Subject – Introduction Project	Year 7	Term Autumn 1st Half	Topic - Design & Technology Introduction

Key words	
Sustainability	the extent to which we can **continue** to use/do something at the same rate without using up all natural resources.
Brief	A **short description** of how the design problem can be solved.
Research	**finding information** about the needs and wants of the user, learning out about existing products, materials and processes.
Specification	A **list** of **measurable** design criteria, that the design must, should or could do.
Designing	Generating **thoughts** of possible **solutions** communicated through **sketches**, **CAD** drawings and **sketch models**.
Evaluation	Comparing the **idea** or **prototype** to the design **specification** to identify how successful it is and it how it can be improved.
Feedback	**Where** the client gives their **opinion** during the design process
Prototypes	A **working model** that can be tested against the specification.
Inclusive	How a design meets the diverse needs of people (i.e. capability, needs and aspirations)
Primary Processing	How **raw** materials are changed into **usable** materials i.e. Fractional **Distillation** - Crude oil into plastics, **Seasoning** - trees into wood, **Smelting** - ores into metal, **Pulping** plants into paper/card

Material Categories	
Wood	Hardwood, softwood and manufactured boards
Metal	Ferrous, Non Ferrous and Alloys
Plastic	Thermo and Thermosetting
Paper/ board	Board is thicker and more rigid than paper

Structures – Forces	
Shear	**forces** acting in **opposite directions** and cause parts of a structure to want to **slide past** one another
Tension	**forces** acting to **stretch** a structure, **pull** it apart.
Compr-ession	**forces** directed **towards** each other, causing an structure to be **squashed**.
Torsion	**forces** acting to **twist** structures

Environmental Responsibilities – 6Rs	
Recycle	Take an existing product that has become waste and **reprocess** it to use in a new product.
Rethink	**Ask** whether we can **sustain** our current way of life and the way we design and make.
Repair	When a product breaks, or doesn't function properly, is to fixed.
Reuse	When a product/parts of that has become waste is another purpose, **without processing** it.
Refuse	Don't use/ buy a product if they're not necessary or sustainable.
Reduce	Minimise the amount of material or energy used.

Product Analysis – ACCESS FM	
Aesthetics	Use adjectives to describe the look/style of the product (bright, dull, Functional, decorative, textured, smooth, shiny etc)
Client/ User	Who is it intended for? (age, gender, activity or profession) and why? Is it **inclusive** design?
Cost	What is the price (estimate if necessary)? Is this reasonable & why?
Environment	How is the environment affected by it's manufacture or use? (CO^2, Global warming, pollution, renewable/non renewable sources of energy or materials, 6Rs &, ethical sources etc.)
Safety	What has been done to avoid/minimise risks to health when using the product? Are there any restrictions (I.e. age) or standards that it meets? (BSI)
Size/Shape	Dimensions in **mm**, (estimate if non given). What is the shape/form? *Has anything to make it ergonomic (Overall shape, grooves, textured, etc that make it easy / safe/ comfortable to hold, use operate)*
Function	What is the product intended to do? Are there any special features that make the product more or less successful? How is it designed to fulfil the need of the user? Does it have any other features?
Materials Methods of Manufacture	What material and standard components is the product made from and why (properties)? What process were used to manufactured it?

Tools, resources & machines			
Try Square	Marks out lines at 90^0 to an edge	**Sand Paper**	Smooths wood
Tenon saw	Cuts straight lines in wood	**Belt Sander**	Shapes and smooths wood
Coping Saw	Cuts curved lines in wood, metal or plastic	**Pillar Drill**	Makes holes in materials

Command Words	
Name	Recall one or more pieces of information.
State	Write down what the term in the question means.
Give	Recall one or more pieces of information.
Describe	Give an account in words of someone or something including all of the relevant characteristics, qualities or events.
Explain	Make an idea, situation or problem clear by describing it in detail revealing relevant data or facts
How	Discuss the creation of something giving specific references to support.

