General Certificate of Secondary Education

Design and Technology: Product Design

Specimen Mark Scheme

The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Registered address: AQA, Devas Street, Manchester M15 6EX *Dr Michael Cresswell Director General*

SECTION A

Question 1

(a) Any sensible design criteria identified, supported by appropriate reason such as colour to attract target user / fit with current fashion / teenage leisure activity; material; weight; dimensions; ergonomics; taste; texture etc.

Design criteria identified (1 mark)

A simple reason with detailed explanation of method, two reasons briefly explained (2 marks)

A reason that is vague or not well explained (1 mark)

A reason that is not relevant or incorrect (0 marks)

Maximum 9 marks

(b) (i) clarity of communication

Design has been significantly developed and includes detail of materials or ingredients, construction techniques. Designs are well drawn with a good use of colour, texture and form. Designs well annotated. Design work is concise, easy to understand and well laid out in the space available. Design could be manufactured by a third party. (5 – 6 marks)

Design is developed and includes detail of some appropriate materials or ingredients, construction techniques, designs are quite well drawn, colour and or texture has been used appropriately although there may be limited application. Designs are annotated although there may be some missing details. Work is fairly well laid out in the space provided. (3 – 4 marks)

Design may not be fully developed and may lack detail of materials, ingredients, construction techniques. Designs may not be very well drawn and there may be no or limited application of colour or texture. Annotation may be limited or missing. (1 – 2 marks)

Absence of design and annotation (0 marks)

(ii) a creative response

Creative response to brief, inclusion of innovative features.
Clear links to moodboard (use of form, texture, colour). Innovative product idea which compliments leisure activity / teenage lifestyle. (4 – 5 marks)

A reasonably creative response to brief and inclusion of some innovative design features. Some link to moodboard (use of form, texture, colour). Product idea compliments leisure activity or some aspect of teenage lifestyle. (2 – 3 marks)

Limited response to brief, little or no link to moodboard (use of form, texture, colour). Product idea may not compliment leisure activity or some aspect of teenage lifestyle. (1 mark)

No response to brief (0 marks)

(iii) feasibility
design solution is fully resolved and viable; design features are fully explored and detail of materials, ingredients and manufacturing processes have been given. (4 marks)

design solution is mostly resolved and appears to be viable although some aspects may not have been fully explored and there may be some gaps in specification of materials, ingredients and manufacturing processes. (3 marks)

design solution is not resolved and may not be viable. Most aspects have not been fully explored and there may be little detail of materials, ingredients and manufacturing processes. (2 marks)

design solution is not resolved and is not viable. Little or no detail of manufacturing process, materials and ingredients. (1 mark)

No evidence of any solution (0 marks)

(c) Concise evaluation with several well reasoned points clearly linked to original design criteria. Opportunities for improvement or further development to design may also have been identified. Response well structured with good use of appropriate design and technology terminology and showing a good grasp of grammar, punctuation and spelling. (5 – 6 marks)

Some well reasoned points linked to original design criteria although response may be lacking in some detail or reference to further development opportunities. Response fairly well structured with some use of design and technology terminology with small number of errors in grammar, punctuation and spelling. (3 – 4 marks)

One point fairly well reasoned or some vague points which might not be linked to original design criteria. Little or no reference to further development opportunities. Response poorly structured with little or no use of design and technology terminology and with numerous errors in grammar, punctuation and spelling. (1 – 2 marks)

No relevant evaluation presented. (0 marks)

SECTION B

Question 2

(a) Any combination of three rows fully completed. 1 mark per material and 1 mark per property up to a maximum of 9 marks.

