



Pearson
Edexcel

Mark Scheme

Summer 2022

Pearson Edexcel GCSE
In Design & Technology (1DT0)
1F: Timbers

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June 2022

Question Paper Log Number 71344

Publications Code 1DT0_1F_2206_MS

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

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Component 1 mark scheme – 1DT0/1F

Section A – Core content

Question number	Answer	Additional information	Mark
1 (a) (i)	Any one property from: <ul style="list-style-type: none"> • Malleable (1) • Ductile (1) • Excellent strength to weight ratio (1) • Lightweight / low density (1) • Waterproof / Impermeable (1) • Resistance to corrosion / won't rust (1) • Food safe / non-toxic (1) 	Do not accept 'can be recycled' Do not accept 'durable'	(1)

Question number	Answer	Additional information	Mark
1 (a) (ii)	Any one property from: <ul style="list-style-type: none"> • Elasticity / mouldability (1) • Soft (1) • Insulator (1) • Permeable / breathable (1) • Insulator / heat insulator (1) 	Do not accept 'durable'	(1)

Question number	Answer	Mark
1 (a) (iii)	Any one property from: <ul style="list-style-type: none"> • Transparent / see through (1) • Translucent / semi translucent (1) • Smooth surface (1) 	(1)

Question	Answer	Additional information	Mark
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number			
1 (a) (iv)	Any one property from: <ul style="list-style-type: none"> • Flexible / flexibility / bendable (1) • Good tensile / compressive strength (1) • Moisture / water resistance (1) • Elasticity (1) • Tough / impact resistance (1) 	Do not accept 'durable'	(1)

Question number	Answer	Mark
1 (b)	Any one disadvantage of urea formaldehyde (UF) for the 3-pin plug (1) and a linked justification of that disadvantage (1) <ul style="list-style-type: none"> • UF is brittle (1) therefore if it gets banged / knocked it can break / shatter / splinter (1) • UF is a thermosetting plastic (1) therefore it cannot be recycled if it breaks / is not biodegradable (1) • UF can melt / burn at high temperatures (1) therefore it becomes a hazard / danger (1) 	(2)

Question number	Answer	Additional guidance	Mark
1 (c)	A calculation that includes: <ul style="list-style-type: none"> • correct calculation of ratios $50 / (13 + 7) = 2.5$ • correct answer $2.5 \times 13 = 32.5 \text{ kg}$ 	Award full marks for correct numerical answer without working. Allow for ECF if candidate gets part of transposition wrong.	(2)

Question	Answer	Additional guidance	Mark
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number			
2 (a)	Any one other hardwood from: <ul style="list-style-type: none"> • Oak (1) • Beech (1) • Ash (1) • Birch (1) • Jelutong (1) Any other appropriate hardwood	Do not accept balsawood or mahogany	(1)

Question number	Answer	Mark
2 (b)	Any one working property of mahogany that makes it an appropriate choice of material (1) and a linked justification of that working property (1) <ul style="list-style-type: none"> • It is hard / durable (1) which means that it will withstand wear as the books are placed in and taken out of the holder (1) • It is tough (1) which means that it is capable of being knocked / bumped / dropped without damaging (1) • It has close / tight grain (1) which means it does not damage the book when lifted in or out (1) 	(2)

Question number	Answer	Mark
2 (c)	Any one advantage for the manufacturer (1) and a linked justification of that advantage (1) <ul style="list-style-type: none"> • They do not hold lots of stock (1) which means they do not need to pay for storage space / tie up finance / not susceptible to falling demand (1) • They could change the type of wood used / easily change the size / change design (1) which means they can respond to individual customers' needs / wants / size of book (1) • Each one will be unique / exclusive (1) which means the manufacturer can charge a higher price (1) • No excess products / stock (1) which means the manufacturer will not have to reduce the price to get rid of stock (1) • Happier / more engaged workforce (1) therefore higher quality products manufactured / greater staff retention (1) 	(2)

Question	Answer	Additional	Mark
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number		guidance	
2 (d)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> correct calculation of the total length of timber required $(2 \times 30) + 40 = 100 \text{ cm}$ (1) correct calculation of volume $100 \text{ cm} \times 5 \text{ cm}^2 = 500 \text{ cm}^3$ (1) correct conversion of units from cm^3 to m^3 $500 \text{ cm}^3 = 500/1,000,000$ or $10^6 = 0.0005 \text{ m}^3$ (1) correct calculation of final cost $0.0005 \times 1200 = \text{£}0.6$ or 60 pence (1) 	<p>Award full marks for correct numerical answer without working.</p> <p>Allow for ECF if candidate gets part of calculation wrong.</p> <p>Special case: Award a max of 3 marks if the factor of 6 unit conversion is incorrect or not evident; for example: £6, £60, £6000, £600000</p>	(4)