Subject	Year 7	Term Autumn 1st Half	Topic - Design & Technology Introduction

1. Material Categories

Wood			Papers	Boards
Natural		manufactured	*Grid*	*Duplex*
Softwood	**Hardwood**	MDF	*Tracing*	*Foil Lined*
Pine	*Oak*	*Plywood*	*Cartridge*	*Corrugated*
Metals			**Plastics**	
Ferrous	**Non– Ferrous**	**Alloys**	**Thermo-plastics**	**Thermosetting plastics**
Iron	*Brass (also an alloy)*	*Mild Steel Brass*	*Acrylic*	*Urea Formaldehyde*

1	Shear 	**forces** acting in **opposite directions** and cause parts of a structure to want to **slide past** one another
2	Tension 	**forces** acting to **stretch** a structure, **pull** it apart.
3	Compressi 	**forces** directed **towards** each other, causing an structure to be **squashed**.
4	Torsion 	**forces** acting to **twist** structures

3. Environmental Responsibilities

1	Recycle	Take an existing product that has become waste and reprocess the material to use in a new product.
2	Rethink	Ask whether we can sustain our current way of life and the way we design and make.
3	Repair	When a product breaks down, or doesn't function properly, try to fix it.
4	Reuse	Take an existing product that has become waste and use the material or parts for another purpose, without processing it.
5	Refuse	Don't use or buy a product if you don't need it or if it's unsustainable.
6	Reduce	Minimise the amount of material you use.

4. MEDIUM DENSITY FIBRE BOARD (MDF) – Properties of: This board is composed of fine wood dust and resin pressed into a board. This material can be worked, shaped and machined easily. It can be painted without the need for an undercoat or primer. It has a smooth finish and no grain. It is commonly used in the building and furniture trades

5. UNITS OF MEASUREMENT You will also need to know the 3 different units of measurements and what they mean: you should be able to read in mm and cm from your rulers

MM – Millimetres **CM** – Centimetres **M** - Metres

Make sure you know the different tool names and their uses!

Tenon Saw– Used to cut straight lines through wood

Belt Sander– Used to smooth and shape wood

Ruler – Used to measure length

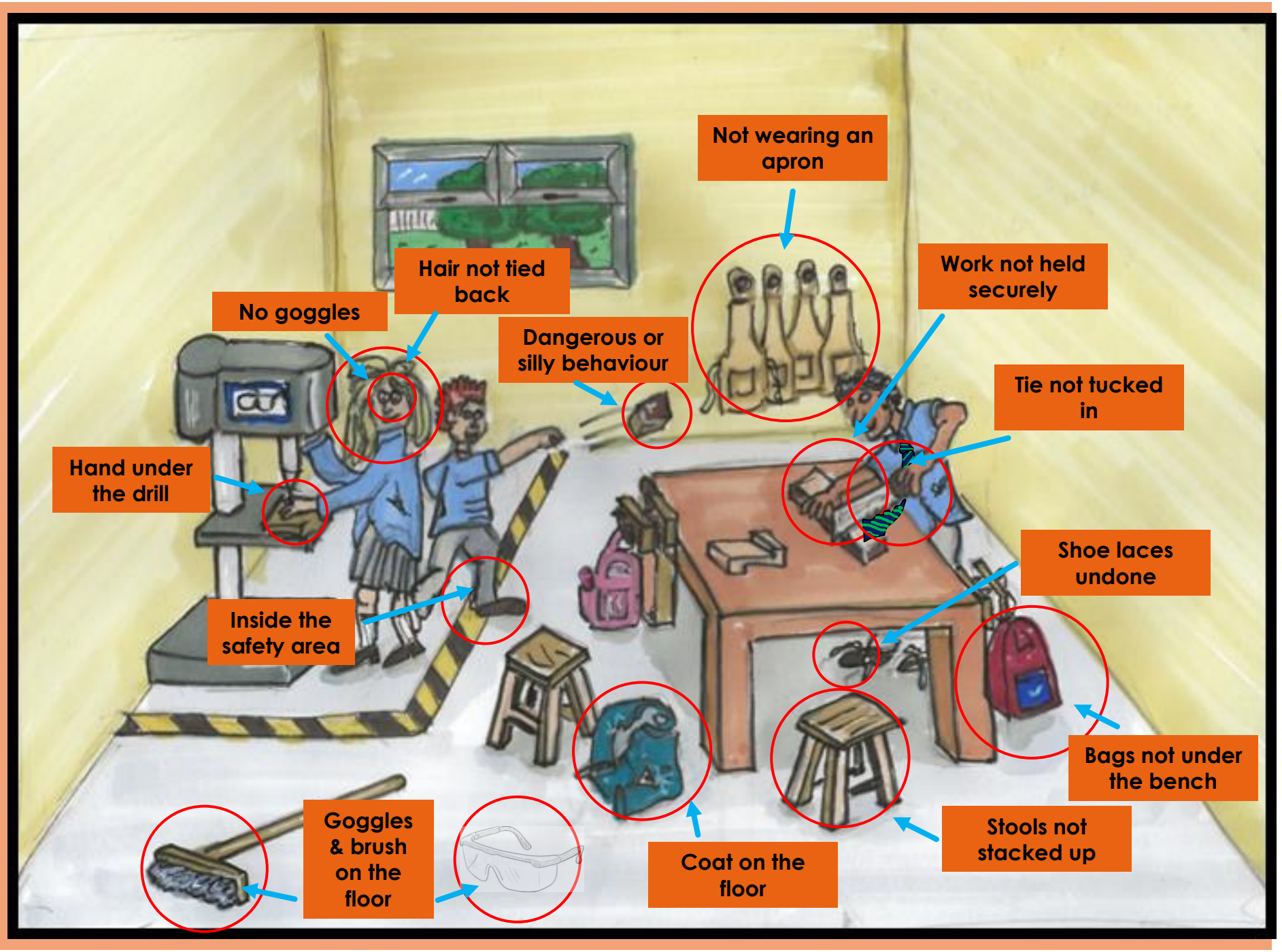
Bench drill – Used to make a hole through wood, metal or plastic

