



Pearson
Edexcel

Mark Scheme (Results)

November 2021

Pearson Edexcel GCSE
In Design & Technology (1DT0)
1B: Papers & Boards

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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.

Component 1 mark scheme – 1DT0/1B

Section A – Core content

Question number	Answer	Mark
1 (a) (i)	Any one property from: <ul style="list-style-type: none"> • Hard (1) • Tough (1) • Straight / close grained (1) • Slightly flexible (1) • Compressive strength (1) 	(1)

Question number	Answer	Additional information	Mark
1 (a) (ii)	Any one property from: <ul style="list-style-type: none"> • Lightweight (1) • Tough (1) • Hygienic / inert (1) • Plasticity (1) • Waterproof (1) 	Do not accept 'High impact' on its own Do not accept 'can be recycled' Do not accept 'durable'	(1)

Question number	Answer	Mark
1 (a) (iii)	Any one property from: <ul style="list-style-type: none"> • Warm / traps air / insulator (1) • Breathable (1) • Durable (1) • Soft (1) 	(1)

Question number	Answer	Mark
1 (a) (iv)	Any one property from: <ul style="list-style-type: none"> • Opaque (1) • Absorbent (1) • Rough / textured surface (1) 	(1)

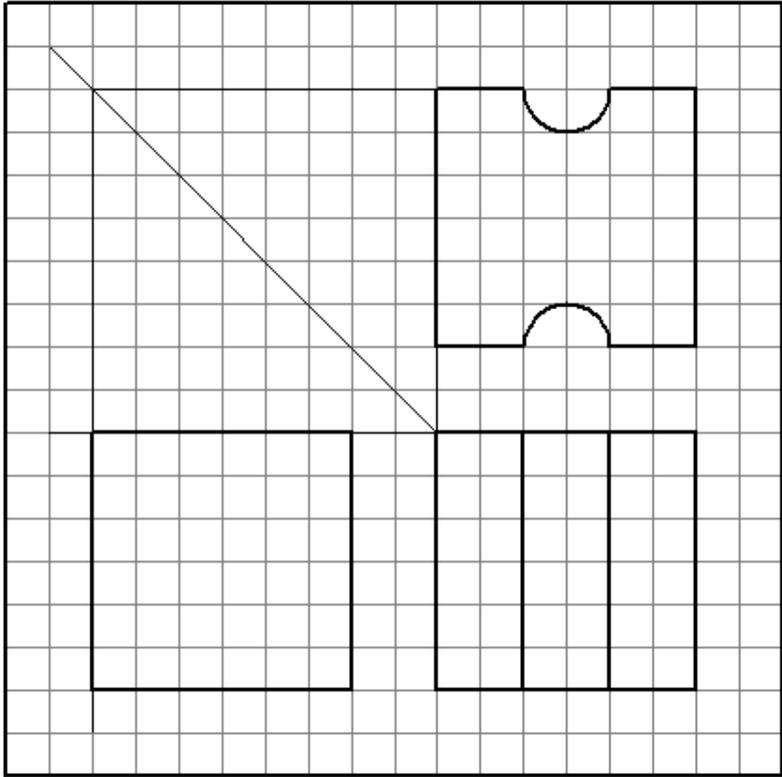
Question number	Answer	Mark
1 (b)	<p>Any one advantage of using wind to generate energy (1) and a linked justification of that advantage (1).</p> <ul style="list-style-type: none"> • The energy generated is free (1) once the installations / construction / investment costs have been paid off (1) • The energy generated is a clean fuel source / does not rely on any burning of materials (1) therefore reducing emissions / greenhouse gases / preserves fossil fuels (1) • It is a sustainable / renewable source of energy (1) which means it will never run out (1) • The UK has good levels of offshore wind / hilly terrain / exposed landscape (1) which provides a good / constant / consistent level of power / electricity (1) 	(2)

Question number	Answer	Additional guidance	Mark
1 (c)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> • correct setting out of formula $\frac{800 - 500}{500} \times 100$ <p>(1)</p> <ul style="list-style-type: none"> • correct answer 60% <p>(1)</p>	<p>Award full marks for correct numerical answer without working.</p> <p>Allow for ECF if candidate gets part of transposition wrong.</p>	(2)

Question number	Answer	Mark
2 (a)	<p>Any one non-ferrous metal from:</p> <ul style="list-style-type: none"> • Copper (1) • Brass (1) • Bronze (1) • Pewter (1) 	(1)

