

Mark Scheme (Results)

Summer 2015

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"> • ATM receipt • Birthday card <p><i>If 3 boxes or more crossed - no marks.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
1(b)	<ul style="list-style-type: none"> • Recipe book • File dividers <p><i>If 3 boxes or more crossed - no marks.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
(Total 4 marks)		

Question	Answer	Mark
2(a) 1	<ul style="list-style-type: none"> • Set square • Set squares • 45°square • 30°/60° square <p>Do not accept 'ruler', 'straight edge', 'angle' or 'triangle'</p> <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p> <p style="text-align: right;">(1 x 1)</p>	
2(a) 2	<ul style="list-style-type: none"> • Protractor • Half-circle protractor <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p> <p style="text-align: right;">(1 x 1)</p>	(2)
2(b)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • Used to protect (1) a brand name / logo / slogan (1) • Indicates that the owner of the brand name / logo / slogan (1) is the only one using it (1) • Used to prevent copying (1) without permission (1) • Used to distinguish a product / service (1) from others (1) • Used to indicate that the product / service (1) is from a unique source (1) <p><i>Accept any other appropriate response</i></p> <p>e.g. Used to protect a brand name (1) and prevent copying (1)</p> <p style="text-align: right;">(1 x 2)</p>	
	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • Indicates a legal / exclusive right (1) to ownership (1) • Indicates an ownership right (1) for a given period of time (1) • Allows the owner to control the production / sale (1) of printed/recorded material (1) • Allows the owner to control the distribution / adaptation (1) of printed/recorded material (1) <p><i>Accept any other appropriate response</i></p> <p>e.g. Used to indicate ownership (1) of a printed material (1)</p> <p style="text-align: right;">(1 x 2)</p>	(4)

(Total 6 marks)

Question	Answer	Mark
<p>3</p>	<p>Key terms linked to a key area</p> <p> Phosphorescent pigments Presentation software High density polyethylene (HDPE) Automation systems Cartridge paper Wi-Fi Computer integrated engineering (CIE) </p> <p> Modern materials Control technology Information and communications technology </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> <p style="text-align: right;">(7 x 1)</p>	<p style="text-align: right;">(7)</p>
<p>(Total 7 marks)</p>		

Question	Answer	Mark
4(a)	<p>Two appropriate products such as e.g.</p> <ul style="list-style-type: none"> • Cereal packaging • Fast food packaging • Blister packaging • CD/DVD packaging • Food tray packaging • Point of sale display • Shoe box • Paperback book • Forehead thermometer strips • School diary planner • Greeting card • Board game • Tetrapak • Cinema ticket • Magazine • Postage stamps • Poster signage • Self-adhesive labels • A brand name of any other specific product <p>Do not accept 'card'</p> <p><i>This list is not exhaustive; accept any product associated with the printing and publishing, paper and board sector that uses modern materials in its manufacture.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
4(b)(i)	<ul style="list-style-type: none"> • Cereal packaging - LDPE • Fast food packaging - polystyrene • CD/DVD packaging – acrylic / polycarbonate • Point of sale display – corrugated card • Shoe box – duplex board • Paperback book – solid white board • School diary planner – solid bleached board • Tetrapak – foil lined board <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)

Question	Answer	Mark
<p>4(b)(ii)</p>	<p>One mark for identifying each benefit One mark for each explanation</p> <ul style="list-style-type: none"> • Better wear characteristics (1) - strength (1) / durability (1) • Better functional characteristics (1) – size (1) / shelf life (1) /protection (1) / rigidity (1) / flexibility (1) / waterproof (1) • Better aesthetic characteristics (1) - surface finish (1) / texture (1) / colour (1) / appearance (1) • Better quality (1) – consistency (1) / reliability (1) • Reduced weight (1) – better strength to weight ratio (1) • Reduced price (1) – better value for money (1) <p>Any other appropriate functional / aesthetic characteristic relating to the given benefit</p> <p>e.g. food tray packaging – better protection (1) so improves the shelf life of the product (1)</p> <p><i>No answer or incorrect answer to 4(b)(i) no marks for 4(b)(ii)</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2) for each of the 2 benefits</i> (2 x 2)</p>	<p>(4)</p>
<p>4(c)(i)</p>	<p>Must be related to the sector</p> <ul style="list-style-type: none"> • Thermochromic inks (1) • Photochromic inks (1) • Hydrochromic inks (1) • Phosphorescent pigments (1) • Polymorph (1) • Holographic card (1) • Piezoelectric (1) • Quantum Tunnelling Composite / QTC (1) <p>Accept any other appropriate response</p> <p><i>Accept the same answer as given in 4(b)(i) if it is a sector based smart material</i> (1 x 1)</p>	<p>(1)</p>

