

Mark Scheme (Results) Summer 2016

Pearson Edexcel GCSE
in Manufacturing & Engineering (5EM03)
Printing & Publishing (Paper 3A)

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please visit our website at www.edexcel.com.

Our website subject pages hold useful resources, support material and live feeds from our subject advisors giving you access to a portal of information. If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

www.edexcel.com/contactus

Pearson: helping people progress, everywhere

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2016

Publications Code 5EM03_3A_1606_MS

All the material in this publication is copyright

© Pearson Education Ltd 2016

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"> • Train ticket • A4 diary <p>If 3 boxes or more crossed - no marks.</p> <p style="text-align: right;">(2 x 1)</p>	(2)
1(b)	<ul style="list-style-type: none"> • Ring binder • Recycled envelope <p>If 3 boxes or more crossed - no marks.</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"> • StaplerStaple gunLong reach stapler • Booklet stapler • Heavy duty stapler <p>Do not accept 'staple' on its own</p> <p>Accept any recognisable spelling (phonetic) of the answer above</p> <p style="text-align: right;">(1 x 1)</p>	
2(a)(2)	<ul style="list-style-type: none"> • Stamp • Stamper • Ink press <p>Accept any answer that makes reference to this type of stamp</p> <p>Do not accept 'postage stamp'</p> <p>Accept any recognisable spelling (phonetic) of the answer above</p> <p style="text-align: right;">(1 x 1)</p>	(2)
2(b)(1)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • Cutting paper (1) • Accurate cutting/cutting to correct dimensions (1) • Cutting in multiples (1) • Cutting a straight edge (1) • Trimming edges of paper (1) <p>Accept any other appropriate response e.g. used to cut paper (1) to accurate dimensions (1)</p> <p style="text-align: right;">(1 x 2)</p>	
2(b)(2)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • Drawing circles (1) • Drawing arcs/curves (1) • Measuring distances (1) • Used with a pencil (1) • Accurate drawing/drawing to correct diameter or radius (1) • Constructing angles (1) <p>Accept any other appropriate response</p> <p>e.g. used to draw a circle (1) to an accurate diameter (1)</p> <p>Accept any other appropriate response</p> <p>e.g. used to produce large amounts of chocolates (1) which are all the same shape (1)</p>	(4)

		(1 x 2)	
			(Total 6 marks)

Question	Answer	Mark
<p>3</p>	<p>Key terms linked to a key area</p> <p>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.</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>Appropriate two 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 • Sat Nav packaging • Shoe box • Paperback book • 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 is acceptable <p>Do not accept 'card'</p> <p>This list is not exhaustive, accept any product from the printing and publishing, paper and board sector that uses a printing process and automation in its manufacture</p> <p style="text-align: right;">(2 x 1)</p>	(2)
4(b)(i)	<p>Appropriate printing process suitable for the named product:</p> <ul style="list-style-type: none"> • Flexography - cereal packaging • Lithography/offset lithography – school diary planner • Gravure/rotogravure/photogravure – postage stamps • Screen printing – poster signage • Letterpress/rotary letterpress – self-adhesive labels <p>Accept any appropriate response</p> <p>If no response or incorrect response to 4a, correct answer can still be awarded</p> <p style="text-align: right;">(1 x 1)</p>	(1)

