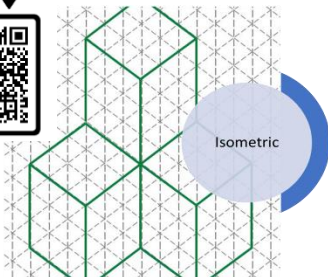
SCAN ME



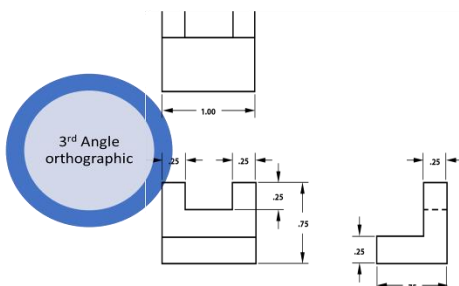
SCAN ME



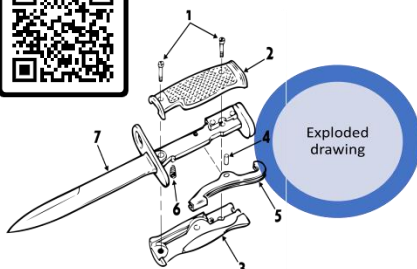
SCAN ME



SCAN ME



SCAN ME





# High Profile Exam Questions

## Standard Stock Forms

<p>Drinks can</p> 	<p>Garden bench</p> 	<p>Helmet</p> 
<p>Tie</p> 	<p>Screws</p> 	<p>Soup carton</p> 
<p>Wedding invitation</p> 		

Materials are sold in a range of standard shapes, sizes and forms.

(a) Choose one of the products from those shown above and circle your choice.

State the main material of the product and give two examples of a standard form.

Material \_\_\_\_\_

Point

1. \_\_\_\_\_

Point

2. \_\_\_\_\_

(2)

(b) Explain why raw materials are processed into standard forms.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Point  
Explain  
Point  
Explain  
or example

(4)

(Total 6 marks)

# High Profile Exam Questions

## Anthropometrics and Ergonomics

(a) Explain what is meant by the term 'anthropometrics'.

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Point, Explain or Example

(2)

(b) Explain what is meant by the term 'ergonomics'.

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Point, Explain or Example

(2)

(Total 4 marks)

## Material Management

During manufacture it is important to use materials efficiently and minimise waste.

Explain how each of the following improves material management.

Nesting of shapes and parts/lay planning \_\_\_\_\_

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Point, Explain, Example

Cutting techniques \_\_\_\_\_

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Point, Explain, Example

[Total 2 x 3 marks]

# High Profile Exam Questions

## Manufacturing Processes

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The table below shows examples of manufacturing processes.

Offset lithography	Turning	Casting	Injection moulding	Weaving	Flow soldering
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Choose one of the manufacturing processes from the table.

Use notes and/or sketches to describe how your chosen process is used to make products.

