



Pearson
Edexcel

Mark Scheme

Summer 2022

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

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June 2022

Question Paper Log Number 71340

Publications Code 1DT0_1B_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 – 1DT0/1B

Section A – Core content

Question number	Answer	Additional information	Mark
1 (a) (i)	<p>Any one property from:</p> <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) 	<p>Do not accept 'can be recycled'</p> <p>Do not accept 'durable'</p>	(1)

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

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

Question number	Answer	Additional information	Mark
1 (a) (iv)	<p>Any one property from:</p> <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)	<p>Any one disadvantage of urea formaldehyde (UF) for the 3-pin plug (1) and a linked justification of that disadvantage (1)</p> <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)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> • correct calculation of ratios $50 / (13 + 7) = 2.5$ <p>(1)</p> <ul style="list-style-type: none"> • correct answer $2.5 \times 13 = 32.5 \text{ kg}$ <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	Additional guidance	Mark
2 (a)	<p>Any one other hardwood from:</p> <ul style="list-style-type: none"> • Oak (1) • Beech (1) • Ash (1) • Birch (1) • Jelutong (1) <p>Any other appropriate hardwood</p>	Do not accept balsawood or mahogany	(1)

Question number	Answer	Mark
2 (b)	<p>Any one working property of mahogany that makes it an appropriate choice of material (1) and a linked justification of that working property (1)</p> <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)	<p>Any one advantage for the manufacturer (1) and a linked justification of that advantage (1)</p> <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 number	Answer	Additional guidance	Mark
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 conversation 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	Answer	Mark
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number		
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
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: $(40 / 20) = 2 \times 400 = 800$ (1) $(40 / 20) = 2 \times 800 = 1600$ (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)

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)	<p>Any two benefits of using carbon fibre for the main 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) 	Do not accept durable, hard wearing or tough	(4)

Question	Answer	Mark
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number		
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)

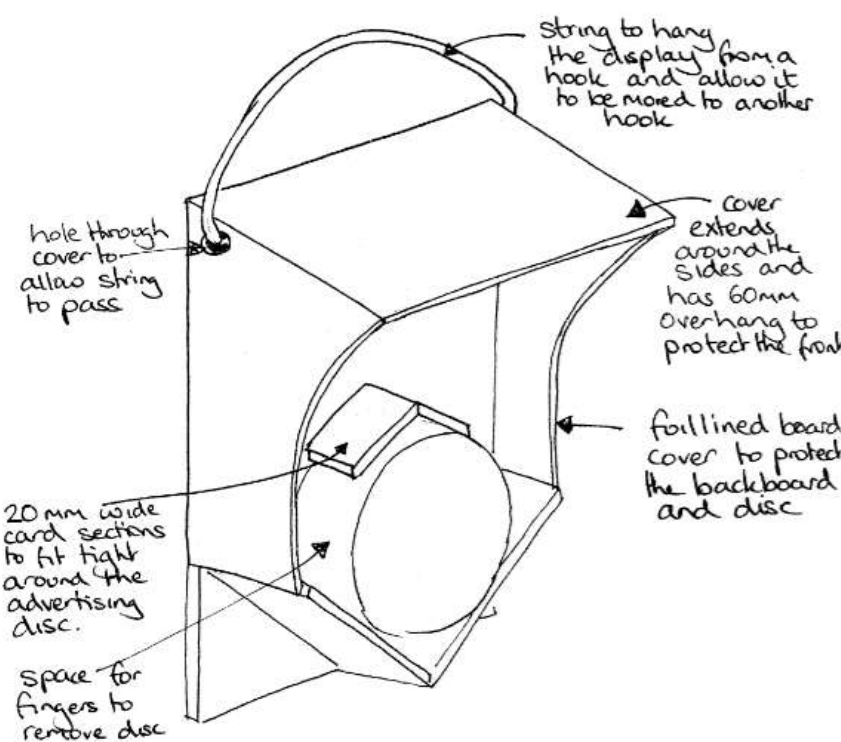
Question number	Answer	Additional guidance	Mark

4 (b)	<p>A calculation that includes:</p> <ul style="list-style-type: none"> • correct working out of area of roll of agro-textile $50 \times 1.2 = 60\text{m}^2$ <p style="text-align: right;">(1)</p> • correct working out of number of rolls $420 / 60 = 7$ rolls <p style="text-align: right;">(1)</p> <p>Alternative method:</p> <p>$420 / 1.2 = 350$ (1)</p> <p>$350 / 50 = 7$ (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	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.