Question	Answer	Mark
<p>4(c)(ii)</p>	<p>One mark for a characteristic One mark for the description</p> <ul style="list-style-type: none"> • Thermochromic inks – inks that will change colour (1) when subjected to a change in temperature (1) • Hydrochromic inks - is a type of ink that changes colour (1) if water has been applied (1) • Photochromic inks - inks that have pigments that react (1) to changes in light levels (1) • Holographic card – used to display overlapping images (1) on the same piece of card (1) • Polymorph - is a thermoplastic material that can be shaped and reshaped any number of times (1) and fuses together when heated (1) • QTC – Quantum Tunnelling Composite – a composite of metals and elastomer binders (1) that enables it to act as a delicate pressure sensor (1) • Piezoelectric – a material that when has an applied stress (1) will generate a voltage (1) • Ionic polymers - synthetic composite material that display behaviour (1) under an applied voltage (1) • Phosphorescent pigments – a material that absorbs radiation (1) then re-emits the radiation later (1) <p><i>Accept any other appropriate response</i></p> <p><i>If no answer or incorrect answer to 4(c)(i) no marks for 4(c)(ii)</i></p> <p style="text-align: right;">(1 x 2)</p>	<p style="text-align: right;">(2)</p>
<p>(Total 10 marks)</p>		

Question	Answer	Mark
<p>5(a)(i)</p>	<p>An answer that makes reference to three of the following points, including an example:</p> <ul style="list-style-type: none"> • A global network of computers (1) • A means of transferring data (1) • A means of collecting data (1) • A means of accessing data (1) • A communication tool (1) • An easy-to-use interface (1) • A system which uses TCP/IP (Transmission Control Protocol/Internet Protocol) (1) • A network that includes web pages and large files that might be digital videos, music files or computer programs (1) • A tool that can be used to send email (1) • A tool that can be used to transfer files (1) <p><i>Accept any appropriate response</i></p> <p>e.g. a global network of computers (1) which allow data to be transferred internationally (1) such as images, music files and emails (1)</p> <p style="text-align: right;">(3 x 1)</p>	<p>(3)</p>
<p>5(a)(ii)</p>	<p>One mark for disadvantage One mark for extension</p> <ul style="list-style-type: none"> • Expected to be continually available (1) increased stress (1) • Staff time wasted 'surfing' (1) lowers productivity (1) • Overrates the performance of the company (1) not meeting customer expectations / loss of personal contact / less direct communication (1) • Online data can be hacked / viruses introduced (1) loss/corruption of data (1) • Presumes a certain level of IT skills (1) staff need training (1) • Replaces research skills (1) knowledge base lost / loss of innovative solutions (1) • Systems failure/power loss/loss of connection (1) causing disruption to manufacturing (1) <p><i>Accept any other appropriate response</i></p> <p><i>Disadvantage must relate to the manufacturer</i></p> <p style="text-align: right;">(1 x 2)</p>	<p>(2)</p>

