

Mark Scheme (Standardisation)

Summer 2019

Pearson Edexcel GCSE
In Design & Technology (1DT0)
1C: Polymers

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Summer 2019

Publications Code: 1DT0_1C_1906_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.

Component 1 mark scheme – 1DT0/1C

Section A – Core content

| Question number | Answer | Mark |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 (a) (i) | Any one property from: resistant to water / waterproof (1) fungus / insect resistant (1) durable / weather resistant / rot resistant (1) | (1) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------|
| 1 (a) (ii) | Any one property from: | Do not accept unqualified | (1) |
| | hard / hardness / good resistance to wear / hard wearing (1) compressive strength (1) good fluidity / casts well (1) | response in relation to strong or strength. Do not accept brittle. | |

| Question number | Answer | Mark |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 (a) (iii) | Any one property from: water resistant / waterproof / weather resistant (1) durable (1) crease / stain / abrasion resistant (1) resistant to mildew / bacteria (1) fibres have high tensile strength (1) | (1) |

| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------|------|
| 1 (a) (iv) | Any one property from: rigid / stiffness (1) hygienic and safe for food use (1) | (1) |
| | pure with no smell or taste / inert (1) good printability (1) good insulator of heat (1) | |

| | guidance | |
|--------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| A calculation that includes: | Award full marks for correct | (2) |
| - | without working. | |
| 7.6 | Allow for ECF if | |
| (1) | candidate gets part of calculation | |
| correct answer to whole number | wrong. | |
| 29% | | |
| (1) | | |
| | | |
| | | |
| | | |
| , , | correct working $\frac{6-5.4}{7.6} \times 100$ 7.6 (1) correct answer to whole number | correct working for correct numerical answer without working. $6-5.4 \times 100$ Allow for ECF if candidate gets part of calculation wrong. |

| Question number | Answer | Mark |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 (c) | Any one negative effect (1) and a linked justification of that negative effect (1). Smaller workforce required (1) therefore there would be loss of jobs / cost of redundancies (1) The company might go out of business / close / downsize (1) resulting in a loss of jobs / profits reduced / loss of income prosperity in the area (1) Money will be tied up in old machinery used to make bags / degrading (1) which cannot be used for anything else / still need to be kept serviced / maintained (1) | (2) |

| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------|------|
| 2 (a) | Isometric drawing / projection (1) (Only answer) | (1) |

| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 2 (b) | Any one explanation that includes an accurate statement about the use of calico (1) and a linked justification of that statement (1). | (2) |
| | Calico is a <u>relatively</u> cheap material (1) therefore it keeps the cost down in terms of prototyping / developing the product (1) Calico can accept a range of surface finishes (1) therefore colours and designs can also be prototyped / tested out (1) Calico is absorbent (1) therefore it can accept a range of surface finishes (1) | |
| | Calico is rigid / stiff when sewn along a seam (1) which means it can hold its shape / allows a 3D shape to be formed / supports its own weight (1) Calico is the same on both sides / looks / feels the same on both sides (1) therefore it does not matter which way round the | |
| | sides (1) therefore it does not matter which way round the material is used (1) | |

| Question number | Answer | Mark |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| | A net that includes an image drawn with a ruler or free hand. Marks to be awarded for the following. • 6 surfaces separated by lines (1) • Correct size – all surfaces 6 squares by 6 squares (1) • Top surface will fold down to fit (using dashed lines) (1) • Bottom surface will fold up to fit (using dashed lines) (1) | (4) |
| | (The third and fourth bullets points above are there to reflect that the top and bottom cannot both be at the top or the bottom since it would leave the play cube without a top or bottom I have shown this below. This would score 2 marks since the top two squares would fold onto each other and there are no dashed lines.) | |

| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 2 (d) | Any one reason that includes an accurate statement about why designers use tracing paper (1) and a linked justification of that reason (1). • It is transparent / translucent / see-through (1) which means it can be placed over a drawing and drawn on to make a copy of the drawing / trace the image / see the pattern of fabric (1) | (2) |
| | It can be placed over a drawing and drawn on (1) which means it can be used to transfer images / used as an overlay / used to be written / drawn on to provide additional information / detail (1) | |

