

Starters and Plenaries

for GCSE AQA DT 3.2 Timbers

zigzageducation.co.uk

POD 10976

Publish your own work... Write to a brief... Register at **publishmenow.co.uk**

⁴ Follow us on Twitter **@ZigZag_DT**

Contents

Product Support from ZigZag Education	
Terms and Conditions of Use	······································
Teacher's Introduction	**************************************
Specification Cross Reference	
Activities	
Activity 1 – Functionality	3
Activity 2 – Aesthetics	5
Activity 3 – Environmental factors	10
Activity 4 – Cost	12
Activity 5 – Social, cultural and ethical factors	14
Activity 6 – Forces and stresses	16
Activity 7 – Materials can be enhanced	18
Activity 8 – Ecological issues	20
Activity 9 – The Six Rs	22
Activity 10 – Social issues	25
Activity 11 – Sources and origins	27
Activity 12 – Working and physical properties	29
Activity 13 – Using and working with materials	31
Activity 14 – How to: shape and form	33
Activity 15 – Stock forms, types and sizes	35
Activity 16 – Scales of production	38
Activity 17 – The use of production aids	40
Activity 18 – Tools, equipment and processes	42
Activity 19 – Tolerances and quality control	44
Activity 20 – Commercial processes	46
Activity 21 – Surface treatments and finishes	48

Teacher's Introduction

This resource contains 21 starters and plenaries which concisely cover the 2017 GCSE AQA DT (8552) specification (2017 onwards) section 3.2: **Timbers**. Similar resources covering other material categories for the same specification points can be found on our website. The starters in this resource offer activities which will engage the students in the lesson following a break or provide an opportunity for students to transition from a break into a lesson by recapping on previous work. The plenaries within this resource can be used to finish a lesson and, therefore, ensure that learning occurs right up to the end of the lesson. The types of activity

Remember!

Always check the exam board website for new information, including changes to the specification and sample assessment material.

are varied, from written communication tasks and extracting information from text, to drawing, modelling and discussion-based activities. This is to ensure the activities appeal to students with a wide range of learning styles, keeping them interested and engaged, and enabling them to practise the wide range of skills that Design and Technology students need to demonstrate in their coursework and exams.

How to use this resource

A cross-reference table has been provided as a useful tool for lesson planning. It links each activity to the specification points it covers and identifies which activities are considered starters and which should be used as plenaries. The identification of each activity as a starter or plenary is only a suggestion and teachers might find that some of the activities are interchangeable.

Extra challenges

Extra challenges have been provided for some of the activities. These can be used as activity extensions to further challenge higher-ability students, as short plenary activities or even as homework tasks.

Reuse this resource

Occasionally throughout this resource you will find prompts and suggestions for different ways of using the activities and resources provided. This means that you can get more out of this pack! The suggestions can be used to create other starters and plenaries or even be incorporated into your main class activities.

Equipment

Due to the varied and creative nature of the activities in this pack, there are some activities which require equipment such as drawing materials, scissors, glue and access to the Internet. Any equipment that is needed is indicated by an 'Equipment list' in the teacher's notes. This helps keeps teachers prepared and organised.

Icons

The icons featured on each worksheet are designed to give the teacher, and the student, some key information about the activity at a glance. The icons indicate the time the students have to spend on the activity, whether it is a drawing activity and what configuration the class will be in for the activity (pair/group/class). If the activity doesn't have an icon indicating 'Pair', 'Group' or 'Class', then it is suggested that the activity be completed individually.

- Time Each of the activities in this pack is designed to take 10 minutes, including time for feedback and answers. The time that students have to complete the activity is indicated by the time icon on the right-hand side of each worksheet. For instance, the time icon given on this page as an example indicates that students should spend 8 minutes on the activity. This does not include feedback time, which would be 2 minutes in this case. Recommended feedback time is indicated in the teacher's notes for each activity.
- **Drawing** Drawing tasks have been included in order to help students develop a skill set that is relevant to Design and Technology. The drawing tasks are indicated using the drawing icon
- Class configuration A range of activities has been created for this resource which
 incorporates independent, paired and grouped work and which will be engaging for
 the students. The varied nature of the activities provides an opportunity for a range of
 learning styles and levels. The tasks that have been suggested for the whole class,
 groups or pairs are indicated using the icons to the right.
- Calculator This icon indicates that the students should have access to a calculator for this activity.

8 minutes

Drawing

Group

Pair

Calculator

May 2021

Specification Cross Referen

This table will enable you to pick and choose starters or plenaries relevant to the teaching. While each activity has been selected as either a starter or a plenary, ye starter and plenary tasks may be interchangeable depending on how you teach this at the teacher's discretion when to use each task.

Specification reference	Activity
	Activity 1 – Functionality
	Activity 2 – Aesthetics
3.2.1 Selection of Materials and Components	Activity 3 – Environ al Factors
Components	Activity 4 – lost 100
	ຊ່າງ ວັດ Social, Cultural and Ethical Fact
3.2.2 Forms a % 1 r % 2s	Activity 6 – Forces and Stresses
5.2.2 FO 3 d 1 7 5.25	Activity 7 – Materials Can Be Enhanced
	Activity 8 – Ecological Issues
3.2.3 Ecological and Social Footprint	Activity 9 – The Six Rs
, оберине	Activity 10 – Social Issues
3.2.4 Sources and Origins	Activity 11 – Sources and Origins
	Activity 12 – Working and Physical Properti
3.2.5 Using and Working With Materials	Activity 13 – Using and Working With Mate
1410221703	Activity 14 – How To: Shape and Form
3.2.6 Stock Forms, Types and Sizes	Activity 15 – Stock Forms, Types and Sizes
3.2.7 Scales of Production	Activity 16 – Scales of Production
	Activity 17 – The Use of Production Aids
3.2.8 Specialist Techniques and	Activity 18 – Tools, Equipment and Process
Processes	Activity 19 — Tolerances and Quality Contro
	Activity 20 – Commercial Processes
3.2.9 Surface Treatments and Finishes	Activity 21 – Surface Treatments and Finish





Activity 1 - Functiona

Teacher's notes and answers

	Starter activity: Junctional
Aim of the activity	Students to practise matching material properties to applicati
Teacher's instructions	Photocopy the activity on the next page and give one copy to students 8 minutes to complete the activity. Spend 2 minutes feeding back and going through ctypes answers.
Students' task	Students should decid each material is commonly used appropriate or aim to find possibilities has been provided to E. 1 a malienge! Could be used as a starter extension, mini plen

Answers:

1	Hardwood		Ì
5 5	Name	Comme	
3	Balsa	Mode	
1	Mahogany	Ca	
1	Oak		
1	Ash	Too	

Softwood

Name	Comme
Spruce	
Pine	Con
Larch	В

Manufactured boards

Comme
F
Kitch
Constraints -

Extra challenge!