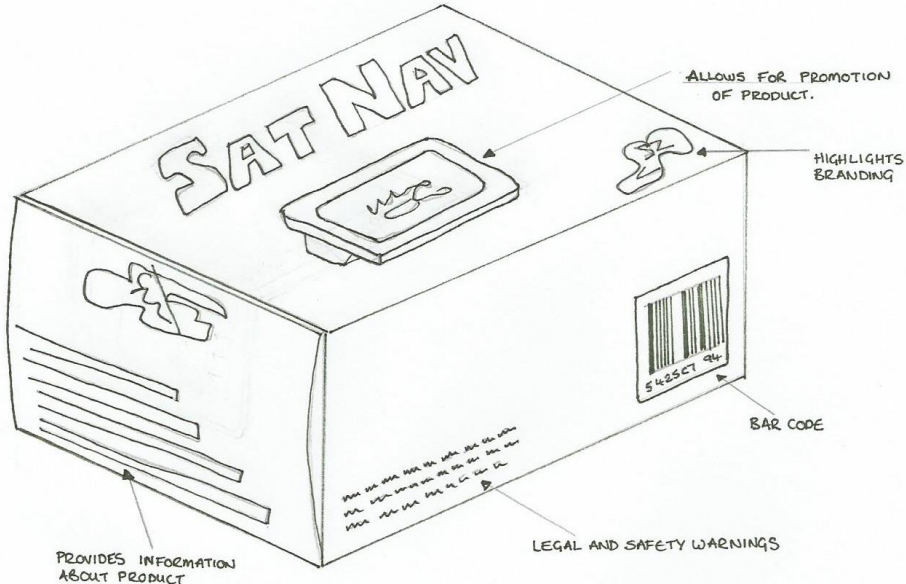
Question	Answer	Mark
5(b)(i)	<ul style="list-style-type: none"> • Mobile phone / infrared / bluetooth • Video conferencing • Voice over Internet Protocol (VoIP) • Electronic point of sale (EPOS) • EDI • ISDN • Texting • Phone • Walkie talkie • Fax • Smart phone • Tablet • Near field communication (NFC) • Email • WIFI <p><i>Accept any other appropriate response</i> <i>Accept Brand names of the above</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)

Question	Answer	Mark
<p>5(b)(ii)</p>	<p>One mark for identifying the benefit One mark for the extension</p> <ul style="list-style-type: none"> • Mobile phone/infrared/bluetooth - flexibility (1) roaming location (1) • Video conferencing – no travel expenses (1) less time wasted in travel (1) • Voice over Internet Protocol (VoIP) - no travel expenses (1) less time wasted in travel (1) • Electronic point of sale (EPOS)/EDI – immediate transfer of information (1) no hard copies needed (1) • ISDN – more data transferred in parallel (1) much quicker (1) • Texting – stored record of transaction (1) accountable (1) • Phone – immediate two way conversation (1) clarity (1) • Walkie talkie – flexibility (1) roaming location (1) • Fax – hard copy record (1) quick transfer of data (1) • Smart phone - immediate (1) access to vast amounts of information (1) • Tablet - flexibility (1) roaming location (1) • Near field communication (NFC) – fast data transfer (1) over short distances / between two devices (1) • Email – permanent record (1) for audit purposes / attaching documents (1) • WIFI – convenient access (1) in a wide variety of locations (1) <p>Other advantages may be seen in light of: Speed, accuracy, information retrieval, meets consumer demands, quicker, increased sales, reduced stock levels, reduced business costs, reduced lead times, calculation of sales, storage space reduced or any other appropriate response.</p> <p><i>Advantages must relate to the retailer No answer or incorrect answer to 5(b)(i) no marks for 5(b)(ii)</i></p>	<p style="text-align: right;">(2)</p>
<p>(1 x 2)</p>		<p>(2)</p>
<p>(Total 8 marks)</p>		

