

# Design Technology

## Revision sheet booklet

Subject contents covered  
in Year 7



**Hardwood**



# WOOD

There are two basic types of wood: hardwood and softwood.



**Softwood**



## HARDWOOD



- . Comes from **deciduous** trees (lose their leaves in winter)
- . **Slow** growing
- . Hard, **dense** wood with tight woodgrain
- . Difficult to cut
- . Expensive

## SOFTWOOD



- . Comes from **coniferous** trees (keep their leaves in winter)
- . **Quick** growing
- . Soft wood with wide woodgrain
- . Easy to cut
- . Cheap



Forest Stewardship Council

### Sustainable Forest

A sustainable forest is a forest that is carefully managed and felled trees are replaced

### Seasoning

#### Seasoning

is when the moisture is removed from the timber in order to be able to make things with it. You can either use the air drying or kiln drying process.

### Forests



### Products



## Timber Cycle

Trees are then Chopped down

### Tree felling machine

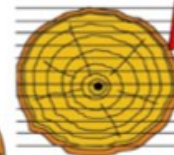


### Deforestation

is the removal of a forest, converting it to non-forest use. Often wildlife's habitat is destroyed.



Seasoning  
Kiln Drying &  
Air Drying



Conversion  
Quarter sawn &  
Through and through

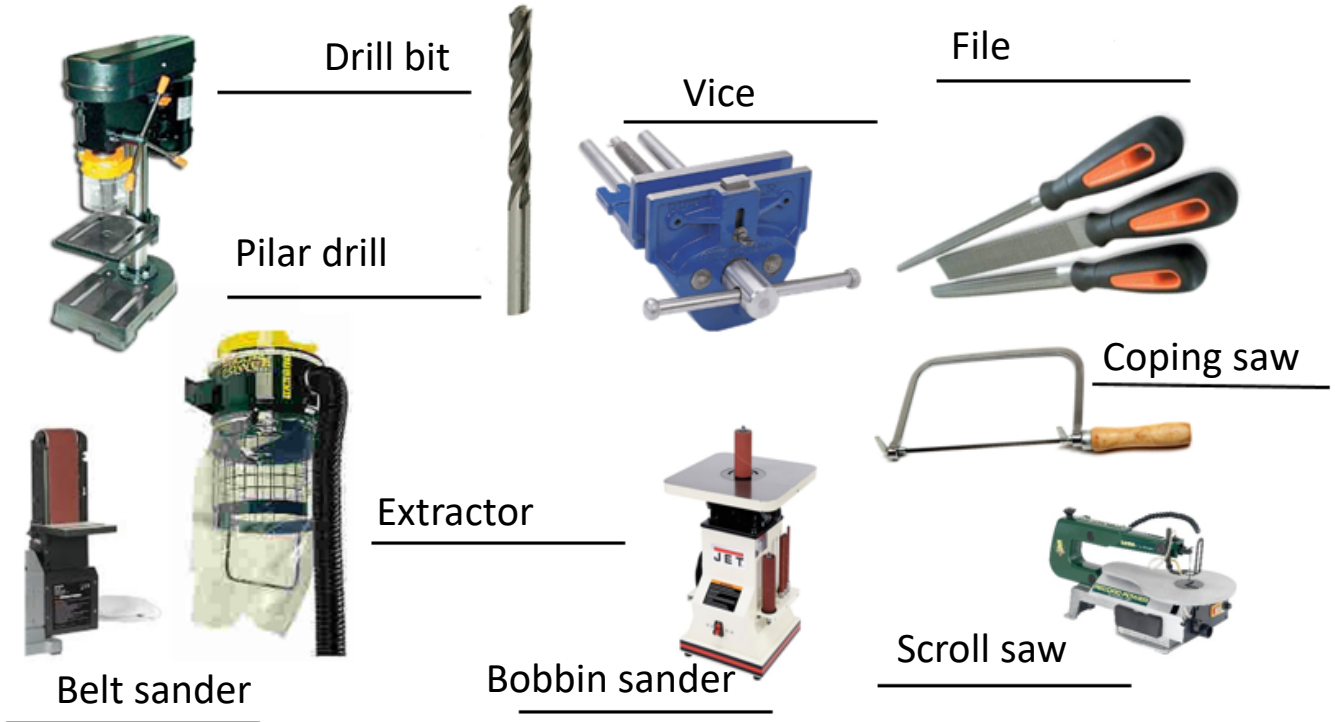
### Conversion

#### Conversion





is when the tree trunk is cut into pieces. Softwoods are usually rough or through and through sawn and hardwoods are quarter sawn for a better looking grain.

# Tools, Equipment and Machinery

This is what you will use for this project



## Know your tools and equipment

Tools	Use	Safety points
	Sawing curves in wood	Could cut your finger Blade gets hot from friction
	Making metal, plastic and wood smoother	Heavy metal would hurt if dropped onto your foot
	Drilling holes in a range of materials	Goggles to be worn Hands away from drill/sander
	Making plastic and wood smoother	Tie loose hair/clothing Secure the material Have the Guard on.



## Research — Material Properties

The materials we will be using can be found below, using the information from the PowerPoint complete the descriptions and think of 3 examples of products made from the 3 materials. Also complete the sentences below using the key words.

### Materials

### 3 Example products

**Pine - Pine is a type of natural wood. It is soft and easy to cut and shape. It is light in colour and can be painted and varnished.**

**Furniture, Doors, wooden toys**

MDF (Medium-density fibreboard) is a man made board wood made from saw dust and glue and forming sheets by applying high temperature and pressure. MDF good for the environment, easy to work with but shouldn't be used outside as it soaks up water. MDF products are usually painted to protect it and to make it look nicer.



Acrylic plastic is a manmade material which comes from oil. It is a thermoplastic so it can be recycled and remoulded numerous times. It comes in a range of forms and colours and often replaces glass. It is waterproof and light shines through it.



Neoprene is a form of thermoset plastic so it cannot be recycled. It comes in a range of forms and colours and is often used in fashion as it is soft and comfortable as well as waterproof. If neoprene burns, it lets off toxic fumes.



MDF is considered            **Environmentally Friendly**            as it is made

### KEY WORDS

from recycled wood.

**Malleable Safe**

Acrylic can be heated and            **Re-moulded**            to make other products.

**Environmentally Coloured**

Neoprene is soft and bendy therefore is considered to be            **Malleable**           .

**Friendly Re-moulded**



# DESIGNING PROCESSES



DEVELOP  
A DESIGN  
BRIEF

WHO? (User)  
WHAT? (Product)  
WHY? (Need)

RESEARCH  
& ANALYSIS  
eg customer profile,  
existing product analysis,  
market research,  
anthropometrics &  
ergonomics

SPECIFICATION  
List of conditions to meet when  
designing and making your product  
(ACCESS FM)

IDEAS  
Initial Sketches

DEVELOPMENT  
Detailed scale drawings, materials,  
construction methods of chosen designs,  
social, moral, environmental  
& sustainability issues

TESTING &  
EVALUATION  
How could the design be  
improved/modified?

MAKE  
Prototype

PLAN  
Manufacturing  
Criteria

FINAL  
DESIGN

MODEL  
Test & improve  
design

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# PRODUCT ANALYSTS

We use ACCESS FM to help write a specification (a list of requirements for a design) and to help us analyse and describe an already existing product.