| Question number | Answer | Mark |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 3 (a) | Any one property given: transparent / translucent / clear / see-through (1) good electrical insulator (1) lightweight (1) waterproof (1) durable / weather resistant (1) | (1) |

| Question | Answer | Mark |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| number | | |
| 3 (b) | Any one reason for using stainless steel (1) and a linked justification of that reason (1). | (2) |
| | Stainless steel is a hard material / has good compressive strength (1) therefore it can be pushed into the ground without bending / deforming (1) | |
| | Stainless steel is resistant to corrosion (1) therefore it will not rust in the wet / damp ground / retain its aesthetic characteristics (1) | |
| | Stainless steel is tough (1) which means it can be knocked into the ground with a hammer / withstand bumps / knocks from lawnmower (1) | |

| Question number | Answer | Mark |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 3 (c) | Any one explanation that references how the company can reduce their carbon footprint (1) and a linked justification of that way (1). They can try and use renewable energy sources / maximise energy efficiency for heating / lighting / powering their factory (1) therefore reducing the demand on finite sources / reducing emissions / fumes (1) They can use new modern / energy efficient machinery / energy recovery systems (1) which will reduce their energy use / consumption (1) They can use virtual chat rooms / work rooms / video conference for meetings / robots for production (1) which means they will not have to travel / reducing pollution (1) Potential replacement parts could be sent to customers as electronic files to be produced in situ (1) rather than sending physical components by road / air creating pollution (1) Any fumes / pollution / waste generated at the factory can be cleaned / scrubbed / carbon filtered / CO² capture (1) therefore reducing the amount of pollutants released into the atmosphere (1) They could use biofuels / electric vehicles (1) to help reduce emissions / fumes (1) | (2) |

| Question number | Answer | Additional guidance | Mark |
|--------------------|------------------------------|------------------------------------|------|
| 3 (d) | A calculation that includes: | Award full marks for correct | (2) |
| | correct working | numerical answer without working. | |
| | £4.97 x 1/12 (1) | Allow for ECF if | |
| | • correct answer to 2 s.f. | candidate gets part of calculation | |
| | £0.41 or 41 pence (1) | wrong. | |
| | | Do not accept 41 on its own | |

| Question number | Answer | Mark |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 3 (e) | Any two ways that references the effects of new and emerging technologies for the apprentices (1) and a linked justification of that way (1) The apprentices will be exposed to the latest technology / manufacturing methods (1) therefore they will be trained / experienced in the latest / most current methods (1) They will be very employable / in demand (1) as the technologies develop and spread to other companies / parts of the country / world (1) They may be highly specialised / highly skilled / ready to move into advanced roles (1) therefore they can command higher salaries (1) Once they have completed their training they may find themselves out of a job (1) because the new technology has replaced manual workers / more efficient technology (1) Improved / safer working environments (1) because of the use of electronic control systems (1) Lower skilled technician roles (1) results in lower paid positions (1) | (4) |

| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------|------|
| 4 (a)(i) | LDR / Light Dependent Resistor (1) (Only answer) | (1) |

| Question number | Answer | Mark |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 4 (a)(ii) | A flowchart that includes feedback loops and labels to the decision box. • 'Yes' and 'No' correctly labelled (1) • Feedback loop with directional arrow from 'No' to above / to the 'MUSICAL TUNE OFF' box (1) • Feedback loop from below 'MUSICAL TUNE ON' to the / just above the diamond decision box (1) START WYBICAL TUNE OPF WYBICAL TUNE ON' WYBICAL TUNE ON | (3) |

| Question number | Answer | Mark |
|-----------------|-------------------------------------------------|------|
| 4 (b) | A bar chart that includes: | (2) |
| | Correct height for National Parks at 30 (1) | |
| | Correct height for other at 63 (range of 62-64) | |
| | (1) | |
| | | |
| | 70 — | |
| | 60 | |
| | 50 | |
| | 30 | |
| | 20 ———————————————————————————————————— | |
| | 10 | |
| | Native forest National Parks Other | |
| | | |
| | | |
| | | |