Question	Answer	Mark
6(a)(i)	<ul style="list-style-type: none"> • Lifting heavy goods (1) • Transfer of goods around factory (1) • Pick and place (1) • Laying out of materials (1) • Automatic cutting of paper/board (1) • Loading machines (1) • Loading lorries (1) • Bundling (1) • Collation of orders (1) <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
6(a)(ii)	<p>One mark for each disadvantage One mark for each extension</p> <ul style="list-style-type: none"> • High set-up costs (1) – purchasing of equipment (1) • High training costs (1) – new skills required (1) • Long set-up time (1) – time needed for new practices to be implemented (1) • Extra space needed (1) – older style factories may not be set up appropriately (1) • Reputation may suffer (1) – due to making staff redundant (1) • They require regular maintenance (1) from specialist technicians (1) • Incorrect programming (1) leads to repetitive mistakes (1) • Increased energy usage (1) leading to high emissions (1) <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(2 x 2)</p>	(4)
6(b)	<p>One mark for identifying each feature One mark for each extension</p> <ul style="list-style-type: none"> • Uses closed-loop processes (1) based on real time inputs (1) • A manufacturing system is linked together (1) using a CAD/CAM interface (1) • Using computers/PLCs/microcontrollers to control an entire production process (1) with constant exchange of information (1) • The whole process is controlled (1) by embedding computers in the system (1) 	(4)

Question	Answer	Mark
	<ul style="list-style-type: none"> • An integrated system using computers (1) to monitor and control the manufacturing processes (1) • Suppliers can be integrated into the system (1) facilitating just-in-time techniques (1) <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(2 x 2)</p>	
(Total 9 marks)		

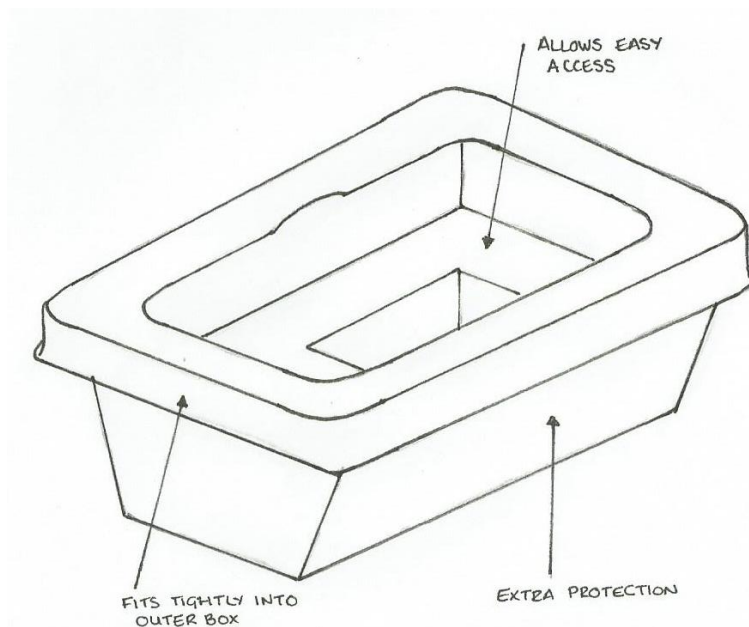
Question	Answer	Mark
7(a)	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> • Know how many units are to be produced (1) • Can plan stock levels (1) • Can consider quantity of materials / components required for each unit (1) • Can order in time (1) • Can consider quantity of materials / components already in stock (1) • Can amend new materials orders (1) • Can consider cost of materials / components (1) • Can budget accordingly (1) • Can research suppliers of materials / components (1) • Can ease supplier relations (1) <p><i>Accept any other appropriate response</i></p> <p>e.g. The manufacturer would need to know how many units are required (1) to be able to plan stock levels (1) and inform suppliers earlier in the chain (1). This allows the manufacturer to budget accordingly (1).</p> <p><i>4 x 1 marks for 4 low responses, or up to 4 marks for a detailed response</i></p> <p style="text-align: right;">(1 x 4)</p>	(4)
7(b)	<p>One mark for each benefit One mark for each extension</p> <ul style="list-style-type: none"> • Accurate information (1) – updated regularly (1) • Fast access to data (1) – search/sort/query (1) • Effective goods tracking (1) – barcoding/EPOS (1) • Fast distribution (1) – Fast delivery details (1) • Detailed information (1) – high storage space (1) • Improved planning (1) – short lead times (1) • Forecasting (1) – collects volumes of data/modelling (1) • Cost of control (1) – better scheduling (1) • Waste control (1) – process monitoring/control (1) • Reduced stock holding(1) – tracks trends/JIT <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(1 x 2)</p>	(2)
(Total 6 marks)		
Total Marks for Section A		50

