Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE
Design Technology
Paper 1C: Polymers

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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

Section A – Core content

Question number	Answer	Additional guidance	Mark
1 (a) (i)	Any **one** property from: • Soft (1) • Insulator of heat (1) • Flexible/flexibility (1) • Warm (1)	Do not accept 'Insulator' on its own	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (ii)	Any **one** property from: • Stiff / rigid / hard (1) • Waterproof / water resistant / stain resistant / non-absorbent (1) • Food safe / non-toxic (1) • Good heat resistance (1) • Good UV resistance (1) • Lightweight (1)	Do not accept the following on their own: 'Can be recycled' 'Durable' 'Light' 'Strong'	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (iii)	Any **one** property from: • Good insulator of heat (1) • Good impact resistance (1) • Printability / takes colour well (1) • Food safe / non-toxic (1)	Do not accept the following on their own: 'Insulator' 'Recyclable'	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (iv)	Any **one** property from: • Corrosion resistance / will not rust (1) • Good fluidity / casts well (1) • Malleability (1)	Do not accept: 'Durable	(1)

Question number	Answer	Mark
1 (b) (i)	Any **one** other property of oak that makes it a suitable choice of material for the floorboards (1) and a linked justification of that property (1) • Oak is hard (1) therefore it will withstand abrasive wear from being walked over / on / furniture placed / moved on it (1) • Oak is durable / hardwearing (1) therefore it will be able to withstand abrasive wear / damage from being walked on (1)	(2)

Question number	Answer	Additional guidance	Mark
1 (b) (ii)	A calculation that includes: • correct working out of cost 57.6 / 1.44 (1) • correct answer £40 or £40.00 (1) ECF Award 1 mark if candidates show 1.44 / 57.6 = 0.025 or Award 1 mark if candidates show $57.6 / 1.44^2$ = 27.70 to 27.80	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong.	(2)

Question number	Answer	Additional guidance	Mark
2 (a)	Any **one** property of copier paper that makes it an appropriate choice of material for the origami rabbit from: • Flexibility (1) • Bendability / easy to bend (1) • Easily creased / holds shape when folded (1) • Biodegradability (1) • Foldability / easy to fold / easily folded / easily foldable (1)	Do not accept 'Foldable' or 'Folded' on their own	(1)

Question number	Answer	Additional guidance	Mark
2 (b)	Any **one** advantage explained of using recycled copier paper to manufacture the origami rabbit (1) and a linked justification of that advantage (1) • Using recycled paper will reduce the need to make new paper / reduce environmental damage / is more sustainable / lowers carbon footprint (1) which reduces the need for cutting down trees to make the pulp required for paper production / reduces deforestation / reduces energy consumption / emissions (1) • Recycling paper stops it going to landfill / being thrown away / reduces waste (1) which keeps the space in landfill available for materials that cannot be recycled (1)	Do not accept 'Recycled' on its own	(2)

Question number	Answer	Additional guidance	Mark
2 (c)	Any **one** feature explained of how SMAs can be used to animate the origami rabbit (1) and a linked justification for that feature (1) • SMAs can be added / connected to the ears / nose / head / tail (1) which can be made to twitch / spring / straighten / fold when activated / heated / cooled / deformed (1) • SMAs can be added / connected to the legs / front paws / arms (1) which can create the impression of the rabbit hopping when activated / heated / cooled / deformed (1) Marking points can be accepted in reverse	Do not accept any reference to 'Move' on its own	(2)

Question number	Answer	Additional guidance	Mark
2 (d)	A calculation that includes: • correct calculation for the area of the standard sheet of A4 paper (Step 1) 29.7 x 21.0 = 623.7 cm^2 (1) • correct calculation for area of the square sheet (Step 2) 21.0 x 21.0 = 441 cm^2 (1) • correct calculation of waste percentage (Step 3) ((623.7 – 441) / 623.7) x 100 = 29.29(2929)% (1) • Correct answer rounded to 29% (Step 4) (1) Alternative method for Steps 2 and 3: • correct calculation for waste area cut off (Step 2) (29.7 - 21.0) x 21 = 182.7 cm^2 (1) • correct calculation of waste percentage (Step 3) (182.7 / 623.7) x 100 = 29.29% (1)	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. Award one mark for the correct rounding of an ECF calculation.	(4)

