

Mark Scheme (Standardisation) Summer 2008 Final

GCE

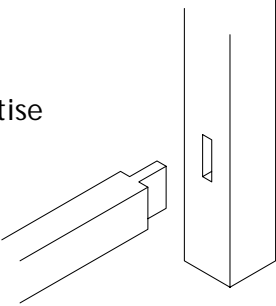
GCE D&T (6142/01)

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.

Product Design: Resistant Materials Technology (6142/01)

Question Number	Answer	Mark
1_(a)	<p>Metal step ladder</p> <p>Material - Aluminium/duralumin (1) Property - Light / Strong / Resistant to corrosion (1) Material - Steel (1) Property - Strong / Economic (1) Material - stainless steel (1) Property - Strong /corrosion resistant / aesthetics(1)</p> <p>Plastic lettering on a shop sign</p> <p>Material - Acrylic (1) Property - Aesthetics (good looks, shiny, bright) / range of colours / durable / UV resistant / easy to cut using CAD/CAM or other specified appropriate method / translucent to let light through (1) Material - Vinyl (PVC) (1) Property - Aesthetics (good looks, shiny, bright) / range of colours / durable / UV resistant / easy to cut using CAD/CAM or other specified appropriate method / Flexible / translucent to let light through / can be easily printed on.(1)</p> <p>NB. If material is unsuitable do not award the property e.g. brass - property: strength = no marks</p> <p align="right">(4 x 1)</p>	(4)
(b)	<p>Any two of the following:-</p> <ul style="list-style-type: none"> • Softwoods come from Coniferous (evergreen) trees / hardwoods come from deciduous trees. (1) • Growth time - Softwoods generally grow quicker (30yrs) / Hardwoods generally grow slower (100+ yrs) / (1) • Softwoods generally open grain / hardwoods generally closed grain (1) • Hardwood is generally more durable, rot resistant / softwood is generally less durable, rot resistant (1) • Hardwoods are generally stronger / Softwoods are generally weaker (1) • Hardwoods are generally more expensive / Softwoods are generally cheaper (1) • Hardwood generally have fewer knots / softwoods have more (1) • Their cell structure is different (1) • Hardwoods are heavier / denser than softwoods (1) <p><i>Do not accept colour / leaf / fruit differences.</i></p> <p>1 mark per difference - max 2</p> <p align="right">(2 x 1)</p>	(2)

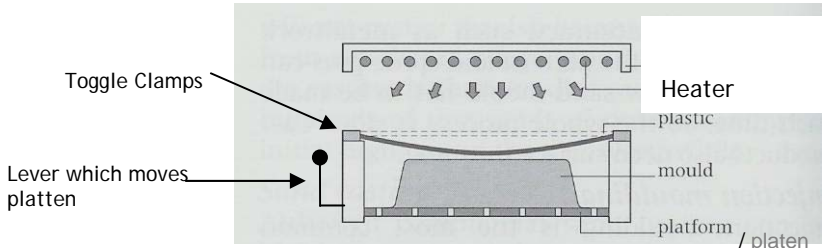
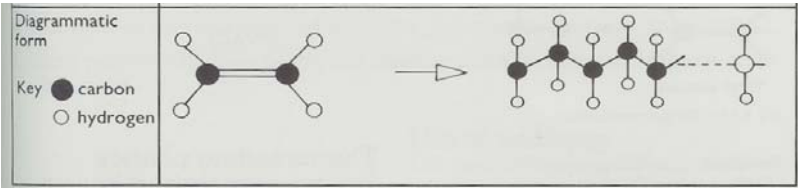
Question Number	Answer	Mark
(c)	<p>A sketch that make reference to the following three points:</p> <ul style="list-style-type: none"> • mortise • tenon • Good proportion of tenon to mortise  <p style="text-align: center;">Mortise and tenon</p> <p>N.B if only a single 2D drawing is presented, to award a maximum mark of 2 marks only.</p> <p style="text-align: right;">(3 x 1)</p>	(3)
	Total for question	9