Coping Saw– Used to cut curved lines through wood, metal or plastic

Try Square – Used to check angles are 90°

Sandpaper – Used to smooth wood

Make sure you know the different hazards in the workshop and how you can avoid them!



Subject D&T | Year 7 | Topic – LAMP

Categories of Plastics (Polymers)

	Type	Description	Example
1	**Thermo-setting plastics**	•Initially set by heat. •Cannot be re-shaped once set. •Are very strong and durable.	Examples: **Urea formaldehyde, Melamine formaldehyde, Phenol formaldehyde.**
2	**Thermo-forming plastics**	• Mostly recyclable •Can be shaped and re-shaped by heat •Have a memory and will return to their original shape when heated •Cannot be re-shaped once set	Examples: **Acrylic, HIPs, Rigid Polystyrene, HDPE, LDPE, Polypropylene.**

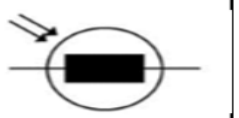
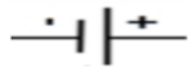
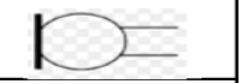
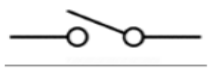
Categories of Wood

	Type	Description	Example	
1	**Hardwoods**	•Come from deciduous trees [lose their leaves in winter] •Usually grow in warmer climates [South America and Asia] •Grow slowly [80years+] to maturity •Are more expensive than softwoods. •Are more difficult to sustain than softwoods.	**B - Balsa A - Ash D - Deciduous H - Hardwood O - Oak T - Teak E - Expensive L - Loses leaves**	
2	**Softwoods**	•Come from coniferous [evergreen] trees with needle-like leaves. •Usually grow in colder climates [Scandinavia, Northern Europe]. •Are easier to sustain than hardwoods. •Are less expensive than hardwoods.	**P - Pine I - Indicates N - Needles C - Cedar E- Evergreen R -Redwood S- Softwood**	
3	**Manufactured Boards**	Are made from waste materials bonded together. •Come in sheet form [usually 1.2m x 2.4m] •Are very stable and have a uniform thickness. •Can be covered with a layer of veneer.	**S- Squashed L- Layers I- Industrial M- Manmade**	**C- Chipboard H- Hardboard I- Inexpensive M- MDF P - Plywood**

Key Words

1	Circuit	When electronic components are connected together to function
2	Finite source	A source of materials that will definitely run out. E.G. oil
3	Oil	Raw material for making plastic
4	Primary Processes	How raw materials are made into useful materials
5	Renewable source	A source of materials that will never run out. E.G Trees
6	Sustainable	If something be kept up/can it keep going or whether a resource can it be replaced
7	System	**Input-Process-Output components** working together to

Symbols used in Circuits

	Name	Symbol		Name	Symbol
1	LED		5	LDR (Light Dependent Resistor)	
2	Battery		6	Microphone	
3	Switch		7	Speaker	
4	Lamp				

1. Command Words

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2	State	Write down what the term in the question means.
3	Give	Recall one or more pieces of information.
4	Describe	Give an account in words of someone or something including all of the relevant characteristics, qualities or events.
5	Explain	Make an idea, situation or problem clear by describing it in detail revealing relevant data or facts
6	How	Discuss the creation of something giving specific references to support.

