

GCSE

Design and Technology: Industrial Technology

Unit **A545**: Sustainability and technical aspects of designing and making

General Certificate of Secondary Education

Mark Scheme for June 2014

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.










All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotations

| Annotation | Meaning |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response. |
|  | Benefit of doubt |
|  | Caret sign to indicate 'SEEN' |
|  | Level 1 |
|  | Level 2 |
|  | Level 3 |
|  | Repeat |
|  | Noted but no credit given |
|  | Tick |

| Question | | Answer | Mark | Guidance |
|----------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------|
| 1 | | b | 1 | Only acceptable answer. |
| 2 | | a | 1 | Only acceptable answer. |
| 3 | | b | 1 | Only acceptable answer. |
| 4 | | c | 1 | Only acceptable answer. |
| 5 | | d | 1 | Only acceptable answer. |
| 6 | | Primary recycling | 1 | Only acceptable answer. |
| 7 | | (Product) Life cycle | 1 | Only acceptable answer. |
| 8 | | Depletion of ozone layer/global warming/smog /release greenhouse gases/ CO2 emissions/ Air pollution | 1 | |
| 9 | | Repair | 1 | Only acceptable answer. |
| 10 | | Eco-design | 1 | Accept eco-friendly/ environmentally friendly |
| 11 | | Reusing products is good for the environment | 1 | True |
| 12 | | The consumption of fossil fuels is likely to result in an energy crisis | 1 | True |
| 13 | | Hydro power is non-renewable | 1 | False |
| 14 | | Built-in obsolescence is environmentally friendly | 1 | False |
| 15 | | All thermoplastics can be recycled | 1 | True |
| | | | 15 | |
| 16 | (a) | (i) Tertiary recycling | 1 | Only answer. |
| | | (ii) Aluminium drinks can or any other commonly used aluminium product. | 1 | 1 mark for suitable aluminium product eg not 'can' |
| 16 | (b) | (i) The timber must be from a managed forest where trees are planted to replace those that have been used. | 2 | 2 marks for a justified response. |
| | | (ii) One mark for each specification point met, plus one additional mark for good use of notes/annotation. (4x1) | 4 | |
| 16 | (c) | One mark for each of two disadvantages. Examples; Wood deteriorates and rots when exposed to damp weather; wood requires a finish to protect it from the elements; wood can crack and warp when exposed to high temperatures/rain/ ice; wood wouldn't last as long as the | | |

| Question | | | Answer | Mark | Guidance |
|----------|-----|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------|
| | | | plastic or aluminium ; safety considerations/splinters/sharp point. (2x1) | 2 | |
| 16 | (d) | (i) | Manufacturing locally means that less energy is required to import and distribute products, as they don't need to be transported long distances; transport costs will be less; more jobs for local people; less congestion from trucks on the roads | 3 | Fully explained and justified response needed for full marks |
| | | (ii) | Cheaper labour/manufacturing costs; availability of expertise/materials | 1 | |

| Question | | | Answer | Marks | Content | Guidance |
|----------|------|--|------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | Levels of response |
| 16 | (e)* | | Up to six marks for a detailed explanation of the benefits to the environment of using recycled materials. | | <p>Response may include consideration of the following points:</p> <p>Carbon footprint of products used from virgin materials will be greater than that of those made from recycled materials.</p> <p>Recycled materials such as plastic or steel have a reduced carbon footprint as extraction impact and associated transportation of raw materials only occurs once.</p> <p>Reprocessing of materials also can take place near centres of industry further reducing energy cost and impact.</p> | <p>Level 3 (5-6 marks) Thorough discussion, showing a good understanding of the issues. There will be three or more clearly identified and explained points. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate will demonstrate the accurate use of spelling, punctuation and grammar.</p> <p>Level 2 (3-4 marks) Adequate discussion, showing reasonable understanding of the issues. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, grammar and punctuation.</p> |

| Question | | | Answer | Marks | Content | Guidance |
|----------|--|--|--------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | Levels of response |
| | | | | | <p>Fossil fuel extraction is reduced, as well as transport of oil to refineries etc.</p> <p>Pollution during processing from raw material such as oil and ore is also eliminated.</p> <p>Finite fossil fuels are preserved for the future.</p> <p>Companies may be responding to Government legislation.</p> | <p>Level 1 (1-2 marks) Basic discussion, showing some understanding of the issues. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised or 'list like'. Errors of grammar, punctuation and spelling may be intrusive</p> <p>0 - a response not worthy of a mark. Add 'Seen' at end of response.</p> <p>Do not apply ticks or annotations to 'Levels of response' questions.</p> <p>Mark these by reading all the answer, decide on an appropriate level, then a specific mark.</p> |
| | | | Total | 20 | | |