Question number	Answer	Mark
3 (a)	Award **one** mark from: • Resistor (1) • Fixed resistor (1) Do not accept: • Variable resistor • Preset resistor • Surface mount resistor	(1)

Question number	Answer	Mark
3 (b)	Any **one** advantage for the manufacturer of making the electronic circuit in batches of 1,000 (1) and a linked justification for the advantage (1) • A batch of circuit boards will take a set amount of time to manufacture (1) therefore the manufacturer can plan how to make best / efficient use of their time / machines / staffing (1) • Any changes in component / material prices can be reflected when a new batch is ordered / manufactured (1) therefore the manufacturer does not have to bear / stand any price increases (1) • If faults are found in a batch of completed / assembled circuit boards modifications can be made / products do not sell (1) therefore material / components wastage / financial loss is kept to a minimum (1) • The manufacturer does not need to buy lots of stock (1) therefore they do not have to invest / tie up money in stock / storage space (1) • The manufacturer can bulk buy components / get discounts (1) therefore being able to take advantage of economies of scale / pass on savings to the customer (1)	(2)

Question number	Answer	Additional guidance	Mark
3 (c)	A calculation that includes: • Correct calculation of number of circuit boards that can be cut from the larger sheet (32 / 4) x (16 / 4) = 8 x 4 = 32 (1) • Correct calculation of cost of one circuit board £3.20 / 32 = £0.10 or 0.1 (1)	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong.	(2)

Question number	Answer	Mark
3 (d)	Any **one** advantage of using batteries (1) and a linked justification of the advantage (1) • They do not need to be plugged into a mains power source / require a cable (1) which means the device is free to be used anywhere / fully mobile / portable (1) • The batteries are a small / discrete component (1) which means they do not take up too much space within the circuit / product (1) • You can use rechargeable batteries (1) which means one set can be used again and again (1) • You can use the voice recorder in remote areas / campsites / beach / power cuts (1) because it does not need to be plugged into the mains power supply (1) • The batteries can simply be replaced with new ones (1) which means no time is wasted having to wait to charge it / can be used straightaway (1)	(2)

Question number	Answer	Mark
3 (e)	Any **two** benefits of using HIPS for the case of the Sing Along Box (1) and a linked justification of that benefit (1) • HIPS is lightweight / has a low density (1) therefore it will be easier for young children to carry / move it around / it is portable (1) • HIPS has good / excellent impact resistance / tough (1) therefore if the box is dropped the contents inside will be protected from damage / the box is unlikely to break (1) • HIPS does not absorb water / is waterproof (1) therefore it can be easily cleaned / wiped down without any risk of damaging the materials / moving / working parts / electronic circuit (1) • As a thermoplastic / thermoforming polymer HIPS can be formed / moulded (1) therefore it is capable of being used to form complex shapes / forms / intricate details (1)	(4)

Question number	Answer	Mark
4 (a)	Any **two** explanations of a working characteristic of stainless steel (1) and a linked justification of that characteristic (1) • Stainless steel is corrosion resistant / rust proof / non-toxic (1) therefore it will not be affected by the corrosive salt / react with / contaminate the contents / surface will not become blemished / food safe (1) • Stainless steel has good torsional resistance (1) therefore it will not distort / twist when the grinder is rotated (1) • Stainless steel is hard (1) which means it will withstand the abrasive wear / scratching from grinding the salt / will not wear / will extend life span of product (1)	(4)