Question Number	Answer	Mark
2_(a)	<p>1 mark per hazard and 1 mark per appropriate control measure</p> <p>Pillar drill</p> <ul style="list-style-type: none"> • Flying debris (1) - operator must wear goggles (1) • Hot, sharp swarf (1) - operator must wear gloves (1) • Contact with moving parts (1) - guards must be in place / tie back loose hair / clothing / remove jewellery (1) • Contact with moving work piece (1) - clamp work piece (1) • Misuse (1) - operator must have had appropriate training (1) • Chuck key left in (1) - correct training to remove key (1) • Un-serviced equipment / unsafe equipment / broken equipment (1) - Regularly maintain equipment (1) • Distractions (1) - Define work area box for one person (1) • Both hands in use during machining (1) - Hip or foot stop (1) • Under going Maintenance - (1) - safe practice established • e.g. isolate before commencing (1) <p>Welding equipment</p> <ul style="list-style-type: none"> • Arc eye / intense light(1) - operator must use darkened face mask/goggles (1) • Personnel in vicinity exposed to welding flash/flare (1) - area screened off (1) • Burns (1) - gloves, wear personal protective equipment (PPE) (1) • Breathing fumes (1)- adequate ventilation (1) • Risk of fire (1) - Extinguisher in vicinity (1) • Misuse (1) - operator must have had appropriate training (1) • Un-serviced equipment / unsafe equipment / broken equipment (1) - Regularly maintain equipment (1) • Under going Maintenance - (1) - safe practice established e.g. isolate before commencing (1) <p>Disc / Belt sander</p> <ul style="list-style-type: none"> • Flying debris (1) - operator must wear goggles (1) • Contact with moving parts (1) - guards must be in place / tie back loose hair / clothing / remove jewellery (1) • In running nips (1) - Minimum gap maintained (1) • Distractions (1) - Define work area box for one person (1) • Both hands in use during machining (1) - Hip or foot stop (1) • Inhalation of dust (1) - face masks/functioning extractor (1) • Misuse (1) - operator must have had appropriate training (1) • Un-serviced equipment / unsafe equipment / broken equipment (1) - Regularly maintain equipment (1) • Under going Maintenance - (1) - safe practice established e.g. isolate before commencing (1) <p style="text-align: right;">(4 x 1)</p>	(4)

Question Number	Answer	Mark
(b)	<p>1 mark for each</p> <p>Employers must ensure a safe working environment / minimize the risk of accidents for their employees. i.e. equipment, training, work methods, etc (1)</p> <p>Employees must ensure they follow all regulations set. i.e. wear safety equipment / follow safe practices (1)</p> <p style="text-align: right;">(2 x 1)</p>	(2)
(c)	<p>Any two of the following:-</p> <ul style="list-style-type: none"> • To protect people's health and safety by controlling risks in the work environment. (1) • Develop and revise regulations in response to change. (1) • Provide training and advice (1) • Enforce compliance / carry out spot checks (1) • Respond to complaints / investigate accidents /breaches(1) <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		8

Question Number	Answer	Mark
3_(a)	<p>Any one of the following :-</p> <ul style="list-style-type: none"> • Contains ferrite / Contains iron (1) • Will corrode / Oxidise / rust (1) • Is Magnetic (1) <p style="text-align: right;">(1 x 1)</p>	(1)
(b)	<ul style="list-style-type: none"> • Batch production (1) <p><i>Only acceptable answer</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
(c)	<ul style="list-style-type: none"> • European safety mark / European safety standard (1) <p><i>Only acceptable answer</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
(d)	<p>1 mark for process and 1 mark for named part of the lathe used.</p> <ul style="list-style-type: none"> • Stage 2: Centre drill (1) drill holes (1) using the tail stock / fixed drill piece (1) • Stage 3: Taper turn (1) using the compound slide (1) when set at an angle (1) • Draw profile on CAD (1) CNC produces taper using two axes of movement (1) <p style="text-align: right;">(2 x 2)</p>	(4)
(e)	<p>Any four of the following:-</p> <ul style="list-style-type: none"> • Faster production of parts (1) • More accurate machining / quality of finish (1) • Repetitive accuracy - less reject parts / reduced human error (1) • Able to produce complex components (1) • Reduced labour costs (1) • 24/7 production i.e. don't need breaks / shift change means increased productivity(1) • Flexible i.e. easily reprogrammed for more or alternate batches (1) • Improved worker safety as machine enclosed. (1) <p style="text-align: right;">(4 x 1)</p>	(4)
	Total for question	11