Question	Answer	Mark
<p>4(b)(ii)</p>	<p>An answer that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • Flexography – flexible printing plates (1), raised images rotated on a cylinder (1), relief printing (1), prints blocks of solid colours (1), ready mixed inks (1), fast drying inks (1), can print on absorbent and non-absorbent materials (1), can print repeat patterns (1), limited quality (1), high-speed (1), CMYK process (1) etc. • Lithography – images put onto dampened plates (1), ink sticks to image area (1), water to non-image area (1), image is transferred to a rubber blanket (1), rubber blanket prints on substrate (1), prints a series of dots (1), can be sheet-fed or web-fed (1), can print onto limited materials (1), high quality process (1), CMYK process (1) etc. • Gravure – image engraved onto cylinder (1), cylinder smeared with ink and wiped clean (1), ink left in engraving makes the print (1), cylinders are durable (1), produces good quality images (1), can print on a variety of substrates (1), low cost (1) etc. • Screen printing – uses a stencil (1) through which ink is pushed (1), film positive used (1) to expose and harden light sensitive emulsion (1), emulsion attached to substrate (1), exposed and developed to wash away image print area (1), ink is forced through fine mesh [screen] (1), screen helps to spread ink evenly (1), can print on virtually any surface (1), prints a series of dots (1), low cost (1) etc. • Letterpress – relief printing (1), raised surface inked (1), surface pressed against material to be printed (1), prints blocks of solid colours (1), used for low volume applications (1), low speed (1) etc. <p>Accept any appropriate response.</p> <p>If no answer or incorrect answer in 4b(1) then no access to marks for 4b(2)</p> <p>No marks for repeating the printing process used without description.</p> <p>Low response (1) or two low responses (2) or 3 low responses (3) or detailed response (3)</p> <p style="text-align: right;">(1 x 3)</p>	<p style="text-align: right;">(3)</p>

Question	Answer	Mark
4(c)	<p>One mark for each identification of example, one mark for each extension:</p> <ul style="list-style-type: none"> • Conveyor systems (1) transfer materials to manufacturing location (1) • Pick and place robots (1) assemble products continuously (1) • Automated printing (1) of essential information (1) • Labelling is applied continuously (1) at the packaging stage (1) • Product coding is applied (1) when packs are sealed automatically (1) • Remotely operated vehicles (1) move products to specified locations (1) • Linked PLCs (1) used to control manufacturing processes (1) • Embedded computers (1) to perform dedicated functions (1) • CAM (1) used to produce consistent products (1) <p>Accept any appropriate response.</p> <p>Accept responses related to 'packaging the packaging'.</p> <p>Low response (1) or two low responses (2) or detailed response (2), for each of the 2 examples</p> <p>If no response or incorrect response to 4a, correct answers can still be awarded 4 marks</p> <p style="text-align: right;">(2 x 2)</p>	(4)
(Total 10 marks)		

Question	Answer	Mark
5(a)	<p>Accept reference to any of the following two functions:</p> <ul style="list-style-type: none"> • To create a design (1) • To modify a design (1) • To analyse a design (1) • To optimise a design (1) • To improve/check the quality of a design(1) • To improve/check the accuracy of a design (1) • To reduce the cost producing a design (1) • To render (1) • To convert 2D to 3D (1) • To produce nets (1) • To stress test (1) <p>Accept any appropriate response.</p> <p>Do not accept quicker, faster, easier, cheaper, better without appropriate reference to CAD.</p> <p>Low response (1) or two low responses (2) (2x1)</p>	(2)
5(b)	<p>An answer that makes reference to two of the following disadvantages:</p> <ul style="list-style-type: none"> • Set-up costs would be high (1) as hardware/software is required (1) • Cost of training staff will increase (1) due to new skills required (1) • Extra maintenance costs (1) due to specialist technicians required (1) • Ongoing updating costs (1) due to new technological developments (1) • Security issues (1) due to possible loss of data/theft of data (1) • Data can be corrupted (1) due to software malfunction (1) <p>Accept any appropriate response.</p> <p>Low response (1) or two low responses (2) or detailed response (2) (1x2)</p>	(2)