Subject D&T | Year 7 | Topic – CAD/CAM

Advantages and Disadvantages of CAD/CAM

	Advantages	Disadvantages
CAD Computer Aided Design	• It's easier to make drawings more accurate. • You can edit or change things very easily and quickly. • You can make identical copies very easily. • You can show different materials and views. • You can add lighting or special FX • You can email designs (environmentally friendly) • You can store lots of designs on a computer.	• Software and computers are very expensive. • You need training on the software – slow initially. • Viruses/hacking etc. • You need compatible software to share designs. • Cloud storage uses electricity
CAM Computer Aided Manufacture	• Easier to be accurate than making something by hand. • Can make identical copies very easily. • Machines don't need a rest and don't get sick so more can be made . • Do not need to consider health and safety – machines can work in hazardous environments with hazardous technologies.	• Machines are very expensive. • Employees need training– slow initially • Machines need maintenance – expensive. • Software can be corrupted.

The Purpose of Packaging

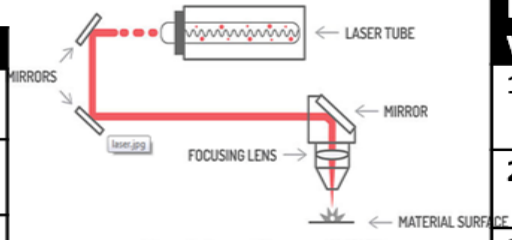
C	**Contain** – keep together
A	**Advertise** – promote
T	**Transport** – move from one place to another
D	**Display** – show what's inside, how to use etc.
I	**Inform**- give info about ingredients, manufacture etc.
P	Protect – keep safe/intact
P	Preserve –prevent contents going off

Key Words

1	CAD	Computer-Aided Design
2	CAM	Computer-Aided Manufacture
3	Symbol	a mark or character used as a representation of an object.
4	Annotation	Information that explains your ideas on a design
5	Label	A word or words that show a part of a design e.g. material
6	Composition	The layout of a page
7	Filament	A thin thread-like piece of material

How a Laser cutter Works

1	CAD created using CAD software i.e. 2D Design.
2	Send CAD file to laser cutter and select correct setting.
3	Focus lens to the surface of the material
4	Laser beam emitted from the laser tube and bounces off series of mirrors
5	The laser beam passes through a lens in the machine head to cut or etch the material surface below.



How 3D Printer Works

1	A 3D image created using CAD software.
2	The CAD file is sent to the 3D printer
3	The motor draws in the plastic filament, melts the plastic. and
4	Melted filament pushed through nozzle.
5	Printer lays down layer upon layer of material to build up the product

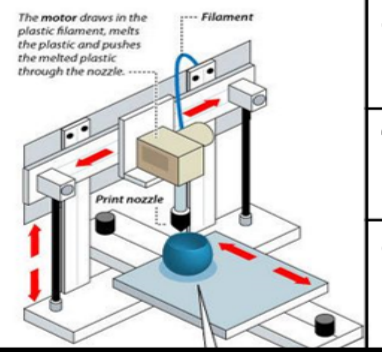


Photo shop Tools

	**Text tool** creates text		**Rectangular Marquee to** select and crop an area
CTRL+/-	**Key command** to Zoom in or out	CTRL T	**Key command** to selects, moves & resizes an object
	**Move tool** helps position selected content or layers		**Magic wand**- Selects areas to remove or recolour
CTRL Z	**Key command** Go back		**Magnetic lasso** selects a border that "snaps" to a pixilated edge of image.

Command Words

1	**Name**	Recall one or more pieces of information.
2	**State**	Write down what the term in the question means.
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6	**How**	Discuss the creation of something giving specific references to support.

Frayer Model

Bridgewater High School

Definition

Finite - Limited in size or amount

Infinite – Limitless or endless in space, amount or size…
Impossible to measure or calculate

Characteristics

Finite resources are coal gas and oil

Infinite resources are paper, wool, cotton

.

