



HAZELWOOD
INTEGRATED COLLEGE

Yr. 8

Technology and Design



Knowledge Organiser

Name: _____

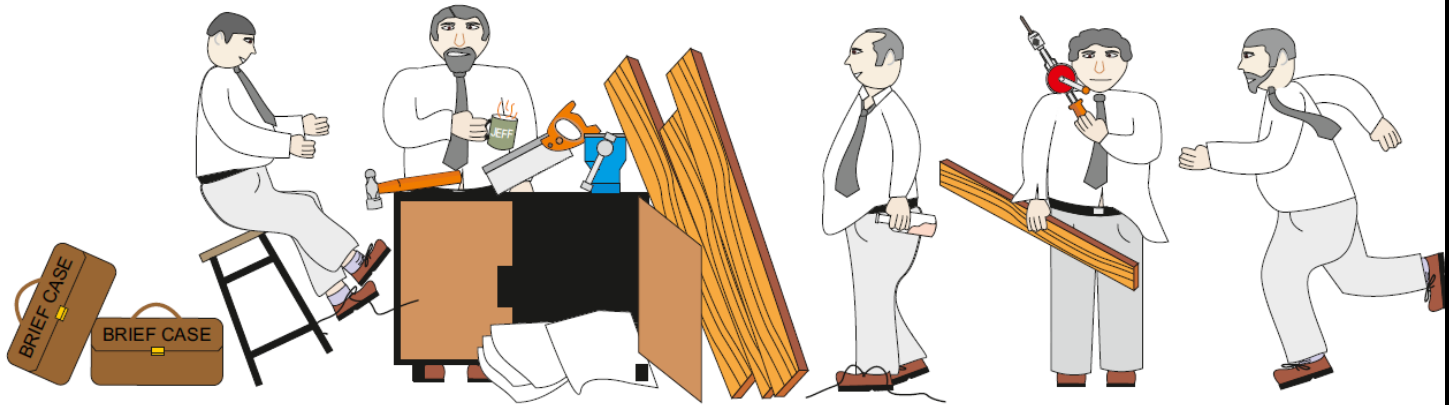
Class: _____

Year 8 Technology and Design Revision Checklist

Time	Topic	Done
Term 1	Health and Safety	
	Woods - Hardwoods	
	Woods - Softwoods	
	Woods - Manufactured Boards	
Term 2	Metals - Ferrous	
	Metals - Non- Ferrous	
	Plastics - Thermoplastics	
	Plastics - Thermosetting Plastics	
Term 3	Designing - 2D	
	Designing - 3D	
	Shading	

Health and Safety

The diagram below shows a series of Health and Safety problems. Look at the diagram carefully and list all of the problems you can see



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Workshop Safety Rules



Safe ED

Before you can use equipment and machines or attempt practical work in a workshop you must understand basic safety rules. These rules will help keep you and others safe in the workshop.

Safe Ed (left) always thinks about working safely. On the other hand, Ed the Handyman (right) never considers safety. Not only is he at risk of having an accident but so are those who work near him. They could have an accident because of his reckless behaviour.



ED the HANDYMAN

Here are some safety rules that you must follow when doing any practical activity in the workshop

1. Always listen carefully to the teacher and follow instructions.
2. Do not run in the workshop
3. Know where the emergency stop buttons are positioned in the workshop
4. Always wear an apron as it will protect your clothes and hold loose clothing such as ties in place.
5. Wear good strong shoes. training shoes are not suitable.
6. When attempting practical work all stools should be put away.
7. Bags should **not** be brought into a workshop as people can trip over them.
8. Do not use a machine if you have not been shown how to operate it safely by the teacher.
9. Always use a guard when working on a machine.
10. Keep hands away from moving/rotating machinery.
11. Use hand tools carefully, keeping both hands behind the cutting edge.
12. Report any damage to machines/equipment as this could cause an accident

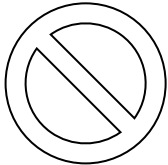
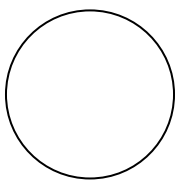
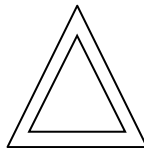

Look at the list of safety rules in the workshop and write down 5 of them that you can easily remember

1. _____
2. _____
3. _____
4. _____
5. _____

Safety Symbols

Safety symbols are used everywhere we go. In the workshop they are used to tell us important information that keeps us safe.