<p>5(c)</p>	<p>An answer that makes reference to two of the following functions:</p> <ul style="list-style-type: none"> • To control the whole manufacturing/automated process (1) • To allow individual parts of the process to access database information (1) • To initiate necessary remedial actions (1) • To reduce manufacturing errors (1) • To allow inter-departmental communication (1) • To maintain quality levels (1) • To schedule maintenance (1) • To store and retrieve data and information (1) <p>Accept any appropriate response.</p> <p>Do not accept quicker, faster, easier, cheaper, better without appropriate reference to CIM.</p> <p>Do not accept answers associated with design and/or development</p> <p style="text-align: right;">(2 x 1)</p>	<p style="text-align: right;">(2)</p>
<p>5(d)</p>	<p>One mark for identification of benefit, one mark for explanation:</p> <ul style="list-style-type: none"> • Improved efficiency (1) by combining design and manufacturing stages (1) • Lower operational costs (1) shorter periods between product design and manufacture (1) • Can reduce waste (1) through better communications between design and manufacturing teams (1) • More consistent products (1) reduced risk of 'out of specification' product being made (1) • Increased sales (1) through quick response to customer demands for new products (1) • Improved auditing (1) for traceability (1) <p>Accept any appropriate response.</p> <p>Low response (1) or two low responses (2) or detailed response (2)</p> <p style="text-align: right;">(1 x 2)</p>	<p style="text-align: right;">(2)</p>
<p>(Total 8 marks)</p>		

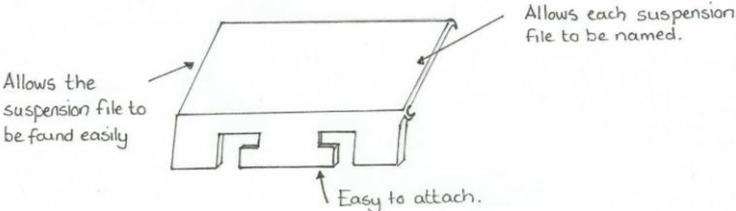
Question	Answer	Mark
6(a)(i)	<p>Description that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • A collection of information/data • Information and data which is organised • Information and data presented in tabular formats • Handle information/data • Storage of information/data • Retrieve information/data • Interrogate data • Query data • Security of information/data <p>Accept any appropriate response.</p> <p>e.g. a database is a stored collection (1) of information which is organised (1) and easily retrieved (1)</p> <p>Low response (1), two low responses (2), three low responses (3) or detailed response (3) (1 x 3)</p>	(3)
6(a)(ii)	<p>One mark for identification of disadvantage, one mark for extension:</p> <ul style="list-style-type: none"> • Costly to install hardware and software (1) due to data collection/inputting (1) • Systems can breakdown/fail (1) leading to loss of data (1) • Connectivity can be lost (1) causing delays (1) • Trained staff required (1) which can be expensive/difficult to recruit (1) • Wrong data can be entered (1) therefore, errors can be transferred/continued (1) • Data can be hacked (1) leading to viruses being introduced (1) • IT skills replace research skills (1) therefore, some knowledge base lost (1) <p>Accept any appropriate response.</p> <p>Low response (1) or two low responses (2) or detailed response (2). (1 x 2)</p>	(2)

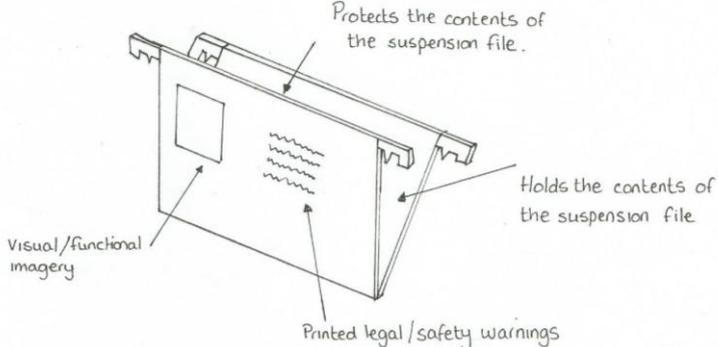
Question	Answer	Mark
6(b)	<p>One mark for identifying each reason, one mark for each extension:</p> <ul style="list-style-type: none"> • Formulas used to generate results (1) meaning less risk of calculation errors (1) • Easier/efficient way of recording data (1) easier to edit (1) • Quicker presentation of information (1) which can be imported into charts/tables (1) • Can store a large amount of data (1) that can be used in decision-making (1) • Ability to share information (1) as data can be transferred electronically (1) • Can support management reports (1) as data can be modelled into 'what if' scenarios (1) <p>Accept any appropriate response.</p> <p>No repetition.</p> <p>Low response (1) or two low responses (2) or detailed response (2), for each of the 2 advantages</p> <p style="text-align: right;">(2 x 2)</p>	(4)
(Total 9 marks)		