Cedar – Chests and closets have use it is easily workable and naturally repels m

Fir - Flooring, because the falls

Yew – Me because of its chemical content Birch – Full because it is durable

Birch – Fu

Beech - Veneer, because it has an aesthetic colour

Walnut - Furniture, because it has an aesthetic colour



Functionality

Consider the tables of timbers, their properties and the list of applications that t materials are commonly used for. Decide what each material is commonly used write this in the appropriate column.

Common uses include:

boat hull, model building, chair, cabinet, table, construction, kitchen worktop, to handle, flooring

Hardwood

Hardwood		
Name Working properties ishysic		ៅ នៅysical properties
Balsa	Soft	Low density
Mahogany	Sregri	Durable
Oak	Hard	High strength
Ash	Smooth finish	Lightweight

Softwood

Name	Working properties	Physical properties
Spruce	Splits easily	High strength
Pine	Resistant to shrinkage	Lightweight
Larch	Flexible	Tough

Manufactured boards

Name	Working properties	Physical properties
Medium density fibreboard (MDF)	Fibrous	Lightweight
Chipboard	Easily worked	Flame retardant
Plywood	Hard	High strength

Extra challenge!

Can you think of another hardwood? Give a physical property, and one reason w common use.





Activity 2 - Aestheti

Teacher's notes and answers

	Starter activity: aesthetic
Aim of the activity	Students to identify target markets and consider how aesthet to a target market. Also to practise sketching, annotation and
Teacher's instructions	Photocopy the activity pages and distribute them to students. products each student should have one. Give the students 8 m Allow 2 minutes at the end of this Gazana is a few students to target market.
Students' task	Students shoula ech ಹಿಡುಗಿಗೆ aesthetics of the product on the marks ಾರ್ಡಿಕ ಸಂಗರ್ಭಕ್ಕೆ product.

Example & wers:

Product	The person who would buy/use this would:	V p
	Be a young child. The product is gender neutral. The child wouldn't have income or a job. They might like other toys with bright colours, different textures and finishes and it might be good to include educational elements.	
	An older person. 65+ years old. This product is gender neutral. They might have a healthy income but be retired. They might like other high-quality furniture items. Possibly hobby and pastime products like gardening and model making.	
	A young adult, possibly a student. This product is gender neutral. The income level might be 'a' a they might have a the job while studying. The income they might be studying. The interested in products and ethics. They might be interesting in environmentally friendly products.	
	An adult. This product is gender neutral. Their income level could be medium. They might be setting up a home and wanting to buy other products for their new home. Low cost furniture might appeal.	



Consider the aesthetics of the clock below. Imagine a person who might buy/use it. Write a little bit about the person buying/using it and draw a picture of them.

When imagining your target market consider:

- Age
- Gender or Gender neutral
- Income level (low/medium/high)
- Job type
- Other products they might like

The person could buy/use this would:	
	The person who might bu
	1 1 1 1 1
	1 1 1 1 1
	1 1 1 1
	1 1 1 1 1
	1 1 1 1 1
Why does the aesthetics of this product appeal	1 1 1 1
to this person?	1 1 1 1
	i
	1 1 1 1 1
	1 1 1 1
	1 1 1 1 1
	1 1 1 1 1
	1 1 1 1 1
	1 1 1 1
	×



Consider the aesthetics of the clock below.

Imagine a person who might buy/use it. Write a little bit about the person buying/using it and draw a picture of them.

When imagining your target market consider:

- Age
- Gender or Gender neutral
- Income level
- Job type
- Other products they might like

The person could buy/use this would:	
	/ man and and and and and and and and and a
	The person who might bu
Why does the aesthetics of this product appeal to this person?	
	1



Consider the aesthetics of the watch below. Imagine a person who might buy/use it. Write a little bit about the person buying/using it and draw a picture of them.

When imagining your target market consider:

- Age
- Gender or Gender neutral
- Income level
- Job type
- Other products they might like

The person could buy/use this would:	
	The p
	ine p
	! ! !
Why does the aesthetics of this product appeal to this person?	
	\ \



The person who might bu

COPYRIGHT PROTECTED

Z/9 Zee Education

Consider the aesthetics of the clock below. Imagine a person who might buy/use it. Write a little bit about the person buying/using it and draw a picture of them.

When imagining your target market consider:

- Age
- Gender or Gender neutral
- Income level
- Job type
- Other products they might like

The person could buy/use this would:	
	The person who might but
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	1 1 1 1
	1 1 1 1
	1 1 1 1
	; ; ; ;
Why does the aesthetics of this product appeal to this person?	1 1 1 1 1 1 1 1
	1 1 1 1 1 1 1
	1 1 1
	, 1 1
	1 1 1 1 1
	1 1 1 1
	1 1 1 1 1
	\



Activity 3 - Environmental

Teacher's notes and answers

	Starter activity: environmental
Aim of the activity	Students to practise design sketching, annotation and commu understand the possibilities of recycled and reused materials.
Teacher's instructions	Photocopy the activity page and give one copy to each studen to complete the activity. Allow 2 minutes as the end of this ses explain the features of their designs.
Students' task	Students should design duct using the material from a pi Extra called the material from a pi Disconnected benefits of upcycling this wood pal

Answers:

Extra challenge!

Discuss the environmental benefits of upcycling this wood pallet.

Example answer:

A benefit of upcycling the wood pallet is that material from the pallet won't en Another benefit is that new materials won't have to be produced saving trees and



Environmental Facto

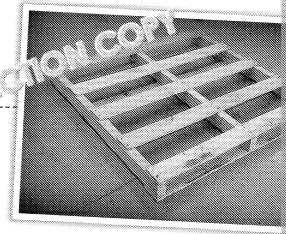
Wood pallets are used for transporting goods and materials. They come in stand sizes and aften make from pine or oak. They are often discarded or sold on very cheaply when they are not longer needed.

Design a product that reuses a pallet like the one in the picture, this one is made pine. The product should have a completely different use than the pallet and can use the material from the pallet, plus any screws, nails or hinges you want to use Annotate your design.

Within the redesign consider:

- Surface finish
- Functionality
- Aesthetics







Extra challenge!

Discuss the environmental benefits of upcycling this wood pallet.