Question	Answer	Mark
<p>8(a)</p>	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> • To hold the inner tray / instructions / Sat Nav / accessories (1) • To protect the contents in transit / on shelves (1) • Enables easier stacking / storage (1) • Allows for promotion of Sat Nav product / highlights branding (1) • Provides information about product (1) • Has legal and safety warnings (1) • Has a bar code for stock control (1) • Allows for full colour printing/printing effects (1) • Provides visual imagery (1) • Attracts target market group (1) <p><i>Accept any other appropriate response</i></p>  <p><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> <p style="text-align: right;">(3 x 1)</p>	<p>(3)</p>

8(b)

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

- To provide extra protection (1)
- Provides storage for accessories (1)
- To fit tightly into the outer box (1)
- To prevent any movement of the Sat Nav / accessories (1)
- Allows Sat Nav to be easily removed from the outer box (1)
- Enables packaging to be simply constructed (1)
- Enables packaging to be reusable (1)
- Enhances visual presentation of Sat Nav (1)



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
(3 x 1)*

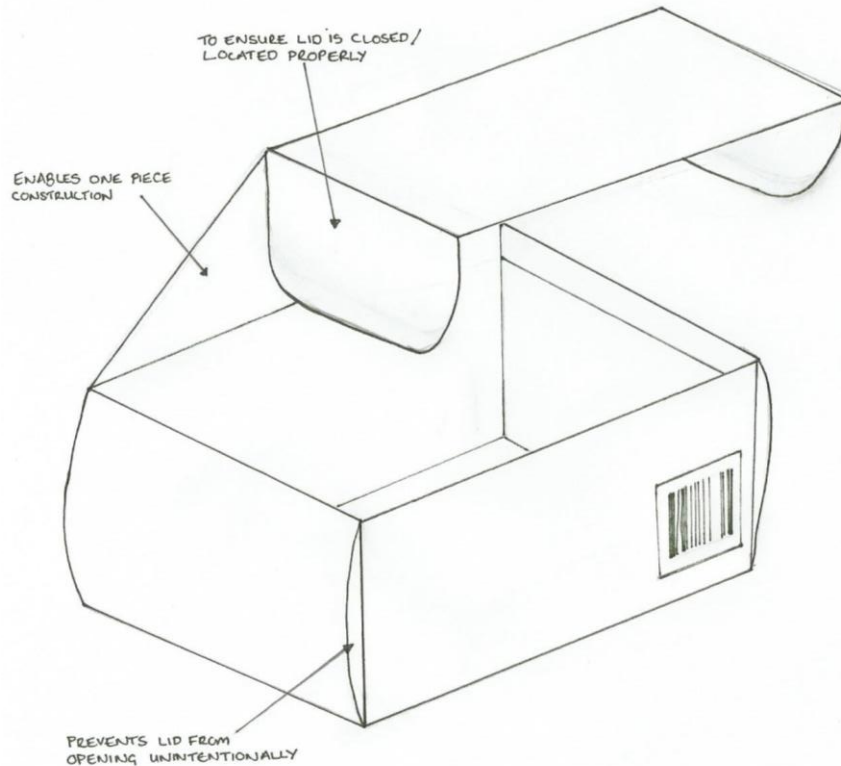
(3)

8(c)

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

- To prevent the lid from opening/opening unintentionally (1)
- To ensure the lid is closed / located properly (1)
- To ensure the package can be stored / moved safely (1)
- To enable one piece construction of the outer box (1)
- No necessity for further mechanical fastenings (1)

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
(3 x 1)

(3)

(Total 9 marks)