Section B

| Question | | Answer | Mark | Guidance |
|--------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------|
| 17 | (a) | Line parallel to edge - G Thread in hole - C Marking position for drilling - B Cutting 3mm rod - F Measuring thickness - E (5x1) | 5 | |
| | (b) | (i) A - Chuck B - Tailstock C - Headstock D - Toolpost/tool holder (4x1) | 4 | D - Allow top/compound slide |
| | | (ii) Examples: Wear apron/overalls; wear goggles/visor; make sure work is tight in chuck; remove chuck key; make sure guard is down; ensure workspace is clear/only one person in area; no loose clothing/hair tied back; know where emergency stop is (3x1) | 3 | Reference to PPE must be specific to machine requirements |
| | (c) | (i) Explanation may include reference to: Consistent quality of products; less skilled labour needed; faster production rates; better for batch production; easy to change for different products; continuous operation Example: CNC machines give more consistent quality/accuracy(1) as human error is not a problem(1). They usually give faster production times and can easily be made to work automatically(1) (3x1) | 3 | One mark only for stating an advantage Comparison needed for second mark Justified response with comparison for full marks |
| Total | | | 15 | |

| Question | | Answer | Mark | Guidance |
|--------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------|
| 18 | (a) | 3 Put heater in place to soften plastic 4 Raise mould into position 5 Turn on vacuum until formed 6 Allow to cool/set (4x1) | 4 | Accept other workable order or additional stages (eg: blow before vacuuming) |
| | (b) | Description to include both design and making stages Example: Using CAD package to produce design and working drawings; use software to produce machine program for (specified) CAM machine; mould produced on CAM machine (3x1) | 3 | Must reference software link between CAD and CAM for full marks |
| | (c) | One mark for each specification point adequately met in a <u>workable</u> jig. Top surface of base to be supported to prevent damage and inaccuracy when drilling (4x1) | 4 | |
| | (d) (i) | One mark for each of three relevant benefits to a manufacturer Examples: The holder can be made in one piece; less material wasted compared to vac. forming; no extra parts to be made/assembled; cost would be lower; only one set of tools needed; quicker to produce (3x1) | 3 | |
| | (ii) | Injection moulding / Extrusion | 1 | |
| Total | | | 15 | |
| 19 | (a) | Ferrous metal - cast iron / stainless steel Alloy - brass / stainless steel / cast iron Composite - carbon fibre/GRP (3x1) | 3 | |
| | (b) | Explanation must include reference to a mixture (1) of metals (1) that contains no iron (1) (3x1) | 3 | |

| Question | | Answer | Marks | Guidance | |
|----------|------|-------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | Content | Levels of response |
| 19 | (c)* | Up to six marks for a detailed explanation of the advantages and disadvantages of making products from plastics rather than metals. | 6 | <p>Response may include consideration of the following points:</p> <p>Advantages: Plastics are cleaner to work with Many batches can be made once tools are produced Less material wastage Plastics are easier to form into shapes Wider range of products can be made Products often made in one piece Product are made more quickly Self-coloured finishes</p> <p>Disadvantages: Some plastics can't be recycled Different machinery/skills needed to make products</p> | <p>Level 3 (5-6 marks) Thorough explanation, showing a clear understanding of the advantages and disadvantages of making products from plastics rather than metals. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate will demonstrate the accurate use of spelling, punctuation and grammar.</p> <p>Level 2 (3-4 marks) Adequate explanation, showing some understanding of the advantages and disadvantages of making products from plastics rather than metals. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, grammar and punctuation</p> <p>Level 1 (1-2 marks) Basic explanation, showing only limited understanding of the advantages and disadvantages of making products from plastics rather than metals. There will be little or no use of specialist terms. Answers may be ambiguous, disorganised or 'list like'. Errors of grammar, punctuation and spelling may be intrusive.</p> <p>0 - a response not worthy of a mark. Add 'Seen' at end of response.</p> <p>Do not apply ticks or annotations to 'Levels of response' questions.</p> <p>Mark these by reading all the answer, decide on an appropriate level, then a specific mark.</p> |

| Question | | Answer | Marks | Guidance |
|----------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| | (d) | <p>Explanation could improve reference to:</p> <p>No storage space required; Parts delivered to assembly point on time; Finished products delivered on completion; More factory space can be used for production; Quality assured parts from suppliers</p> <p style="text-align: right;">(3x1)</p> | 3 | <p>One mark only for simply stated benefit</p> <p>Two or more simple statements - two marks</p> <p>Detailed/Justified response needed for full marks</p> |
| | | Total for question | 15 | |
| | | Total for paper | 80 | |

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