Aesthetics



What does the product look like (eg. shape, colour, form, size)?  
Do you think it looks attractive?  
Why? Where did the designer get their inspiration?

Cost



How much does the product cost to make?  
Is it value for money? Will it make a profit?  
Is it affordable to your consumer?

Customer



Who is the target market?  
Why would a consumer buy it?  
What impact would it have on their life

Environment



What is the product's impact on the planet?  
How long will it last?  
Can it be recycled?

Safety



Is it safe for the consumer?  
Does it meet safety standards?  
Is the product high quality?

Size



Is it an appropriate size?  
Has the designer considered anthropometrics? What are the measurements in mm?

Function



What does it do? Does it work?  
Is it easy to use? Why is it needed?

Materials



What is it made from? Would a different material make it better?  
What impact could the choice of material have on the environment?

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Finishes are added to woods to protect them from rotting and insects, to make them last longer and to make them look nicer. These finishes can be applied with a cloth, brush or a spray.

**Different processes**



**for metal and for wood**

**Wood stain**

**varnish**

**Sealer**

**Paint**

**French polish**



# Design Technology

## Revision sheet booklet

Subject contents covered  
in Year 8

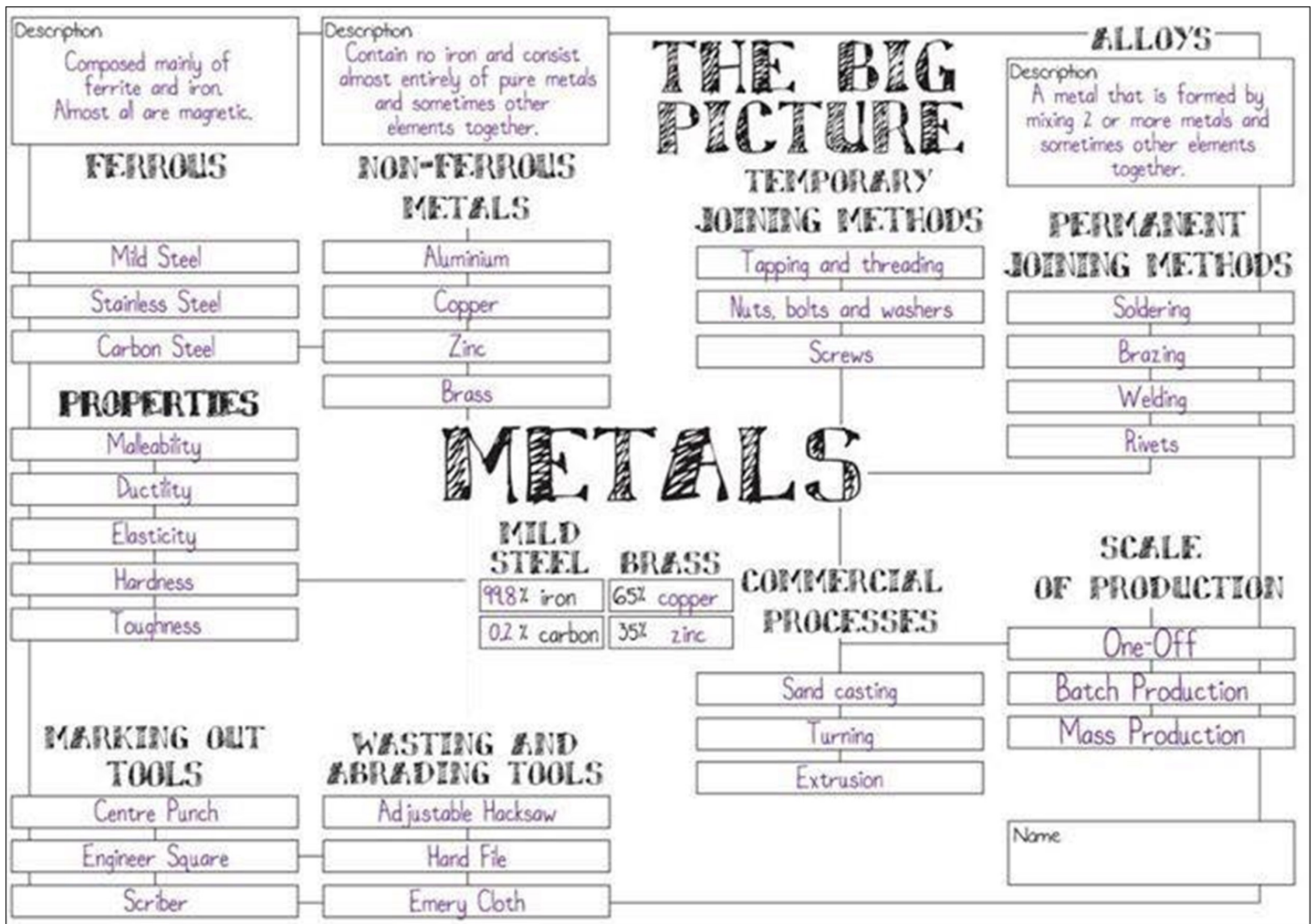


# Metals:

The majority of Ferrous metals are Steels, these Iron based alloys are created from a raw material known as Iron Ore.

Iron Ore is burnt using Coke (Coal). The Carbon removes the oxygen from the Ore, but the carbon left in the Iron affects the properties of the Iron.

By adjusting the carbon content the properties can be changed.



# Tools for Metals:

Guillotine former roller



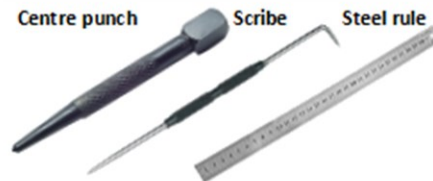
A guillotine is to cut sheet metal— A former bends the metal to a certain angle—a roller curves the metal.

Tin snips



Tin snips manually cut sheet metal like scissors cut paper

Centre punch Scribe Steel rule



A centre punch dints the metal to stop the drill bit from sliding—a scribe scratches the metal to mark where to cut—a steel rule is used to measure.