Question number	Answer	Mark
2 (b)	<p>Any one reason for using standard sized rods (1) and a linked justification of that reason (1).</p> <ul style="list-style-type: none"> • They will be readily available from a supplier (1) which means the company do not have to invest in machinery / time to manufacture the rods (1) • They will be able to buy long lengths which they simply cut to the size they require (1) which means only very simple processing is required which will reduce the level of skill required / speed up manufacturing times (1) • A standard 10mm drill bit can be used (1) so no further reduction of the material diameter is required (1) • They would be mass produced by specialist manufacturers (1) which means a reduction in unit cost / cheaper (1) 	(2)

Question number	Answer	Mark
2 (c)	<p>Any one property of felted wool fabric that makes it an appropriate choice of material (1) and a linked justification of that property (1)</p> <ul style="list-style-type: none"> • It does not fray (1) which means it will leave a neat finish / edge around the base (1) • It is soft / smooth / cushioned (1) which means it will not damage any surface the game is placed on (1) 	(2)

Question number	Answer	Mark
2 (d)	<p data-bbox="339 304 959 338">A completed orthographic drawing that shows:</p>  <ul style="list-style-type: none"> <li data-bbox="344 1283 1203 1391">• correct width of the cube at 30mm for side view = 6 spaces on the grid (1) <li data-bbox="344 1402 1203 1509">• correct depth of the cube at 30mm for side view = 6 spaces on the grid (1) <li data-bbox="344 1520 1203 1628">• correct size of the semi-circle on the plan view = 2 spaces on the grid (1) <li data-bbox="344 1639 1203 1747">• correct position / presence of the second semi-circle at the front edge / bottom edge of the plan view (1) 	(4)

Question number	Answer	Additional Guidance	Mark
3 (a)	<p>Any one composite from:</p> <ul style="list-style-type: none"> • Carbon fibre (1) • Concrete (1) • Plywood (1) • MDF (1) • Chipboard (1) • Robotic materials (1) • Reinforced polymers / textiles (1) 	Do not accept GRP / fibre glass / glass fibre	(1)

Question number	Answer	Mark
3 (b)	<p>Any one reason for using fibreglass (1) and a linked reason for the use (1)</p> <ul style="list-style-type: none"> • Fibreglass is a tough material (1) which means it can withstand the knocks and bumps of hitting rocks / stones (1) • Fibreglass is water resistant (1) which means that it will not absorb water when out on the river (1) • Fibreglass can be moulded into complex shapes (1) which means it can be used to create curved shapes / smooth lines / streamlined shape / create a single piece moulding (1) • A high-quality surface finish can be achieved on the mould / product (1) which will reduce friction / allows to boat to move better through the water (1) • Fibreglass forms a lightweight structure (1) which means it will be easy to lift the boat out of the water (1) • Low maintenance material (1) which means it does not need to be re-varnished / repainted (1) • Resin can be pigmented (1) which means no painting / colouring is needed after moulding (1) 	(2)

Question number	Answer	Additional guidance	Mark
3 (c)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> • correct working out $100/2 = 650/x$ $(2 \times 650)/100$ <p>(1)</p> <ul style="list-style-type: none"> • correct answer 13ml <p>(1)</p> <p>Alternative method</p> <ul style="list-style-type: none"> • $6 \times 2 = 12\text{ml} + (0.5 \times 2) = 1 \text{ ml}$ <p>(1)</p> <ul style="list-style-type: none"> • $12 + 1 = 13\text{ml}$ <p>(1)</p> <p>Alternative method</p> <ul style="list-style-type: none"> • $(650/100) \times 2 = 6.5 \times 2$ <p>(1)</p> <ul style="list-style-type: none"> • 13ml <p>(1)</p> <p>Alternative method</p> <ul style="list-style-type: none"> • $(2/100) \times 650$ <p>(1)</p> <ul style="list-style-type: none"> • 13ml <p>(1)</p>	<p>Award full marks for correct numerical answer without working.</p> <p>Allow for ECF if candidate gets part of calculation wrong.</p>	(2)

Question number	Answer	Mark
3 (d) (i)	<p>Correct class of lever given</p> <ul style="list-style-type: none"> • Class 1 / type 1 / 1st class (1) 	(1)

