



Pearson

Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE

In Manufacturing & Engineering (5EM03)

Paper 3A: Printing and Publishing, Paper and Board

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General Marking Guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Learners 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 learner'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 learner's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the learner has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) Ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear

ii) Select and use a form and style of writing appropriate to purpose and to complex subject matter

iii) Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question	Answer	Mark
1(a)	<ul style="list-style-type: none">• Instruction manual• Greeting card <p><i>If 3 boxes or more crossed - no marks.</i></p>	(2)
1(b)	<ul style="list-style-type: none">• Self-adhesive label• Envelope <p><i>If 3 boxes or more crossed - no marks.</i></p>	(2)
(Total 4 marks)		

Question Number	Answer	Mark
2(a) 1	<ul style="list-style-type: none"> • Self-adhesive tape • Adhesive tape • Sticky tape • Insulation tape • Masking tape <p>Accept any answer that makes reference to an appropriate trade name, e.g. 'Sellotape' 'Scotch tape'</p> <p><i>Accept any recognisable spelling (phonetic) of the answers above</i> <i>Do not accept 'duct tape' or 'tape' on its own</i></p>	
2(a) 2	<ul style="list-style-type: none"> • Embossing tool • Embosser <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p>	
2(b) 1	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • Drawing curved lines (1) • Drawing consistency/repeating the same shape (1) • Can be bent to desired shape (1) • For special lines (1) • For drawing irregular shapes (1) <p><i>Accept any other appropriate response</i></p> <p>e.g. for drawing curved lines (1) in a consistent manner (1)</p>	(2)
2(b) 2	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • To establish a horizontal reference/use as a guide when aligning paper to drawing board (1) • To draw horizontal lines (1) • To draw lines at 90 degrees (1) • To support a set square (1) • To support a rule (1) • To measure horizontal lengths (1) • Used with a pencil (1) <p><i>Accept any other appropriate response</i></p> <p>e.g. to draw horizontal lines (1) with a pencil (1)</p> <ul style="list-style-type: none"> • Converts analogue to digital (1) • Reduces wire connections (1) • Reduces size of circuit (1) • Converts digital to analogue (1) • Combines an entire circuit into one package (1) • Processes signal to control logic gate (1) <p><i>Accept any other appropriate response</i></p> <p>e.g. Reduces size of circuit (1) reducing the number of wire connections (1)</p>	

Question Number	Answer	Mark
3	<p>Key terms linked to a key area</p> <p><i>No mark awarded where 2 or more lines are drawn from a term. Lines do not have to be straight but term and key area must be clearly linked.</i></p>	(7)
(Total 7 marks)		

Question Number	Answer	Mark
4(a)(i)	<p>Appropriate two products, such as:</p> <ul style="list-style-type: none"> • Cereal packaging • Fast food packaging • Blister packaging • CD/DVD packaging • Food tray packaging • Point of sale display • Sat Nav packaging • Shoe box • Paperback book • Suspension file • School diary planner • Greeting card • Board game • Tetrapak • Cinema ticket • Magazine • Postage stamps • Poster signage • Self-adhesive labels <p>A brand name of a specific product is acceptable</p> <p><i>This list is not exhaustive, accept any product from the printing and publishing, paper and board sector that use finishing processes in their manufacture</i></p>	(2)
4(a)(ii)	<p>Appropriate two processes [Shenton 2], such as:</p> <ul style="list-style-type: none"> • Gluing/fixing • Trimming • Laminating • Folding • Varnishing • Foil blocking • Binding • Die stamping • Edge staining • Indexing <p><i>Accept any other appropriate response</i></p>	(2)