Pop Rivet Gun and rivet



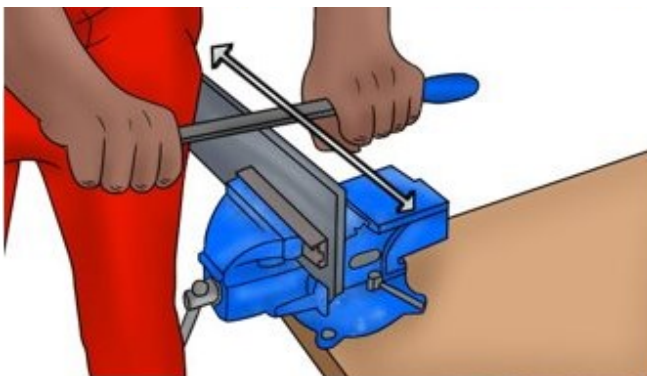
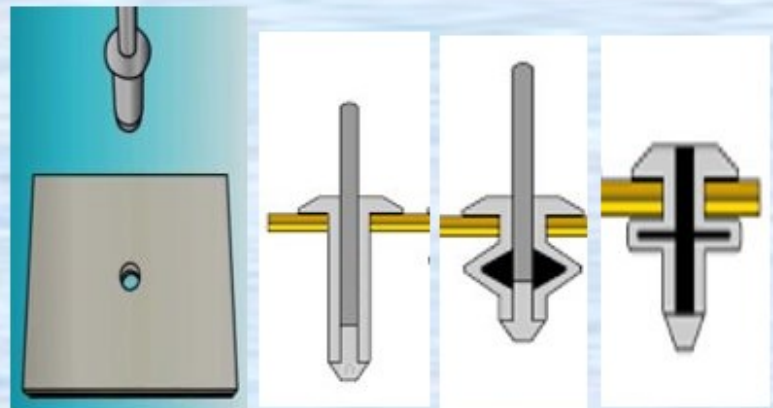
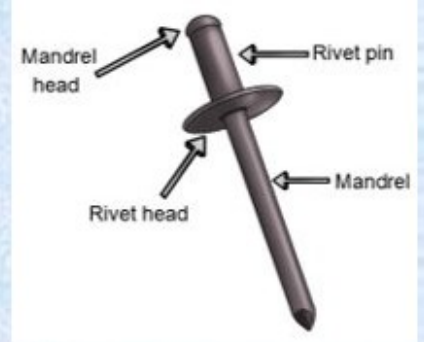
A pop rivet gun allows you to join sheet metal together using a rivet.

## Semi Permanent Joining

## Pop Riveting



A Pop Rivet is a quick method of joining sheet metal together. This process is often used to join sheet material to a hollow tube.



**Draw filing** is a technique used for producing smooth, square edges, particularly on pieces of metal. The process works by moving any type of single cut file forwards and backwards along the length of the material's edge.

1



2

Emery Cloth

3



Wire Wool



Most plastics are made from Crude Oil



But it's running out!

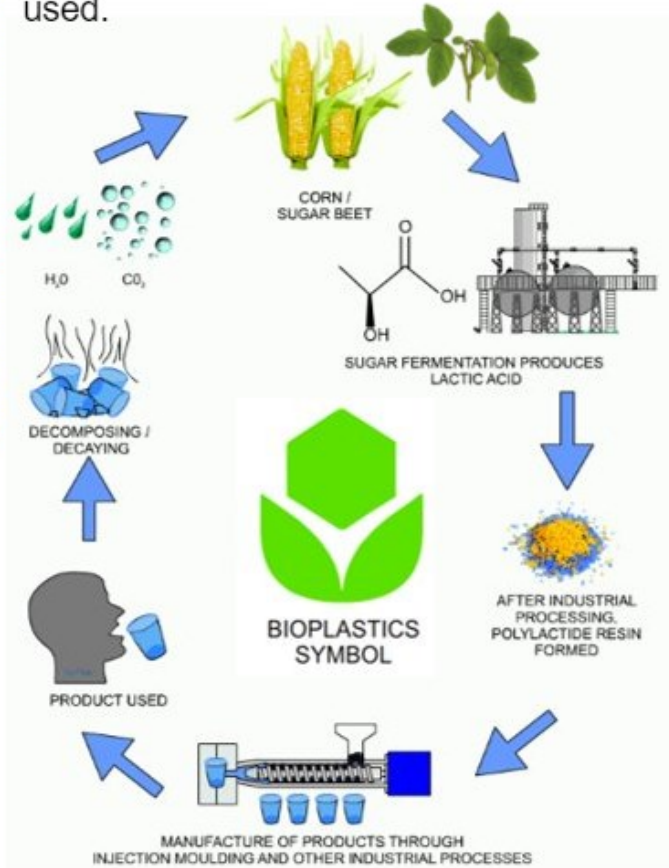


Fossil fuels are a **finite** resource, meaning they can't be replaced once they run out

Plastics can take 100's of years to **decompose** in **landfills** and threaten **wildlife**



**Bioplastics** are being developed & can decompose in just 5 years. They are made from synthetics such as **corn & soya starch**, meaning no crude oil is used.



## Thermo-plastics & Thermo-setting plastics

### Thermo-plastics

- Can be heated and **reshaped** many times
- Are **recyclable**
- Usually quite **flexible**
- Commonly used in **packaging, bottles, toys, plastic bags**
- **Melts** when heated
- Old products can be melted down in factories to make **new objects**



### Thermo-setting plastics

'Set' like jelly

- Can **only** be heated and shaped **once**.
- Usually quite **rigid**
- Commonly used to make things that become **hot** (eg- **kettles, plugs, kitchen utensils**)
- Does **not melt** when heated, **burns** instead
- **Cannot** be recycled
- Once the product becomes unusable, they are disposed of in **landfills**





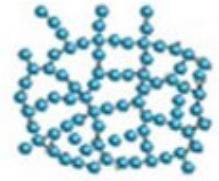
# Molecular structure of plastics

## What are Elastomers?

- o Thermoplastics
- o Thermosets
- o Natural
- o Synthetic
- o Can be stretched to many times their original length
- o Can bounce back into their original shape without permanent deformation