<table>
<tr><th>Product</th><th>Material</th><th colspan="2">Property of material</th></tr>
<tr><td rowspan="2">Scooter</td><td rowspan="2">Aluminium alloy</td><td colspan="2">Lightweight</td></tr>
<tr><td colspan="2">Strong compared to weight.</td></tr>
<tr><td rowspan="2">Shirt</td><td rowspan="2">Cotton
Polyester
Polyester cotton
linen</td><td>Cotton:
Lightweight, cool, strong, absorbent, creases easily</td><td>Polyester:
Strong, smooth, elastic, crease resistant</td></tr>
<tr><td>Polyester cotton:
Strong, smooth, elastic, crease resistant, lightweight, cool</td><td>Linen:
Lightweight, cool, creases easily, absorbent, very strong</td></tr>
<tr><td rowspan="2">Muffin</td><td rowspan="2">Flour
Blueberry</td><td colspan="2">Flour:
Carbohydrate, fibre</td></tr>
<tr><td colspan="2">Blueberry:
flavour, colour, texture
source of vitamins, fructose</td></tr>
<tr><td>Mug</td><td>Porcelain</td><td colspan="2">Porcelain: Hard wearing, non-absorbent, easily cleaned, washable, hard, dense, fine</td></tr>
<tr><td>Playing cards</td><td>Laminated card</td><td colspan="2">Good print surface, print on both sides, resists grease/moisture, easily cut, flexible</td></tr>
</table>

Toy duck	Polypropylene	High impact strength, a thermoplastic, flexes without breaking, range of colours, mouldable
Skateboard	Plywood Aluminium Steel Resin	Plywood: Very strong, stable, different finishes, flexible
		Aluminium: Lightweight, strong compared to weight, difficult to join, polishes well
		Steel: strong, malleable, ductile, rusts easily
		Resin: flexible, available in different colours / transparency
Jumper	Wool Acrylic	Wool: Warm, soft, crease resistant, absorbent
		Acrylic: Soft, wears well, inexpensive, builds up static, poor absorbance
Risotto	Rice Mushrooms	Rice: starch, good source of energy, fibre, complex carbohydrate
		Mushrooms: source of vitamin D, add flavour and texture
Casserole dish	Glass Pyrex	Glass: Transparent, cheap, strong, resistant to high temperatures, readily available
		Pyrex: toughened glass, heat resistant glass

(9 marks)

(b) (i & ii)

Material	Source	Process one	Process two
Flour	Plant - wheat	Grading, purifying, grinding	Processing (Bleaching, oxidizing, adding salt / leavening agents)
Copper	Copper ore Mined Accept – out of the ground	Smelted Turned into ingots	Rolled cut
Polyester	Oil	Fractional distillation Accept refraction, heating	Polymerisation via catalytic cracking Accept polymerisation
Scots pine	trees	Logging sawing	Seasoning Planing
polythene	Oil	Refraction Heating	Polymerisation
Sugar	Sugar beet	Slicing, soaking, removal of impurities	Filtration, evaporation, crystalisation, sieving
Linen	Plant - flax	Retting, soaking, rippling, scutching	Twisting, mercerizing, bleaching, dyeing
Corrugated cardboard	trees	Logging Shredding Boiling to form pulp	Adding chemicals Adding dyes Pouring over mesh Rolling cutting
slip	Clay pits Out of the ground	Crushed dried	Mixed with other chemicals Water added

(i) Correct identification of source of raw material (1 mark)

(ii) Correct description of how raw material is processed including two or more stages. (3 marks)

Correct description of process but which may lack some detail or stage in processing. (2 marks)

Brief or vague description of process which may lack important stages. (1 mark)

Incorrect description of process given (0 marks)

Question 3

(a) (i) Corn starch is a renewable material as it is produced from plant material rather than oil. As such it is biodegradable/compostable. Reference might be made to reasons why traditional plastics should not be used as they come from a finite resource and do not degrade over time.

A detailed, concise and well structured response which explains one point in detail with reference to a second point or several points. (3 marks)

A detailed answer which explains one point in detail or more than one point (2 marks)

A superficial answer which deals with one aspect only (1 mark)

Incorrect response provided (0 marks)

(ii) Sustainable forests are managed forests rather than natural ones. Planted in rows with adequate access, only the required trees are cut. Fast growing softwoods are usually grown and replacement saplings planted each time a fully grown tree is felled

A detailed, concise and well structured response which explains one point in detail with reference to a second point or several points. (3 marks)

A detailed answer which explains one point in detail or more than one point (2 marks)

A superficial answer which deals with one aspect only (1 mark)

Incorrect response provided (0 marks)

(b) (i) Nets have been carefully rotated and nested together to reduce the amount of wastage.