Question	Answer	Mark
7(a)	<p>One mark for identifying benefit, up to two marks for extension:</p> <ul style="list-style-type: none"> • Reduced use of paper (1) fewer trees would be needed (1) reducing global warming (1) • Reduced use of fossil fuels (1) to process paper materials (1) and carry out printing processes (1) • Lower carbon emissions (1) less fuel/energy needed manufacture printed materials (1) and transport them (1) • Reduced waste (1) less discarded paper (1) reducing need for recycling (1) • Less processing of raw materials (1) would reduce pollution (1) and improve health (1) • Reduces need to travel (1) to meet customers/clients (1) means less emissions from transport (1) <p>Accept any appropriate response.</p> <p>Up to 3 marks for a detailed response.</p> <p style="text-align: right;">(1 x 3)</p>	(3)

Question	Answer	Mark
<p>7(b)</p>	<p>One mark for identifying advantage, up to two marks for extension:</p> <ul style="list-style-type: none"> • Instant contact with potential customers (1) at low cost (1) to quickly obtain feedback (1) • Able to contact existing customers database (1) and target a wider audience (1) more efficiently (1) • Ability to change/modify marketing strategies quickly (1) to maximise potential sales (1) and achieve targets (1) • Can choose an appropriate communication system (1) to target potential customer sectors/groups (1) more quickly (1) • Allows for paperless marketing(1) reducing printing costs (1) and be updated easily (1) • Reduces time (1) to mail materials (1) which also reduces labour costs (1) • Reduces cash outlay producing printed materials (1) reduces storage space requirement (1) and potential waste of out of date materials (1) <p>Accept any appropriate response.</p> <p>Do not accept references to specific types of communications technology e.g. email, internet, smart phone etc. without explanation of benefit.</p> <p>Up to 3 marks for a detailed response.</p> <p style="text-align: right;">(1 x 3)</p>	<p>(3)</p>
<p>(Total 6 marks)</p>		
<p>Total Marks for Section A</p>		<p>50</p>

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"> • Allows the suspension file to be mounted on the drawer slides (1) • Allows accurate/contained suspension of the files (1) • Allows the suspension file to slide backwards and forwards (1) • Enables smooth movement of the suspension file (1) • Acts as a stop for the suspension rods (1) • Enables consistent/standardised storage (1) • Enables the capacity of the suspension file to hold weight (1) <div> </div> <p>Accept any other appropriate response.</p> <p>Answer must contain both notes and sketches.</p> <p>Max two marks if only notes or sketches used.</p>	<p>(3 x 1) (3)</p>

Question	Answer	Mark
<p>8(b)</p>	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> • Allows each suspension file to be named/renamed (1) • Designed to be easy to attach/reattach (1) • Allows the user to organise the suspension files according to preference (1) • Allows the user to find the suspension file contents quickly/easily (1) • Allows the user to move the suspension files quickly/easily (1) • Provides information about the suspension file contents (1) <p>8(b) Index tab</p>  <p>Allows the suspension file to be found easily</p> <p>Allows each suspension file to be named.</p> <p>Easy to attach.</p> <p>Accept any other appropriate response.</p> <p>Answer must contain both notes and sketches.</p> <p>Max two marks if only notes or sketches used.</p> <p style="text-align: right;">(3 x 1)</p>	<p>(3)</p>