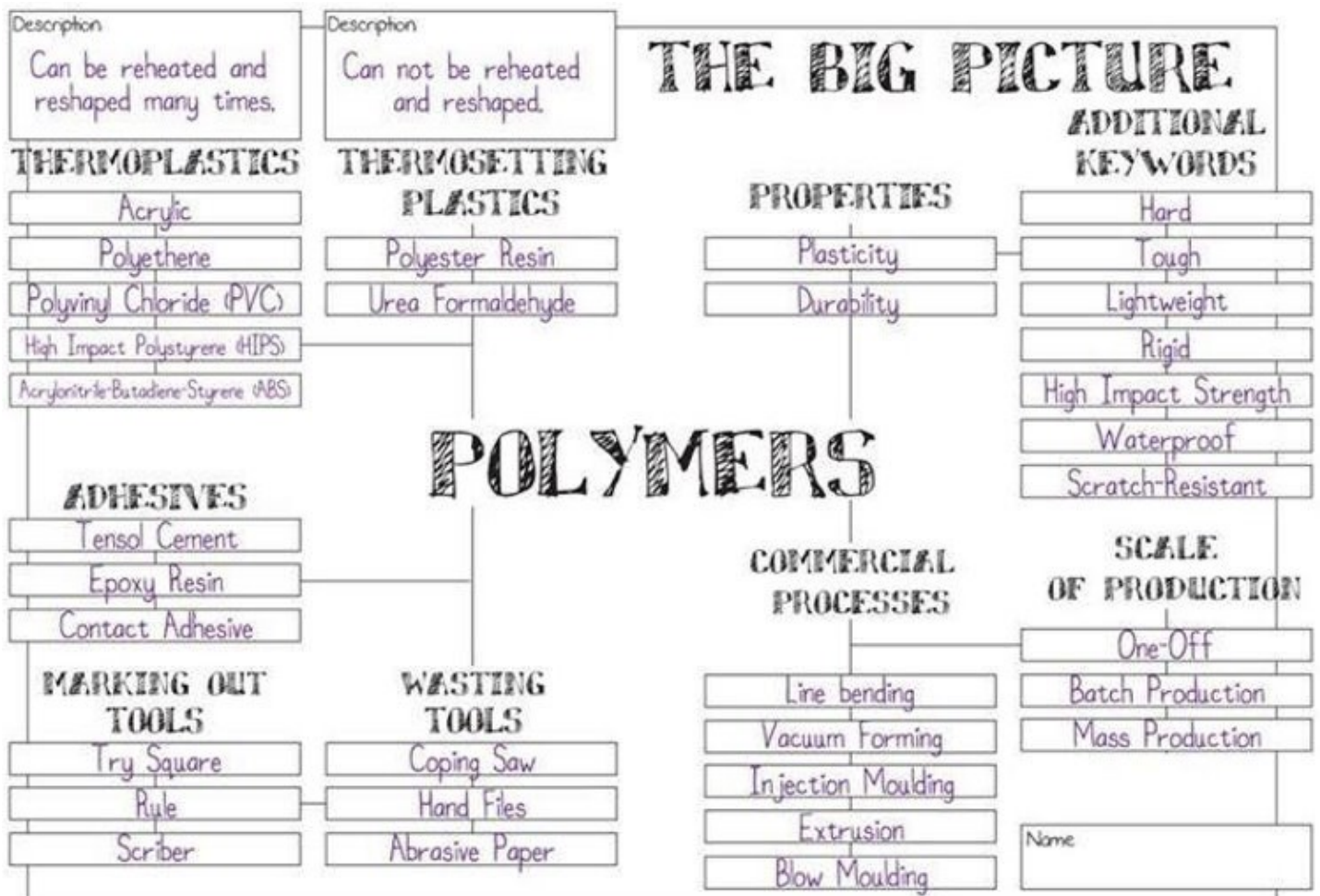
Thermoplastic



Thermoset



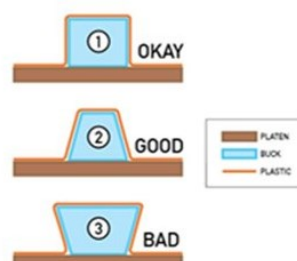
Elastomer



## Moulds:

2 Part Mould

Tapered Moulds



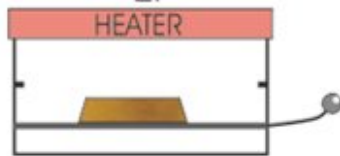
# Vacuum Forming How does it work?

1.



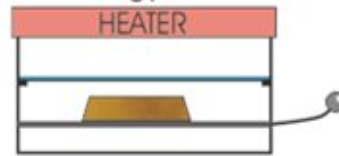
A SUITABLE MOULD / FORMER IS CAREFULLY MANUFACTURED

2.



THE MOULD IS PLACED IN THE VACUUM FORMER

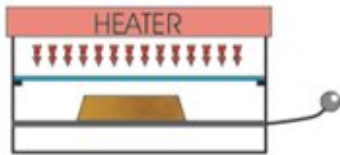
3.



PLASTIC SHEET IS PLACED ABOVE THE MOULD AND CLAMPED SECURELY.

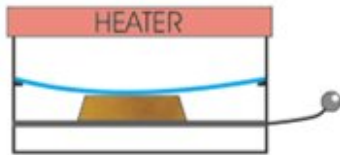


4.



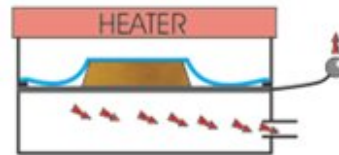
THE ELECTRIC HEATER IS TURNED ON TO WARM THE PLASTIC SHEET.

5.



THE PLASTIC BECOMES FLEXIBLE WHEN HEATED

6.



THE AIR IS PUMPED OUT OF THE AREA BELOW THE PLASTIC AND MOULD.

7

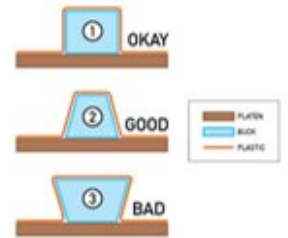
The plastic cools around the mould.

8

The platen and mould is lowered releasing the mould.

9

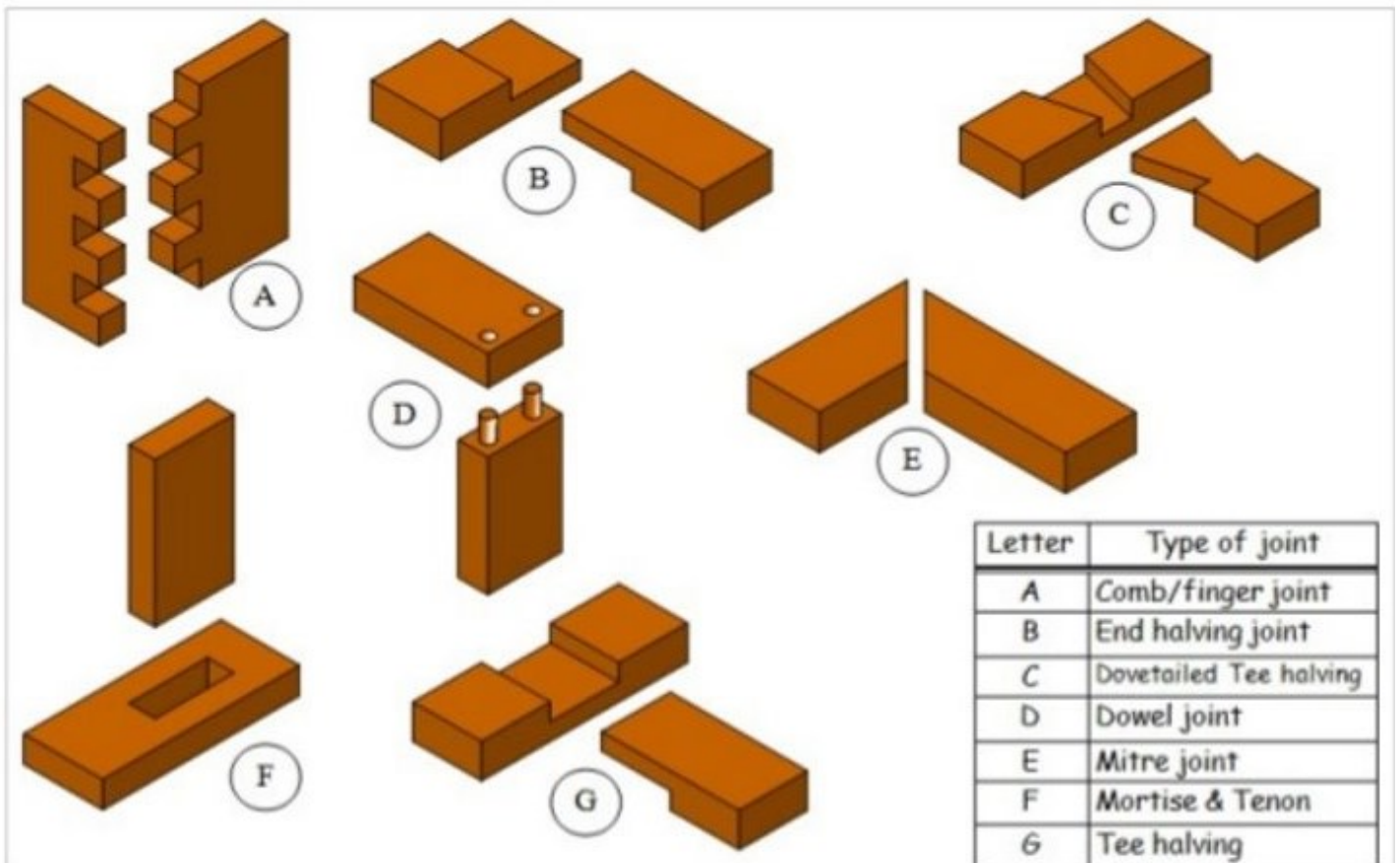
The excess plastic is cut, completing the product.