Activity 4 - Cost

Teacher's notes and answers

Aim of the activity	Students to learn how to take cost into consideration when caidea of bulk-buy discount is introduced.
Teacher's instructions	Photocopy the activity on the next page and give one copy to students 8 minutes to complete the activity. Spend 2 minutes feeding back and going through strand an wers. Provide calc
Students' task	Students should work in the gaps in the table be a calculator if ಇತರ ತಿನ್ನಿಯ
Answers	. Material for

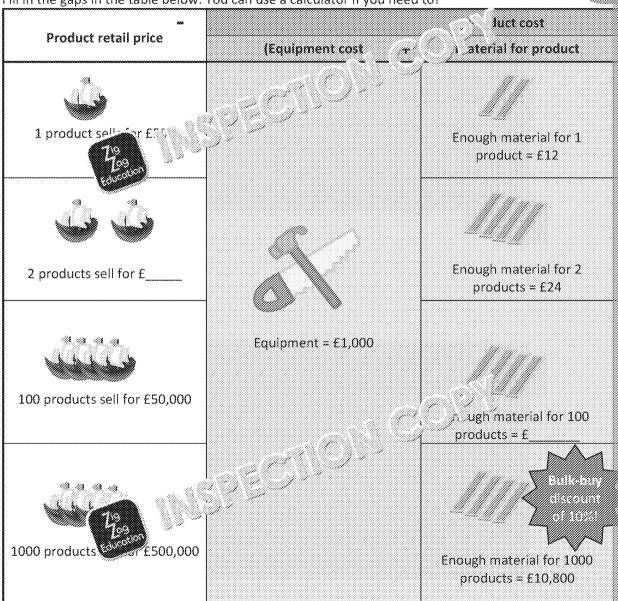
An	sw	ers
----	----	-----

Product retail price	[Equipment cost +	Material for = product	Produ
1 product sells for £500		Enough material for 1 product = £12	1 proc £1.8
2 products sell for £1000		Enough material for 2 products = £24	2 pro:
100 products sell for £50,000	Equipment cost =	Enough material for 100 products = £1,200	100 pr £2,
1,000 products sell for £500,000	£1,000	Enough material for 1,000 products = £10,800	1000 pro f <u>11</u>



Cost

Fill in the gaps in the table below. You can use a calculator if you need to!





Activity 5 – Social, cultural and s

Teacher's notes and answers

en la set de	er activity: social, cultural and e
Aim of the activity	Students to learn how social, cultural and ethical factors affec
Teacher's instructions	Photocopy the activity on the next page and give one copy to minutes to complete the activity. Spend 2 minutes at the end going through student answers.
Students' task	Students should read the high studies and decide whethe social responsionat halisaral influences or ethical sources.





What factors does this product
☑ Social ☑ Cultu



What factors does this product

☐ Social ☐ Culture



V is a free joins does this product & Lisocial ローロー Culture



Social, cultural and ethical

Read the mini case studies below and decide whether each one falls into the cat social responsibility, cultural influences or ethical sources. Be careful – they may more than one category!

Case study 1:

Dylan bought this fair-trade bowl from a website that supports tourism in Ethiop fair wages had been paid to the workers who made the product, and that they go



What factors	does	this	product	
☐ Social				

Case study 2:

Azahara has decided she only wants to buy locally sourced products. She chose a was made from ash. This is a locally sourced FSC-approved material, meaning it is deforestation. Local craftsmen can also be supported this way.



What factors does this product ☐ Social ☐ €

Case study 3:

Jessica wants some new furniture for her kit han in tead of buying something near bought some old chairs. They in the form bound, but she can sand and paint the means no new resources are the sign and it increases the life of the original part of the property of the control of the property of the property



What factors does this product ☐ Social ☐



Activity 6 - Forces and st

Teacher's notes and answers

	Plenary activity: forces and st
Aim of the activity	Students to solidify knowledge of types of forces and stresses
Teacher's instructions	Photocopy the activity on the next page and give one copy to 8 minutes to complete the activity. Spend 3 minutes at the end and going through student answer
Students' task	In Part A students showing draw definitions for the forces and one is being drawed white definition provides a second write definition.



Part A:

Read the definitiond to identify the forces and stresses.

- 1. Compression
- 2. Tension
- 3. Shear

Part B:

Write the definition for the forces and stresses below.

- 1. When force is being applied through twisting.
- 2. When force is applied and creates or increases an angle or curve.





Forces and stresse

Part A:

Read the definitions to identify the forces and stresses.

1.	When force is applied in opposite directions, to opposite ends, to push either together.
2.	When force is applied in opposite directions to pull இசி end away from ea
3.	When steem of the stress a possible directions, on different planes. The stress a possible directions on different planes. The stress a possible directions on different planes. The stress a possible directions on different planes.
Part	: B:
Writ	te the definition for the forces and stresses below.
1.	Torsion
2.	Bending



Activity 7 - Naterials can be

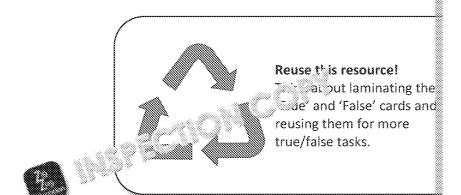
Teacher's notes and answers

25 25	enary activity: materials can be
Aim of the activity	Students to demonstrate their knowledge of how materials ca be used as a recap or to identify students' existing knowledge
Teacher's instructions	Photocopy the activity on the next page and give one copy to statements on the board. Engage the class in a discussion to id are true or false, and why students and it it. If the students have an activity have each they can cut out the hold up the relevant ball to display their answer. This will he individual the samswers. You can ask students with an incotic and the correct answer.
Students'	Students should discuss as a class whether the statements are to explain the reasons behind their answers.

Answers:

Statement Reinforcing a material makes it weaker. You can reinforce a material by adding layers of the same material, or another material. Stiffening a material always makes it stronger. Making a material more flexible can make it stronger.

Timber is stronger when bent in the direction of the grain.





Naterials can be enhar

Are the statements below true or false? You decide! Tick to indicate whether you the statement is true or false. Then, hold up the 'True' or 'False' card to share you answer with the class. Be prepared to explain the reason for your answer.

Statement	True	
Reinforcing a material makes it weaker.		
You can reinforce a material by adding layers of the same material, or another material		
Stiffening a material always makes and organ.		
Making a al அரசாexible can make it stronger.		
Timber is stronger when bent in the direction of the grain.		

True Fa





Activity 8 - Ecological is

Teacher's notes and answers

	Plenary activity: ecological is
Aim of the activity	Students to demonstate their knowledge of when and how car product life cycle.
Teacher's instructions	Photocopy the activity on the next page and give one copy to students 5 minutes to complete the activity. Spend 5 minutes feeding back and going through styles are wers.
Students	Students should work to but the carbon footprints product life cy to be an arrow to be a few to be a f

Answers:

Allow any valid answers.