A full answer as above (2 marks)

A superficial answer such as “reduces wastage” (1 mark)

Incorrect response provided (0 marks)

(ii) Lithography/offset lithography (2 marks)

Gravure, letterpress, flexography (1 mark)

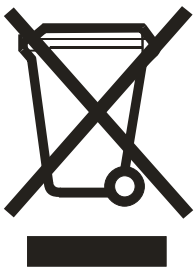
Incorrect response provided (0 marks)

(iii) Die-cutting (2 marks)

Stamping (I mark)

No credit for laser cutting or other incorrect process (0 marks)

(c)

	
• Green Dot – fee has been paid to recover packaging in some European countries	• Disposal of Waste Equipment by Users in Private Households in EU • Labelled product must not be placed in normal bins but deposited at specialist collection points
	
Aluminium – can be recycled	Glass – can be recycled

Complete answer (2 marks)
Partially complete answer (1 mark)
Incorrect answer (0 marks)

(d) A measure of the impact human activities have on the environment in terms of the amount of *green house gases produced*, measured in *units of carbon dioxide*

A clear description similar to above or covering the main points shown in italics (3 marks)

A clear description relating to environmental impact which mentions Carbon dioxide (2 marks)

A simplistic statement clearly indicating environmental impact but not mentioning either of the two points in italics (1 mark)

Incorrect response provided (0 marks)

Question 4

(a) Design has visual impact. There is a clear link to and creative use of the school logo and it has been sufficiently simplified to enable efficient manufacture in a batch of 200. (4 marks)

Design has visual impact. There is a clear link to the school logo and it has been sufficiently simplified to enable efficient manufacture in a batch of 200. (3 marks)

Design has visual impact or clearly links to the school logo but may not be well drawn. Design may not be appropriate to the scale of production. (2 marks)

Design may not be well drawn or have impact. There may not be any link to the school logo and may not be appropriate for the scale of production**.** (1 mark)

No design produced (0 marks)

(b) (i) Any suitable production process appropriate to the design in (a) and the scale of production:
laser cutting; milling/routing; pewter casting; die-cutting; chocolate moulding; pastry/biscuit/salt-dough/clay cutting; injection moulding; CNC turning; screen printing/block printing; machine embroidery; (1 mark)

(ii) Material:
Any named material suitable for production process identified in (i) and for the scale of production:
Plywood, MDF, aluminium, polystyrene, felt, fabric (specific), clay, card, biscuit mix, pastry, acrylic, etc. (1 mark)

No marks for generic names – wood, metal, plastic, clay, fabric etc

Reason:
Clear justifications linked to properties, manufacturing techniques, costs, aesthetics, availability etc. (1 mark)

One reason well explained or two reasons bullet pointed. (2 marks)

One reason stated without explanation (1 mark)

No reason given (0 marks)

(c) (i) An accurate description of each stage of the process, sequence is clear with no major omissions. Decoration is applied at the correct stage of the process. Suitable for producing 200. (5 – 6 marks)

A generally correct sequence of manufacturing detailed but maybe some omissions. Suitable for producing 200 (3 - 4 marks)

Some significant omissions in the sequence of manufacturing or processes may be incorrectly detailed. Suitable for producing 200. Decoration may have been

applied at incorrect stage of process. (2 marks)

Only part of the process superficially detailed or unsuitable for producing 200. Decoration applied at incorrect stage of process. (1 mark)

No description of process given (0 marks)

(ii) Correctly named tools and equipment for major stages of manufacture (3 marks)

Some tools and equipment are correctly named (1 - 2 marks)

No tools/equipment named or incorrectly named (0 marks)

(iii) Quality of communication is good. Clear drawings and notes sequentially laid out. (4 marks)