Explain why number 2 is the best shaped mould.

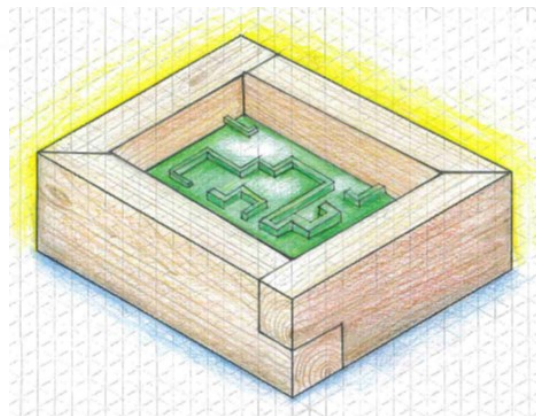
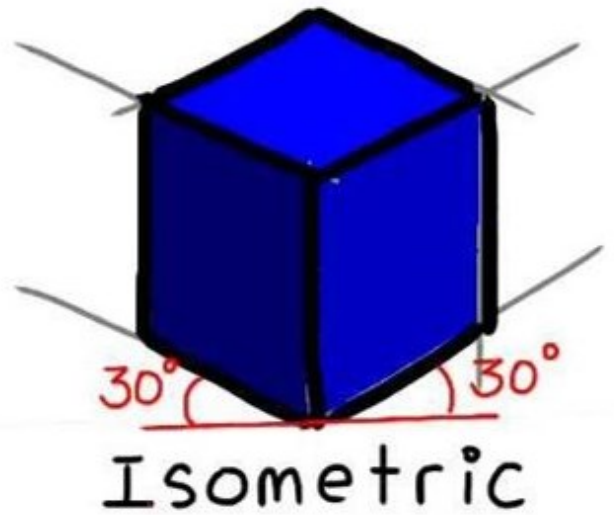
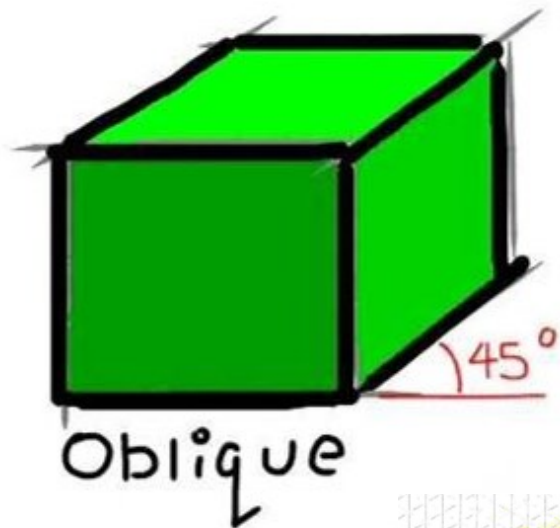
The sides of the mould are tapered (angled) so the mould can come out and be reused again and again.

# Wood joints - Focus on wood Joints



Letter	Type of joint
A	Comb/finger joint
B	End halving joint
C	Dovetailed Tee halving
D	Dowel joint
E	Mitre joint
F	Mortise & Tenon
G	Tee halving





Up-levelling your Isometric design- How to get top marks

Have you made the plastic look **shiny**?

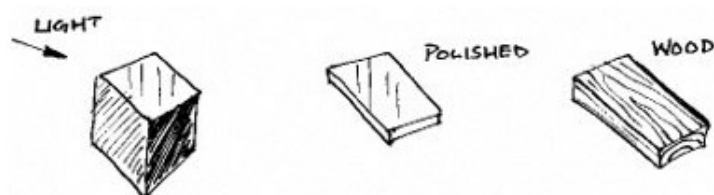


Is your track design **3D**?

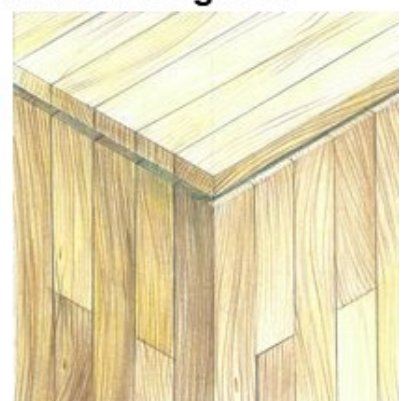
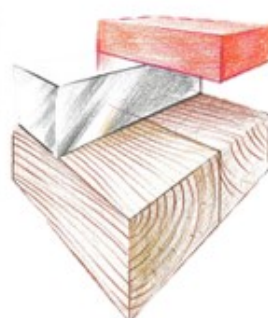


Have you used **gradient** shading?

Have you included **wood grain**?



Have you included **texture**?  
-Shiny/matt/smooth/coarse





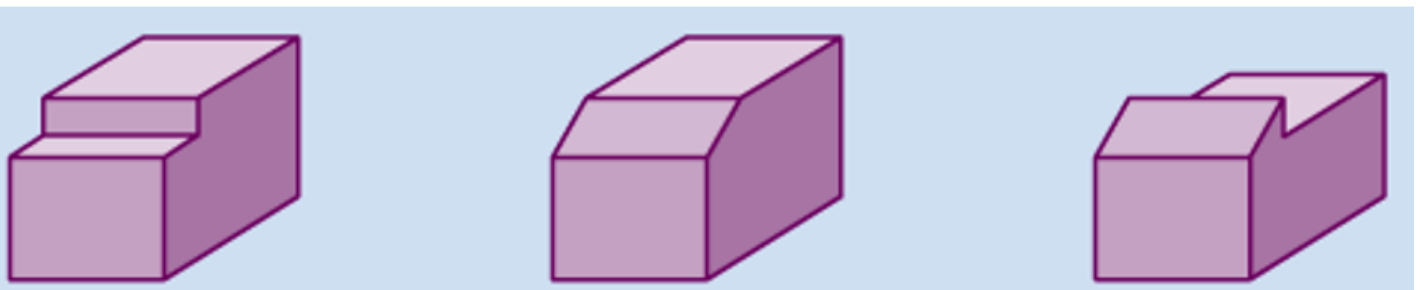
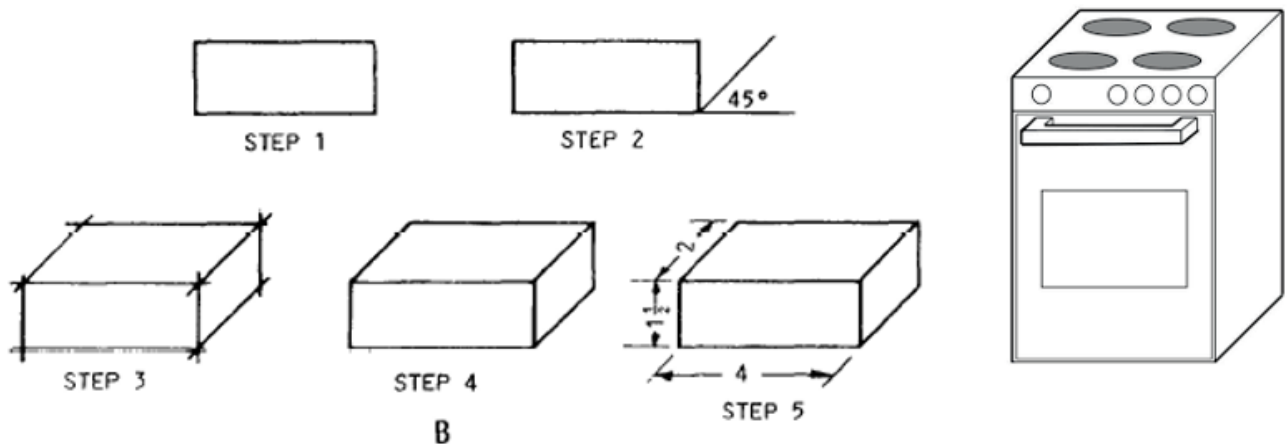
# Design Technology