Question number	Answer	Mark
3 (a)	<ul style="list-style-type: none"> Light emitting diode / LED (1) (Only answer) 	(1)

Question number	Answer	Mark
3 (b)	<p>Any one reason for using a bevel gear (1) and a linked reason for the use (1)</p> <ul style="list-style-type: none"> To convert rotary motion through 90° (1) so it will take up less space inside the drill (1) To increase / decrease rotary speed (1) which means that the chuck can be made to turn faster / slower than the motor speed (1) To increase the torque (1) which means it will be able to drill harder / denser materials (1) 	(2)

Question number	Answer	Additional guidance	Mark
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3 (c)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> • Correct calculation of the compound gear ratio $(40 / 20) \times (40 / 20) = 4$ (1) • Correct calculation of driven RPM $4 \times 400 = 1600 \text{ RPM}$ (1) <p>Alternative method:</p> <p>$(40 / 20) = 2 \times 400 = 800$ (1)</p> <p>$(40 / 20) = 2 \times 800 = 1600$ (1)</p>	<p>Special case: If only one step has been calculated, e.g. $40 / 20 = 2 \times 400 = 800$ (1) If no working out and answer is 800 (0)</p>	(2)
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Question number	Answer	Mark
3 (d)	<p>Any one benefit of using a battery (1) and a linked justification of the benefit (1)</p> <ul style="list-style-type: none"> • Portability / convenience (1) therefore the user does not need to be near a power supply / plug / ease of use (1) • No power leads (1) which means improved safety as there will be no trailing cables (1) • The battery can be replaced with a fully recharged battery (1) which means the hand drill can continue to be used (1) 	(2)

Question number	Answer	Additional guidance	Mark
3 (e)	Any two benefits of using carbon fibre for the main	Do not	(4)

	<p>body (1) and a linked justification of that benefit (1)</p> <ul style="list-style-type: none"> • It is lightweight (1) which means it is not too heavy for the user to hold / can work longer without tiring (1) • It can be formed into complex shapes / forms (1) which means smooth / sleek / ergonomic forms can be manufactured (1) • It has excellent strength to weight ratio (1) which means although being light, it is capable of normal / intended use (1) 	<p>accept durable, hard wearing or tough</p>	
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Question number	Answer	Mark
4 (a)	<p>Any two explanations that references the way in which agro-textiles can be used (1) and a linked justification of each way (1)</p> <ul style="list-style-type: none"> • They can be used to stop soil erosion (1) which means nutrients / soil will not be washed away (1) • They can be used to warm the ground (1) which means crops may grow faster / increased yields (1) • They can be used to help retain moisture in the soil (1) which means that the amount of water required to grow crops is reduced / saves valuable water (1) • They can be used to help protect the crops from birds / insects / pests (1) which means the crop will be bigger / more crops / fewer crops lost by being eaten (1) • They can be used to protect against adverse weather conditions such as wind / frost / hail / solar radiation (1) which means they have a greater chance of surviving / growing (1) • They can be used as a weed control membrane (1) which means time can be saved by not having to remove weeds (1) 	(4)