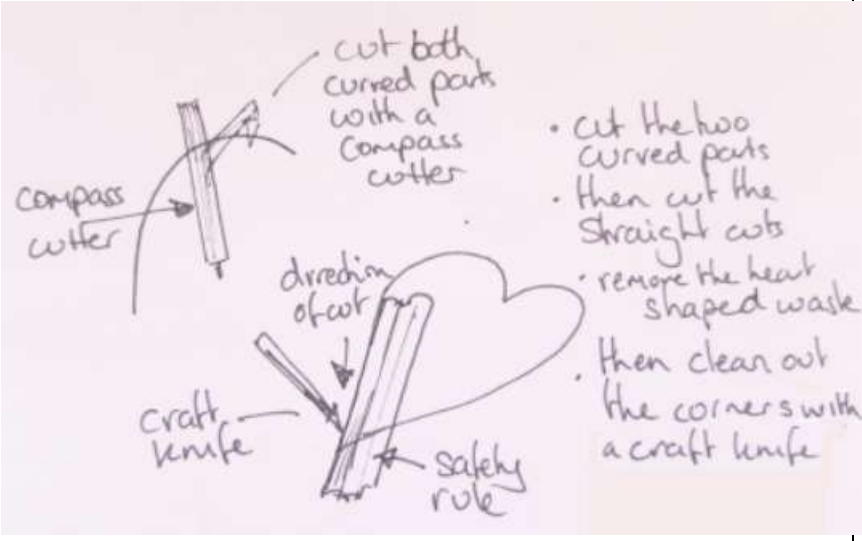
Section B – Papers and Boards

Question number	Answer	Mark
5 (a)	<p>Marks will be awarded for understanding of design and technology, not graphical skills.</p> <p>Notes and sketches to show how to:</p> <ul style="list-style-type: none"> hold the disc securely (1) and allow the disc to be easily changed when a different flavour of ice cream is being sold (1) e.g. clips / straps / elastic band / lid over the top / MUST not be a permanent fixing include a cover that protects the backing board and support (1) and prevents the disc from being affected by wind and rain (1) e.g. roof must extend over / beyond the disc / cover the width as a minimum / sloping roof / use of moisture resistant materials / run off / removable acrylic front panel be able to be hung up on a hook near to the ice cream (1) and easily moved to another hook when ice cream is being sold at a different location (1) e.g. string / hole / capable of being removed / non-permanent / hole in back panel / extended back panel with hole <p>Example of candidate response:</p> 	(6)

	<p>Notes:</p> <p>String to hang on hooks and allow the display to be moved.</p> <p>Hole through cover to allow string to pass.</p> <p>Foil lined board cover to protect the backboard and disc. Cover extends around the sides and has a 60mm overhang to protect the front.</p> <p>String to hang the display from a hook and allow it to be moved to another hook.</p> <p>20mm wide card sections to fit tight around the advertising disc. Space for fingers to remove disc.</p>	
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Question number	Answer	Mark
5(b)	<p>Any two explanations that include a way the 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 saving or 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) • Polymer windows 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) • Sublimation printed designs can be colourful / in the theme of money (1) which would make the design more attractive for younger children (1) 	(4)

Question number	Answer	Mark
6 (a)	<p>Any two advantages for the manufacturer of using a standard sized paper (1) and a linked justification (1)</p> <ul style="list-style-type: none">• The size of the pages/book can be made to match the size of a standard sheet of bonded paper (1) which means less waste being produced / the designer can maximise the material / make most efficient use of the bonded paper (1)• Standard sized sheets 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)• Standard sized sheets 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"> • Place front cover on a cutting mat (1) • Correctly locate and cut the two curved sections at the top of the heart with a compass cutter / wad punch and hammer (1) • Cut along the straight lines with a craft knife (1) • Use a safety rule to ensure a straight cut / safety of user (1) • Cut into corners to remove any remaining pieces of pulp (1) <p>Example of candidate response:</p>  <p>Notes:</p> <p>Cut both curved parts with a compass cutter Then cut the straight cuts Use craft knife and safety rule Remove the heart shaped waste Then clean out the corners with a craft knife</p>	Cap at 3 marks if no sketches or all sketches no notes	(4)

Question number	Answer	Mark
6 (c)	<p>Any one explanation that includes a reason for applying hot foil blocking (1) and a linked justification for that reason (1).</p> <ul style="list-style-type: none"> • Hot foil blocking will emphasise the lettering on the cover of the guest book (1) providing a more attractive / luxurious product (1) • Hot foil blocking will provide a metallic effect to highlight the lettering (1) which will give it a more expensive appearance for an item which will be kept as a reminder of the wedding (1) • Hot foil blocking provides a shiny finish to parts of the cover of the guest book (1) which can be used in combination with other design features (1) 	(2)

Question number	Answer	Mark
6 (d)	<p>Any two explanations that include a method (1), plus two linked justifications of that method (1) + (1).</p> <p>Adhesives / gluing / perfect binding (1)</p> <ul style="list-style-type: none"> • Adhesives will soak into the cover and the pages (1) which means it is less likely for pages to fall out as there will be a bonded connection between the pages and the front/back covers (1) <p>Stapling (1)</p> <ul style="list-style-type: none"> • The staple provides a mechanical connection between the two covers and the pages (1) which results in a joint which is easy to produce and does not require any drying time (1) <p>Split pins / paper fasteners (1)</p> <ul style="list-style-type: none"> • A joint is formed by holes being made in the covers and the pages (1) which results in a guest book where it is possible to add/remove pages as necessary (1) <p>Stitch Binding (1)</p> <ul style="list-style-type: none"> • Binding would attach all of the pages together along a spine (1) which means pages will not become detached / the guest book would last a long time (1) <p>Binding (spiral / comb / wire) (1)</p> <ul style="list-style-type: none"> • Binding allows the potential to add additional pages (1) which means the book could be made bigger / unused pages removed (1) 	(6)