Quality of communication is sound. Drawings may lack some annotation but are generally easy to understand and most information is provided. (3 marks)

Quality of communication is reasonable. Drawings and or annotation lack significant details or may be difficult to understand in places. Superficial information only may be given. (2 marks)

Quality of communication may be poor, drawings without notes or notes without drawings, not easily understood. (1 mark)

Notes and sketches not given (0 marks)

Some suggestions to aid markers with processes

Laser cutting - Draw in suitable software (Corel, 2D Design Tools, ProDESKTOP), nominate different colours for cutting and engraving (typically red for cut, black for engrave but do vary), place material in laser and adjust setting. Send single design to print so that quality can be checked. If ok, copy and paste ensuring maximum use of material (nesting). Send to print, replace material until required number achieved. Unlikely any edge finishing is required in most materials.

Milling/routing – Draw in suitable software (Corel, 2D Design Tools, ProDESKTOP), nominate different colours for different size cutters or, place material in machine and adjust setting (typically referred to as offsets, may include feeds and speeds relative to material). Send single design to plot so that quality can be checked. If ok, copy and paste ensuring maximum use of material (nesting). Send to plot, replace material until required number achieved. Edges are likely to be rough so some form of sanding and polishing/painting/varnishing might be specified.

Pewter casting- Draw in suitable software (Corel, 2D Design Tools, ProDESKTOP), nominate different colours for different size cutters or, place material (typically MDF or Necuron) in milling machine/router and adjust setting (typically referred to as offsets, may include feeds and speeds relative to material). Send single design to plot so that quality can be checked. If ok, repeat to get a number of moulds. Heat pewter (variety of methods used) until molten and pour into moulds. Once cool, remove form mould and trim excess material. Polishing is likely, maybe

application of colour.

Die-cutting – Make a cutter by fastening dieflex bade around MDF/plywood shape (double sided tape or screws). Use this in press to stamp out shapes. Likely to be linked to some form of printing e.g. Laser printing is likely for card, sublimation printing/transfer printing for fabrics. Latter involves a heat transfer system – press or iron. Reference might be made to crop marks for alignment. Fabric parts might be sewn together and filled with wadding.
Chocolate moulding – First issue is to manufacture moulds in large quantity. Any system can be used for making formers although CAM system (laser/milling) is most likely. Vacuum form moulds (most likely from HIPS or PET – food quality needed) in trays. Trim and clean/disinfect. Heat chocolate in bain marie or microwave, poor into moulds, scrape off surplus chocolate and put in fridge to set. A protective cover will be needed (foil, polythene).

Pastry/biscuit/salt-dough/clay cutting – a cutter will need to be made. A simple vacuum formed HIPS cutter can be made over any rigid former and trimmed to make an effective stamping tool. Alternatively, a strip of sheet metal could be shaped and joined to form a cutter. Material will need to be rolled out into even sheets and stamped. Excess material rolled out again and process repeated. Cooking or kiln firing should be noted. Decoration might include icing or edible printing onto rice paper, painting, glazing etc. Edible decorations likely to be covered (cellophane wrapping for example).

Injection moulding – could utilise an injection moulding machine or hot melt glue gun and coloured sticks. Mould could be made in acrylic layers (laser cutting most likely). Plastic injected into mould and allowed to cool (more than one mould would be needed). Once removed, excess plastic needs to be trimmed (fettling). No further work should be necessary.

CNC turning – as flat shape not specified this process might be suggested. Only suitable for forms made up cylinders, spheres, cones which are symmetrical around the length. Draw in suitable software (LatheCAM). Place material in lathe and ensure correct tools are in place. Length and diameter of material (billet) will need to be put into software. Send single design to machine so that quality can be checked. If ok, repeat until required number achieved. Unlikely any finishing is required in most materials (aluminium or brass most common) although polishing on buffing wheel is possible.

Screen printing/block printing – Might be suggested onto a range of materials such as card or fabric. Screen/printing block will need to be prepared. A wide variety of methods are possible. Ink applied to block and pressed onto material or pressed through screen using a squeegee. There will be a considerable amount of drying time needed. A suitable cutting out method will need to be specified but scissors used to cut a simple outline might be regarded as suitable. Additional work such as sewing fabric pieces together will gain extra credit.