Below is a table of symbols that you will need to know - they can be divided into 4 sections.

Types	Prohibition Signs	Mandatory Signs	Warning Signs	Safe Condition Signs
Meaning	You must not. Do not do. Stop.	You must do. Carry out the given action.	Risk of danger	The safe way. Where to go in an emergency
Colour	Red/White	Blue/White	Yellow/Black	Green/White
Shape				

Colour each of the signs its proper colour

Hazard



Toxic



Corrosive



Explosive



Harmful / Irritant



Hazard warning



Flammable



Electricity

Prohibition



Do not run



No eating or drinking

Mandatory



Wear eye protection



Wear hand protection



Use welding mask



Use face shield

Safe Conditions Sign



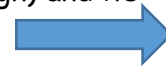
First aid










Location of first aid eyewash

Test yourself

*please note that you will need to remember its type (warning sign) and its meaning (corrosive)



Sketch of Symbol	Type of Symbol	Name of Symbol
		
		
		
		
		
		
		

Woods

Woods can be identified by 2 main groups - Hardwoods and softwoods

Hardwoods

Hardwoods have the following properties to make them easy to remember

- Takes over 100 years to fully mature
- Heavier than softwoods
- Come from deciduous trees (loses its leaves in winter)
- More expensive than softwoods
- Mainly used for furniture and flooring

Oak

Light tan in colour and straight grained. High quality timber.

Moderately hard to work with hand tools. Tools should be kept sharp. Produces a high quality finish with wax, furniture oil and varnish.

Uses include; quality furniture, cabinet making and boat building.



Ash

Colour - cream to pale tan. Tough, flexible and straight grained, very good steam bending qualities. Can be shaped and formed well with handtools. A smooth finish can be achieved and stains well.

Used for cabinet making, boats and handles of tools. Ash veneered plywood is popular.



Mahogany

Medium to dark brown in colour. Relatively easy to work with hand tools and machinery. Produces a good quality finish with glass paper. Takes varnish well.

Wide range of uses including furniture and boat building. Used widely as veneer.



Beech

Pale white to pink brown in colour. Very good for steam bending. It can be worked reasonably well with hand tools and machinery.

Used for quality furniture, handles, manufacturing chairs and good for wood turning. Often used as a facing for plywood.



Test yourself

1. Write a general description of the nature of hardwoods.

2. Complete the paragraph on Oak, by adding the missing words.

Light tan - straight - Moderately - wax - cabinet making

_____ in colour and _____ grained. High quality timber.
_____ hard to work with hand tools. Tools should be kept sharp. Produces a high quality finish with _____, furniture oil and varnish. Uses include; quality furniture, _____ and boat building.

3. Name the hardwood Medium to dark brown in colour and relatively easy to work with hand tools and machinery.

4. Describe two main uses of the hardwood you named in question 3.

(i) _____

(i) _____

5. Study the trees below. Write the correct name above each one.



Softwoods

Softwoods have the following properties to make them easy to remember

- Takes over 30 years to fully mature
- Lighter than hardwoods
- Come from evergreen trees (doesn't lose its leaves in winter)
- Less expensive than hardwoods
- Mainly used for furniture and flooring

Pine

Virtually knot free with straight grain, making it ideal for a range of uses. Light brown. Very easy to cut and shape, meaning accurate work is easier to achieve than with most softwoods and hardwoods. A smooth finish can be achieved.

Used in the manufacture of furniture. Often used for turning wood products. Used to manufacture plywood.



Cedar

Has a pleasant aroma, when cut and machined. Its straight grain means that it works well with tools and machines. Starts as reddish brown in colour, after weathering turns to a silver grey.

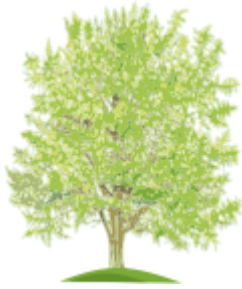
Used for decking, furniture and general construction. Used for roof shingles, due to its resistance to all weathers.



Yew

Straight grained which means it can be shaped and formed quite easily. However, the grain can sometimes be difficult to work. An oily wood that resists natural degradation from the weather and elements..