| Question number | Indicative content | Mark |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 4 (c) | Collaboration could be used whereby different people look at problems from different perspectives / viewpoints such as technically / from a manufacturing perspective / materials / users' needs and wants Collaboration allows people / teams to bounce ideas off each other, sparking imagination Teams might be in different countries and contribute over the internet in chat rooms / video conference User-centred design considers the needs and wants of others at the centre / heart of all decisions User-centred design also ensures that users' views and opinions are considered at every stage of the design process Feedback is taken very seriously in user-centred design ensuring users' needs and opinions are gathered and acted upon Systems thinking looks at the whole problem and breaks it down into individual parts / blocks Systems thinking looks at how different parts of a design / system fit / work / interact / feedback back into other parts of the system Systems thinking considers where any energy / power will come from and what inputs / control / outputs will be required and work together Evaluation / analysis of existing products / designers / movements Use of external stimulus / triggers / biomimicry Iteration is used to fine tune / develop ideas in response to consumer feedback | (6) |

| Level | Mark | Descriptor |
|---------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 0 | No rewardable content |
| 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: • allow different charity postcards to be displayed (1) and changed (1) • .g. flap / slot to hold postcard with finger cut out section • provide a method to allow bigger coins to be put in (1) and kept inside without someone being able to shake them out (1) • .g. small slots / wider slots / slides / that let coins / folded notes to be inserted / tipper tray / tapered slot • provide a secure method so that coins can be removed (1) without causing any damage to the box (1) • .g. locked units / security screws / keypad entry Example of candidate response. | (6) |
| | Pravous a lot formed by extending length of clear august back and totaling over. Itali circle removed to allow postarial to he problem in/ polited out. length of act extended for higher come higher come higher miles to he was to he was to he to he want by toom to get back thungs! Someway and waited. Pre paral wand have labs be conditioned an insert to beautiff, and a ley lock door powel waited to fit in to beautiff, and a ley lock door powel waited to fit in to beautiff, and a ley lock door powel waited to fit in to beautiff, and a ley lock door powel waited to fit in to beautiff, and a ley lock | |
| | Annotated notes: Narrow slot formed by extending length of clear acrylic back and folding over. | |
| | Half circle removed to allow postcard to be pushed in / pulled out. | |
| | Length of slot extended for bigger coins. | |
| | Tapered slot inside for coins / notes to pass between but too narrow for them to get back through. | |
| | Small panel would be cut out and an insert door panel made to fit in. The panel would have tabs to keep it in and a key lock to keep it closed securely. | |

| Question number | Answer | Additional guidance | Mark |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------|
| 5(b) | Any two explanations that include a way the unit meets or fails to meet the requirement (1) and a linked justification of that way (1) The head is life sized / correctly proportioned (1) which means the glasses can fit as if they were being worn / the glasses can fit into place without having to be folded (1) The bridge of the glasses will sit on the nose and the side bits on a small shelf like the ears (1) which simulates how the glasses will be worn / allows the user to see what they look like on / prevents arms from falling (1) The arms just sit on a small shelf like bit without anything to stop them moving (1) which means the glasses might fall / slip off / move around (1) The angle of the nose is very steep / material smooth and shiny (1) which may mean that the glasses slide down so are not secure (1) The lightweight nature of the material (1) might mean that it is easily knocked over / glasses fall off (1) Large solid / stable base (1) which means it has a large surface area in contact with the table / difficult to fall over (1) | Do not accept anything related to secure in relation to theft | (4) |

| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6 (a) | Any two advantages which include an explanation (1) and a linked justification (1) | (4) |
| | The product can be marked / marketed as made from a sustainable material (1) which might increase sales / widen potential market appeal /allows consumers to make informed choices about products (1) Knife parts can be recycled / materials separated (1) which means they will not go to landfill / take many years to break down (1) Oil / crude oil will not be used (1) which means resources will last longer due to reduced demand (1) Less chance of environmental pollution / accidents (1) because oil will not need to be transported to processing plants to make polymers (1) | |