## Revision sheet booklet

Subject contents covered  
in Year 9

# Oblique

Is a way of presenting designs/**drawings** in three dimensions. In order for a design to appear three dimensional, a 45 degree angle is applied to its side. The cooker below, has been **drawn** in **oblique** which is an **inaccurate** form of drawing in 3D.

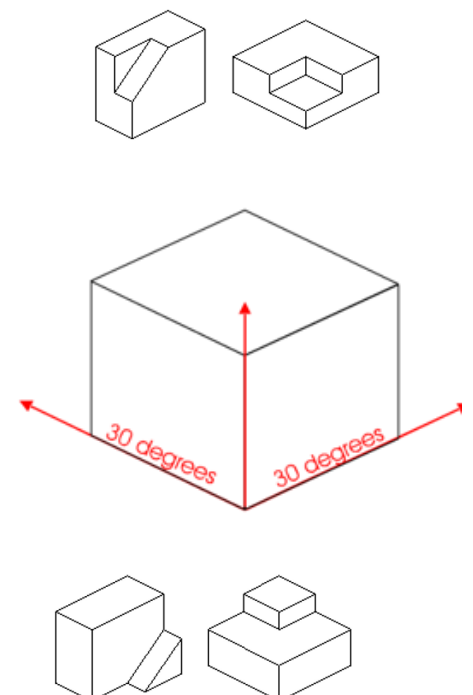
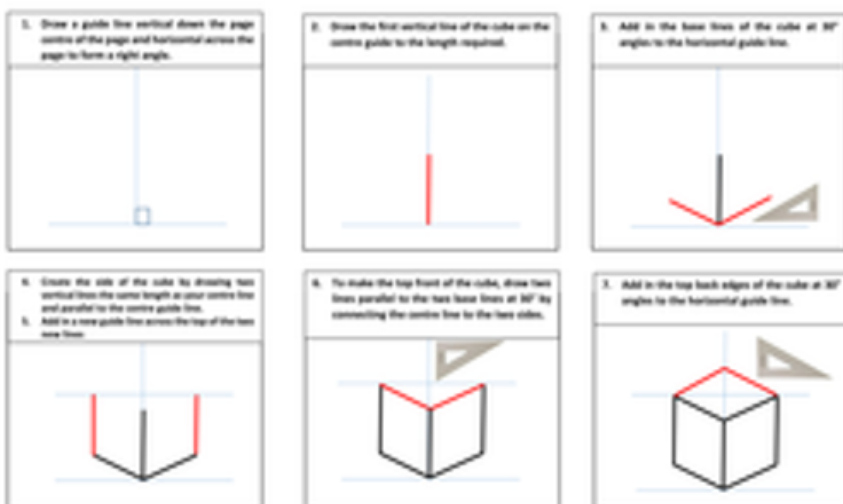


# Isometric Drawing

Is way of presenting designs/**drawings** in three dimensions. In order for a design to appear three dimensional, a 30 degree angle is applied to its sides. The box below, has been **drawn** in **isometric projection** which is a more realistic view than oblique. Drawing on isometric paper allows for more accuracy.