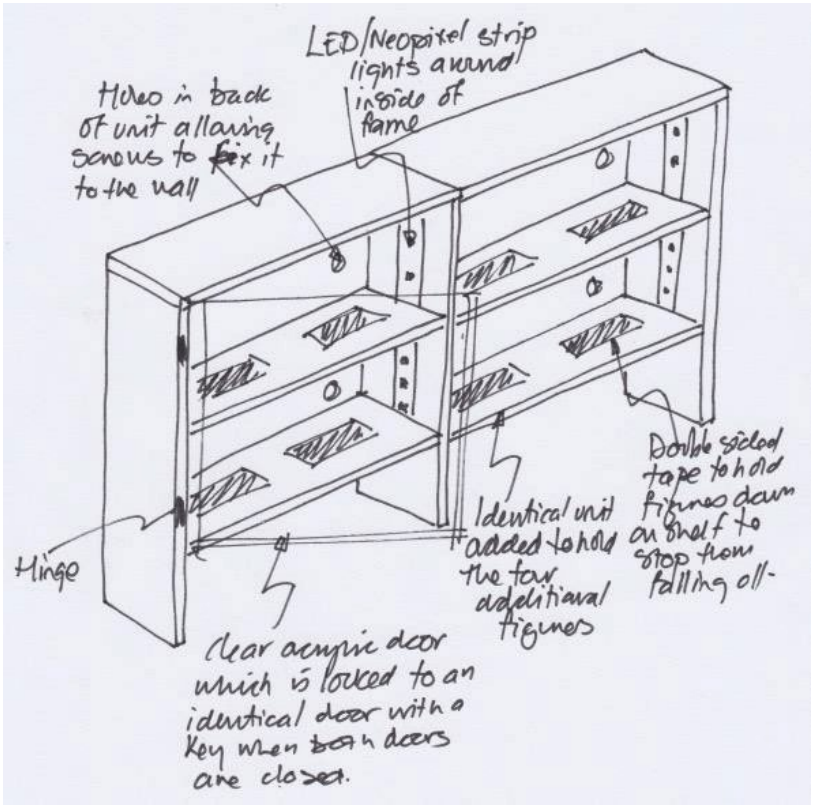
Question number	Answer	Additional guidance	Mark
4 (b)	A calculation that includes: • Correct calculation of the percentage of material that CANNOT be recycled 100 – 80 = 20 % (1) • Correct calculation of the weight of material that CANNOT be recycled (20 / 100) x 270 = 54 grams (1) ECF Award 1 mark for an answer of 216 grams which is what 80% represents	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. 216 alone with no working out is zero marks.	(2)

Question number	Indicative content	Mark
4 (c)	• Designers can see / get a better idea of how products work when they are taken apart • Designers can see / draw each individual part that they may be able to improve / refine / combine / design them out / combine them into one individual part • Designers may be able to introduce standardised components into their new designs • Designers can look at ways of trying to reduce material usage / wastage when designing a new product • Designers can take measurements of existing products • Designers can look at how they might improve the assembly / manufacture of a new product to reduce time • Designers take inspiration that they can use in their own work • Designers can analyse / evaluate the materials that have been used • Designers can get to see the intricate workings of the product • Designers are able to evaluate products in terms of working out / discovering what is wrong with them / identify flaws • Designers can work out how they can be improved / made more reliable / energy efficient	(6)

Level	Mark	Descriptor
	0	
Level 1	1 - 2	• 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	• 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	• 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 – Polymers

Question number	Answer	Mark
5 (a)	**Marks will be awarded for understanding of design and technology, not graphical skills.** Notes and sketches that include: • be able to display an additional four collectable figures (1) and include a method to stop them falling off the shelves (1) e.g. unit is made taller / wider to show extra four spaces and double sided tape / glue dots / slots / recessed grooves / lipped front edge ('door' will also attract credit for stopping the figures falling off the shelf) • include a method to stop the collectable figures from being stolen (1) that still allows them to be seen (1) e.g. hinged / sliding doors & lock / lockable / padlock / hasp and staple and clear acrylic / glass screen • be capable of being fixed to a wall (1) and include a lighting system (1) e.g. screws / bolts / wall / flat plates / hooks and LEDs / neo pixels / bulbs used / strip lights (reference to 'lights' generically without any subsequent graphical indication or reference to wiring does not attract a mark)	(6)

	Example of candidate response:  Notes: • Double sided tape to hold figures down on the shelf to stop them falling off • Hinges • Clear acrylic door which is locked to an identical door with a key when both doors are closed • Identical unit added to hold the additional four figures • LED / neo pixel strip lights around inside of frame • Holes in back of unit allowing screws to be used to fix it to the wall	