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

Question	Answer	Mark

number		
7 (b)	<p>Any two working properties explained (1) plus a linked justification of the property (1).</p> <ul style="list-style-type: none"> • Solid whiteboard has rigidity (1) which means that it is capable of holding its shape once it has been bent into the shape of the holder (1) • The surface of solid whiteboard has good printability (1) which means images/logos/designs can be printed on the phone holder to make it more attractive for consumers (1) • It has good compressive strength (1) which means the support part will not deform / crumble under the weight of a mobile phone (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) $33.53475 \text{ cm}^2 \times 0.4 = 13.4139 \text{ cm}^3$ Rounded to 13 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 13.4139 or 13</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 support part of the mobile phone stand rather than making from a single piece (1), plus two linked justifications of that reason (1) + (1).</p> <ul style="list-style-type: none"> • 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 solid whiteboard can be used (1) which reduces the amount of bigger sheets needing to be purchased / small off cuts used up (1) therefore maximising material usage / reducing the need for new pulp to be produced/ more sustainable long term (1) • Allows sections to be used that are appropriate for the loadings that will be placed on them (1) meaning a thinner piece of board could be used for the base when compared to the front/back of the support part (1) • Fabrication allows for the sharp angle to be achieved / retain shape / more rigid (1) due to the thickness of the material a small radius would be created if manufacturing as a single piece (1) meaning it would not collapse / unfold / delaminate (1) 	(6)

Question number	Answer	Mark
8 (a)	<p>Any one explanation that includes a benefit of manufacturing the plant carrier using corrugated board (1) and a linked justification of that benefit (1).</p> <ul style="list-style-type: none"> • It has very good impact resistance/shock absorbency (1) which means it protects the plants should the carrier get knocked/dropped (1) • It is available in large flat sheets (1) which reduces the number of pieces of board needed to produce the plant carrier/reduces the complexity of being manufactured from smaller pieces (1) • Corrugated cardboard has flutes on the inside (1) which means the board is capable of folding without the need for any scoring in the direction of the flutes (1) 	(2)

Question number	Answer	Mark
8 (b)	<p>Any one explanation that includes an advantage of carrying out quality control checks (1), plus one linked justification of that advantage (1) + (1).</p> <ul style="list-style-type: none"> • The plant carrier can be checked for dimensional accuracy (1) which means tooling can be checked / changed if the compartments are not the correct size (1) therefore reducing the number of plant carriers that would be cut of the wrong size / reducing waste / rejects (1) • The plant carrier can be checked for stability (1) which means edges / glued joints can be inspected (1) therefore reducing the risk of the plant carrier falling apart (1) • The position of the labels can be checked (1) and gluing processes adjusted accordingly (1) which reduces the chance of labels being applied in the wrong place/upside down (1) • The edges of the plant carrier can be checked (1) meaning the cutting tool can be replaced at the right time (1) so the sharpness of the outline does not need further processing (1) • Registration / density of colour can be checked (1) meaning that the position of the plates can be adjusted / inks replaced (1) therefore the label can be read / is not blurred / illegible (1) 	(3)

Question	Answer	Mark
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number		
8 (c)	<p>Any two advantages of using printing for the labels (1) and a linked justification of those advantages (1).</p> <ul style="list-style-type: none"> • Printing allows the labels to be produced in small batches (1) which means that the retailer is able to use the same carrier design for a range of different products (1) • Printed labels can be produced with a relatively short lead in time (1) which means more labels are able to be produced quickly should demand increase for a specific type of plant (1) • Printing labels will allow for text and coloured images to be included (1) which could result in a more visually attractive package than printing directly onto the carrier (1) • Printing can be used with different types of paper (1) which means alternative materials could be used without changing the design of the label (1) 	(4)

Question number	Indicative content	Mark
8 (d)	<ul style="list-style-type: none"> • The plant carrier is quite compact with a large base area which means it will balance and not tip over when it has plants in it • Corrugated board is a flexible material and might deform if too much weight is put in the plant carrier but is quite stiff and rigid in the direction opposite to the flutes • Could be customised / personalised for use by different garden centres/supermarkets by printing a name/logo on the copier paper labels • The plant carrier is manufactured from widely available materials / sustainable given it is made up from paper and board which is widely recyclable • There are only spaces for a small number of plants which would limit the number that somebody could carry easily as it would not be possible to carry more than one in each hand. • 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 same design of carrier can be used for other purposes such as carrying drinks/bottles meaning it could be used for outdoor events/festivals/cafes • Copier paper labels can be customised for the retailer/venue/event and used for promotional purposes • The printed labels make effective / efficient use of natural materials as these can be produced in small batches whilst the carrier can be produced in larger batches • It is easier to print on to copier paper than the corrugated board which has flutes which limits the number of printing processes that can be used • Copier paper would allow vivid colours to be produced as it is a bright white colour to make it more attractive to a range of customer groups 	(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.