My chosen manufacturing process is

**6 Marks**

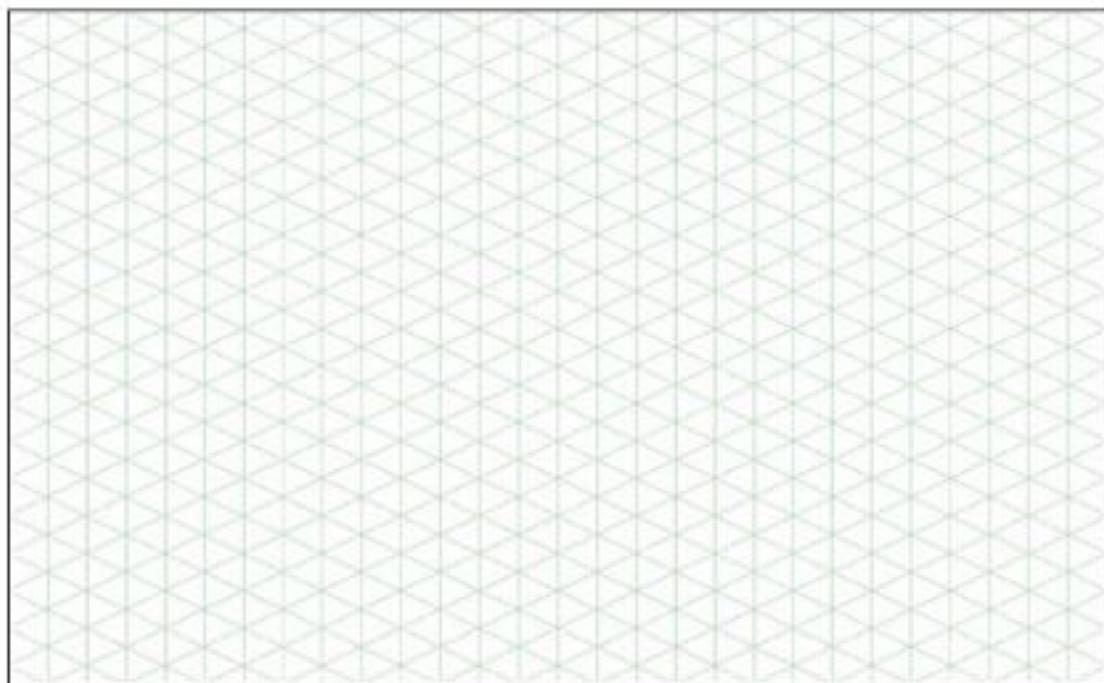
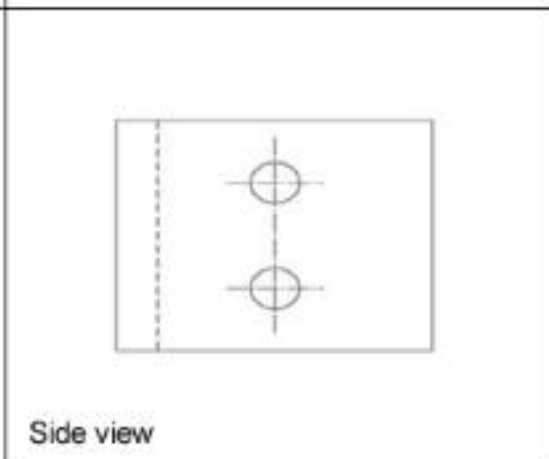
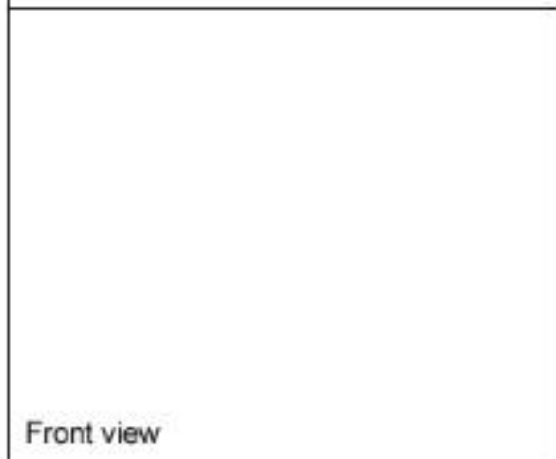
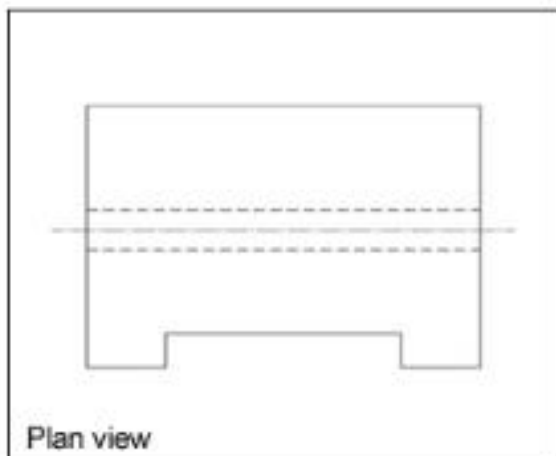
(1) Correct Diagram  
(5) Notes/Annotations



# Drawing Techniques

Below is a drawing of part of a point of sale display.

Complete the third angle orthographic projection by adding a front view and isometric drawing of the shape in the boxes provided.



# Examination Top Tips

## Subject Terminology

### Schematic diagram

Graphic symbols or simplistic diagrams used to convey a system (e.g. an underground map).

### Working properties

How a material reacts to external forces.

### Life cycle assessment

A technique used to assess the environmental impact of a product at all stages of its manufacture, use and disposal.

### Social responsibility

The idea that a designer needs to evaluate the impact their product could have on society and take action to make this better.

### Conceptual stages (of design)

Use of models, sketches and computer aided design (CAD) to show the design of a product as it develops.

### Physical properties

Properties that refer to the actual matter that forms the material (eg insulation, conductivity, fusibility).

### Technology push

Technological discoveries used to drive the development of a product.

### Prototype

An early model or sample of a product used to test a concept.

## Command Words

### Analyse

Separate information into a range of different components.

### Apply

Put into effect in a recognised way

### Compare

Identify similarities and differences

### Consider

Review and respond to given information

### Contrast

Identify differences

### Define

Specify meaning

### Describe

Set out characteristics

### Discuss

Present key points about different ideas or strengths and weaknesses of an idea

### Explain

Set out purpose or reasons

### Evaluate

Explore good and bad reasoning in your answer and give an overall conclusion to your answer

### Give

Produce an answer from recall

### Identify

Name or otherwise characterise

### Justify

Support a case with evidence

### Outline

Set out main characteristics

### State

Express clearly and briefly

## Dissecting a Question

### Using Point, Explain, Example (PEE).

Look at the question and the key command words, for example with this question:

### **Outline the benefits of using stock forms for designers and manufacturers (4 marks)**

- The question doesn't ask for an example. The use of the word outline suggests that the answer needs clear points to be made but not necessarily explained in detail.
- The question is worth 4 marks so would need 4 points to be made.

Let's look at another question:

### **Analyse and evaluate the ecological issues that have to be considered in the sourcing and extraction of raw materials to make products.**

### **Give examples to support your answer (8 marks)**

- The question clearly states examples are needed.
- The question also uses command words 'analyse' and 'evaluate' a range of different points need to be given that explore both good and bad issues – so this question looks at extraction, evaluate would mean compare the benefits of extracting one material over another, for example how quarries can be turned into lakes and wildlife reserves.
- The question is worth 8 marks so Point Explain would need to be used 4 times with examples given as part of those explanations where possible.

When in doubt, it is always best to write more. This will give you a bigger chance of achieving the marks compared to making short bullet pointed answers.