Finite/Infinite

Synonyms

- Limited
- Restricted
- Definable
- defined

- Boundless
- Unbounded
- unlimited
- Without limit
- Without end
- limitless

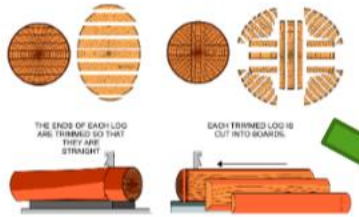
Choose one and put it in a sentence

Wood Processing

O1 To know the primary source of wood, the primary processing and sustainability.

O2. to be able to independently work safely, accurately and efficiently to produce quality practical work

Primary Processing of trees to make wood.



1. Mature trees are cut down, these are replaced by saplings. This makes the forest sustainable - what does this mean?
2. The tree trunks are stacked, this allows some water to evaporate making them lighter. They are then taken to the sawmill.
3. The logs are transported on wagons. In the tropics, logs are floated down rivers carried by the current to the sawmills.
4. The logs are cut into boards. They might be left rough sawn or planed for a smoother finish.
5. The timber is then stacked and separated. This provides cover from the rain but allows air flow to dry the moisture out. **SEASONING**

Wood Processing

WHY DO WE SEASON IT?

- To allow it to slowly dry out, avoiding warping and splitting

Wood

LO1. All pupils will be able to understand (know) why we use lighting.

LO2. All pupils will know where wood comes from, the types, primary processing.

LO3. All pupils will be able to independently work safely, accurately and efficiently to produce quality practical work

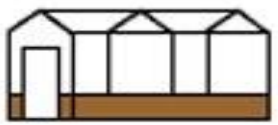
Plenary :- pupils will recap LO
Key words- _ mood lighting , task analysis, sources ,sustainability,

What does sustainable mean?

SUSTAINABLE FOREST LIFE CY

Practise

Explain



1 YEAR OLD

Seedlings grown in greenhouses until strong/ established.

5 YEARS OLD

Seedlings transplanted in sustainable forests

Young trees grown in a natural environment. Every five years they are thinned out to allow remaining trees to make more progress.

25 YEARS OLD

After twenty years trees are almost ready for felling. The growth of trees is monitored carefully. They are felled between twenty five and thirty years of age.

30 YEARS OLD

After felling, wood is sent to wood mill for making paper or timber for furniture or building.
Felled trees are replaced by planting seedlings. The twenty-five to thirty-five year cycle begins.

Highlight **key words** at each stage

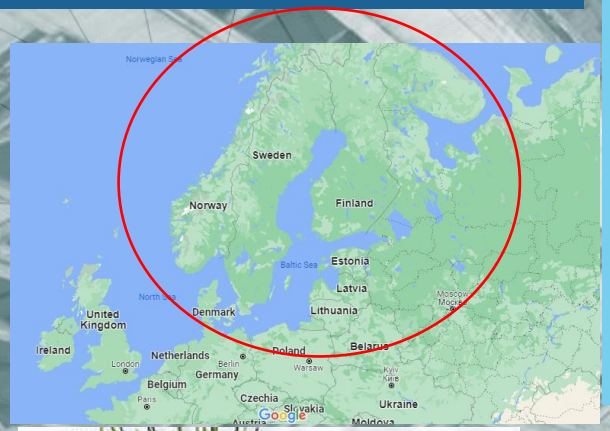
Categories of timber

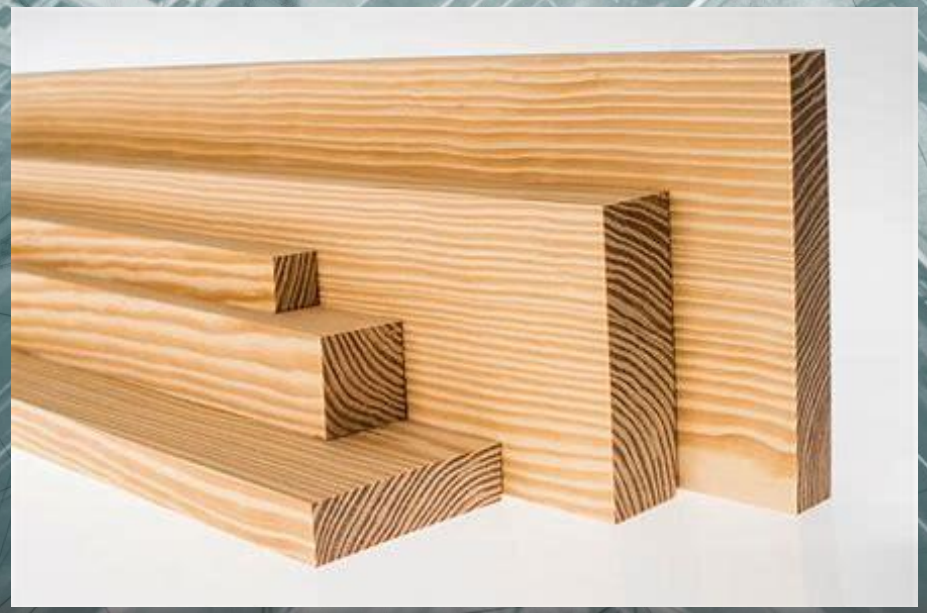
LO1. All pupils **will be able to understand (know) the difference between hard & softwood.**