Question number	Answer	Mark
5(b)	Any **two** explanations that include a way the number play set meets or fails to meet the requirement (1) and a linked justification of that way (1) • There is a full set / lots of numbers and maths symbols (1) therefore the child will be able to make up lots of different sums / equations (1) • The numbers are all very clear / easy to read (1) therefore there can be no confusion as to what the number is / 6 and 9 cannot be confused (1) • Helps teach them about how the numbers look / differentiate numbers / symbols (1) without the need of having to be able to write (1) • The numbers are easily moved around / rearranged (1) therefore they can learn that some problems / calculations have the same answer (e.g. 6 x 4 = 24 and 4 x 6 = 24) (1) • There might not be enough numbers / symbols to make up some questions / answers [e.g. 11 x 11 = 121 (1) so the set will not be very useful as you will not be able to make the correct answer since you need 6 1s and there are only 3 in the set] (1) / therefore some extended calculations will not be able to be completed (1) [Accept the opposite to the above in that there are enough counters (1) to make some large sums / calculations (1)] • Some of the numbers / symbols might get lost (1) therefore you will not be able to carry out a full range of sums / equations (1) • The plus / multiply symbols are quite similar (1) therefore the child might get confused as to what the sum / equation actually is (1) • There is one disc that is the greater / less than symbol which the child might not be able to identify (1) therefore they may not understand what the purpose of the question / task is (1)	(4)

Question number	Answer	Additional guidance	Mark
6 (a)	Any **two** explanations for using acrylic for the desk tidy (1) and a linked justification (1) • Acrylic does not warp / cup / twist (1) therefore it will stay flat / in shape (1) • Acrylic is available in large sheets (1) therefore bits of material do not need to be stuck together to make a panel / shelf / piece big enough for the side panel as a single piece (1) • Acrylic is available in a range of colours / transparent (1) therefore it can be made using any colour to increase potential sales / appeal to a wider audience / increase aesthetic appeal (1) • Acrylic is easily machined / laser cut (1) therefore the panels / slots /shelf for the adjustable shelves can be cut / machined on a router (1) • Acrylic is readily available (1) can be purchased in large volumes for mass production (1)	Do not accept 'Cheap' Do not 'Cut to fit' without reference to the panels / slots / shelf	(4)

Question number	Answer	Additional Guidance	Mark
6 (b)	Marks will be awarded for understanding of design and technology, not graphical skills. Notes and sketches that include: • Area cleaned to remove any dust / waste material (1) • Tensol® cement is applied to the surface (1) • The two parts are brought into contact / pressure applied (1) • Held in place by clamps / tape / jig at right angles (1) • Left for an amount of time for the glue / adhesive to dry (1) Example of candidate response:  Notes: • Area cleaned before Tensol® cement applied • Two bits in contact with each other • Glue / cement will chemically bond the surfaces together • Left to dry	Cap at 3 marks if no sketches or all sketches and no notes	(4)

Question number	Answer	Mark
6 (c)	Any **one** explanation of a physical characteristic of expanded polystyrene (1) and a linked justification of the characteristic (1) • Expanded polystyrene has a low density / is lightweight (1) which means it will not add any additional weight / increase shipping / postage costs (1) • Expanded polystyrene is impact resistant (1) which means that it will protect the sharp corners from any potential damage (1)	(2)

Question number	Answer	Additional guidance	Mark
6 (d)	Any **two** explanations that include a shaping method that could be used to produce the shallow curve (1), plus two linked justifications of that method (1) + (1) Laser cutter / laser cutting (1) • A solid piece would be removed / cut (1) as the curve would have been drawn in CAD to create the required shape (1) File / filed / filing (1) • A round / half round hand file would create the correct form as they remove the waste (1) as they are curved / rounded (1) Sanding / sanded / abrading / abraded (1) • A bobbin sander could be used to machine the curve (1) as the sander block is round / moves up and down to remove the waste (1) Sawing / saw / using a [suitable] saw (1) • A coping / scroll (Hegner) saw can be used to cut along the line while the work is held in a vice / flat on the table / machine (1) as it has a thin blade allowing a curve to be cut / work rotated (1)	Do not credit 'Cutting' on its own	(6)

Question number	Answer	Additional guidance	Mark
7 (a)	Award **one** mark from: • Coping saw (1) Award different / phonetic spellings of xxx, including (there are other variations): • Copping • Cooping • Copeing • Coopeing	Do not credit 'Saw' on its own Do not credit 'Chopping saw'	(1)

Question number	Answer	Mark
7 (b)	Any **two** benefits for the manufacturer of using stock materials (1) plus a linked justification of the benefit (1) • It means the materials will be widely / readily available / can be bulk purchased / do not have to be machined to a specific non-standard size (1) therefore the materials will be cheaper / reducing overall costs / improve profit margin (1) • The manufacturer does not need to have / hold lots of different sized materials (1) which reduces the need for cutting / machining / reducing waste / machining time / processes (1) • Machines do not have to be reset each time a different sized material is used (1) therefore it helps to reduce the manufacturing time / speed up manufacturing / reduce potential errors that might be introduced (1)	(4)