Question Number	Answer	Mark
4(a)(iii)	<ul style="list-style-type: none"> • Gluing/fixing - (1) use of a spray/liquid/tape (1) to adhere a material/sheet to a substrate (1) • Trimming - use of a guillotine (1) to cut to a guideline/crop marks (1) • Laminating - sealing between two layers (1) via bonding (1) • Folding - into signatures (1) using a knife/buckle (1) • Varnishing - liquid applied onto the surface (1) to create a protective/decorative film (1) • Foil blocking - applied using a pattern (1) on a heated die (1) • Binding - fixing pages together (1) using glue/wire/combs/holes (1) • Die cutting/stamping - using knives/creasing rules (1) to cut specific shapes (1) • Edge staining - colouring sections (1) by gilding/dying (1) • Indexing - cutting thumb grooves (1) by die stamping (1) <p><i>Accept any other appropriate response</i></p>	(2)
4(b)	<p>One mark for each technique One mark for each description</p> <ul style="list-style-type: none"> • Visual inspection (1) by checking against prototype/first-off/template etc. (1) • Size checks (1) by direct measurement or gauging/templates or checking against drawing/tolerances (1) • Optical checks (1) to ascertain alignment (1) • Functional checks (1) to check the operation of the product (1) • Ultrasonic checks (1) to detect flaws or measure thickness (1) • Material/component checks (1) to meet specification (1) • Positional checks (1) use of crop marks/target or registration marks (1) • Printing checks (1) use of colour bar/densitometer readings (1) <p><i>Accept any other appropriate response</i></p> <p><i>No credit for repetition</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2) for each of the techniques</i></p>	(4)

Question Number	Answer	Mark
(Total 10 marks)		

Question Number	Answer	Mark
5(a)	<p>Accept any two responses:</p> <ul style="list-style-type: none"> • To control machine processes (1) • To assist in the operations of a manufacturing plant (1) • To assist in planning (1) • To assist in management (1) • To assist in transportation (1) • To assist in storage (1) • To create a faster production process (1) • To reduce waste (1) • To reduce energy consumption (1) • To improve product consistency (1) • To improve product accuracy (1) <p><i>Accept any other appropriate response</i></p>	(2)
5(b)	<p>One mark for identifying the disadvantage One mark for the description</p> <ul style="list-style-type: none"> • The software itself is expensive (1) so initial costs are high (1) • Can be slower than traditional methods (1) for one-off or low-volume production (1) • Training costs are high (1) when staff are using software and machinery (1) • Can be expensive to maintain (1) as highly skilled technicians required to carry out repairs (1) • Programming errors can occur (1) creating defective batches of products (1) • Consumers can look negatively (1) on this 'deskilling' of workers (1) <p><i>Accept any other appropriate response</i></p>	(2)
5(c)	<p>One mark for identifying each benefit One mark for each description</p> <ul style="list-style-type: none"> • PLCs control manufacturing devices, i.e. laser cutters/NC/CNC machines/robots/printers (1) to improve quality (1) • PLCs give continuous operation (1) as they do 	(4)

Question Number	Answer	Mark
	<p>not need breaks (1)</p> <ul style="list-style-type: none"> • PLCs can repeat actions (1) indefinitely (1) • PLCs can work in hazardous environments (1) reducing dangers for workers (1) • PLCs can work with fewer staff (1) reducing costs (1) <p><i>Accept any other appropriate response</i></p> <p><i>No credit for repetition</i></p> <p><i>Low response (1) or two low responses (2), or detailed response (2) for each of the benefits</i></p>	
(Total 8 marks)		

Question Number	Answer	Mark
6(a)(i)	<p>Any one of the following:</p> <ul style="list-style-type: none"> • Mobile phone/infrared/bluetooth • Video conferencing • Voice over Internet Protocol (VoIP) • Electronic point of sale (EPOS) • EDI • ISDN • Texting • Phone • Walkie talkie • Fax • Smart phone • Tablet <p><i>Accept brand names of the above</i> <i>Accept any other appropriate response</i></p>	(1)
6(a)(ii)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • A method of connecting devices • A local area network (LAN) • Hotspots • Wireless connection • Access to the internet • Access with router • Allows you to use email • Allows easy communication • Enables the internet of things <p><i>Accept any other appropriate response</i></p> <p>e.g. A method of connecting devices (1) which allows for easy communication (1)</p>	(2)
6(b)	<p>One mark for identifying each reason One mark for each explanation</p> <p>The use of a dedicated computer system (1) within a larger system to perform specific functions (1)</p> <p>To monitor each process (1) as each part of the process has its own embedded system (1)</p> <p>Embedded computers are integral to process design (1) as industrial workplaces can often be harsh environments (1)</p>	(6)