Machine embroidery – this would be a very slow production method but might be suggested. Design to be drawn in suitable software (Corel Draw, Paint) and pasted into the embroidery software (PE Design). Fabric fastened into frame with backing fabric attached. Coloured threads threaded into machine in correct sequence. Design sent to machine. Excess threads need to be trimmed afterwards. A suitable cutting out method will need to be specified but

scissors used to cut a simple outline might be regarded as suitable. It would not be feasible to cut out shape prior to embroidering in this instance as fabric needs to be held in frame. Additional work such as sewing fabric pieces together will gain extra credit.

(d) References to tests or precautions e.g. check that materials are not flammable; sharp edges; easily breakable – shatter; HACCP

Two tests or precautions with detailed explanation of methods, three tests or precautions briefly explained with clearly identified danger (3 marks)

A simple test or precaution with detailed explanation of method, two tests or precautions briefly explained with clearly identified danger (2 marks)

An explanation that is vague and does not mention a specific danger (1 mark)

No explanation provided (0 marks)

(e) (i) Appropriate safety rule or interventions identified, relevant to manufacturing process in (c). (1 mark)

(ii) Detailed explanation of risk associated to rule showing a sound understanding of danger. (2 marks)

Superficial response identifying appropriate risk associated to rule. (1 mark)

No reason or incorrect reason supplied (0 marks)

Safety rules / risk intervention should relate to process described earlier so answers such as using protective clothing whilst using the laser are not valid. Any sensible answer regarding general housekeeping, behaviour, supervision, protective clothing etc.

Apart from good housekeeping rules the following additional safety issues are associated with the processes listed for part (c):

Laser cutting – a fully guarded system. Fire and fume risk:
1 Supervise at all times,
2 ensure extraction is running

CNC milling/routing - a fully guarded system:
1 Sharp tools so care needed when placing/removing materials.
2 Dust risk, care needed when removing to avoid eye contact.

Pewter casting – burn risk:
1 Wear gloves and face mask when pouring.
2 Goggles and loose clothing/hair secured when drilling or polishing.

Die-cutting – sharp blades:
1 Handle with care.
2 Keep hands free when using press.

Dye sublimation/transfer printing – burn/fire risk:
1 Keep hands away from heated surfaces.

2 Watch fabric closely to avoid fire risk

Chocolate moulding - burn risk, hygiene risk:
1 Handle with care.
2 Ensure all surfaces which come in contact with chocolate are clean and sterilised

Pastry/biscuits. - burn risk, hygiene risk:
1 Handle with care. Oven gloves needed.
2 Ensure all surfaces which come in contact with food are clean and sterilised

Ceramics – burn and toxicity risk:
1 Severe burn risk when emptying kiln, adult supervision needed.
2 Toxic dusts/glazes, keep surfaces clean, was hands after use

Injection moulding - burn risk,
1 Handle with care/wear gloves when using hot glue-gun system.
2 Keep knife blade cutting away from you when trimming excess plastic

CNC turning - a fully guarded system.
1 Sharp tools so care needed when placing/removing materials.
2 Swarf risk, care needed when removing to avoid eye contact, metal swarf can be very sharp.

Printing – toxic materials. Fire/fume risk when using solvent based inks.
1 Use solvent based inks in well ventilated area free from naked flame
2 Wash hands after use

Machine embroidery – unguarded system. Danger from moving parts, especially needle:
1 Keep hands clear when machine is in use
2 Fasten all loose clothing /hair

Question 5

(a) (i) Any sensible user group identified including:

Training shoe A: sports person, runner, male in mid 20s-30s, someone interested in fitness

Training shoe B: teenage female; tennis player; female 20s

Identification of specific user (2 x 1 mark)

(ii) Training Shoe A: blue and white male colours, sole has grip / material moulded for support / flexibility / traction; good for sport, ease of movement, support; ankle support specific to sport e.g. running / aerobics / tennis etc.; fabric (mesh) breathable; insole cushioned / breathable to prevent fungal infection

Training Shoe B: gold colour is fashionable, retro design, comfort for daily wear; flat sole not suitable for sport use (high impact) as no grip / moulded support; no ankle support

Well reasoned answer including comparisons between the two shoes. Candidate identifies a number of specific design features for each training shoe and appropriately links these to the target user.