Used to manufacture both interior and exterior furniture e.g. chairs, gate posts and wood turning.



Fir

A reddish brown wood and relatively knot free. Good to work with handtools and machinery. When smoothed to a fine finish, the grain tends to stand out from the surface.

Used extensively in the construction industry and in the production of plywood. Also used in a range of joinery work.



Test yourself

1. Write a general description of the nature of softwoods.

2. Name a popular softwood that is a reddish brown wood and relatively knot free

3. Read the statements below and then name the softwood.

Has a pleasant aroma, when cut and machined.

Straight grain

When newly cut is reddish brown in colour.

After weathering turns to a silver grey.

Softwood name: _____

4. Study the trees below. Write the correct name above each one.



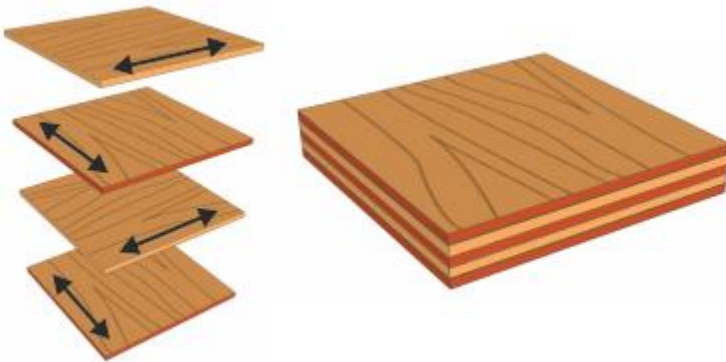
Manufactured Boards

- Manmade boards are *manmade*
- They are commonly used in the construction industry, for interior fittings and furniture.
- They are more stable than natural woods and are less likely to warp and twist out of shape.
- They are all manmade in factories / mills. They are usually composed of natural woods and resin, which binds them together.

Plywood

Plywood is a composite material. Composed of individual plies / veneers of wood. The plies are glued together with synthetic resin.

Plywood is less likely to warp or split, due to this construction. Supplied in a range of sizes and thicknesses.



Blockboard

type of plywood. Built up with a core of softwood strips bonded together with adhesive and covered with a sheet of plywood on either side.

Used as a building material and for furniture manufacture including fitted kitchens / bedrooms.

A strong and heavy board, unlikely to warp and twist. The plywood faces are normally beech or other natural woods.



Chipboard

This is made up of small chips of wood bonded together with resin and formed into sheets by compression.

It is not as strong as plywood or block board, but it is not expensive. Chipboard is often covered with a plastic laminate or wood veneer and used in cheap furniture. A particle board. Interior and moisture resistant chipboards are available.



MDF (Medium Density Fibreboard)

This is made up of small chips of wood bonded together with resin and formed into sheets by compression.

It is not as strong as plywood or block board, but it is not expensive. Chipboard is often covered with a plastic laminate or wood veneer and used in cheap furniture. A particle board. Interior and moisture resistant chipboards are available.



Hardboard

Made from wood fibres that have been pulped.

The pulp is put under pressure until the fibres bond to produce a tough board.

Standard hardboard is smooth on one side and rough on the other. It is not as strong as the other boards.

Duo faced hardboard has two smooth faces.

Used for hidden parts of furniture such as the back of a cupboard.



Test yourself

1. Write a general description of a manufactured board

2. Write a brief description of chipboard

3. Read the description below. Name the manmade board.

NAME: _____

A quality board, relatively cheap. Composed of fine wood dust and resin pressed into a board. Can be worked, shaped and machined easily. Paint can be applied to it, without the need for an undercoat or primer.

4. In simple terms, how is hardboard manufactured.

Metals

Woods can be identified by 2 main groups - Ferrous and Non-Ferrous

Ferrous

Ferrous metals have the following properties to make them easy to remember

- *Doesn't* contain iron (except for Stainless Steel)
- Can rust
- Heavier than Non-Ferrous metals

Mild Steel

Carbon 0.1% + Iron 99.9% = Mild Steel

Alloy of carbon and iron. Tough. High tensile strength. Can be case hardened. Rusts very easily, unless the surface is protected from moisture.

Most common metal used in school workshops. Used in general metal products and engineering.



Stainless Steel

Iron + Nickel + Chromium = Stainless Steel

Tough, resistant to rust and stains. Does not corrode.