Example answers:

- Carbon is produced when sourcing materials because the processes used to raw materials are energy-intensive and require the burning of fuel, which atmosphere. Carbon emissions could be reduced by aiming to make the processing less energy will cause less carbon to be produced.
- The production of timber stock is energy-intensive. Producing energy to perform the burning of fuel, which releases carbon into the atmosphere. Carbon emaining to make the process as efficient as possible using less energy will produced. Reducing wastage could also help to reduce carbon emissions as will have to be used.
- The manufacturing of timber products is energy-intensive. Producing energy to
 processes requires the burning of fuel, which releases carbon into the atmosple
 and reducing wastage are valid ways of reducing carbon emissions from manufacturing carbon designed to use the least possible amount of material; this will help
 produced by the product (its carbon footprint).
- A wooden chair would normally be used long-term in this is not always to
 product doesn't directly produce carbon, draighing the product to be dura
 reduce wastage and prevent more and interest of the made to resproduces carbon).
- Disposal and recycling an agroduct can cause carbon emissions. Firstly, the disposal are agreed as produce carbon by using fuel. Then, if the product carbon by using fuel as produces of recycling the wood is also energy-intensive and will not as a gy-intensive as sourcing and producing a product from the raw.

Extra challenge!

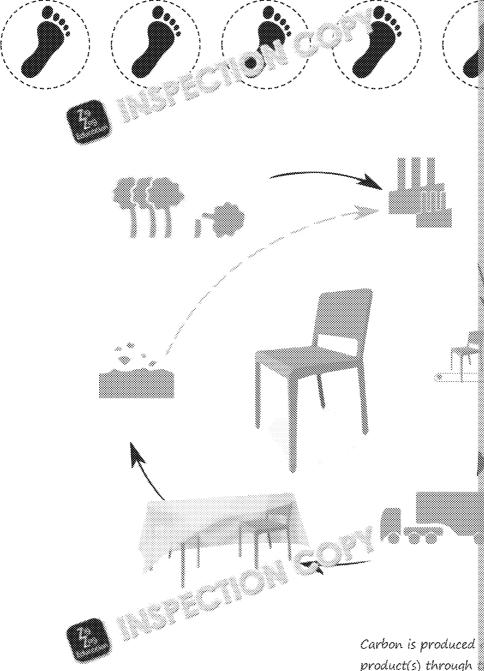
The carbon footprint is bigger because more fuel is used to transport the product some countries that manufacture products cheaply do not have to follow the samanufacturers in the UK, so there is less time and money spent trying to make environmentally friendly. This can lead to larger carbon footprints.



Ecological issues

In pairs, consider the product life cycle of a wooden chair (shown below). Cut out carbon footprints and place them on the life cycle at stages where you think carb is produced.

Be ready to explain why you think carbon is produced, how it's produced and a we the production of carbon could be reduced at each stage that you have identified example has been completed for you.



Extra challenge!

Discuss the following question: How is the carbon footprint of a product affected if the product is manufactured in a country different from the location of the final consumer (e.g. made in China, used in the UK)? Carbon is produced product(s) through vehicles. It is expelled as petrol and diesel when extracting the produced by transpareducing the produced has to travel between manufacturer, retails



Activity 9 - The Six F

Teacher's notes and answers

	Starter activity: the Six F
Aim of the activity	Students to learn the definitions of the Six Rs and be able to id
Teacher's instructions	Split the class into groups of three. Photocopy the activity sheet in pages and give one activity sheet to each group of state students decide who will be the indigetory of their group (or now student who will be the indigetory were page, with instruction of the students of the activity. Exisiting or the page of uniters (found on the answer page) can be cut for weaker students, consider providing them with a list of the
Students' task	In groups of three, students should play noughts and crosses. The Six Rs is the answer to the clue / being defined to be able to place the students is a judge who will let the players know whetherthe answer. The first player to get a row of three wins.

Answers:

Repair	Repair	Reuse
Reduce	Recycle	Rethink
Refuse	Recycle	Reduce

A differ

The class could play noughts at the teacher be

This game cost Cut out the quanties correspo-(attach with player claims answer, their answer, claims themselves given is incost



The Six Rs

In groups of three, play noughts and crosses! One person is 'noughts' and the ot 'crosses'; the third person is the judge. The players take turns to place the count the grid. The first person to get a row of three wins (remember your row can also diagonal). But wait! There's a twist! In order to put down your nought or cross, you decide which of the Six Rs matches the definition or clue. If you get it right, you count your counter and claim the square; if you get it wrong, the other player get claim the space. The judge will have the answers and will tell you whether you have correct answer!

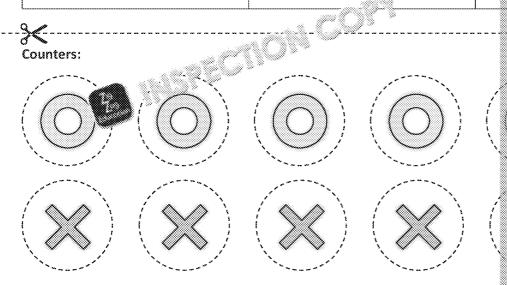
Fix som hat is broken or worn.	When something breaks, you can try to it instead of throwing it away and buying a new one.	
To use less of something is to your consumption.	To process the raw materials of an item and use it again in a different way.	
Say no to excess consumption	If a raw ma or accomes from a eswarce it is especially it so it so that the materials it is made of can be used again.	



es only!



	WARNING: Answers below. For judge's eyes only!
Repair	Repair
Reduce	Recycle
Refuse	Recycle



Activity 10 - Social iss

Teacher's notes and answers

	Plenary activity: social issu
Aim of the activity	Students to demonstrate knowledge of social issues and pract quick sketching skills.
Teacher's instructions	Photocopy the activity on the next page and give one copy to 8 minutes to complete the activity. Spend 3 minutes at the enance going through student answer
Students' task	Students should choor ್ರಾಕ್ಟ್ರಿಕ್ view social issues. Draw a storyk negative impages ರ ್ಷ್ಟ್ರಾಂದಿತ issue.