| Question number | Answer | Additional guidance | Mark |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------|
| 6 (b) | Marks will be awarded for understanding of design and technology, not graphical skills. | Cap at 3 marks if no sketches or | (4) |
| | Notes and/or sketches that include: | all sketches no notes | |
| | Use of tap / tap wrench (1) Ensure tap is at 90° to the work surface (1) Wind through / rotate back to cut waste materials (1) Wind through to cut thread (1) Use of 2nd / plug tap (1) | | |
| | Example of candidate response: | | |
| | Tap hold in tap wrench Rotated ferward 2Brds of a turn and then notated back to remove debris. Continue to wind through. Need to make sure tap is hold at 90° to two wark surface After taper top has been used, wind through 2nd/plvg tap. | | |
| | Annotated notes: Tap held in tap wrench. Rotated forwards 2/3rds of a turn and then rotated back to remove debris / swarf. Continue to wind through. Need to make sure tap is held at 90° to the work surface. After taper tap has been used, wind through 2 nd / plug tap. | | |

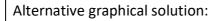
| Question number | Answer | Mark |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6 (c) | Any one explanation that includes a reason for using different coloured polymers (1) and a linked justification for that reason (1). Different colours can be used for aesthetic / style purposes (1) allowing consumers / users to select colours to reflect their taste / kitchen colour scheme (1) Different coloured polymers can be used for different handles / knives to be used on different products such as fish / chicken (1) therefore no cross contamination / blue for fish / red for meat (1) | (2) |

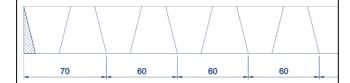
| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6 (d) | Any two explanations that include a technique (1), plus two linked advantages of that technique (1) + (1). Technique – laser cutter (1) Explanation – file / drawing created on CAD system (1) which can be downloaded to laser cutter for accurate cutting (1) Technique - CNC router / milling machine (1) Explanation - which can repeat cut (1) therefore making identical components quickly (1) Technique - drilling jigs (1) Explanation - could be used to drill holes at each end of the slot / parts to size (1) requiring no / little marking out / use of saw to remove excess material (1) | (6) |

| Question | Answer | Additional | Mark |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------|
| number | | guidance | |
| 7 (a) | One surface finish or treatment given from: textured mould / raised / recessed profile (1) laser engraved / etching (1) vinyl stickers (1) printing / sublimation / silk screen / pad / (1) paint (1) | Do not accept injection moulding on its own | (1) |

| Question | Answer | Mark |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| number | | |
| 7 (b) | Any two explanations that include a reason for using a stock sized rod (1) and a linked justification for that reason (1) The rods can be bulk purchased / bought in (1) therefore no need to make them / just cut to length (1) The rods would be an exact size (1) therefore a standard 6mm drill bit can be used to make the holes for the pegs to fit into (1) It would be wasteful to make the rods from square stock material (1) therefore it reduces waste / cost (1) It would be a time-consuming process to make the rods (1) therefore it speeds up the overall production / manufacturing time (1) Stock sizes would be used from available range / sizes (1) therefore allowing design / manufacturing decisions to be made to suit (1) Do not have to invest money in machinery (1) saving capital / training costs (1) | (4) |

| Question number | Answer | | Additional guidance | Mark |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 7 (c) | Conversion of units either at the start or the end Tessellation to show that two pieces require minimum of 7 cm (40 + 20 + 10 mm) or (X + Y + 1cm) Calculation of maximum number of tessellations from 181 cm length 181 cm - 1 cm = 180 180/ 6 cm = 30 30 x 2 pieces per tessellation = 60 Conversion of units (1) 181/4=45.25 = 45 whole bodies (1) | at (1) (1) (1) (1) | Do not award the final mark if the final answer is not a whole number. Award full marks for correct numerical answer without working. Allow ecf if candidate gets part of calculation wrong. | (5) |