Practise

Explain

SOFTWOODS come from evergreen, **CONIFEROUS** trees with thin, **NEEDLE** - like leaves. They usually grow relatively **QUICKLY** (30yrs to maturity) in the **COLDER** climates of Northern Europe and **SCANDINAVIA**. They are less **EXPENSIVE** than **HARDWOODS** and easier to grow **SUSTAINABLY.**





Categories of timber

LO1. All pupils will be able to understand (know) the difference between hard & softwood.

HARDWOODS come from **DECIDUOUS** trees (trees that lose their leaves in winter).They usually grow in **WARMER**, more humid climates. They grow **SLOWLY** (80+ years). They are more difficult to sustain than softwoods and are more **EXPENSIVE**. They are mainly grown in **SOUTH AMERICA** and **ASIA**.

Explain

Practise

Q1. Explain how a deciduous tree is different from a **coniferous tree.**

Q2. **State** one reason why hardwoods are more difficult to sustain than softwoods

Q3. Give one reason why hardwoods are more expensive than softwoods.

5mins

Categories of timber

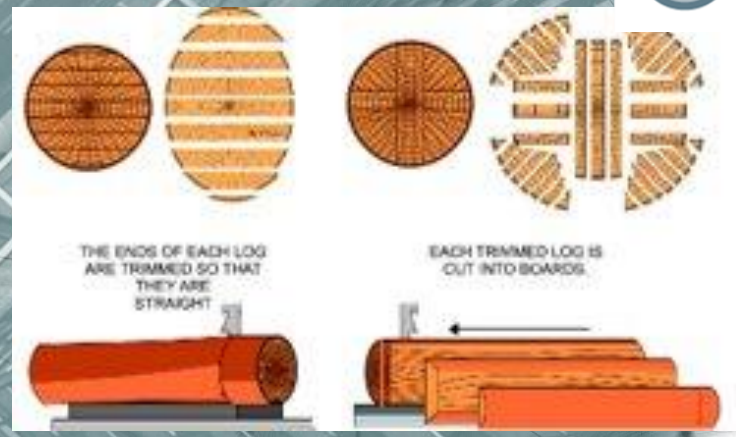
LO1. All pupils **will be able to understand (know) the difference between hard & softwood.**

Manufactured boards are made from the **WASTE** sections of **FELLED** trees – the parts which are of little use as **PLANKS**. The wood is reduced to **PULP,** particles or thin strips and **BONDED** together using special adhesives or resins.

Practise

Explain

What is a veneer?



Manufactured boards:

- come in **sheet form** (usually 1.2 x 2.4m)
- are extremely **stable** and of **uniform** thickness
- are **less expensive** than laminating planks of timber
- can be covered with **veneers [thin layers of hardwood]**
- are available in a variety of **thicknesses** (3, 6, 9, 12, 15, 18, 22mm etc.)

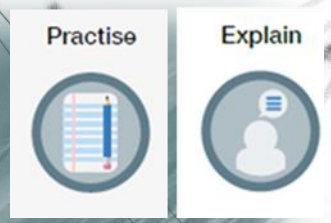
These flat-pack drawers are made from MDF covered with a veneer.

Have a go at the:

5mins

Q1. Define the word ‘felled’.
Q2. **State** the form manufactured boards come in.
Q3. What is veneer?
Q4. Explain why manufactured boards are often covered with a layer of veneer.