Answers



Example answer for unsafe working conditions:

The manufacturing process creates atmospheric pollution	The pollution contaminates the rain which falls to the ground	8
People are sicker, crops and animals are affected.	• People are too sick to work, the crops aren't worth as much and animals are sick	6 S

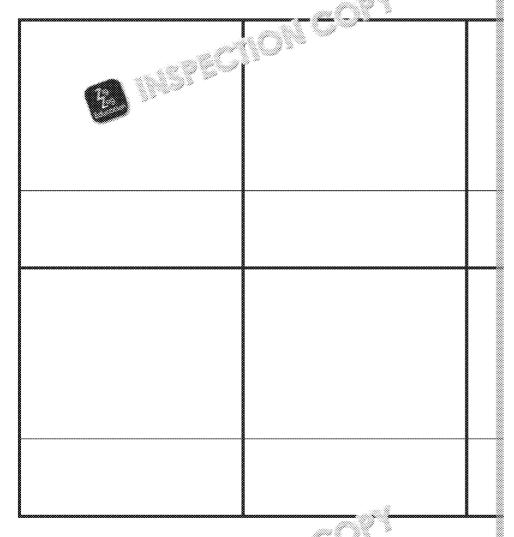


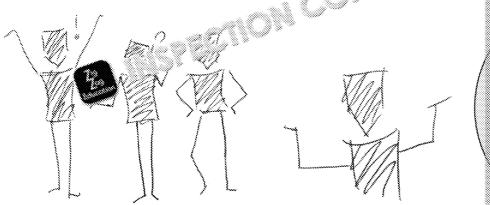
social issues

Choose one of the social issues listed below. Draw a storyboard demonstrating to negative impacts of the social issue. Use the bigger boxes to draw in and the small boxes underneath to write short explanations about your drawings, as in a comic

Social issues:

- The effect of deforestation on local people
- Workers paid an unfair wage
- Automation (robots making things instead of people)
- Atmospheric pollution







Activity 11 - Sources and

Teacher's notes and answers

	Starter activity: sources and o	
Aim of the activity	Students to gain an overview of the processes involved in the products.	
Teacher's instructions	18 minutes to complete the activity Spend @minutes at the en	
Students' task	Students should use that have specified to fill in the gaps in the	

Answers



Felling is the process of chopping down trees. Logging machinery is used to do this in a controlled and safe way. Hardwoods can take 60–100 years to

softwoods 25-30 years.

mature and grow big enough, and

The branches are removed, leaving just the trunk. This is then cut into manageable lengths.



The planks are then sold. Freshly cut planks still have a high water and this is call the planks of the control of the planks are the planks

The start reduces moisture in the tine called seasoning. This can be done by leaving the timber to dry out in the sun, or sometimes by using a kiln.

It is importal make the rerenewable. Council (FSC identify this



The lengths transported they are cut process is care Different ty processed diproperties at



Manufacture chipboard at fusing chips adhesive. The waste.



Sources and origins

Use the terms provided to fill in the gaps in the timeline.

Terms:

- Felling
- Conversion
- Seasoning
- Green timber
- Sustainable
- Adhesive

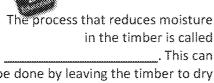


is the process of chopping down trees. Logging machinery is used to do this in a controlled and safe way. Hardwoods can take 60-100 years to mature and grow big enough, and softwoods 25-30 years.

The branches are removed, leaving just the trunk. This is then cut into manageable lengths.



The planks are then sold. Freshline planks still have nig yater กาก วิทาร is called



____. This can be done by leaving the timber to dry out in the sun, or sometimes by using a kiln. It is impo make the

renewabl Council (F identify the



The leng transpor where the planks. T

Different processes their pro



Manufac chipboar fusing ch

of using \{\}



Activity 12 – Working and physic

Teacher's notes and answers

55 C	ary activity: working and physic
Aim of the activity	Students to learn the definition of physical and working prope
Teacher's instructions	Photocopy the activity on the next page and give one copy to bottom of the page, along the dotted line so hide the example examples if they need a hint. Give the dominates at the end of this sizes in the ding back and going through
Students' task	Students shoulawas and physical a

Answers		
Physical properties	Wor	
What a material is or does even when it is r the nature of the material.	not in use – What a material is or l	***





Working and physical pro

Write a definition for working properties and physical properties.

	Physical properties
	Working properties
•	

Need a hint?

Unfold the bottom of the page to see a list of physical and working properties of

Physical properties	Wo
Density	Strength
Absorbecay	Toughness
Weight	Hardness



Activity 13 – Using and working v

Teacher's notes and answers

nere to the	er activity: using and working w
Aim of the activity	Students to develop an understanding of how the properties of a ma functionality of a commercial product.
Teacher's instructions	Photocopy the activity on the next page and give one copy to each sominutes to complete the activity. Spend 2 minutes at the end of this through student answers.
Students' task	For the first product, student the Irluse the terms provided to fill is properties of the child of \$2.50 to discover how the properties affect product. For the segment product the students should use arrows to confident of the students used in commercial products. Extra challenge! Could be used as a starter extension, mini plenary of the students should answer the multiple-choice question.

Answers:

1) Electrical fitting - made from urea-formaldehyde

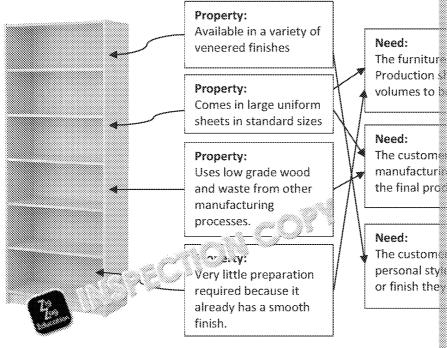
This children's toy is made from **Beech**.

This wood has a fine finish, which means that it is less likely to splinter.

The colour is light with a pinkish hue. The grain is close.

This grain makes this wood tough and durable. This means that the product will la

2) Flat pack furniture - made from MDF



Extra challenge!

Consider the children's toy. Seasoning is used to modify the properties of the Beech to What does seasoning do? Choose **one** of the options below.

- ☐ Changes the colour of it from light to dark.
- ☐ Increases the moisture content to reduce the chances of warping
- Reduces the moisture content to reduce the chances of warping
- ☐ Makes the wood weaker

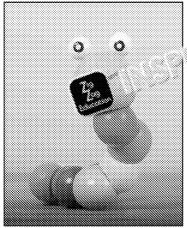


Using and working with ma

You need to develop an understanding of how the properties of a material are use improve the functionality of a commercial product.

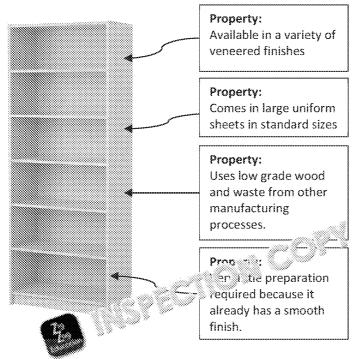
For the first product, use the terms provided to fill in the gaps in the description properties of the children's toy to discover how the properties affect and improve function of the product. For the second product use arrows to match the needs properties of the materials used in the flat pack furniture.

1) Children's toy



This children's	This children's tay & malastrom			
Table of Lines	a	finis	h, which mean	
The colour is li	ght with a _		_ hue. The gra	
This grain mak will last a long		d	and	
Terms:	close	tough	pinkish	

2) Flat-pack furniture – made from MDF



Need:

The furnitue Production s volumes to s

Need:

The custom manufacturing the final pro-

Need:

The customs personal style or finish the

COPYRIGHT PROTECTED



Extra challenge!