Question	Answer	Mark
<p>8(c)</p>	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> • Holds the contents of the suspension file (1) • Protects the contents of the suspension file (1) • Allows the contents of the suspension file to be moved safely (1) • Allows the contents of the suspension files to be separated (1) • Enables the user to open the suspension file for easy access (1) • Provides printed legal and safety warnings (1) • Can provide printed visual/functional imagery (1) <p>8(c) Insert</p>  <p>Accept any other appropriate response.</p> <p>Answer must contain both notes and sketches.</p> <p>Max two marks if only notes or sketches used.</p> <p style="text-align: right;">(3 x 1)</p>	<p>(3)</p>
<p>(Total 9 marks)</p>		

Question	Answer	Mark
9(c)	<p>Appropriate descriptions including three of the following points (statements must be applicable to suspension files):</p> <ul style="list-style-type: none"> • Checking availability of materials (1) • Ordering materials (1) • Receiving materials (1) • Goods inward inspection/testing (1) • Storing materials (1) • Stock checks/rotation (1) • Coding checks (1) • Quality checks (1) • Sourcing materials (1) • Purchasing materials (1) • Liaison with user departments (1) • Assembling 'internal' orders (1) • Delivery of 'internal' orders (1) • Completing documentation (1) • Liaison with administration departments (1) <p>Accept any other appropriate response but must be related to the manufacture of suspension files</p> <p>e.g. the stage where the manufacturer would source suitable materials/components (1) for the suspension files. These materials/components could then be purchased (1) and inspected (1) on arrival at the company.</p> <p>3 x 1 marks for 3 low responses or up to 3 marks for a detailed response.</p> <p style="text-align: right;">(1 x 3)</p>	(3)
(Total 9 marks)		

Question	Answer	Mark
10(a)	<ul style="list-style-type: none"> • Cardboard (1) • Cartonboard (1) • Solid whiteboard (1) • Cast coated board (1) • Duplex board (1) • Sugar paper (1) <p>Accept any other appropriate response.</p> <p>Do not accept generic answers such as 'board', 'card', 'paper' etc</p> <p>Accept any recognisable spelling (phonetic) of the answers above.</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"> • Die cutting (1) • Guillotine cutting (1) • Saw cutting (1) • Punching (1) • Folding (1) • Shearing (1) • Scoring/creasing (1) • Grooving/notching (1) • Gluing/adhering (1) • Heating (1) • Stamping (1) • Drilling (1) • Powder/dip coating (1) • Assembly (1) <p>Accept any other appropriate response.</p> <p>Accept any recognisable spelling (phonetic) of the answers above.</p> <p style="text-align: right;">(3 x 1)</p>	(3)

Question	Answer	Mark
10(b)(ii)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • Quick method/fast production rate (1) • Excellent surface finish (1) • No further processing needed (1) • Any excess material can be re-used (1) • Unit costs are low for medium to high volume injection runs (1) • Highly automated process (1) • Reliable process (1) • Minimal waste (1) • Not labour intensive (1) • Can be mass produced easily (1) • Complex shapes can be produced (1) • Multiple components on each mould (1) <p>e.g. a highly automated process (1) allowing index tabs to be mass produced easily (1) with consistent quality (1)</p> <p>Accept any other appropriate response.</p> <p>3 x 1 marks for 3 low responses or up to 3 marks for a detailed response</p> <p style="text-align: right;">(3 x 1)</p>	(3)

Question	Answer	Mark
10(c)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • materials are less likely to be made from non-renewable/finite resources (1) • materials can be bio-degradable/compostable (1) • materials take less processing in manufacture (1) • materials consume less energy in manufacture (1) • smaller volume of material is used (1) • materials can be recycled (1) <p>Accept any other appropriate response</p> <p>Do not accept generic responses such as 'less global warming' or 'less CO2' without qualification</p> <p>e.g. thinner materials can be used in modern suspension files (1) meaning they don't use as much energy when manufacturing them (1) and they are easy to recycle at the end of their useful life (1)</p> <p>3 x 1 marks for 3 low responses or up to 3 marks for a detailed response</p>	(3)
(Total 10 marks)		