Finishes of timber



Timbers can be **treated** with several **surface finishes**. They have different purposes and are chosen depending on where the product is going to be used and what type of **visual appearance** is desired:

Paint

- Indoor and outdoor use
- Wood is sealed with a primer first
- Coats the surface of timber
- Cost effective

Wax

- Gives a dull gloss shine
- Enhances the grain
- Surfaces must be sealed

Stain

- Enhances the grain
- Penetrates the surface of timber
- A variety of colours are available

Varnish

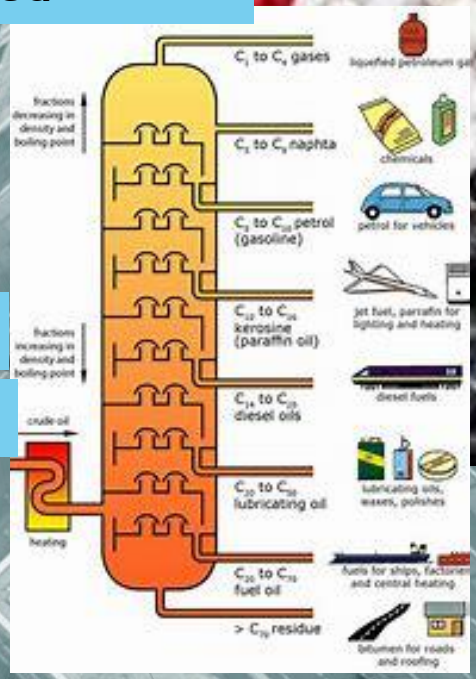
- Tough surface develops
- Resistant to heat and water
- Can be coloured

Plastic

LO1. All pupils will understand (know) the sources of plastics.

LO2. All pupils will know examples of types of plastic

Where does it come from?
Under the sea bed



What is the primary processing called?

Fractional Distillation

Practise

Explain

Can it be made from anything else?Yes corn and potato starch

Plastic can be natural or synthetic.

Plastic

LO1. All pupils will understand (know) the sources of plastics.

LO2. All pupils will know examples of types of plastic

Polypropylene | Polyester | Rubber/latex | Cellulose | Polycarbonate | Shellac

TASK- Put each type in the correct column and explain what they are used for:

NATURAL	USES	SYNTHETIC	USES
Rubber/latex	Gloves, trainer soles, medical tubes, balloons	Polyester	Clothing
Cellulose	Give grip to the bow of a stringed instrument.	Polycarbonate	Phone cases, clear safety goggles, machine guards
Shellac	A natural finish in polish and sealers	Polypropylene	Buckets and ropes

Can you tell whether these plastics are natural or synthetic ?