Consider the children's toy. Seasoning is used to modify the properties of the Besits use. What does seasoning do? Choose **one** of the options below.

- ☐ Changes the colour of it from light to dark.
- ☐ Increases the moisture content to reduce the chances of warping
- ☐ Reduces the moisture content to reduce the chances of warping
- ☐ Makes the wood weaker

Activity 14 - How to: shape

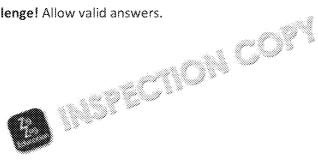
Teacher's notes and answers

	Plenary activity: how to: shape o
Aim of the activity	Students to become familiar with the process of drilling.
Teacher's instructions	Split the class into pairs. Photocopy the activity on the next papair of students. Give the students 8 minutes to complete the 2 minutes at the end of this session and back and going the
Students' task	Students should work into put the instructions for how to Extra as a starter extension, miniple The swents should pick pne of the processes and write a simple someone could follow.

Answers:

Order (number 1–7)	Instruction
1	Choose the correct drill bit(s), considering size and type. You we correct width of the hole, and you might need a second (small needs to be smaller than the desired hole). If you are going to bit must be slightly smaller than the screw.
2	Prepare the surface of the material. Make sure the surface is a where the material will be drilled. Consider putting masking to drilled to make sure the drill doesn't slip and scratch the surfa
3	If using a handheld drill, secure the material to a stable, flat su secure the material to the bed and raise the bed to the correc
4	Insert the correct drill bit into the drill. Make sure the drill bit drill, check that the safety guard is the correct height.
5	If needed, drill a pilot hole first — this will help guide a screw in bigger drill bit to make sure it is lined up correctly.
6	Drill the hole, making sure the drill is at the correct angle.
7	Check the hole and remove excess dust and material.

Extra challenge! Allow valid answers.





How to: shape and fo

Put the following instructions for how to drill in the correct order by numbering t

Order (number 1-7)	Instruction
	Check the hole and remove excess dust and material.
	Choose the correct drill bit(s) come aring size and type will need one drill bit for and or about width of the hole, a you might need and many many many many many many many many
	Drill the hole, making sure the drill is at the correct ang
	If needed, drill a pilot hole first — this will help guide a se correctly or help to guide a bigger drill bit to make sure lined up correctly.
	If using a handheld drill, secure the material to a stable, surface. If using a pillar drill, secure the material to the and raise the bed to the correct position.
	Insert the correct drill bit into the drill. Make sure the dis in place tightly. If using a pillar drill, check that the saf guard is the correct height.
	Prepare the surface of the material. Make sure the surficlean and grease free. Mark out where the material will drilled. Consider putting marking walks where the material be drilled to make such the print doesn't slip and scratch surface of the last as

Extra challes Pick one of

cesses below and write a simple set of instructions that some

- Cut
- Turn
- Mill
- Cast



Activity 15 - Stock forms, type

Teacher's notes and answers

Access 0.0 Names 0.0	arter activity: stock forms, types
Aim of the activity	Students to test their knowledge of stock forms, types and size
Teacher's instructions	Display a question on the board or read the question out loud the four different responses (A, B, C or D). You can give student whiteboards in order to express when you get they agree with of the room to A, B, C or D and refuse students to stand in the they have chosen when you get answer after every students.
Students'	Stude s as the answer the questions given by standing in the ir a second of the letter A, B, C or D, or they can use the paper letter whiteboards given to them to give their answers to the question

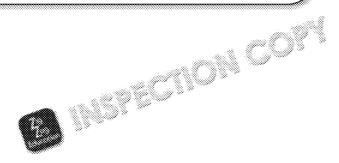
Answers:

- 1. A. Planks rough cut
- 2. B. Boards
- 3. B. Planks planed
- 4. D. Mouldings
- 5. C. Screw



Reuse this resource!

Think about laminating these letter cards and reusing them for more multiple-choice tasks.





Stock forms, types and

The teacher will allocate a letter to each corner of the classroom, or you can use letters (A, B, C, D) given to you by your teacher to give your answers to the quest below.

- 1. What stock form of timber is used for a garden fence?
 - A. Planks rough cut
 - B. Boards
 - C. Planks planed
 - D. Mouldings
- 2. What stock form of timber is used for room, A. Planks rough cut

 - B. Boards
 - C. Planka pla
 - D.
- What stock form of timber is used for floorboards?
 - A. Planks rough cut
 - B. Planks planed
 - C. Boards planed all round
 - D. Boards planed square edge
- What stock form of timber is used for decorative skirting boards?
 - A. Veneer
 - B. Boards
 - C. Planks planed
 - D. Mouldings
- What standard component is used to secure a timber shelf to the wall?
 - A. Hinge
 - B. Nut
 - C. Screw
 - D. Nail









Activity 16 - Scales of pro

Teacher's notes and answers

	Plenary activity: scales of proc
Aim of the activity	Students to learn about scales of production.
Teacher's instructions	Photocopy the activity on the next page and give one copy to students 8 minutes to complete the activity. Spend 2 minutes feeding back and going through stream are wers.
Students' task	Students should work ്റ്റ്റ്റ്റ്റ് to ചി in the gaps in the table.

Answers:					
Scale of p	Definition				
Prototype	A functioning and aesthetically correct version of a design used to test and demonstrate a design.	A b			
Batch production	A specified number of products to be produced for a limited time.	<u>D</u> V			
Mass production	A large number of products produced over a long period of time.	P			
Continuous production	A production process that is constant. It operates 24/7, producing high volume for the lowest possible cost.	S			





Scales of production

In pairs, fill in the gaps in the table below.

Scale of production	Definition	Examples of prod
Prototype		An example of how a
Batch production	sp.väfied number of products to be oduced for a limited time.	
	A large number of products produced over a long period of time.	Pencils, doors, mould
Continuous production		Stock forms, standars components (e.g. plas boards, mouldings).





Activity 17 - The use of produ

Teacher's notes and answers

ese.	tarter activity: the use of produc
Aim of the activity	Students to try different methods of translating a shape, incluand using a template.
Teacher's instructions	Split the class into groups of four. Photocopy the activity on the page, along the dotted line, to hide the shape. One of the stud see the shape until giving feedback of a copy of the activistudents. Give the shape until giving feedback to explore which means a quick extension, the students could be asked which efficient if they were to duplicate the shape multiple times.
Students' task	Students should work together to duplicate the shape at the be three different methods given to try to achieve this aim. This a groups of four. One person from the group should not see the people in the group. Two people will use Method 1 (one of the the shape), the third person will use Method 2, and the fourth everyone has finished, or 8 minutes has passed, the students method has generated the most accurate results.

Answers:

Method 3 is the most accurate.

This method is using a template.