Question number	Answer	Mark
3 (d) (ii)	<p>Correct type of movement given</p> <ul style="list-style-type: none"> • Oscillation (1) 	(1)

Question number	Answer	Mark
3 (e)	<p>Any two benefits of sports textiles (1) and a linked justification of the benefits (1).</p> <ul style="list-style-type: none"> • Sports textiles can be lightweight / flexible (1) therefore they will not weigh down the athlete too much / move with the body (1) • They can have inbuilt sensors / monitors such as heart rate monitors (1) therefore their performance can be monitored and data recorded for analysis later (1) • They can contain UVA/UVB blockers / barriers (1) which means they protect the athlete from harmful rays / sunburn when out training / exercising / performing (1) • They can be used to control bacteria (1) which means the athlete has more protection from infection / odours / reduces body odour (1) • They can have waterproof coatings (1) which means the fabrics will not absorb water / retain water / moisture / wet fabrics rubbing on the skin (1) • They can be wicking fabrics which draw water / moisture away from the body (1) which means they can take away / absorb sweat (1) • They can stretch / hug the body (1) which means they will provide less drag (1) • They can be breathable (1) which allows the moisture to escape from inside the garment (1) 	(4)

Question number	Answer	Mark
4 (a)	<p>Any one working property of corrugated board (1) and a linked justification of that property (1).</p> <ul style="list-style-type: none"> • It is flexible / easily folded / bent (1) which means it can be folded along the 'grain / flutes' to create the form of the package (1) • It can be easily printed on / has good printability (1) which means surface graphics / branding can be easily applied to the surface (1) • It is a fully biodegradable material (1) which means it is sustainable / can be put into compost bins / does not need to go to landfill (1) • It has good impact resistance (1) which means it will offer some protection to the lightbulb in transit (1) 	(2)

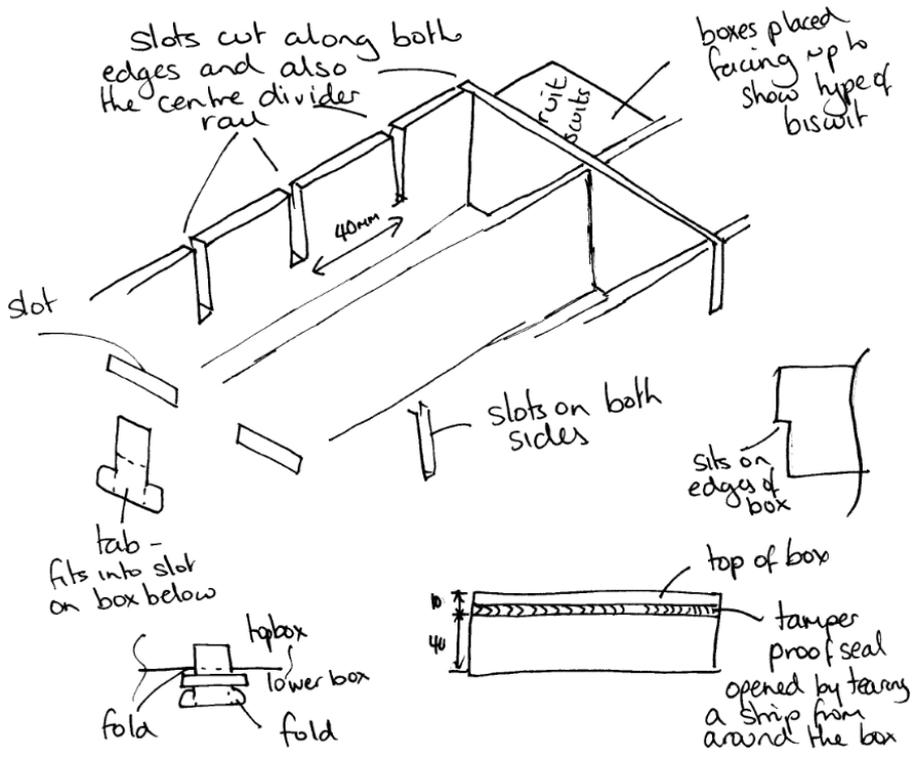
Question number	Answer	Mark
4 (b)	<p>Any one explanation that references the way that the cost of materials has been kept to a minimum (1) and a linked justification of that way (1).</p> <ul style="list-style-type: none"> • Only one material type has been used (1) which means other / separate / additional materials do not need to be purchased / stocked / incur additional / further costs (1) • It is an open-sided package with the bulb held inside a cutting (1) which has reduced the area of material required to make a fully enclosed package (1) • It is a regular / rectangular shape (1) which means that long rectangles can be cut efficiently from the stock material without leaving too much waste / can be effectively lay planned (1) 	(2)