Cutlery, medical instruments, specialist corrosion resistant products such as pipes. Stainless steel pots and pans. Jewellery and watches.



Iron

Cast iron has a carbon content higher than 2.1%.

Cast iron is brittle and can snap. Cast iron is likely to break/shatter if dropped or when it receives a 'blow'.

Products include; cast iron garden furniture, house numbers, weathervanes and vices.



Carbon Steel

Carbon 0.6 - 1.4 + Iron 99.4 - 98.6%

Alloy of iron and carbon. Higher carbon content than mild steel.
Tough and strong.

Carbon steel can be heat treated e.g. hardening and tempering.

Used for cutting tools such as drills and lathe tools.



What is an Alloy?

An alloy is a mixture of 2 or more metals joint together

Examples of this are as follows

Steel = Carbon + Iron

Brass = Copper + Zinc



Test Yourself

1. What is cast iron? List some cast iron products.

2. What is an alloy? In your answer, explain why mild steel is an alloy.

3. Mild steel is a very common alloy. State its carbon content. List some uses of mild steel.

4. What type of steel is used for cutting tools? List two cutting tools that are manufactured from the type of steel you have just named.

TYPE OF STEEL: _____

CUTTING TOOL ONE:

CUTTING TOOL TWO:

5. What is the composition of stainless steel?

6. What are the main physical properties of stainless steel?

7. Describe two uses / practical applications of stainless steel?

Plastics

Woods can be identified by 2 main groups - Thermoplastics and Thermosetting Plastics

Thermoplastics

Thermoplastics have the following properties to make them easy to remember

- Can be moulded and reheated many times
- Can be recycled

PVC

Polyvinyl Chloride. Better known as PVC. It is a tough material which can be purchased as a hard material or alternatively a flexible form.

It can be welded or bonded with an adhesive.

It has a range of uses including water pipes, raincoats, long play records, coating on electrical wires and many more.



Acrylic

This is the most common plastic in a school workshop.

It is purchased usually in the form of sheets and comes in a range of colours.

It can be translucent (e.g. smoked), transparent or opaque.

It is resistant to most acids and weather conditions



Nylon

Is used in engineering to make gears and bearings.

It's oily nature means that friction is reduced between moving parts made from nylon.

Gears, bearings, wheels and clothing



Test Yourself

1. Complete the paragraph on thermoplastics, by adding the missing words.

re-shaped - reheating - chemical - becomes weaker - recycled

These plastics can be re-heated and ____-____ in various ways. They become mouldable after _____ as they do not undergo significant _____ change. Reheating and shaping can be repeated. The bond between the molecules is weak and _____ when reheated, allowing reshaping. These types of plastics can be _____.

2. Acrylic, also known as perspex is used widely in schools. Why is this?

3. Write the full name of the material also called PVC.

4. Describe some of the physical properties of PVC

5. Why is Nylon often used in engineering?

Thermosetting Plastics

Thermosetting plastics have the following properties to make them easy to remember

- Can only be moulded once
- Cannot be recycled

Epoxy Resin

Many adhesives (glues) are thermosetting plastics.

A good example is 'Araldite' which is an epoxy resin that hardens when a second chemical is added (a catalyst).

It will bond most materials including woods and metals as well as some plastics.



Melamine Formaldehyde

Used in the production of plastic laminates because of its smooth surface and hygienic qualities for kitchen worktops.

It is also used in electrical plugs and sockets because it can be cast and it is an excellent insulator.



Urea Formaldehyde

Urea Formaldehyde has physical properties of high hardness and high toughness, making it suitable for strong, knock-resistant electrical fittings.

It is also scratch resistant and a very good electrical insulator, making electrical fittings manufactured from this polymer safe to use.



Test Yourself

1. Complete the paragraph on thermosetting plastics, by adding the missing words.

heated - cannot be - cross linked - molecules - dimensions

Once _____ and moulded, these plastics --- _____ reheated and remoulded. The molecules of these plastics are _____ in three _____ and this is why they cannot be reshaped or recycled. The bond between the _____ is very strong.

2. Name a glue that is a thermosetting plastic and describe how it is mixed.

3. Why is Melamine Formaldehyde used for the manufacture of kitchen worktops?

4. Urea Formaldehyde is also used for the manufacture of electrical plugs and sockets. Why ?