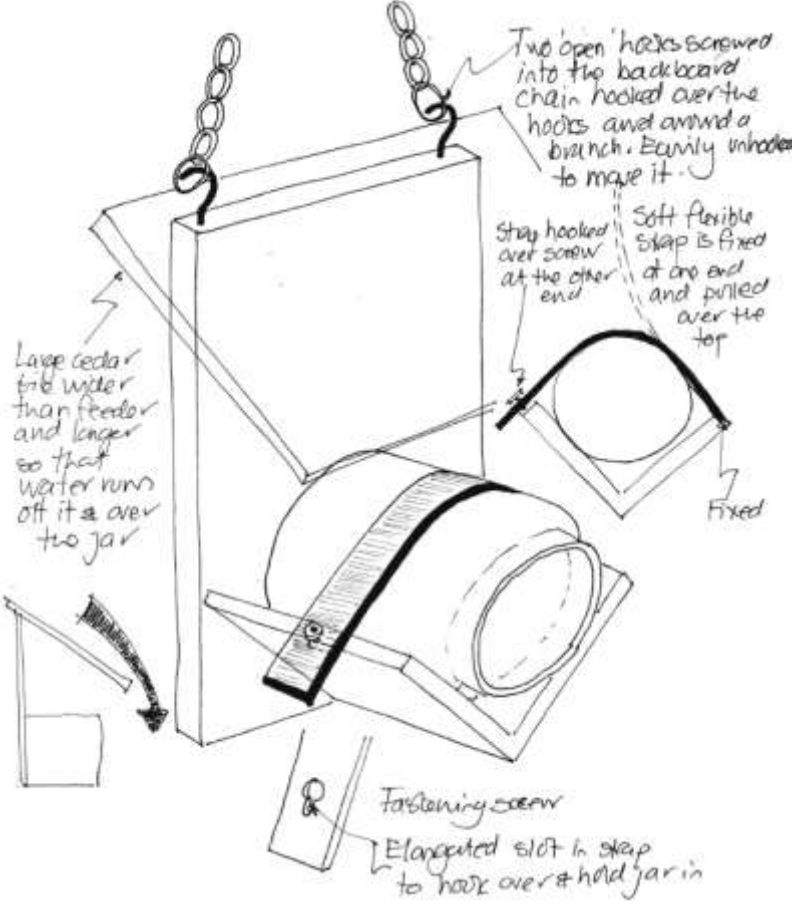
Question number	Answer	Additional guidance	Mark
4 (b)	A calculation that includes:	Award full marks	(2)

	<ul style="list-style-type: none"> • correct working out of area of roll of agro-textile $50 \times 1.2 = 60\text{m}^2$ <li style="text-align: right;">(1) • correct working out of number of rolls $420 / 60 = 7$ rolls <li style="text-align: right;">(1) <p>Alternative method:</p> <p>$420 / 1.2 = 350$ (1)</p> <p>$350 / 50 = 7$ (1)</p>	<p>for correct numerical answer without working.</p> <p>Allow for ECF if candidate gets part of calculation wrong.</p>	
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Question number	Indicative content	Mark
4 (c)	<ul style="list-style-type: none"> • Fair trade supports the development of farmers and producers working in local communities / communes / cooperatives by receiving a fair price for their crops / products • Products / crops displaying the fair-trade logo have been produced by small-scale farmer organisations who employ local people • Locals benefit from employment / regular income / improved standards of living • Communities benefit from money going back into the local economy • There are a set of environmental and social conditions that must be met to be branded as a fair-trade producer meaning improved benefits for the environment and locals • Workers have some rights which are protected and enforced by being a fair-trade supplier • Minimum prices are set / adhered to / guaranteeing a fair price for the crop / products • Fairtrade Premiums are paid on products and are reinvested in local business / community projects to support farmers / residents • Fairtrade allows for farming to be a reliable source of income for local families meaning that the skills of farming can be passed from one generation to the next leading to improvements in lifestyle and local economy • Fairtrade emphasises the reduction of exploitation and child labour / developing the skills of workers / improved human rights 	(6)

Level	Mark	Descriptor
	0	
Level 1	1 - 2	<ul style="list-style-type: none"> • Attempts to interrogate and deconstruct information but connections and logical chains of reasoning are flawed. • An unbalanced appraisal of the information/issues, containing judgements that show a limited awareness of the interrelationships between factors or competing arguments.
Level 2	3 – 4	<ul style="list-style-type: none"> • Interrogates and deconstructs information and provides some connections and logical chains of reasoning. • A balanced appraisal of the information/issues, containing judgements that show an awareness of the interrelationships between factors or competing arguments.
Level 3	5 - 6	<ul style="list-style-type: none"> • Interrogates and deconstructs information and provides sustained connections and logical chains of reasoning. • A well-balanced appraisal of the information/issues, containing judgements that show a thorough awareness of the interrelationships between factors or competing arguments.