Question	Answer	Mark
<p>11(a)</p>	<p>Any two of the following reasons:</p> <ul style="list-style-type: none"> • To improve efficiency (1) • To improve throughput/output (1) • To reduce manufacturing costs (1) • To improve control of manufacturing costs (1) • To reduce labour costs (1) • To improve consistency/accuracy (1) • To improve process control (1) • To reduce wastage (1) • To reduce health and safety risks (1) <p>Accept any other appropriate response</p> <p>Do not accept 'quicker', 'faster', 'cheaper' without clarification.</p> <p>No repetition</p> <p style="text-align: right;">(2 x 1)</p>	<p style="text-align: right;">(2)</p>
<p>11(b)</p>	<p>One mark for identifying each procedure, one mark for each extension:</p> <ul style="list-style-type: none"> • Visual inspection (1) checking against prototype/first-off/template etc. (1) • Size checks (1) by direct measurement or gauging/templates/optical sensors or checking against drawing/specification/tolerances (1) • Functional checks (1) opening/closing the suspension files/testing the runners (1) • Positional checks (1) use of crop marks/target or registration marks (1) • Printing checks (1) use of colour bar/densitometer readings (1) • Machinery checks (1) use of maintenance activities (1) <p>Accept any other appropriate response.</p> <p>No repetition</p> <p>Low response (1) or two low responses (2) or detailed response (2), for each of the three reasons</p> <p style="text-align: right;">(3 x 2)</p>	<p style="text-align: right;">(6)</p>

Question	Answer	Mark
11(c)	<p>One mark for identifying each benefit, one mark for each extension:</p> <ul style="list-style-type: none"> • Early identification of non-conforming product (1) fewer customer complaints (1) • Avoids faulty products being dispatched (1) less returns (1) • Fewer product recalls (1) avoids dealing with customer complaints (1) • Minimises possibility of safety hazards (1) negative effect on manufacturers reputation (1) • More consistent/reliable product (1) increased customer confidence (1) • Increased sales/profit/turnover (1) improved manufacturers status (1) • Detection of broken machinery (1) control of processes (1) • Less waste (1) improved efficiency (1) <p>Accept any other appropriate response.</p> <p>Low response (1) or two low responses (2) or detailed response (2) for each of the two benefits.</p> <p style="text-align: right;">(2 x 2)</p>	(4)
(Total 12 marks)		

Question	Answer	Mark
<p>12(a)(i)</p>	<p>One mark for any of the following changes:</p> <ul style="list-style-type: none"> • Reduced employment opportunities (1) • Increased competition for jobs (1) • Higher skill levels required (1) • Increased emotional stress (1) • Changes to work patterns (1) • Alterations to life style (1) • Changes to work requirements (1) • More training required (1) • Reduced physical demands (1) <p>Accept any other appropriate response.</p> <p>Low response (1) or two low responses (2) or detailed response (2)</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 effect, one mark for explanation:</p> <ul style="list-style-type: none"> • Reduced noise pollution (1) better designed equipment (1) • Better dust/fume extraction (1) dedicated extraction/conditioning systems (1) • Improved temperature control (1) regulated air conditioning (1) • Cleaner/healthier (1) improved equipment design (1) • Improved lighting (1) better designed illumination (1) • Improved safety (1) equipment fitted with safety sensors (1) • Fewer injuries (1) more space in workplace (1) <p>Accept any other appropriate response.</p> <p>Low response (1) or two low responses (2) or detailed response (2) for each of the two effects</p> <p style="text-align: right;">(2 x 2)</p>	<p style="text-align: right;">(4)</p>