- Conversion to cm:
 Length of polymer = 181cm
 Pair of bodies = 6cm
- Calculation 181/6 = 30 (with required 1cm remaining)
- Therefore 30 pairs can be obtained from strip
- Answer = 60 bodies

Alternative solution

$$181 \times 4 = 724 \text{ cm}^2$$

$$\frac{1}{2}$$
 (4 + 2) x 4 = 12 cm² (1)

(1)

$$724 \div 12 \text{ OR } 72400 \div 1200$$
 (1)

$$= 60.3$$
 (1)

| Question number | Answer | Additional guidance | Mark |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------|
| 7 (d) | Any two explanations that include a working property (1), and two linked justifications of that working property (1) + (1). HIPS is tough / has high impact strength (1) which means it will withstand the knocks and bumps during play / being thrown / bitten (1) therefore it lasts a long time / does not break / dent / mark / loose its visual appearance (1) HIPS is waterproof (1) which means it will withstand being put in a child's mouth (1) therefore does not absorb any moisture / bacteria / can be washed / cleaned / sterilised without causing any damage (1) HIPS provides a good printing surface / substrate (1) which means it is easily printed on (1) therefore no additional surface preparation is required saving time / money (1) HIPS can be moulded smooth (1) which means it can be wiped clean / hygienic (1) therefore making it safer for children / not spread germs (1) | Do not accept HIPS as being an electrical conductor / heat safe / lightweight given the context and size of the part | (6) |

| Question number | Answer | Mark |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 8 (a)(i) | Any one explanation that includes a reason (1) and a linked justification of that reason (1). Light stabilising additives might be used to reduce the colour fading / UV light degradation (1) therefore meaning the polymer retains its original colour longer (1) Reinforcing fibres can be added (1) which means the polymer can be made stiffer / improve overall strength (1) Pigments can be added (1) therefore allowing the window frames to be manufactured in different colours (1) Plasticisers can be added (1) to make the polymer more flexible / softer to ease the extrusion / manufacturing process (1) | (2) |

| Question number | Answer | Mark |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 8 (a)(ii) | Any one explanation that includes a working property (1), and one linked justification of that property (1) + (1). PVC is weather / water proof / durable (1) which means it can withstand the various elements / rain it will be subjected to as an external component (1) therefore it will last a long time / not absorb any water (1) PVC is chemical resistant (1) which means it will not be affected by any cleaning products / detergents that might be used to clean the windows (1) therefore making it capable of lasting a long time (1) PVC has plasticity / softens when heated (1) which means the material can have good fluidity / flow characteristics (1) therefore allowing it to be extruded through a profiled die (1) | (3) |

| Question number | Answer | Mark |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 8 (b) | Any two negative effects that relate to the use of PVC (1) and a linked justification of that factor (1). PVC is derived / made from oil (1) therefore it places a demand on the finite resource / will eventually run out (1) PVC is very expensive / difficult to recycle (1) which places a great demand on natural resources / money / time to deal with properly / encourages people to tip / landfill (1) PVC gives off dangerous / poisonous fumes if burnt (1) therefore polluting the atmosphere / causing damage to the environment (1) | (4) |

| Question number | Indicative content | Mark |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 8 (c) | Colour can be varied / changed to meet specific needs of building environmental / architecture / design trends Durability / longevity and therefore less maintenance is required Greater energy efficiency from raw materials to recycling when compared to some other materials Difficult to meet demand / measure / gauge demand around Europe / Worldwide in terms of building programmes Demand for window frames increases pressure on drilling / extraction of finite resources Extraction / exploration of oil reserves can cause environmental damage in local / national areas Transportation and pollution issues to local communities because of bringing oil ashore / increased air miles Pollution caused because of fractional distillation of crude oil into useful hydrocarbons PVC is very difficult and expensive to recycle / dispose of Large products to transport / ship taking up large volume containers / use of fuel to move / pollution during transportation Potential issues in terms of separating additives out during the any recycling process | (9) |

| Level | Mark | Descriptor |
|---------|-------|-------------------------------------------------------------------------------------|
| | 0 | No rewardable content |
| 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. |