Question number	Answer	Additional guidance	Mark
4 (c)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> • correct working out of current area $40 \times 8 = 320\text{cm}^2$ (1) • correct working out of increase in area $320 \times 1/8 = 40\text{cm} + 320 = 360\text{cm}^2$ (1) <p>Alternative method</p> <ul style="list-style-type: none"> • correct working out of current area $40 \times 8 = 320\text{cm}^2$ (1) • correct working out of increase in area $320 \times 1.125 = 360\text{cm}^2$ (1) <p>Alternative method</p> <ul style="list-style-type: none"> • correct working out of current area $40 \times 8 = 320\text{cm}^2$ (1) • $320 \times 9/8 = 360\text{cm}^2$ (1) 	<p>Award full marks for correct numerical answer without working.</p> <p>Allow for ECF if candidate gets part of calculation wrong.</p>	(2)

Question number	Indicative content	Mark
4 (d)	<ul style="list-style-type: none"> • IoT has given rise to services and products like 'Hive' • Electrical plug sockets / light bulbs can sense being used and can monitor and provide feedback / data to relatives to see daily routines are being carried out such as boiling kettles / ovens / toasters • Cameras / webcams can be placed in homes / on front doors so that movements can be observed by relatives / carers / when not at home • Trackers / presence sensors / 'track my mobile' can be used to monitor to see where people are • Personal alarms / alert / call buttons can be worn by users, if they fall / feel unwell the alarms can be pushed and will alert emergency services / relatives • On line shopping / supermarket / home deliveries allow users to shop from their own homes and to have food delivered to their own homes based on what has been eaten / what is left in the cupboards / use of RFID tags • Use of SMART locks / lights / heating • Smart appliances can be controlled remotely and through voice activation 	(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.

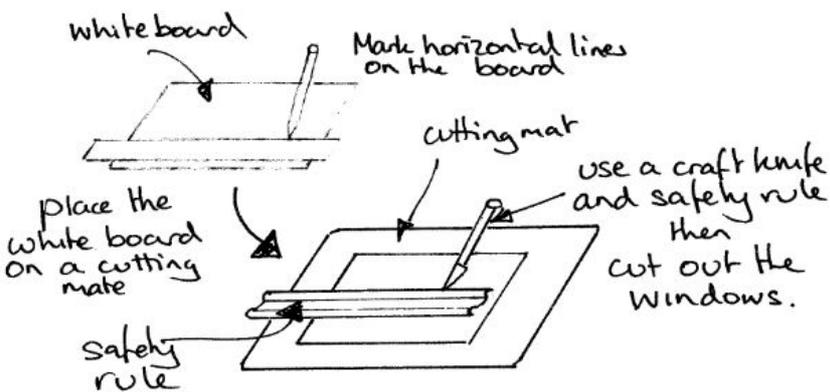
Section B – Papers and Boards

Question number	Answer	Mark
5 (a)	<p>Marks will be awarded for understanding of design and technology, not graphical skills.</p> <p>Notes and/or sketches that include:</p> <ul style="list-style-type: none"> • Provide separate storage spaces for different sized boxes of biscuits (1) and allow the types of biscuit to be seen (1) e.g. removable slots / dividers / trays / label holders / boxes face up with biscuit type written on them • Be portable (1) when two presentation cases are securely fixed on top of each other (1) e.g. handle / strap / cut-out / tabs / additional layer to sit inside the lid / ribbon / string / card strap / sleeve / plastic wrap • Include a tamper proof method (1) that will stop the boxes of biscuits from falling out (1) e.g. lid / layer / screen / seal / 'card zip' <p>Example of candidate response.</p>  <p>The sketch shows a perspective view of a presentation case with a lid. Annotations include: 'Slots cut along both edges and also the centre divider rail' with arrows pointing to the case's structure; '40mm' indicating a slot width; 'Biscuit boxes' written on the lid; 'boxes placed facing up to show type of biscuit'; 'slot' pointing to a detail of a slot; 'tab - fits into slot on box below' pointing to a detail of a tab; 'slots on both sides' pointing to side slots; 'sits on edges of box' pointing to a detail of a box sitting on a slot; 'top of box' pointing to the lid; 'tamper proof seal opened by tearing a strip from around the box' pointing to a seal on the lid; and 'fold' pointing to a detail of a box being folded into a slot.</p>	(6)