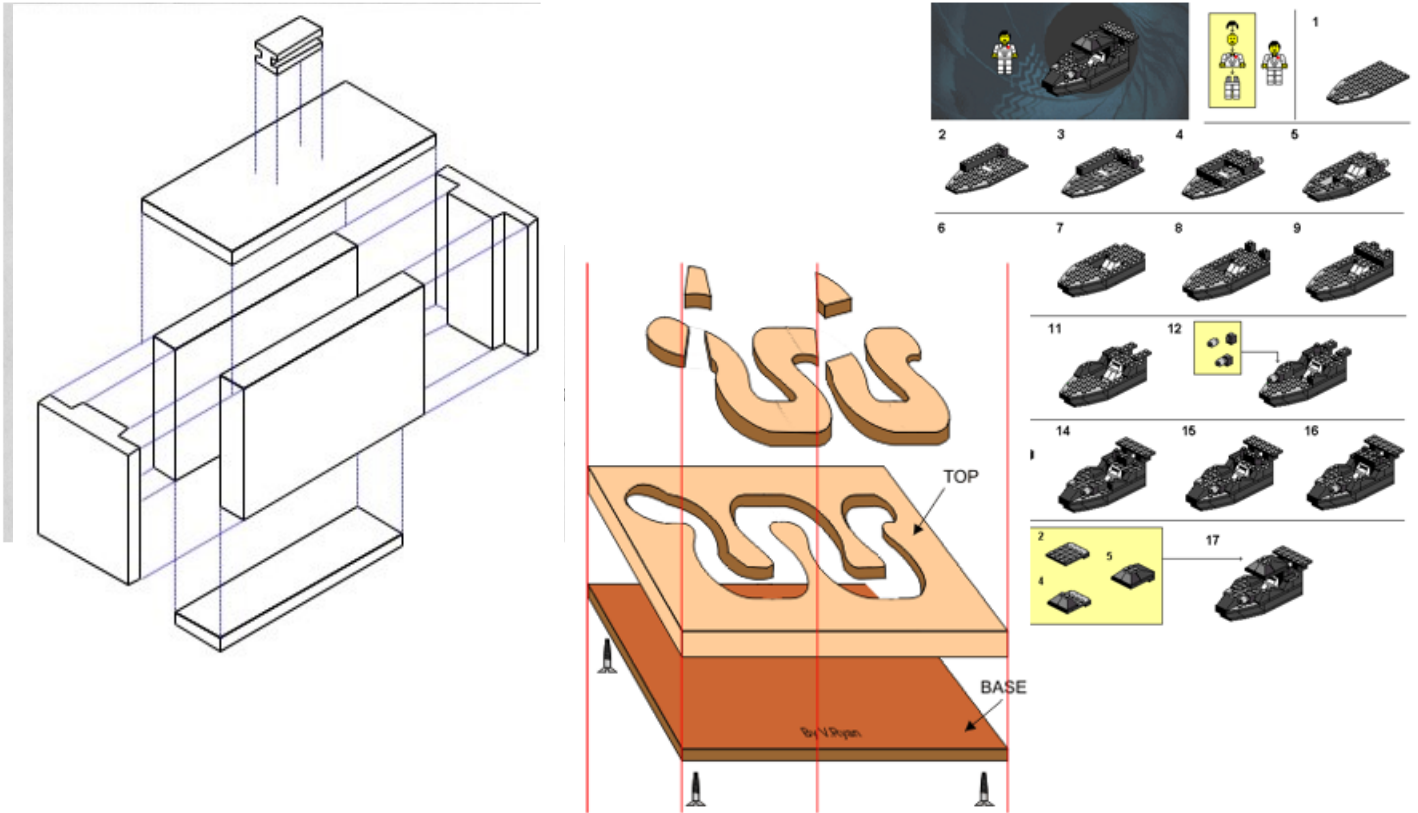
## Isometric Projection

Key words: parallel right angle vertical horizontal diagonal equal isometric edge



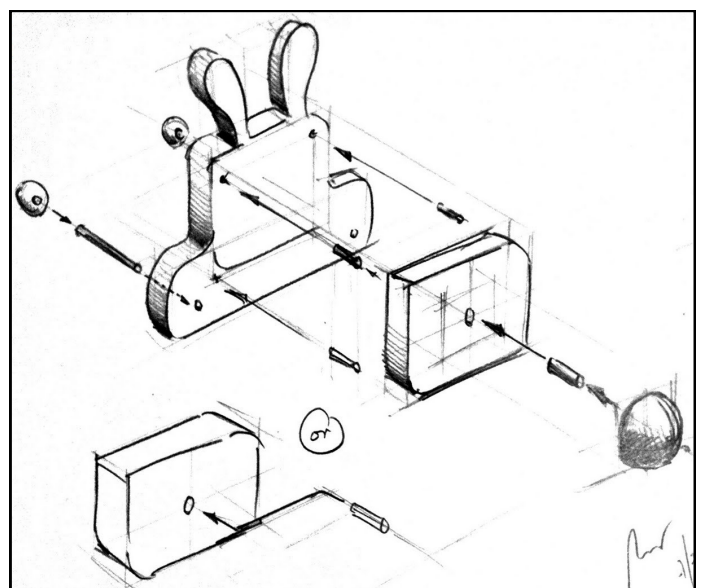
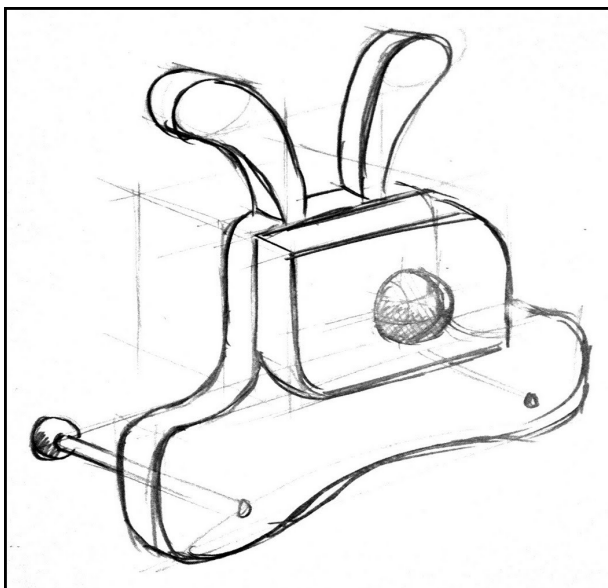
# Exploded view

'Exploded view' or 'assembly drawing' shows an object broken into **component parts** for use in an instruction manual or parts ordering. It also helps people understand how the product is **assembled**.



Isometric View

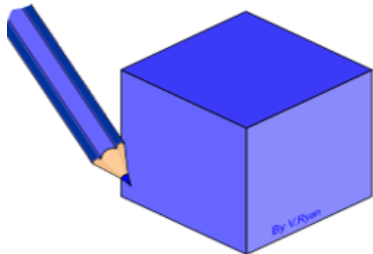
Exploded View





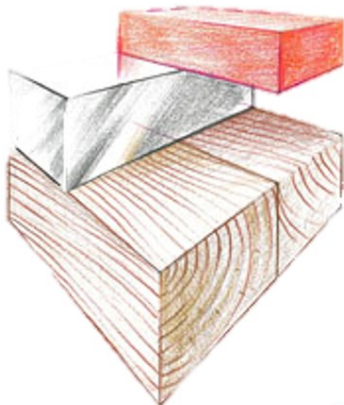
# Rendering (colouring in), shading with a light source and texture

## 3 Tone shading



### Flat surfaces

Texture

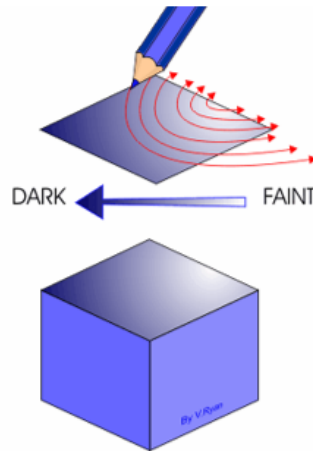


**Wood**  
Add the grain to the shape including the knots. Colour with various browns and yellow.

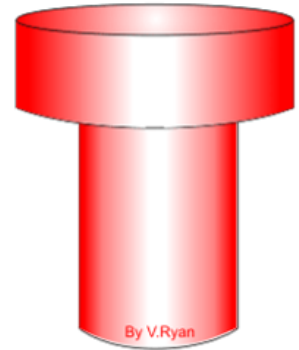
**Metal**  
Add parallel lines of varying width to the surface. Colour using greys and black.

**Rubber**  
Round the colours to soften the shape. Remove the front edges and replace with dots. Colour as required.

## Gradient shading



### Curved surface



**Concrete**  
Roughen the edges of the shape. Use random circles on the surfaces. Colour using blacks and greys.

**Glass**  
This shape will be clear so draw in the back edges. Use light blues to colour.

**Plastic**  
Colour the shape as required. Remove parallel highlights with a ruler and rubber.

## Why do we redesign Products?



New Materials are invented



Technology becomes smaller



Modernising



Adding Features



New technology is invented.