(4 marks)

Reasoned answer including at least one comparison between the two shoes and identification of one or more design features which are appropriately linked to the target user.

(3 marks)

Superficial response which may not make any comparison between the training shoes or may not identify a specific design feature and make links to the target user.

(2 marks)

Brief explanation / one word answer / sound reason but not linked to appropriate target user. (1 mark)

No response or inappropriate response provided (0 marks)

(b) (i) Any sensible choice including:
Nike, Adidas, Reebok, Next, Apple, Levis, ASDA, Tesco, Nokia, Sony Ericsson, DFS, Heinz, Colman's, Bic, Paul Smith, DKNY, Diesel, Calvin Klein etc.

Well drawn logo, easily identifiable and in proportion. (2 marks)
Reasonable drawing, identifiable as brand logo. (1 mark)
Poor quality drawing with no indication of brand logo (0 marks)

(ii) Reference to logo, colours, advertising, style of product / advert, use of celebrity, sponsorship of events, identification with a target user group

Detailed response mentioning two or more of above and showing a sound understanding of what a brand is. (3 marks)

Well written response with reference to one or more of above showing a reasonable understanding of what a brand is although response may be lacking in some detail. (2 marks)

Limited response showing lack of understanding of what a brand is although may mention one of above. (1 mark)

Response shows no understanding of what a brand is and mentions none of above (0 marks)

(c) London traditionally one of the world's centres for design. Design education and major company HQs in the west. Manufactured abroad as cheap labour, centre of most of world's textile production. Developing countries eager for contracts, poverty.

Detailed response mentioning two or more of above and showing a sound understanding (3 marks)

Well written response with reference to one or more of above showing a reasonable understanding although response may be lacking in some detail. (2 marks)

Limited response showing lack of understanding although may mention one of above. (1 mark)

Response shows no understanding and mentions none of above. (0 marks)

(d) Fair trade: fair price for growers / manufacturers to alleviate poverty; consumer conscience: improved quality; politics; Fair Trade logo, advertising campaign, marketing by supermarkets.

Detailed response mentioning two or more of above and showing a sound understanding of what a Fair Trade is. (3 marks)

Well written response with reference to one or more of above showing a reasonable understanding of what Fair Trade is although response may be lacking in some detail. (2 marks)

Limited response showing lack of understanding of what Fair Trade is although may Mention one of above (1 mark)

Incorrect response given. No mention of above. (0 marks)

Question 6

(a) (i) Computer Aided Design (1 mark)

(ii) Computer Aided Manufacture (1 mark)

Any of the above words incorrectly given (0 marks)

(b) Any sensible advantages such as:
designing – changes can be made easily; electronic storage of designs; designs can be shared / sent quickly by email; designs can be rotated / changed from 2d to 3d; rendering; experimentation with colour ways; accuracy.
manufacturing - very accurate; quality control and quality assurance; particularly useful in producing large quantities of the same object; will run for extended periods of time; reduction of labour costs etc.

(2 x 2 marks)

Advantage well explained (2 marks)
Advantage stated but not explained. (1 mark)
Non relevant or inaccurate response given (0 marks)

(c) Reference to Just In Time (JIT), stock control, data transfer, remote manufacturing, video conferencing, software sharing, CNC and CAM.

Thorough explanation detailing several examples or one or more examples fully explored.
Benefits of ICT clearly discussed above manual methods.
Response well structured with good use of appropriate design and technology terminology and showing a good grasp of grammar, punctuation and spelling.