Question number	Answer	Additional guidance	Mark
7 (c)	A calculation that includes: • Conversion of units at any stage (1) • Calculation of the cost of Part number 1 and 2 (1) 2 at 100 mm = 200 mm or 0.2 m x 2.80 = £0.56 • Calculation of the cost of Part number 3 (1) 1 at 75 mm = 75 mm or 0.075 m x 2.80 = £0.21 • Calculation of the cost of Part number 4 (1) 3 at 100 mm = 300 mm or 0.3 m x 3.30 = £0.99 • Total cost of the material (1) 0.56 + 0.21 + 0.99 = £1.76 Any response of £1760 or £17.60 or equivalent without any working out shown must be awarded 0 marks	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. £1760 or £17.60 are partially correct answers given some incorrect conversion of units has taken place but can be awarded 4 marks	(5)

Question number	Answer	Mark
7 (d)	Any **two** explanations that include a benefit of polishing (1), plus two linked justifications of that benefit (1) + (1) • Polishing the edges creates a smoother finish (1) which means there will be no rough edges (1) therefore the user will not hurt / cut themselves when putting / taking plants in / out (1) • Polishing the edges creates a glossy / high sheen (1) which means it looks nice / better aesthetics (1) therefore adding value / attracts more customers (1)	(6)

Question number	Answer	Mark
8 (a)	Any **one** explanation of a physical characteristic of ABS (1) and a linked justification of that characteristic (1) • ABS has a low density / is lightweight (1) therefore the body will not be too heavy for the child to move / hold / lift / carry (1) • ABS is durable / hardwearing (1) therefore the drawers will not wear as they are moved in and out (1)	(2)

Question number	Answer	Mark
8 (b)	Any **one** explanation of an issue associated with the ecological footprint of using ABS (1) plus two linked justifications of that explanation (1) + (1) • ABS is made / derived from oil (1) which requires further processing / cracking (1) therefore causing pollution as a result of the processing to turn oil into the raw materials / hydrocarbons (1) • ABS is not easily recycled (1) which means most waste ends up in landfill (1) therefore taking up valuable space / years to break down / potentially polluting the land (1)	(3)

Question number	Answer	Mark
8 (c)	Any **two** reasons for manufacturing the features of the jewellery box to a tolerance (1) and a linked justification (1) • The length of the two small drawer knobs need to be of a certain length (1) otherwise they will not be long enough to be able to get hold of / grip to be able to open the drawers (1) • The shape and size of the drawers must be manufactured to a certain size (1) otherwise they will not move in and out freely (1) • The eyes / nose must be positioned within a certain set of dimensions (1) otherwise they may look odd / cross eyed / nose in the wrong place relative to the eyes (1) • The spaces / holes for the eyes / nose / drawers must be manufactured to the correct size (1) so that the separate pieces can fit in correctly / neatly (1) • Identical parts / face / feet / belly (1) therefore they will be interchangeable / will fit into any manufactured body when assembled / left or right hole (1)	(4)

Question number	Indicative content	Mark
8 (d)	Impact on **cost factors** in relation to: • The colour of the material can vary depending on the amount of pigment / additives put in when it is being mixed • If the material gets wet the quality is affected and can result in air bubbles • ABS has a low melting temperature which makes it an ideal material for injection moulding • The quality of the finished product in terms of dimensional accuracy will be dependent upon the accuracy of the injection mould itself • Surface textures can be included in the injection moulding mould to add detail to the surfaces • Small parts can be made to such high tolerances that they can be assembled with a push / interference fit • There will need to be some gluing of parts such as the nose and eyes • Some of the parts are very small and a great deal of care will need to be taken on machines when making parts so small • Due to batch production stages / steps should be planned so as to maximise machine processes / times / set up • The product can be made in different colours by cleaning out the machine / hopper and using different colour pigments / ABS granules / additives • Injection moulded products do not need any additional surface finishing / treatments other than to check for flashing due to the process	(9)

Level	Mark	Descriptor
	0	
Level 1	1 - 3	• 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	• 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	• 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.