	<p>Annotated notes:</p> <p>Card zip around the box is tamper proof</p> <p>Prevents the top of the box from being removed</p> <p>Types of biscuits shown on boxes face up</p> <p>Folding lock tabs to hold two boxes together</p> <p>Slots cut in sides all the way along</p> <p>Dividers can be slotted in where you like in the box to create smaller spaces</p>	
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Question number	Answer	Mark
5(b)	<p>Any two explanations that include a way the cardboard boot meets or fails to meet the requirement (1) and a linked justification of that way (1).</p> <ul style="list-style-type: none"> • It has holes on both sides of the boot / shaped like a boot (1) which means that the size / proportions will be the same as their own foot (1) • They will be able to sit down / work at a table when learning (1) which means that they will not have to be bending / reaching down (1) • The boot may move about (1) which would make it difficult when pulling tight on the lace / doing up the bow (1) • The whole boot is quite small (1) therefore it might be difficult to tie knots and bows on (1) • The laces are quite long (1) which means they might get tangled / tied in knots (1) • The cardboard might rip around the holes (1) which would stop the young children from being able to practice / laces come out (1) • Cardboard may lack sufficient rigidity (1) distorting the boot when the laces are pulled tight (1) 	(4)

Question number	Answer	Mark
6 (a)	<p>Any two explanations of working properties of solid white board (1) and a linked justification (1)</p> <ul style="list-style-type: none">• Solid white board is rigid (1) which means that it will not be easily damaged by repeated use / strips pushed and pulled (1)• Solid white board has good absorbency (1) meaning that it can be securely glued (1)• Solid white board has a smooth surface (1) which means there will be less friction between the strip and the frame (1)	(4)

Question number	Answer	Mark
6 (b)	<p>Marks will be awarded for understanding of design and technology, not graphical skills.</p> <p>Notes and / or sketches that include:</p> <ul style="list-style-type: none"> • Measure / mark out the location of one edge of the window (1) • Measure / mark out parallel / perpendicular edges (1) • Place the board on a cutting mat (1) • Use a safety rule and craft knife (1) • Cut with no overcut (1) <p>Example of candidate response:</p>  <p>Annotated notes:</p> <p>Mark out horizontal lines on the board</p> <p>Place the white board on a cutting mat</p> <p>Use a craft knife and safety rule</p> <p>Cut out the windows</p>	(4)

Question number	Answer	Mark
6 (c)	<p>Any one explanation that includes a reason for manufacturing to a tolerance (1) and a linked justification for that reason (1).</p> <ul style="list-style-type: none"> • The width of the strips must be within a set size so that the strips move freely (1) if not the strips might not fit within the spaces in the frame (1) • The length of the strips must be within tolerance (1) otherwise they might not be long enough to accommodate all the numbers (1) 	(2)

Question number	Answer	Mark
6 (d)	<p>Any two surface finishes or treatments (1), plus two linked justifications of that surface finish or treatment (1) + (1).</p> <ul style="list-style-type: none"> • The slides can be laminated / have films (1) which means they will slide smoothly (1) therefore there will be less wear / friction between the different parts of the number frame (1) • The slides can be varnished (1) which means the surface of the slides will be better protected against dirty fingers (1) therefore it will look nicer / stay looking nicer for longer (1) • The slides can be printed / embossed / hot foil blocked (1) which means they can be different colours / textures (1) therefore the calculation numbers could have one finish and the numbers for the total could be another making them stand out from each other (1) 	(6)

Question number	Answer	Mark
7 (a)	One name given from: <ul style="list-style-type: none"> • Paper fastener (1) • Split pin fastener (1) 	(1)

Question number	Answer	Mark
7 (b)	Any two explanations that include an advantage of using CAD (1) plus a linked justification for the advantage (1). <ul style="list-style-type: none"> • The software can be linked to CNC machines (1) which means that parts / panels can be cut direct from drawings (1) • Software can be used to lay plan panels / parts (1) which means efficient use can be made of the material available / plan to minimise waste (1) • Design software can be used to stress test / test loadings (1) which means that if parts fail / item is not capable of carrying load it can be modified (1) • Component parts can be copied and pasted (1) which speeds up the design process (1) • Models can be coloured / surface textures applied (1) which means accurate rendered drawings can be produced to show life like quality / get feedback from potential clients (1) 	(4)