Question	Answer	Mark
9(a)(i)1	<ul style="list-style-type: none"> • Marketing <p style="text-align: right;">(1 x 1)</p>	
9(a)(i)2	<ul style="list-style-type: none"> • Processing and production • Production and processing • Processing • Production <p style="text-align: right;">(1 x 1)</p>	(2)
9(a)(ii)	<ul style="list-style-type: none"> • Materials supply and control • Materials supply • Materials control • Material purchase • Stage 4 / four • Four / 4 <p style="text-align: right;">(1 x 1)</p>	(1)
9(b)	<p>Any three of the following points:</p> <ul style="list-style-type: none"> • Development of the design brief (1) • Design specification for the mass produced satellite navigation system packaging (1) • Listing design criteria (1) • Listing performance requirements (1) • Use of internet/websites to investigate existing designs (1) • Sketches are produced by hand (1) • Initial design ideas are produced (1) • Development of design ideas (1) • Modelling ideas using ICT (1) • Using CAD software (1) • Prototyping before manufacture (1) • Sourcing materials/supplies/consumables (1) • Costing resource requirements (1) • Communicating with client/customer (1) • Design modification (1) <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(3 x 1)</p>	(3)
9(c)	<p>An appropriate description including three of the following points (statements must be applicable to satellite navigation system packaging):</p> <ul style="list-style-type: none"> • Gathering together of manufactured packaging (1) • Selecting correct packaging materials/equipment for transit of packaging (1) 	

Question	Answer	Mark
	<ul style="list-style-type: none"> • Packaging boxed together (1) • 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) • Box items sent to manufacturer of Sat Navs (1) • Details sent to finance department for invoicing requirements (1) • Stock control (1) • Could be in flat pack condition (1) <p><i>Accept any other appropriate response but must be related to the manufacture of satellite navigation system packaging; do not accept answers that relate to the <u>production</u> or <u>assembly</u> of the satellite navigation system packaging</i></p> <p><i>1 x 1 mark low response, 3 x 1 mark 3 low responses or up to 3 for detailed response</i></p> <p>e.g. At this stage the satellite navigation system 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 customer to ask for the money that they owe (1). The bigger boxes might have bar codes on (1).</p> <p style="text-align: right;">(3 x 1)</p>	<p>(3)</p>
<p>(Total 9 marks)</p>		

Question	Answer	Mark
10(a)	<ul style="list-style-type: none"> • Cardboard • Coated card • Recycled card • Bleed proof card • Card • Duplex board • Carton 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> <p style="text-align: right;">(1 x 1)</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 • Die punching • Folding • Shearing • Scoring/creasing • Grooving/notching • Gluing/adhering • Varnishing • Embossing • Laminating • Vacuum forming • Heating <p><i>Accept any other appropriate response</i></p> <p><i>Do not accept 'printing' or any variation of printing such as 'full colour printing', 'lithography' or 'screen printing'</i></p> <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p> <p style="text-align: right;">(3 x 1)</p>	(3)

Question	Answer	Mark
<p>10(b)(ii)</p>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • Quick method / fast production rate • Flexible process (can print on absorbent or non-absorbent substrates) • Prints directly onto surface of substrate • Inks are fast drying • Inks are ready mixed • Quick to clean up • Little finishing required • Unit costs are low • Highly automated process • Reliable process • Minimal waste <p><i>Accept any other appropriate response</i></p> <p><i>3 x 1 marks for 3 responses, or up to 3 marks for a detailed response</i></p> <p><i>Allow 1 mark for any combination of the following without explanation:</i></p> <p><i>faster/quicker/cheaper/easier/accurate/consistent</i></p> <p>e.g. Flexography is a high speed print process (1) that prints directly onto the surface (1) and is economical for very high volumes (1).</p> <p>e.g. After the initial set up costs, the unit cost is low (1) as it is a highly automated process (1) with a fast production rate (1).</p> <p style="text-align: right;">(3 x 1)</p>	<p style="text-align: right;">(3)</p>
<p>10(c)</p>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • Lightweight material • Can be mass produced easily • Low cost per unit • Complex shapes can be formed/allows for one piece construction • Little waste as material can be reused • Durable • Environmentally sustainable • Provides appropriate protection • Available in a range of colours <p><i>Accept any other appropriate response</i></p> <p><i>3 x 1 marks for 3 low responses, or up to 3 marks for a detailed response</i></p>	<p style="text-align: right;">(3)</p>