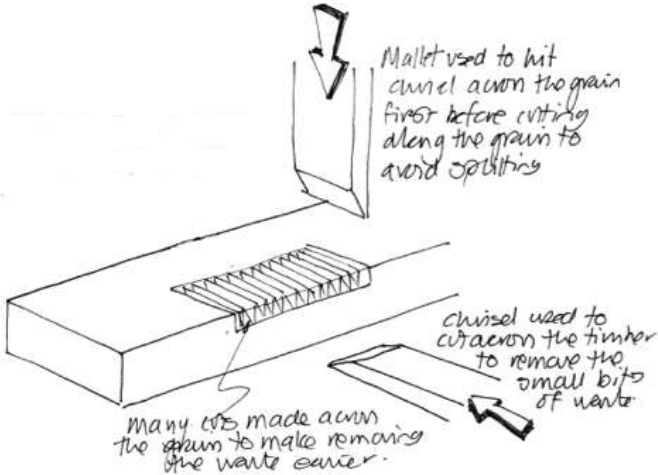
Section B – Timbers

Question number	Answer	Mark
5 (a)	<p>Marks will be awarded for understanding of design and technology, not graphical skills.</p> <p>Notes and sketches to show how to:</p> <ul style="list-style-type: none"> • hold the jar securely (1) and allow an empty jar to be easily replaced (1) e.g. clips / straps / turn buttons / lid over the top / MUST not be a permanent fixing • include a cover that protects the backboard (1) and jar support and keeps the jar dry (1) e.g. roof / tile / pitch roof / slope / water run off / beyond the neck of the jar / cover the width as a minimum • be able to be hung up in a tree (1) and easily moved to another tree (1) e.g. chain / string / hole / mirror plate / capable of being removed / non-permanent / screw / nail <p>Example of candidate response:</p>  <p>The sketch shows a rectangular backboard with a jar hanging from its bottom edge. Two chains are attached to the top of the backboard, with a note: "Two open hooks screwed into the backboard chain hooked over the hooks and around a branch. Equally unhooks to make it." A strap is hooked over a screw on the side of the backboard, with a note: "Strap hooked over screw at the other end." A soft flexible strap is fixed at one end and pulled over the top of the jar, with a note: "Soft flexible strap is fixed at one end and pulled over the top." A fixed support is shown at the bottom right. A note on the left says: "Large cedar tree wider than feeder and longer so that water runs off it & over the jar." A fastening screw is shown with an elongated slot in the strap, with a note: "Fastening screw Elongated slot in strap to hook over & hold jar in".</p>	(6)

	<p>Notes:</p> <p>Two 'open' hooks screwed into the backboard. Chain hooked over the hooks and around a branch. Easily unhooked to move it.</p> <p>Strap hooked over screw at the other end.</p> <p>Soft flexible strap is fixed at one end and pulled over the top</p> <p>Fastening screw – elongated slot in strap to hook over and hold jar in.</p> <p>Large cedar tile wider than feeder and longer so that the water runs off it and over the jar.</p>	
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Question number	Answer	Mark
5(b)	<p>Any two explanations that include a way the wooden money box meets or fails to meet the requirement (1) and a linked justification of that way (1)</p> <ul style="list-style-type: none"> • You can see how much you have saved / filled it up (1) therefore you can continue to save / break it open to spend (1) • There is no easy / obvious way to gain access (1) which means that you are more likely not to touch / get the money out (1) • The tea cup is not an obvious shape / appealing to a young child (1) which means they are not going to be motivated to save (1) • See-through screens are likely to get scratched / react with UV light (1) meaning the young children can't see the coins very well / coins will be obscured (1) • Not a lot of space for coins / too thin (1) which means not a lot of money can be stored / saved (1) 	(4)

Question number	Answer	Mark
6 (a)	<p>Any two advantages for the manufacturer of using a standard sized board (1) and a linked justification (1)</p> <ul style="list-style-type: none"> • The size of the painting surface can be made to match the size of a standard board (1) which means less waste being produced (1) • Standard sized boards cost less (1) which will reduce the overall cost of the material / product (1) • As it is supplied to a set size there will be less cutting required (1) which means the overall manufacturing time will be reduced / quicker (1) • The boards will be of a known size (1) which means the designer can maximise the material / make most efficient use of the board (1) • Uses less energy to make the product (1) which means reduced energy costs / production costs (1) • Standard sized boards are more readily available (1) which means the lead time for material supply to the manufacturer can be reduced (1) 	(4)

Question number	Answer	Additional Guidance	Mark
6 (b)	<p>Marks will be awarded for understanding of design and technology, not graphical skills.</p> <p>Notes and sketches to show how to:</p> <ul style="list-style-type: none"> • Cut / chop across the grain (1) • Cut along the length of the rebate / with the grain after cutting across the grain (1) • Pare across the rebate to remove the loosened waste (1) • Clean up edges / square out the corners with chisel in vertical plane (1) • Use of hand router to level the bottom (1) <p>Example of candidate response:</p>  <p>Notes:</p> <p>Mallet used to hit the chisel across the grain first before cutting along the grain to avoid splitting</p> <p>Chisel used to cut across the timber to remove the small bits of waste</p> <p>Many cuts made across the grain to make removing the waste easier</p>	Cap at 3 marks if no sketches or all sketches and no notes	(4)