The use of production (

The aim of this activity is to duplicate the shape at the bottom of this page. There three different methods given to try to achieve this aim. Get into groups of four. person from the group should not see the shape, so only reveal it to three people group. Two people will use Method 1 (one of these people must not have seen to shape), the third person will use Method 2, and the fourth will use Method 3. We everyone has finished, or 8 minutes has passed, stop and discuss which method generated the most accurate results.

Method 1 (two people):

One person describes the shape to a second person The lace of describes (who have to draw the shape based on the first person's description alone.

Method 2:

The person using this was a can look at the shape and use a ruler to measure a

Method 3:

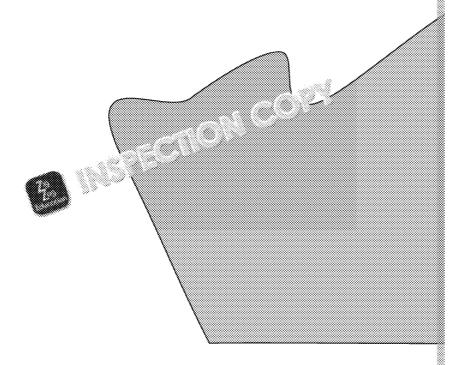
The person using this method can cut out the shape and draw round it, or trace

Which of these methods is the most accurate?

Method is the most accurate.

Unfold the bottom of the page to reveal the shape for this task. Make sure that of Method 1 doesn't see the shape!

Shape:



COPYRIGHT PROTECTED

Zig Zeg Education

Activity 18 - Tools, equipment a

Teacher's notes and answers

55 = 1	ary activity: tools, equipment ar
Aim of the activity	Students to learn which manufacturing and modelling method deforming and reforming methods.
Teacher's instructions	Photocopy the activity on the next page and give one copy to 8 minutes to complete the activity. Spend 3 minutes at the end and going through student answer
Students' task	Students should sort t' esses into four different categor hand forming tyvi, c y mercial process.



- Sliding bevel
- Mortise gauge
- Mitre square

Cutting tool:

- Tenon saw
- Coping saw
- Jigsaw

Hand forming tool:

- Chisel
- Disc sander
- Plane

Commercial process:

- Routing
- Turning
- Milling



Tools, equipment and pro

Sort the processes into three different categories:

- Measuring tool A tool used to accurately mark a height, width or depth or a surface.
- Cutting tool A tool used to trim, split or remove material to achieve the de
- Hand forming tool A tool that can be controlled by the user's hand without
- Commercial process A method that is used in industry applications.

	······
Measuring tool / Cutting tool / Hand forming tool / Commercial process	T %) equipment and proce
	ிறு உண்டு இவற்று stable gauge for setting angles. This is ideal for s sides or components.
	Coping saw A type of saw used to cut complex forms into wood. A carpenters to cut mouldings.
	Disc sander A motor-powered tool that uses a rotating disc to spin time-efficient alternative to sanding by hand.
	Turning Using a wood lathe to spin timber, and using handheld wide variety of forms can be produced.
	Tenon saw A hand saw used for cutting straight lines with accuracy ideal for cutting joints in wood.
	Mortise gauge A tool used to scribe mortise-and-tenon joints in wood two parallel lines to an edge.
	Plane Used to flatten or smooth a surface that is uneven or repushed across the surface using two handles.
	Milling Milling is a process that uses computer numerical contremove material from a workpiece. There is a high accurate
	Jigsaw A saw used to cut াতি injo-sheet material. Electrical up and do ুন ি hi ঃ peing pushed by the user in the dire
	ો એક કર્યો કરો કરો કરો કરો કરો કરો કરો કરો કરો કર
***************************************	Chisel A tool that consists of a large blade attached to a hand off material at a controlled rate.
	Mitre square Similar to a sliding bevel, but the angle is fixed at 45°. T angles as well as checking that they are correct.



Activity 19 - Tolerances and qu

Teacher's notes and answers

Sec. 18.00	irter activity: tolerances and que
Aim of the activity	Students to learn to identify measurements that are / are not
Teacher's instructions	Photocopy the activity on the next page and give one copy to 8 minutes to complete the activity. Spend 3 minutes at the enangle going through student answer
Students' task	Students should meas ുട്ടു length of the pieces to see whet tolerances. Thanka ചാണ്ട് nent should be 5 cm with tolerances

Answers		
1	Did it meet the	tolerances?
	☑ Yes	□ No
2	Did it meet the	L
2	□ Yes	☑ No
-	Did it meet the	tolerances?
3	☑ Yes	□ No
4	Did it meet the	tolerances?
4	□ Yes	☑ No
<u>_</u>	Did it meet the	tolerances?
5	☑ Yes	□ No
<u></u>	Did it meet the	tolerances?
6	☑ Yes	□ No
7	Did it meet the	tolerance:
/	□ Yes	E.

Extra challenge!

How would ak sure you get the highest quality finish when using a CNC mone of the combelow.

****	20000000				
	Make sure the	cutting settings	are correct to	or the materia	il being used

- ☐ Keep the machine clean and in working order.
- ☐ Make sure that an allowance is made for kerf (a small amount of material the CNC mill).
- ☑ All of the above.





Tolerances and quality c

Tolerances are the minimum and maximum meaurements that a product or part to be in order to be usable.

Below are seven rectangles, which represent seven pieces of wood that have be out to form the sides of a box. Measure the length of each piece to see whether

The measurement should be 5 cm with tolerances of \pm 2 mm.

1.

							C	d it	meet t	he toler
			****************			ا ا			Yes	C
2.						**********				
	(199°			L)id it	meet 1	the tolers
			,						Yes	Ľ
3.							!			
							D	id it ı	neet t	he toler
									Yes	C
] ~_					
4.							Di	id it n	neet ti	າe tolerລະ
									Yes	г
								اسا	162	L_3
5.					***************************************					
							Di	ditn	neet th	ne tolera
									Yes	
6.						7				
							D	id it r	neet tl	ne toler
									Yes	
7.							n:	c'it m	oot th	ie tolera:
							Ì			
					1884			L	Yes	L
		1								
F	معالمهما									
	chall would	888 TW9988	335.535		the highe	est-qu	uality finish v	when	using	a CNC m
one o	f the o	ptions	below.							
							r the materi	al be	ing use	ed.
				an and ir owance i			r. f (a small an	noun	t of ma	aterial the
(CNC mi	illing).								
	All of th	ne abo	ve.							