Question	Answer	Mark
	e.g. Thermoplastic materials can be formed into complex shapes (1) which means they can provide appropriate protection for a Sat Nav (1) at a low cost per unit (1) <p style="text-align: right;">(3 x 1)</p>	
(Total 10 marks)		

Question	Answer	Mark
11(a)(i)	Two of the following: <ul style="list-style-type: none"> • Automatic quality checks carried out on finished product (1) • Sensors used to detect foreign bodies (1) • Used to combine the correct materials/processes for assembly (1) • Used to monitor machinery is working correctly (1) • Automatic quantity checks (1) • Automatic movement (1) <p><i>Accept any other appropriate response</i></p> <p><i>Do not accept assembling or finishing product on its own</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
11(a)(ii)	One mark for each type One mark for each extension <ul style="list-style-type: none"> • PLCs (1) to control processes in production (1) • Use of conveyor systems (1) to move the packaging from one process to the next (1) • Embedded computers (1) to perform dedicated functions (1) • Machine monitoring (1) to control quality and accuracy (1) • To improve safety (1) in hazardous conditions (e.g. shearing) by using robots (1) • Use of CAM (1) to monitor whole process performance (1) <p><i>Do not accept CAD or CNC on their own</i></p> <p><i>Accept any other appropriate response</i></p>	(4)

Question	Answer	Mark
	<p><i>Low response (1) or two low responses (2) or detailed response (2) per example</i></p> <p style="text-align: right;"><i>(2 x 2)</i></p>	
<p>11(b)</p>	<p>One mark for each benefit One mark for each extension</p> <ul style="list-style-type: none"> • Reduced customer complaints (1) better/consistent quality (1) • Repeatability of specification (1) due to no human involvement (1) • Reduced costs (1) as less staff are required (1) • Faster production rates (1) due to 24/7 operation (1) • Dangerous operations can be carried out (1) without risk or injury to workers (1) • Less waste produced (1) due to carefully controlled production (1) • Better process control (1) due to in-process monitoring (1) • Less energy consumed (1) due to reduction in wasted activity (1) <p><i>Accept any other appropriate response</i></p> <p><i>2 x 1 marks for 2 responses each, or 2 marks for a detailed response</i></p> <p><i>Allow 1 mark for any combination of the following without explanation:</i> <i>faster/quicker/cheaper/easier/accurate/consistent</i></p> <p style="text-align: right;"><i>(3 x 2)</i></p>	<p>(6)</p>
<p>(Total 12 marks)</p>		

Question	Answer	Mark
<p>12(a)(i)</p>	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • A system for reducing waste (1) • Maximises customer value (1) • A responsive system (1) • Eliminating processes that do not add value (1) • Focuses processes and production (1) • Organising a 'flow' system of processes (1) • A system which allows processes to be flexible (1) <p><i>Accept any other appropriate response</i></p> <p>e.g. lean manufacturing is a responsive system (1) which allows a company to minimise waste (1)</p> <p style="text-align: right;">(2 x 1)</p>	<p style="text-align: right;">(2)</p>
<p>12(a)(ii)</p>	<p>One mark for identifying the advantage One mark for explanation</p> <ul style="list-style-type: none"> • More consistent/accurate products (1) - fewer returns (1) • Lower purchase price (1) – increased sales (1) • Shorter ordering times (1) – improved response for customer (1) • Automated ordering (1) – in-demand products available (1) • Fewer customer complaints (1) - more repeat sales (1) • Ability to order bespoke/varied products (1) – improved customer satisfaction (1) • Better communication with manufacturer (1) – less likelihood of delivery errors (1) • Receipt and movement of goods inward improved (1) – simplified tracking procedures (1) • Increased number of customer referrals (1) resulting in a larger customer base (1) <p><i>Do not accept 'easier', or 'faster/quicker' without explanation</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2), for each of the advantages</i></p> <p style="text-align: right;">(2 x 2)</p>	<p style="text-align: right;">(4)</p>