Question Number	Answer	Mark
	<p>Embedded systems don't require large power supplies (1) because they integrate dedicated/miniaturised componentry (1)</p> <p>Embedded computers reduce the need for cooling (1) as they will produce a lot less heat (1)</p> <p>There is minimal ingress of moisture/dust/chemicals (1) as it can be a fan-less system (1)</p> <p>Easier maintenance (1) no need to trace component faults/instant diagnosis (1)</p> <p>Allows opportunities for effective change of function (1) as the embedded computer can be reprogrammed when required (1)</p> <p><i>Accept any other appropriate response</i></p> <p><i>No credit for repetition</i></p> <p><i>1 x 1 mark low response, 3 x 1 mark 3 low responses, or detailed response (2) per reason</i></p>	
(Total 9 marks)		

Question Number	Answer	Mark
7(a)	<p>One mark for identifying the benefit, up to two marks for the explanation:</p> <ul style="list-style-type: none"> • Allows online questionnaires to be used (1) instant feedback (1) target market can be established (1) • Demographic information can be analysed (1) existing products known to target market (1) allows matching customer requirements (1) • Information about materials can be obtained (1) suitability for product (1) cost details (1) • Compare existing products (1) to optimise the development of the design (1) minimising the cost of the product (1) • To generate break even data (1) through the use of spreadsheets (1) to calculate cost of production (1) <p><i>Accept any other appropriate response</i></p> <p><i>Low response (1) or detailed statement (3)</i></p>	(3)

Question Number	Answer	Mark
7(b)	<p>One mark for identifying the benefit, up to two marks for the explanation:</p> <ul style="list-style-type: none"> • Fewer material shortages (1) by accessing stock records (1) and matching orders accordingly (1) • Improved scheduling (1) by accessing orders (1) and minimising downtime (1) • Efficient utilisation of staff (1) by utilising training/skills records (1) to ensure skilled staff are in the appropriate position (1) • Appropriate allocation of plant/equipment (1) by accessing resources list (1) and process capability (1) • Set control points for quality checks (1) access product specifications (1) to minimise product waste (1) • Allows modelling of deadlines (1) use of spreadsheets (1) access to process data (1) • Maximise machine efficiency (1) by ensuring correct process allocation (1) from accessing computer stored data and information (1) <p><i>Accept any other appropriate response</i></p> <p><i>Low response (1) or detailed statement (3)</i></p>	(3)
(Total 6 marks)		
Total Marks for Section A		50

Question Number	Answer	Mark
8(a)	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> • Allows the packaging to hang (1) • To be used with euro hooks (1) • Enables the backboard to support the packaging (1) • Enables smooth movement on /off the hook (1) • Minimises lateral (side to side) movement on the hook (1) • Enables consistent/standardised storage (1) • Allows for the maximum amount of promotional space (1) • Allows consumer to tilt the package to one side to check the contents of other packages (1) <div style="text-align: center;"> <p>The diagram shows a hand-drawn rectangular box with a wavy bottom edge. In the center of the top edge, there is a hook-shaped cutout. Three arrows point from text labels to specific parts of the hook: one points to the top curve of the hook with the label 'ENABLES SMOOTH MOVEMENT ON/OFF THE HOOK', another points to the vertical stem of the hook with the label 'ALLOWS THE PACKAGING TO HANG', and a third points to the bottom curve of the hook with the label 'MINIMISES LATELAL (SIDE TO SIDE) MOVEMENT ON THE HOOK'.</p> </div> <p><i>Accept any other appropriate response</i> <i>Must have notes and sketches (notes or sketches only, maximum 2 marks)</i></p> <p><i>1 x 1 mark low response, or up to 3 marks for detailed response</i></p>	(3)
8(b)	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> • To promote the toy figure for sale (1) • To provide a space for branding (1) • To provide a large area for visual imagery to attract the prospective purchaser (1) • To enable the promotion/branding/imagery to be seen from a distance (1) • To present sales information about the toy figure - price/tag line/slogan/key selling points (1) • To provide space for legal/safety warnings (1) • To provide space for bar coding (1) • To provide a fixing surface for the figure casing (1) • To support the packaging when stored on a hook (1) 	(3)

Question Number	Answer	Mark
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Accept any other appropriate response
 Must have notes and sketches (notes or sketches only, maximum 2 marks)
 1 x 1 mark low response, or up to 3 marks for detailed response

8(c)

An answer that makes reference to any of the following points:

- To provide an area for storage of the toy figure (1)
- To provide protection for the toy figure (1)
- To prevent excessive movement of the toy figure (1)
- To be transparent so the toy figure can be seen by the prospective purchaser (1)
- To provide a fixing surface for the backboard (1)
- Enables packaging to be simply constructed (1)
- To be recycled easily (1)

Accept any other appropriate response
 Must have notes and sketches (notes or sketches only, maximum 2 marks)

(3)

Question Number	Answer	Mark
	<i>1 x 1 mark low response, or up to 3 marks for detailed response</i>	
(Total 9 marks)		

Question Number	Answer	Mark
9(a)(i)1	<ul style="list-style-type: none"> • Processing and production • Production and processing • Production processing • Production • Processing <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p>	
9(a)(i)2	<ul style="list-style-type: none"> • Assembly and finishing • Finishing and assembly • Assembly • Finishing <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p>	(2)
9(a)(ii)	<ul style="list-style-type: none"> • Design • Stage 1/stage one • One/1 • First/ First stage 	(1)
9(b)	<p>An answer that makes reference to any of the following:</p> <ul style="list-style-type: none"> • Gathering consumer opinion (1) • Calculating product costs (1) • Developing a marketing plan (1) • Using market research (1) • Developing a competitive edge (1) • Advertising the toy figure packaging (1) • Promoting the toy figure packaging (1) • Carrying out questionnaires/surveys (1) • Pricing for the target market (1) • Using trade/electronic (internet, e-mail) media (1) • Identifying gaps in the market (1) <p><i>Accept any other appropriate response</i></p>	(3)
9(c)	<p>Appropriate descriptions including three of the following points (statements must be applicable to toy figure packaging):</p> <ul style="list-style-type: none"> • Gathering together of manufactured packaging (1) • Selecting correct packaging materials/equipment for transit of packaging (1) • Packaging boxed together (1) 	

Question Number	Answer	Mark
	<ul style="list-style-type: none"> • Sealing boxes (1) • Labelling boxes (1) • Bar coding applied to boxed sets of packaging (1) • Boxes packed onto pallets (1) • Pallets/flat pack packaging transferred to storage/dispatch (1) • Final quality checks (1) • Packing/shipping lists (1) • Planning route for delivery (1) • Details sent to finance department for invoicing requirements (1) • Stock control (1) <p><i>Any other appropriate response but must be related to the manufacture of toy figure packaging; do not accept answers that relate to the <u>production</u> or <u>assembly</u> of the toy figure packaging</i></p> <p>e.g. At this stage the toy figure packaging would be put into bigger boxes (1) and then sent to the customer (1). The details of this would then be sent to the finance department (1).</p> <p><i>1 x 1 mark low response, 3 x 1 mark 3 low responses, or up to 3 marks for a detailed response</i></p>	(3)
(Total 9 marks)		

Question Number	Answer	Mark
10(a)	<ul style="list-style-type: none"> • Cardboard • Coated card • Recycled card • Bleed proof card • Card • Duplex board • Solid white board • Cast-coated board <p><i>Do not accept 'board', 'hardboard' or 'paper'</i></p> <p><i>Accept any other appropriate response</i></p>	(1)
10(b)(i)	<p>Any three of the following:</p> <ul style="list-style-type: none"> • Material shaping, such as cutting • Die cutting • Guillotine cutting • Shearing • Scoring/creasing • Grooving/notching • Folding/bending • Heating • Gluing/fixing • Flexography • Lithography • Laminating • Varnishing • Embossing <p><i>Do not accept 'Vacuum forming' and the generic term 'printing'</i></p> <p><i>Accept any other appropriate response</i></p> <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p>	(3)

Question Number	Answer	Mark
10(b)(ii)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • Relatively inexpensive moulds/much cheaper tooling than other forming methods • Durable moulds/can be replaced infrequently • Quick changeover rate/easy to change mould • Flexibility for different shape/size/gauge/colour of figure casing • Quick method/fast production rate when set up • Can be mass produced easily • Unit costs are very low for medium to high volume production runs • Highly automated process • Reliable process • Minimal waste • Not labour intensive • Products have consistent quality • Can produce multiple parts at once • Suitable process for the material used for the figure casing <p><i>Accept any other appropriate response</i></p> <p>e.g. Highly automated process (1) allowing products to be mass produced easily (1) with a consistent quality (1)</p> <p><i>3 x 1 mark for 3 low responses, or up to 3 marks for a detailed response</i></p>	(3)
10(c)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • Improved aesthetics • Higher quality printing • Better ergonomics • Better functionality/strength • Longer lasting/durable • More consistent product • More accurate product • More reliable product • Safer product • Lower costs • Increased efficiency • Lower purchase price • Allows for product guarantee • Allows for increased range/variation of product • Lighter product 	(3)