Question number	Answer	Mark
6 (c)	<p>Any one explanation that includes a reason for applying varnish (1) and a linked justification for that reason (1)</p> <ul style="list-style-type: none"> • Varnish will provide a wipe clean surface (1) which means if paint gets on the frame it can be washed off easier (1) • The varnish will offer a layer of protection to the grain / seal the grain / bond the grain (1) which means that if any paint gets on the surface it will not soak into the timber and stain / leave a permanent mark / reduced risk of surface splintering (1) • Varnish is a clear / glossy / matt finish (1) which means the natural grain pattern will be seen / more attractive product (1) 	(2)

Question number	Answer	Mark
6 (d)	<p>Any two explanations that include a suitable wood joint (1), plus two linked justifications of that suitable wood joint (1) + (1)</p> <p>Dowel joint (1)</p> <ul style="list-style-type: none"> • It uses dowels to join the two pieces together making a more mechanical joint / increased gluing area (1) which means it is less likely to break apart given a bit of the dowel is in each of the two parts (1) <p>Mortise and tenon (1)</p> <ul style="list-style-type: none"> • The mortise and tenon mortise increases the gluing / contact area (1) which results in a joint which is less likely to be pulled apart / capable of taking greater loads without breaking (1) <p>Bridle (1)</p> <ul style="list-style-type: none"> • The bridle joint increases the gluing / contact area (1) which results in a joint which is less likely to be pulled apart / capable of taking greater loads without breaking (1) <p>Tee halving / lap (1)</p> <ul style="list-style-type: none"> • A joint is formed by removing certain areas from both parts (1) which results in a mechanical / physical joint with a bigger gluing area / capable of taking bigger compressive loads (1) <p>Screwed joint (1)</p> <ul style="list-style-type: none"> • Holes are drilled in the upright (1) which means a screw can be used to pull the rail into the upright / can be enhanced / strengthened with the use of adhesive (1) <p>Dovetail / dovetail halving (1)</p> <ul style="list-style-type: none"> • A joint is formed by cutting the tail and pin in separate parts (1) which results in a mechanical / physical joint with a bigger gluing area (1) 	(6)

Question number	Answer	Mark
7 (a)	<ul style="list-style-type: none"> • Compression (1) • Compressive (1) 	(1)

Question number	Answer	Mark
7 (b)	<p>Any two working properties explained (1) plus a linked justification of the property (1).</p> <ul style="list-style-type: none"> Ash is flexible / has elasticity (1) which means that it is capable of being bent / flexed to create the open shape of the vase (1) Ash has good water resistance (1) which means it will not absorb / soak up any stray water from the test tube / spilt water (1) It has good compressive strength (1) which means the small part across the top will not distort under pressure from the two sides (1) 	(4)

Question number	Answer	Additional guidance	Mark
7 (c)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> Conversion of units at the start or end (1) Calculation of the area of the semi-circle (1) $\pi r^2 / 2$ $3.142 \times 1.5^2 / 2 = 3.53475 \text{ cm}^2$ Calculation of the area of the rectangle (1) $10 \times 3 = 30 \text{ cm}^2$ Calculation of the total area (1) $30 \text{ cm}^2 + 3.53475 \text{ cm}^2 = 33.53475 \text{ cm}^2$ Calculation of the total volume (1) $33.53475 \text{ cm}^2 \times 2 = 67.0695 \text{ cm}^3$ Rounded to 67 cm^3 	<p>Award full marks for correct numerical answer without working.</p> <p>Allow ECF if candidate gets part of calculation wrong.</p> <p>Credit full marks for 67.0695 or 67.0</p> <p>Alternative method may show calculation of volume of separate parts that are then added together</p>	(5)