Question Number	Answer	Mark
4_(a)	<p>1 mark per labelled feature on diagram and/or each written point. Max 3 if no diagram or no notes.</p> <div data-bbox="552 387 1037 745" data-label="Image"> </div> <ul style="list-style-type: none"> • Description or diagram of two part rivet (1) • Rivet loaded in rivet gun / diagram of gun (1) • Handles squeezed / lazy tongs pushed / pin pulled / arrows on diagram (1) • Rivet splays / diagram shows splayed rivet (1) • Pin snaps off / diagram of snapped pin (1) <p style="text-align: right;">(4 x 1))</p>	(4)
(b)i	<p>Any two of the following:-</p> <ul style="list-style-type: none"> • It is a computer generated / on screen image (1) • 3 dimensional image/ rotatable image (1) • Image generated from mathematical data (1) <p style="text-align: right;">(2 x 1)</p>	(2)
(b)ii	<p>Any four of the following:-</p> <ul style="list-style-type: none"> • Designs can be visualised in 3D earlier in the design process. (1) • Working drawings can be quickly generated from the virtual model. (1) • Can be virtually tested / animated to check that it fits / works / functions as expected without a physical model. (1) • Can be used to generate a machining programme. (1) • Can be rendered to produce a photorealistic image for advertising/packaging/promotional purposes. (1) • Experiment / edit rapidly with different colour schemes /styles (1) • Electronically sent to clients / consultants for immediate feedback. (1) • Virtual model is produced to precise / accurate sizes. (1) <p style="text-align: right;">(4 x 1)</p>	(4)
Total for question		10

Question Number	Answer	Mark
5_(a)	Any one of the following:- <ul style="list-style-type: none"> • Chromium (1) • Nickel (1) • Magnesium (1) <p style="text-align: right;">(1 x 1)</p>	(1)
(b)	Any one of the following:- <ul style="list-style-type: none"> • Corrosion resistant (1) • Improved aesthetics - shiny (1) • Reduced magnetic properties (1) <p style="text-align: right;">(1 x 1)</p>	(1)
(c)	Any two of the following:- <ul style="list-style-type: none"> • The metals to be alloyed are heated in a furnace (1) • The metals melt into a molten/liquid state (1) • The melted metals are mixed / combined (1) <p style="text-align: right;">(2 x 1)</p>	(2)
(d)	Any four of the following features of the diagram:- <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right;">(4 x 1)</p>	(4)
(e)	1 mark per diagram and explanatory point. <div style="text-align: center; margin: 10px 0;">  </div> <ul style="list-style-type: none"> • Diagram of individual monomer(s) (1) reference to monomer (1) • Double bond is split / double bond in diagram (1) • Chain reaction occurs (1) • Long chains are formed / diagram of long chain (1) • Catalyst / Heat / pressure is needed for the process to take place (1) • The long chains can be between 200 and 2000 links (1) • Cross links / covalent bonds are formed / diagram shows a clear cross links (1) <p style="text-align: right;">(4 x 1)</p>	(4)
Total for question		12