Solving problems

## Technology push

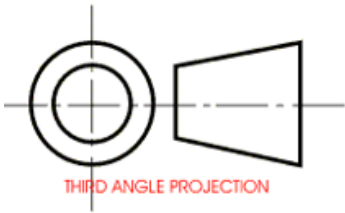
- New technology is often pushed on to the market, driven by research
- Often consumers are not aware of the new technology or the advantages it may bring
  - Some products might not be very useful or necessary, others may do the job perfectly and not change for decades
  - Compare the microwave with the electric carving knife
  - E.g. Self driving cars



## Market pull

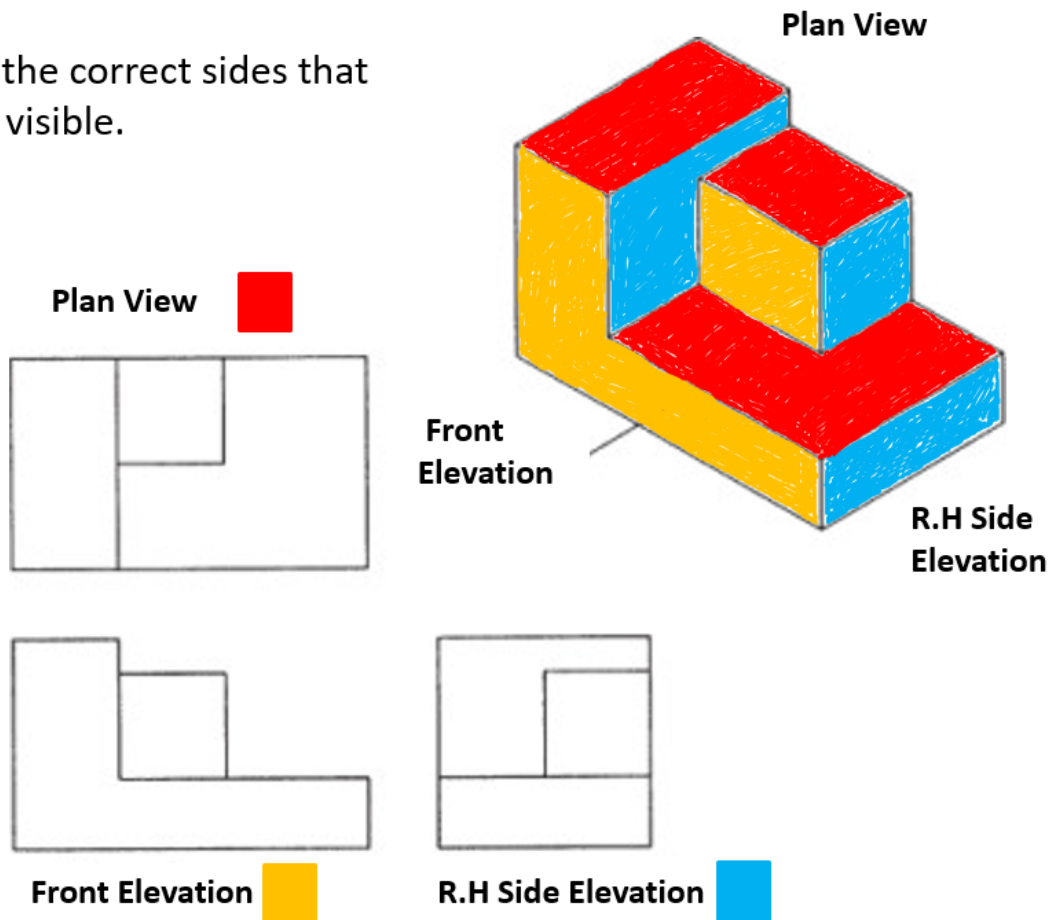
- Consumer driven pressure causes manufacturers to continuously develop new products or add functionality to existing products
  - How would you feel if next year's smartphones had no greater functionality and were no smarter than at present?
  - We demanded larger screen phones due to the how we now use these devices.





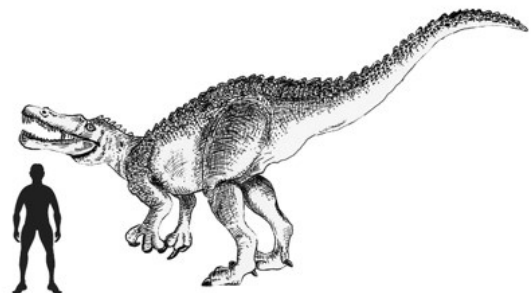
Orthographic Projection is a way of drawing an object from different directions. Usually a front, side and plan view are drawn so that a person looking at the drawing can see all the important sides.

Colour in the correct sides that would be visible.



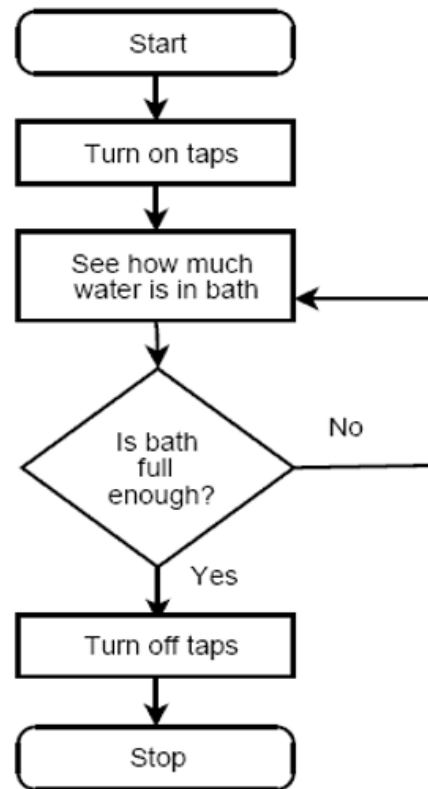
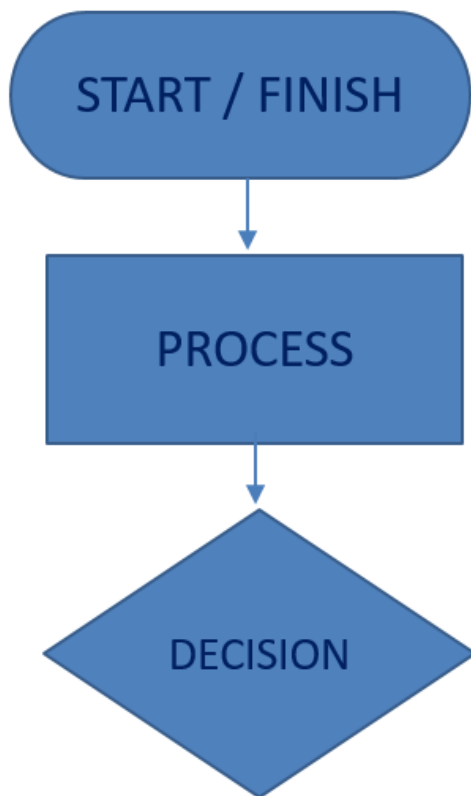
## Scale

- If a scale is written with a larger number first then the drawing is larger than real life. E.g. 2:1 is double real life size.
- If a scale is written with a smaller number first then the drawing is smaller than real life. E.g. 1:2 is half real life size.





# Flow charts



## Quality Control (QC) & Quality Assurance (QA)

**Quality Control** is a system of maintaining standards in **products** by testing it against the specification. E.g. Using robots to repeatedly test the product or checking a product is correct, safe and fit for purpose.



**Quality assurance** is the methods used to prevent mistakes and defects in manufactured products and avoiding problems when delivering products or services to customers. E.g. checking ingredient expiry date, maintaining machinery and equipment, training staff on hygiene etc.