Question Number	Answer	Mark
	<ul style="list-style-type: none"> • Appropriate-sized product <p><i>Accept any other appropriate response</i></p> <p>e.g. Modern materials have better functional characteristics (1) are more durable (1) and allow for more detailed printing/promotion on the backboard (1)</p> <p><i>3 x 1 mark for 3 low responses, or up to 3 marks for a detailed response</i></p>	
(Total 10 marks)		

Question Number	Answer	Mark
11(a)	<p>An answer that makes reference to any of the following:</p> <ul style="list-style-type: none"> • The use of systems (1) to control machinery/processes (1) • The use of control systems (1) to replace human operators (1) • The ability of a process (1) to operate without the need for human sensory input (1) • Mechanical devices that are operated electronically (1) and function automatically (1) <p><i>Accept any other appropriate response</i></p>	(2)
11(b)(i)	<p>One mark for each example One mark for each description</p> <ul style="list-style-type: none"> • Robots/pick and place (1) to assemble toy figure packaging (1) • Use of conveyor systems (1) to move the toy figure packaging from one process to the next (1) • Flexible manufacturing system/embedded computers (1) to perform dedicated functions at each step of assembly/production (1) • Machine monitoring (1) to control quality and accuracy (1) • To improve safety (1) in hazardous conditions by using robots (1) • PLCs (1) to control processes in production (1) • Automated printing (1) of toy figure packaging text/imagery (1) • Automated cutting/forming processes (1) for backboard/figure casing (1) • Remotely operated vehicles (1) moving toy figure packaging components to another stage of production/storage (1) <p><i>Accept any other appropriate response</i></p> <p><i>No credit for repetition</i></p> <p><i>1 x 1 mark low response, 3 x 1 mark 3 low responses, or detailed response (2) per example</i></p>	(6)
11(b)(ii)	<p>One mark for the disadvantage One mark for the explanation</p> <ul style="list-style-type: none"> • Increased capital cost (1) due to purchase of equipment (1) 	(2)

Question Number	Answer	Mark
	<ul style="list-style-type: none"> • Increased noise (1) due to more machines being used (1) • Increased energy usage (1) as increased power requirements of the machines (1) • Increased maintenance costs (1) as more equipment to monitor and maintain (1) • More training required (1) to be able to operate the equipment (1) <p><i>Disadvantage must relate to the manufacturer</i></p> <p><i>Accept any other appropriate response</i></p>	
11(b)(iii)	<p>One mark for the benefit One mark for the explanation</p> <ul style="list-style-type: none"> • Consistent product (1) as controlled better (1) • Product reliability (1) as more likely to be produced to specification (1) • Reduced delivery time (1) as manufacturer can vary product to suit demand (1) • Lower prices (1) as less waste and quicker assembly (1) • Product guarantee (1) as confidence in the automation process (1) • Able to read printed text/logos/information (1) because of sharper images (1) • Customer satisfaction (1) because of consistent products (1) <p><i>Benefit must relate to the consumer</i></p> <p><i>Accept any other appropriate response</i></p>	(2)
(Total 12 marks)		