(6 - 8 marks)

Sound understanding of how ICT can be used in manufacturing to make process more efficient with one or more examples well explained.
Response fairly well structured with some use of design and technology terminology, with a small number of errors in grammar, punctuation and spelling.

(3 - 5 marks)

Simple reference to one application of ICT in manufacturing process.
Response poorly structured with little or no use of design and technology terminology, and with numerous errors in grammar, punctuation and spelling.

(1 - 2 marks)

Incorrect or no irrelevant response (0 marks)

Additional Sample Questions Mark Scheme

1 (a) Smart /modern materials are developed through the invention of new or improved processes, for example, as a result of 'man' made materials or human intervention. In other words, not naturally occurring changes. They are altered to perform a particular function. Many smart and modern materials are developed for specialised applications but some become available for general use.

A full and detailed answer with a clear description similar to above, covering the main points:
man made to perform specific function, change according to environment / intervention.
(3 marks)

A clear description but which may be lacking in detail or which only covers one point.
(2 marks)

A simplistic statement which mentions one point.(1 mark)
No relevant response (0 marks)

1 (b) (i) Identification of smart / new material. (1 mark)

1 (b) (ii) Appropriate and detailed description of material's properties including an example of its use in a real product.
(3 marks)
Sound description of material's properties and an appropriate example of its use or detailed description with no example.
(2 marks)
Superficial description of material's properties or example of use. (1 mark)
Incorrect description of properties with no reference to use. (0 marks)

Smart / new material	**Property / function**	**Example of use**
Precious metal clays	A clay-like medium consists of very small particles of precious metals (such as silver, gold or platinum) mixed with an organic binder and water.	Used to make jewellery, beads and small sculpture.
Shape memory alloy also known as a smart alloy, memory metal, or muscle wire	An alloy that "remembers" its shape.	Glasses frames made from titanium-containing SMAs are marketed under the trademarks Flexon and TITANflex.
Corn starch polymer	Cornstarch, or cornflour, is the starch of the maize grain, commonly known as corn.	Cornstarch has many uses in the manufacturing of environmentally friendly products. For example, in 2004, the Japanese company Pioneer announced a biodegradable Blu-Ray disc made out of cornstarch. The use for the plastic is vast, as it is a renewable plastic that has the benefits of being biodegradable, used in injection molding, in extruders, and other common milling processes.
Thermochromic fabrics and materials	Changes with warmth the thermochromic dyes become colourless and the fabric changes colour.	Used for Global Hypacolour T shirts and fun items. Serious applications include medical textiles. Mood rings. Light sensitive sunglasses.

UV sensitive fabrics	Changes colour when exposed to UV light. Reverts back when out of the sunlight.	Used to show that the clothing has been exposed to the sun – a warning of overexposure to sunlight.
Glow in the dark fabrics	Activated with a light source so that it glows when in the dark.	Used for safety wear and club wear, as well as fun items.
Fluorescent fabrics	Fluorescent dyes absorb energy and emit extra light in daylight.	Adapted from nature to produce brightly coloured safety wear.
Reflective fabrics	Glass beads refract the light and beam it back to the source.	Valuable for night wear for safety as they reflect the beams from headlights.
Reflective trims	Glass prisms and bright colours beam the light back to its source.	Also valuable for trims for safety wear in the dark or gloomy environments.
Smart glass or switchable glass, also called smart windows or switchable windows electrically switchable glass or glazing	Changes light transmission properties when voltage is applied.	Windows and skylights.
Quantum Tunneling Composites (or QTCs)	Composite materials of metals and non-conducting elastomeric binder, used as pressure sensors. As the name implies, they operate using quantum tunneling: without pressure, the conductive elements are too far apart to conduct electricity; when pressure is applied, they move closer and electrons can tunnel through the insulator.	"smart", touchable membrane control panels to control electronic devices within clothing, e.g. mp3 players or mobile phones. Allows equipment to be operated without removing clothing layers or opening fastenings and makes standard equipment usable in extreme weather or environmental conditions such as Arctic/Antarctic exploration or spacesuits. However, eventually, due to the low cost of QTC, this technology will become available to the general user.