Question number	Answer	Additional guidance	Mark
7 (c)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> • Calculation of the cost of the top / base $2 \times 0.45 \times 9 = \text{£}8.10$ (1) • Calculation of the cost of the inner shelf $0.24 \times 9 = \text{£}2.16$ (1) • Calculation of the area of the upright $0.4 \times 0.15 = 0.06\text{m}^2$ (1) • Calculation of the cost of 4 uprights $4 \times 0.06 \times 9 = \text{£}2.16$ (1) • Calculation of the total cost $8.10 + 2.16 + 2.16 = \text{£}12.42$ (1) 	<p>Award full marks for correct numerical answer without working.</p> <p>Allow ecf if candidate gets part of calculation wrong.</p>	(5)

Question number	Answer	Mark
7 (d)	<p>Any two explanations that includes a reason for manufacturing in batches (1), plus two linked justifications of that reason (1) + (1).</p> <ul style="list-style-type: none"> • Once the batch has been made the production line can be changed (1) which means that other products can be made (1) therefore ensuring that staff are employed / manufacture continues to utilise machinery / make profits (1) • Specific orders from retailers can be made / met (1) which means that manufacturers do not have to hold lots of stock (1) therefore they do not end up with lots of money invested / tied up in stock (1) • Batch production can generally respond quickly to customers' demands (1) which means any new orders can be turned around quickly / demand met (1) therefore ensuring that supplies reach the retailers in good time / when ordered (1) 	(6)

Question number	Answer	Mark
8 (a)	<p>Any one explanation that includes an effect of the compressive force (1) and a linked justification of that effect (1).</p> <ul style="list-style-type: none"> • The thickness of the paper used for the bottom cube might not be sufficient (1) which could result in the cube not being able to support the weight of the other cubes (1) • The compressive force / pressure / weight on the bottom cube could result in the cube deforming (1) which could result in the other cubes becoming unstable (1) • Joints in the folded paper might lack strength (1) resulting in the sides of the cube flexing / leading to joint separation / gaps appearing (1) 	(2)

Question number	Answer	Mark
8 (b)	<p>Any one explanation that includes an advantage of the stencil (1), plus one linked justification of that advantage (1) + (1).</p> <ul style="list-style-type: none"> • The stencil is used to trace / draw around (1) which means the nets will always be the same (1) therefore the cubes will fit / stack together as designed (1) • The stencil can be moved over the paper (1) to ensure maximum use of the material / lay planning (1) therefore reducing waste (1) • The stencil reduces the need to measure and mark out individual nets (1) reducing the complexity / time of marking out (1) therefore removing the opportunity for errors to be made during production (1) 	(3)

Question number	Answer	Mark
8 (c)	<p>Any two explanations that include effects of harvesting of trees (1) and a linked justification of those effects (1).</p> <ul style="list-style-type: none"> • Harvesting trees reduces biodiversity (1) as types of tree/plant that cannot be used for paper making are removed (1) • Large areas / forests have been destroyed due to logging (1) which has resulted in the loss of large living areas for local people / loss of animal life / species (1) • Large areas of forest may be clear-cut / land which has been cleared of all but the smallest trees (1) which has resulted in the loss of soil fertility / exposed large areas of land / increased risk of flooding / risk of landslides (1) 	(4)

Question number	Indicative content	Mark
8 (d)	<p>AO3 (9 marks)</p> <ul style="list-style-type: none"> • The cubes are a very angular / geometric shape which allows the cubes to be stacked • It is a lightweight material that may not be able to hold its shape • The use of standard stock sized materials will help to minimise waste during production • The cubes will be relatively light in weight so they may well over balance / be knocked off easily • Copier paper may be too easily deformed when handling the cubes • Offset lithography can result in high quality images that would give the cubes more visual impact • Copier paper is bright white in colour so can take printing easier • Offset lithography allows for vivid colours to be printed so the cubes provide a visual stimulus • Copier paper comes from softwood which is readily available • The demand for paper has resulted in genetic modification of trees to make them grow taller/faster • Copier paper can be readily recycled • Offset lithography ink needs to be disposed of sustainably 	(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.