Question Number	Answer	Mark
12(a)(i)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • Reduced noise (1) • Quieter machines (1) • Cleaner workplace (1) • Fewer hazards (1) • Modern technology can replace workers in hazardous areas (1) • Healthier environment (1) • Atmosphere cleaned (1) • Less vibration (1) • Less risk of accidents/injury (1) <p><i>Accept any other appropriate response</i></p>	(2)
12(a)(ii)	<p>One mark for identifying each effect One mark for each explanation</p> <ul style="list-style-type: none"> • Continuous operation (1) reducing time (1) • Modern machines (1) faster production (1) • Reduced costs (1) by automating processes (1) • Access to data (1) allows constant monitoring (1) • Eliminating worker waste (1) improves use of time (1) • Less waste produced (1) due to carefully controlled production (1) <p><i>Accept any other appropriate response</i></p> <p><i>Do not accept cheaper, faster, quicker without an explanation</i></p> <p><i>No credit for repetition</i></p> <p><i>Low response (1) or two low responses (2), or detailed response (2) for each of the effects</i></p>	(4)
12(b)	<p>One mark for identifying each advantage One mark for each explanation</p> <ul style="list-style-type: none"> • Modern machines use less energy (1) so reducing CO2 emissions (1) • Smaller/thinner products (1) less use of natural resources (1) • Less waste/reworking of materials (1) less materials used/processing (1) • Transportation reduced (1) saving of fossil fuels/less emissions (1) 	(4)

Question Number	Answer	Mark
	<ul style="list-style-type: none"> • Use of alternative energies (1) reducing energy requirements (1) <p><i>Accept any other appropriate response</i></p> <p><i>No credit for repetition</i></p> <p><i>Low response (1) or two low responses (2), or detailed response (2) for each of the advantages</i></p>	
(Total 10 marks)		

Question Number	Answer	Mark
13	<p>One mark for identifying each impact One mark for each explanation</p> <p>Real time stock taking (1) reduces waste of stock (1)</p> <p>Simplified sourcing (1) improved cost control (1)</p> <p>Use of barcodes (1) improved material traceability (1)</p> <p>Direct links to supplier and other departments (1) allowing immediate updating of material lists (1)</p> <p>Allows more frequent ordering (1) meaning less storage space required (1)</p> <p>Accurate modelling of material usage (1) ensures less stock out (1)</p> <p>Identifies potential obsolescence (1) avoids over ordering (1)</p> <p>Search facilities using databases/spreadsheets (1) allow sourcing/ordering of alternative materials (1)</p> <p><i>Accept any other appropriate response</i></p> <p><i>Do not accept cheaper, faster, quicker without an explanation</i></p> <p><i>No credit for repetition</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2) for each impact</i></p>	(4)
(Total 4 marks)		

Question	Answer	Mark
<p>14</p> <p>QWC i, ii, iii</p>	<p>Indicative content</p> <ul style="list-style-type: none"> • Use of energy management systems • Intelligent lighting • Use of low energy devices • Energy consumption alarms • Minimising over production • Start up and shut down scheduling • Generating own sources of energy • Lean manufacturing techniques • Efficient production planning • Minimise high/low temp operations • Pre-heating • Use of heat exchangers/heat pumps/heat sinks • Improved insulation • Energy recovery systems • Retrofit PLCs • Reduce transportation/movement • Improve staff awareness <p>e.g. Manufacturers can use peak and demand monitor devices which will suggest better consumption methods that can be automatically actioned. They will be able to control their energy use by careful strategies such as intelligent lighting and the fitting of low energy devices. Manufacturers could use their own sources of supply such as solar panels/wind turbines or use heat pumps to service some energy needs. Other areas of energy control can be achieved by careful planning and use of insulation.</p>	<p>(6)</p>
<p>(Total 6 marks)</p>		

Level	Mark	Descriptor
	0	No material deserving of reward
1	1-2	The learner identifies at least two methods of monitoring/controlling energy consumption or gives a brief description of one method. The learner shows limited knowledge of monitoring/controlling energy consumption. The learner uses everyday language and the response lacks clarity and organisation. Spelling, punctuation and the rules of grammar are used with limited accuracy.
2	3-4	The learner gives a brief description of two methods of monitoring/controlling energy consumption or a detailed description of one method. The learner shows good knowledge of monitoring/controlling energy consumption. The learner uses some manufacturing/technological terms and shows some focus and organisation. Spelling, punctuation and the rules of grammar are used with some accuracy. Some spelling errors may still be found.
3	5-6	The learner gives a detailed explanation of at least two methods of monitoring/controlling energy consumption. The learner shows a developed knowledge of monitoring/controlling energy consumption. The learner uses a range of appropriate manufacturing/technological terms and shows good focus and organisation. Spelling, punctuation and the rules of grammar are used with considerable accuracy.
		(Total 6 marks)
Total Marks for Section B		60
Total Marks for the whole paper for Sections A & B		110