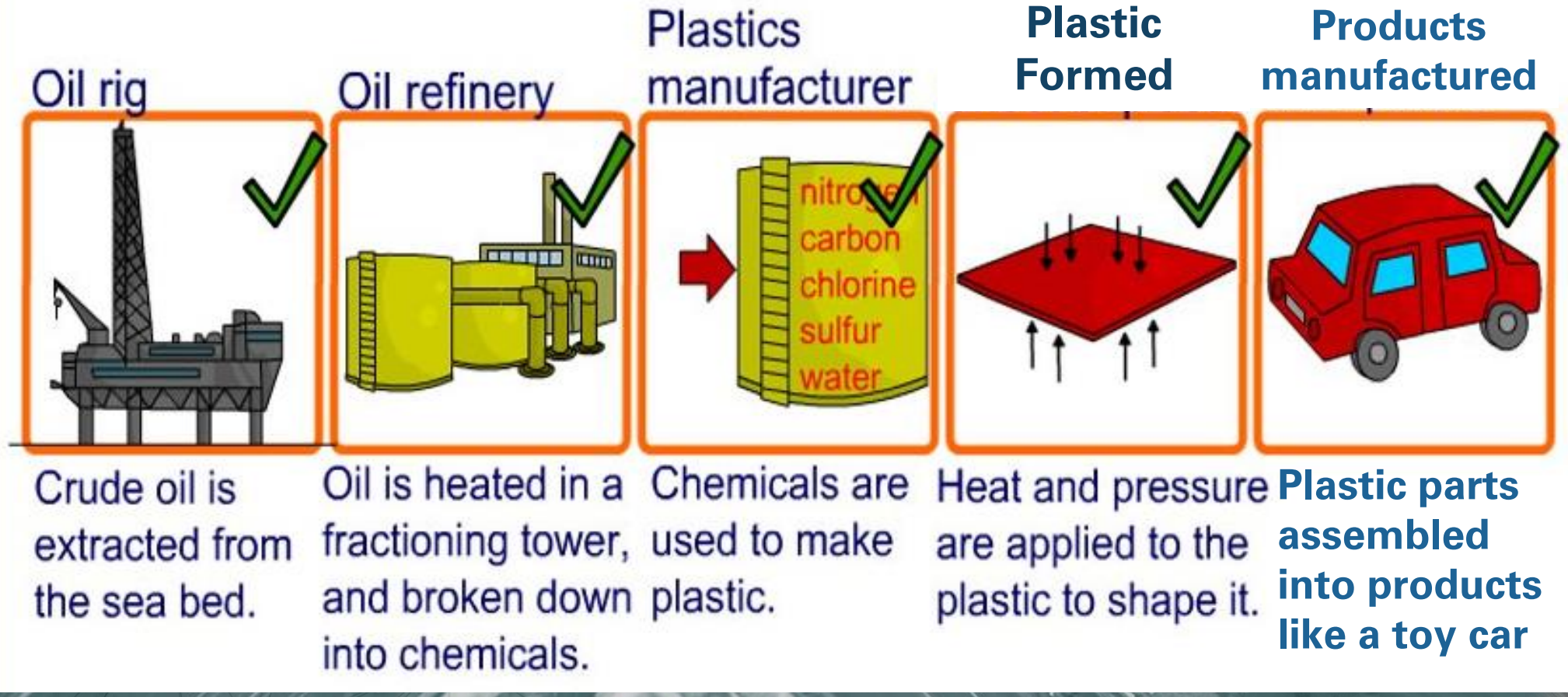
Practise | Explain

Plastic

LO1. All pupils will under stand (know) the sources of plastics.

LO2. All pupils will know examples of types of plastic

Primary Processing of Oil to make synthetic plastic.



Plastic

LO1. All pupils will understand (know) the sources of plastics.

LO2. All pupils will know examples of types of plastic

Thermosetting plastics are stiff and rigid. Once made into an object they cannot be re-shaped

Practise

Explain

Urea formaldehyde

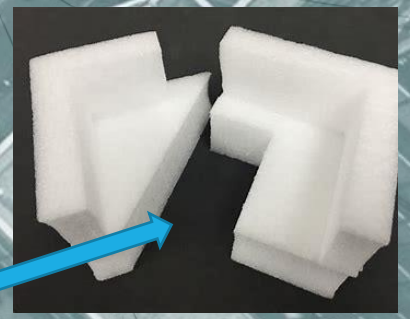
Why is a thermosetting plastic used for plug sockets?

Melamine Formaldehyde

Phenol formaldehyde

Common stock forms Of plastic:

- Sheet
- Granules
- Powder
- Foams
- Film
- Filament



Plastic

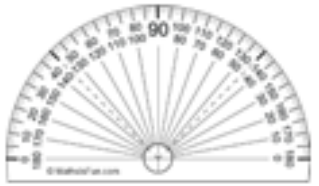
LO1. All pupils will understand (know) the sources of plastics.

LO2. All pupils will know examples of types of plastic

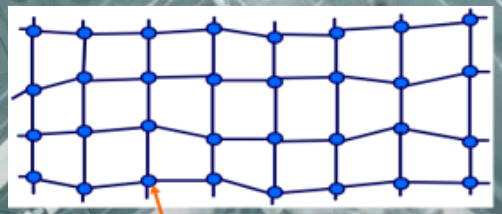
Thermoforming plastics are mostly recyclable and can be shaped and re-shaped with heat

Practise

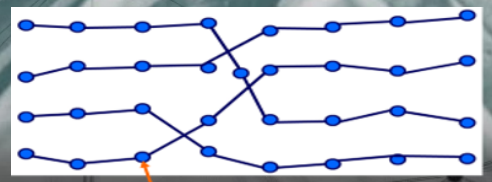
Explain

Object	Material	Object	Material
	Polypropylene		PET (polyethylene terephtalate)
	Acrylic		Rigid polystyrene
	Low density polythene		High impact polystyrene

Thermosetting plastics are stiff and rigid. Once made into an object they cannot be re-shaped.



Thermo-forming plastics are mostly **recyclable** and can be **shaped and reshaped** with **heat.**



Have a go at the stretch & challenge in your booklet

HWK - Revise from KO for QMA