Question Number	Answer	Mark
6_(a)	<p>Any two of the following points with its explanation :-</p> <ul style="list-style-type: none"> • Can easily modify production planning in light of new data (1) so production is optimised based on latest information (1) • Plan for the effective use of machine time (1) maximizing manufacturing potential and minimizing non productive time (1) • Electronic systems allow immediate implementation of the production plan (1) reducing delays between changing operations (1) • Facilitate efficient production (1) reducing delays / downtime / maintaining stock levels (1) and automatically reordering stock (1) • Can quickly calculate costings / timings (1) giving precise / reliable information (1) • Less paper copies of schedules need to be printed (1) reducing costs (1) <p style="text-align: right;">(2 x 2)</p>	(4)
(b)	<p>Any three of the following strategies with its description.</p> <ul style="list-style-type: none"> • Finite capacity scheduling (1) - (Resourced based) Manufacturing capability analysed in order to predict the completion time (1) • Infinite capacity scheduling (1) - (Time based) Completion date set and capacity manipulated to meet this deadline (1) • Order based scheduling (1) - Tasks are scheduled based on order priority (1) • Constraint based scheduling (1) - Identifies potential bottlenecks and sequences events to eliminate them (1) • Discrete event scheduling (1) - Analyses production stages identifying gaps, then seeks to reduce / eliminate them, resulting in more stable production lines (1) <p style="text-align: right;">(3 x 2)</p>	(6)
	Total for question	10

Question Number	Answer	Mark
7_(a)	<ul style="list-style-type: none"> • A material that reacts / changes (1) to a given input / environment change (1) <p>NB: If properties of a specific smart material are described, one mark only</p> <p style="text-align: right;">(1 x 2)</p>	(2)
(b)	<p>Any six of the following:-</p> <ul style="list-style-type: none"> • Use more recycled material for production (1) • Use materials than can be easily recycled at the end of the products life (1) • Design it for easy disassembly to aid recycling (1) • Reduce the range of materials in the product to maximize its recycling potential (1) • Reduce the usage of combined materials which cannot be separated and recycled (1) • Design product to be easily repairable / reusable rather than disposable, so extending its life (1) • Reduce the amount of energy the product needs when in use (1) • Reduce the volume of material used in manufacture by re-design (1) • Reduce waste by using more bio-degradable materials in products (1) • Designer could use a material which requires less energy to extract / process / less harmful to dispose of (1) • Select cleaner manufacturing processes which use less energy / produce less harmful waste. (1) • Base manufacturing nearer source materials / market to reduce transport costs • Use materials from sustainable sources <p style="text-align: right;">(6 x 1)</p>	(6)
Total for question		8

Question Number	Answer	Mark
8_(a)	<p>Any four of the following:-</p> <ul style="list-style-type: none"> • Smaller products are often more desirable due to increased portability / reduced size / reduced weight / less space (1) • Smaller products can be seen as being more advanced therefore are more appealing/ fashionable to some consumers (1) • More features can be included into a product making it more appealing (1) e.g. longer battery life • Designer has more scope to develop style of product as electronic systems are so small they have little impact on the shape of the end product (1) • Products can be made and sold cheaper due to less material / transport/ storage / packaging costs (1) • Reduce stigma from visible medical aids as they are more inconspicuous (1) <p style="text-align: right;">(4 x 1)</p>	(4)
(b)	<p>Any eight of the following:- Max seven if only advantages or disadvantages given.</p> <ul style="list-style-type: none"> • A - Consumers presented with an ever increasing volume of readily available products (1) • A - Consumers can buy cheaper goods due to increased competitiveness (1) • A - Consumers have a higher standard of living (1) • A&D - Consumers have a continuing expectation / thirst for more advanced / higher quality goods (1) • D - Due to increased range of similar products consumers find it more difficult to choose. • D - Consumers value goods less due to cheapness and ready availability (1) • D - Consumers encouraged to upgrade when styles changes rather than a when product reaches the end of its life (1) • D - Consumers forced into replacing / upgrading products due to design for obsolescence (1) • D - Consumers encouraged to dispose of faulty goods rather than repair (1) • D - Materialistic view of society encouraged (1) • D - Encourage over-spending resulting in debt. (1) • D - Encouraged to buy products not really needed resulting in more waste. (1) • D - People having to live in polluted environments. (1) • A&D - Growing concern among consumers of environmental issues due to waste / pollution (1) <p style="text-align: right;">(8 x 1)</p>	(8)
	Total for question	12
	Total marks for paper	80