COPYRIGHT PROTECTED

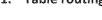
Zig Zeg Education

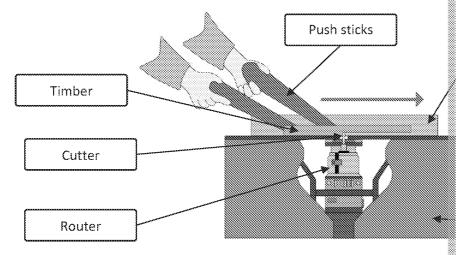
Activity 20 – Commercial pr

Teacher's notes and answers

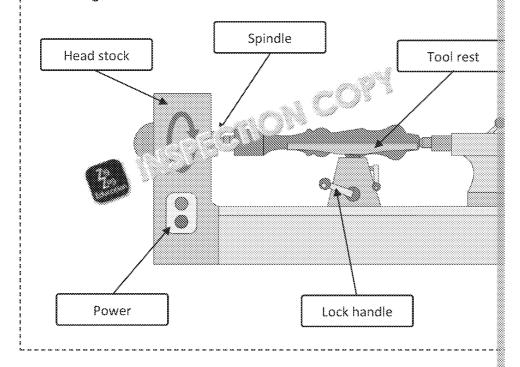
	Plenary activity: commercial pro
Aim of the activity	Students to practise knowledge of commercial processes.
Teacher's instructions	Split the class into pairs. Photocopy the activity on the next pa pair of students. Give the students 8 minutes to complete the 2 minutes at the end of this session and back and going the
Students' task	Students should choor the diagraph of the diag

Answers 1. Table routing





2. Turning

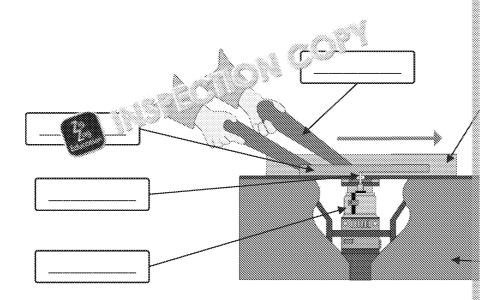




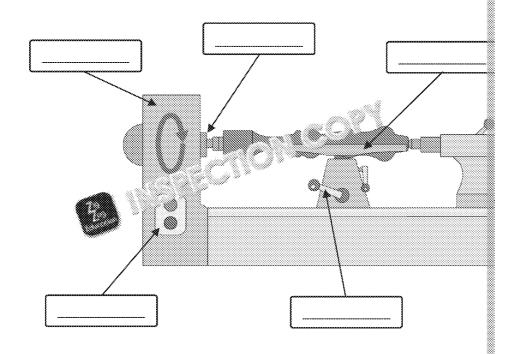
Commercial process

The diagrams below illustrate the processes of table routing and turning. Label to diagrams using the words provided.

1. Table routing – choose from the labels below: timber, router table, router, guide, push sticks, surface, cutter



2. Turning – choose from the labels below: bed, lock handle, power, spindle, tool rest, head stock, tail stock





Activity 21 - Surface treatments

Teacher's notes and answers

	ary activity: surface treatments
Aim of the activity	Students to practise their knowledge of surface treatments an
Teacher's instructions	Photocopy the activity on the next page and give one copy to 8 minutes to complete the activity. Spend imminutes at the entand going through student answer
Students' task	Students should numhinswactions in the correct order. finishes includ പ്രവിധാരണ്ട് പ്രമുദ്ധവും and vinyl decals.

Answers



Paint

Used to add colour to timber for aesthetic appeal, as well as protection. A solid colour in This is called opaque. A surface finish can be glossy, silky or matt.

Number of instruction	Instruction
2	Using a brush, coat the timber in a layer of primer to seal the wood.
5	Many coats can be applied, depending on darkness of colour and thick
3	After an even coat of primer has dried, the first layer of paint can be a
1	Clean and sand the surface smooth using sandpaper or a sander.
4	When it is dry, sand down the surface again.

Wood stain

Used to brighten or change the colour of the natural timber. Stain is commonly used to like expensive hardwoods. It gives a layer of protection, and varnish can be used on top

Number of instruction	Instruction
3	Using a cloth, apply stain evenly.
4	Remove excess from surface with clean cloth.
1	Clean and sand the surface smooth using sandpaper or a sander.
5	Sealant such as varnish can be applied using a brush to give extra prot
2	Wood conditioner can be added using a cloth to prevent a blotchy fin

Oil and wax

Used to enhance the natural colour of the timber, and provides a layer of protection a

instruction	
1 Clean and sand the surface smooth ്ടിന് പ്രത്യത്തിലെ or a sander.	
2 Other layers can be an initial sined for a better finish.	
4 Using a cloth இது vie a roll evenly.	
3 Leavat hai, using a clean cloth, buff surface to achieve shi	ie.

Tanalising

Timber can graph into a pressurised cylinder to remove air and force treatment solution preservative, protecting it against rot and weathering.

Number of	Instruction
instruction	
3	Put treatment solution into cylinder, and use pressure pump to force
1.	Load timber into treatment cylinder.
5	Once complete, remove timber from cylinder.
4	Drain treatment cylinder, and start final vacuum.
2	Seal the door, and activate vacuum pump to remove air.



Surface treatments and fi

Consider the instructions for surface treatments and finishes. The order of the instructions has been mixed up! Number the instructions in the correct order.

Paint

Used to add colour to timber for aesthetic appeal, as well as protection. A solid conseen. This is called opaque. A surface finish can be glossy, silky or matte.

Number of instruction	Instruction
	Using a brush, coat the timber in a layer of crimer to seal the wo
	Many coats can be applied, dener [377] O Sarkness of colour and
	After an even coat of paint can
	Clean and s அதிக்கே smooth using sandpaper or a sander.
	he ட ுy, sand down the surface again.

Wood stain

Used to brighten or change the colour of the natural timber. Stain is commonly usoftwoods look like expensive hardwoods. It gives a layer of protection, and variable to the colour of the natural timber.

Number of instruction	Instruction
	Using a cloth, apply stain evenly.
	Remove excess from surface with clean cloth.
	Clean and sand the surface smooth using sandpaper or a sander.
	Sealant such as varnish can be applied using a brush to give extra
	Wood conditioner can be added using a cloth to prevent a blotch

Oil and wax

Used to enhance the natural colour of the timber, and provides a layer of protect

Number of	Instruction
instruction	instruction
	Clean and sand the surface smooth using sandpaper or a sander.
	Other layers can be applied and shined for better finish.
	Using a cloth, apply wax or oil evenly.
	Leave to dry, and, using a clean cloth, buff surface to achieve shi

Tanalising

Timber can be put into a pressurised of its remove air and force treatment acts as a preservative, proto the fractions for and weathering.

Number of instruction	Instruction
•	Put treatment solution into cylinder, and use pressure pump to f
	Load timber into treatment cylinder.
	Once complete, remove timber from cylinder.
	Drain treatment cylinder, and start final vacuum.
	Seal the door, and activate vacuum pump to remove air.