Question	Answer	Mark
12(b)(i)	<p>Two of the following:</p> <ul style="list-style-type: none"> • May reduce carbon emissions (1) • May result in operational efficiencies / less energy / saves fossil fuels (1) • Likelihood of reduced waste going to landfill (1) • Could produce healthier environment (1) <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
12(b)(ii)	<p>One mark for identifying the benefit One mark for extension</p> <p>Explain one benefit that this could have on the workforce</p> <ul style="list-style-type: none"> • Healthier working environment (1) because it is cleaner (1) • Requirement to learn/use specialist techniques such as fishbone diagrams and SPC (1) contributing to worker development (1) • Bonus payments/incentives (1) may be performance related (1) • Development of communication skills (1) as team working important (1) • Improved promotion prospects for those in post (1) as skills in demand (1) • More direct communication (1) as fewer layers of management (1) • More job security (1) as manufacturing likely to be more efficient (1) • Higher motivation (1) workers will not become tired of monotonous/repetitive jobs (1) <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(1 x 2)</p>	(2)
(Total 10 marks)		

Question	Answer	Mark
<p>13</p>	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> • Use suitable forms of supply/tessellation/lay planning to reduce waste • Reworking non-compliant products to save materials • Burn offcuts/packaging materials to reclaim heat • Recover energy from the processing of materials through exhaust systems/heat exchangers • Use paper/board made from field crop fibre / agricultural residues rather than wood pulp • Use recycled polymers to reduce consumption of fossil fuels • Rework materials to make new products • Recycling materials so less waste materials go to landfill • Source local materials to reduce transportation costs • Using alternative forms of energy (1) to reduce the consumption of fossil fuels <p><i>Accept any other appropriate response</i></p> <p><i>Up to 4 low responses (4) or detailed response (up to 4)</i></p> <p style="text-align: right;">(1 x 4)</p>	<p style="text-align: right;">(4)</p>
<p>(Total 4 marks)</p>		

Question	Answer	Mark
<p>14</p> <p>QWC i, ii, iii</p>	<p>Indicative content</p> <p>Discussion may address the following issues:</p> <ul style="list-style-type: none"> • <i>Impact</i> <ul style="list-style-type: none"> ▪ Increased level of accuracy • <i>Development</i> <ul style="list-style-type: none"> ▪ Greater levels of automation allow for greater levels of control ▪ Reduction in human errors ▪ Higher level of precision from machines ▪ Less variability ▪ Automatic sensors / quality control checks ensuring the quality of the product • <i>Impact</i> <ul style="list-style-type: none"> ▪ Reduced wastage • <i>Development</i> <ul style="list-style-type: none"> ▪ Automation allows for earlier detection of faulty goods ▪ Automation allows for automatic removal of goods not up to standard ▪ Automation can self regulate and does not tire / become inaccurate • <i>Impact</i> <ul style="list-style-type: none"> ▪ Move away from highly skilled manual jobs / crafts / unique products • <i>Development</i> <ul style="list-style-type: none"> ▪ Automation may be less efficient when making items of a bespoke standard or skill level and when carrying out one off quality checks <p><i>Accept any other appropriate response</i></p>	<p style="text-align: right;">(6)</p>
(Total 6 marks)		

Level	Mark	Descriptor
	0	No material deserving of reward
1	1-2	The learner identifies at least two impacts that automation has on the quality of products or gives a brief description of one impact, and shows some understanding of the topic. 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 at least two impacts that automation has on the quality of products or a detailed description of one impact. 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 impacts that automation has on the quality of products. 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 Section A & B		110