Question number	Answer	Mark
7 (d)	<p>Any two explanations that includes a reason for fabricating the main body of the flower vase rather than making from a single piece (1), plus two linked justifications of that reason (1) + (1)</p> <ul style="list-style-type: none"> • Fabrication will require less volume of material (1) which means the cost will be less (1) therefore allowing the product to be sold for less / make more profit for the manufacturer (1) • Less waste will be produced during the manufacture (1) which means that less material must be disposed of (1) therefore reducing the amount going to landfill / tipping (1) • Smaller sections of timber can be used (1) which reduces the amount of bigger section timber needing to be purchased / small off cuts used up (1) therefore maximising material usage / reducing the need for trees to be felled / processed / leaves trees to grow for longer / more sustainable long term (1) • The grain can be put in different directions for the separate pieces (1) which means end grain could show on the face (1) therefore making / creating different aesthetic features (1) 	(6)

Question number	Answer	Mark
8 (a)	<p>Any one explanation that includes a benefit of manufacturing the tray from plywood (1) and a linked justification of that benefit (1)</p> <ul style="list-style-type: none"> • It has very good dimensional stability (1) which means it will not warp and twist / will stay flat (1) • It is available in large flat sheets (1) which means the tray can be cut as a single piece rather than being made up from smaller strips being joined together (1) • The construction of plywood with layers at 90 degrees to each other (1) means the tray is less likely to split / bend when machined (1) 	(2)

Question number	Answer	Mark
8 (b)	<p>Any one explanation that includes an advantage of carrying out a quality control check (1), plus one linked justification of that advantage (1) + (1)</p> <ul style="list-style-type: none"> • The tray can be checked for dimensional accuracy (1) which means tooling can be checked / changed if the tray is not the correct size (1) therefore reducing the number of trays that would be cut of the wrong size / reducing waste / rejects (1) • The grain / edges can be checked for splinters (1) which means edges / surfaces can be hand finished (1) therefore reducing the risk of injury to users / returns / complaints from customers (1) • The size of the holes can be checked (1) and tooling adjusted accordingly (1) which reduces the chance of glasses / plates / cutlery falling out / over if the holes / slots are not deep enough (1) 	(3)

Question number	Answer	Mark
8 (c)	<p>Any two reasons for using a router (1) and a linked justification of those reasons (1)</p> <ul style="list-style-type: none"> • The router can be used with a collar / profile cutter (1) which means that it can follow around a template and make identical copies of the tray (1) • It can be used to plunge to a depth (1) which means it can cut out the slots / recesses (1) • Different sized / profiled cutters can be used (1) which means that shaped edges / rounded corners achieved / sharp edges removed (1) • Routers can be used in CNC machines (1) which means the tray can be cut unaided / 24/7 / faster than by hand methods (1) 	(4)

Question number	Indicative content	Mark
8 (d)	<ul style="list-style-type: none"> • It is quite large and will fit on a lap / table / will balance and not tip over • It is a hard material and might be quite uncomfortable on a lap / heavy • Would be difficult to clean / wash because it could not be put in a dishwasher so not great from a hygiene point of view if food gets spilt on it • Could be customised / personalised for use in restaurants with the logo / name machined into the surface • The tray is manufactured from widely available materials / sustainable given it is made up from different bits of timber • The sheet is quite thick and stable / will not warp / widely available in a range of sheet sizes allowing many to be cut from a larger sheet • The oak veneer makes effective / efficient use of natural hardwoods to create a nice surface finish rather than using solid timber / more sustainable • Plywood with an oak veneer is cheaper than using solid oak sections • Design of the tray may not be suitable for all social groups, for example some cultures may not use implements / utensils • Useful in social situations for taking food / drink to friends / customers 	(9)

Level	Mark	Descriptor
	0	
Level 1	1 - 3	<ul style="list-style-type: none"> • Attempts to interrogate and deconstruct information but connections and logical chains of reasoning are flawed. • An unbalanced appraisal of the information/issues, containing judgements that show a limited awareness of the interrelationships between factors or competing arguments. • A conclusion may be presented but it is likely to be generic assertions rather than supported by relevant judgements.
Level 2	4 – 6	<ul style="list-style-type: none"> • Interrogates and deconstructs information and provides some connections and logical chains of reasoning. • A balanced appraisal of the information/issues, containing judgements that show an awareness of the interrelationships between factors or competing arguments. • A conclusion is presented that is partially supported by relevant judgements.
Level 3	7 - 9	<ul style="list-style-type: none"> • Interrogates and deconstructs information and provides sustained connections and logical chains of reasoning. • A well-balanced appraisal of the information/issues, containing judgements that show a thorough awareness of the interrelationships between factors or competing arguments. • A conclusion is presented that is fully supported by relevant judgements.