Question	Answer	Mark
12(b)	<p>One mark for identifying benefit. One mark for explanation:</p> <ul style="list-style-type: none"> • Improved aesthetics (1) as high quality surface finishes/printing effects/colours/textures can lead to increased sales (1) • Increased availability (1) as lower cost/quicker to market/larger product range will help with repeat sales (1) • Better functionality (1) as being more lightweight/compact will encourage a purchase (1) • Improved mechanical characteristics (1) as strength/durability will persuade customers to purchase (1) • More sustainable (1) as biodegradability/degradability/easier to disassemble/easier to recycle will lead to more sales (1) <p>Accept any other appropriate response.</p> <p>Do not accept 'cheaper'</p> <p>Low response (1) or two low responses (2) or detailed response (2) for each of the two benefits</p> <p style="text-align: right;">(2 x 2)</p>	(4)
(Total 10 marks)		

Question	Answer	Mark
<p>13</p>	<p>An answer that makes reference to the following points with explanation:</p> <ul style="list-style-type: none"> • Guards/sensors on machinery (1) • Machinery can shut down/stop automatically (1) • Machinery can operate in hazardous environments (1) • Less human input at the production stage (1) • Reduced number of accidents (1) • Fewer fatigue related accidents (1) • Enables continuous processing with less risk of accidents (1) • Better process control less risk of injury (1) <p>Or any other appropriate response</p> <p>e.g. control technology can shut down machinery automatically (1) which lowers the risk of injury (1) and better process control can reduce the number of accidents (1) as less human input is required at the production stage (1)</p> <p>Up to 4 low responses (4) or detailed response up to (4)</p> <p style="text-align: right;">(4 x 1)</p>	<p style="text-align: right;">(4)</p>
(Total 4 marks)		

Question	Answer	Mark
<p>14</p> <p>QWC i, ii, iii</p>	<p>Indicative content Discussion may address the following issues:</p> <p>Impact <u>Production efficiency</u></p> <p>Development</p> <ul style="list-style-type: none"> • Improved throughputs achieved • Increased productivity • Can operate continuously • Does not tire • Can be modified/upgraded to increase efficiency • Able to operate in extreme/hazardous conditions • Lower levels of waste <p>Or any other appropriate response</p> <p>Impact <u>Product quality</u></p> <p>Development</p> <ul style="list-style-type: none"> • Produces consistent /uniform products • Operates within closer tolerances • Adjustment of the level of precision • Produces products to specification • Reduced risk of error • Ability to extract non conforming product <p>Or any other appropriate response</p> <p>Impact <u>Manufacturing costs</u></p> <p>Development - 'Positive'</p> <ul style="list-style-type: none"> • No wage costs • No holiday pay to 'factor in' • No national insurance, income tax, pension to 'factor in' • No sick pay/compensation costs • No redundancy costs • Lower energy costs i.e. can work in dark/cold/heat • Less non conforming product • Reduced waste • Lower raw materials costs <p>Or any other appropriate response.</p>	<p style="text-align: right;">(6)</p>

Question	Answer	Mark
	<p>Development - 'Negative'</p> <ul style="list-style-type: none"> • Expensive to maintain/service • Initial capital costs high • Replacement costs high • Updating/refurbishing costs high • Can breakdown increasing 'down time' • Can be inflexible • Malfunctions can be very disruptive/costly <p>Or any other appropriate response.</p> <p>Example learner answer (level 3); Robots are able operate continuously without getting tired or needing to take breaks this enables output to be increased which improves efficiency. There are no wages or other costs linked to employing people such as holiday pay, national insurance, pensions etc to pay which lowers manufacturing costs. Workplace lighting, heating / cooling is often not needed, so expenditure on energy is reduced. The reductions in manufacturing expenditure makes competitive pricing possible as these costs do not need to be 'factored in' when costing products. However, the initial purchase costs of robotics costs can be high and can also be expensive to maintain and repair if they breakdown. Robots are able to produce consistent products to precise specifications so waste is reduced and quality is maintained.</p>	
(Total 6 marks)		

Level	Mark	Descriptor
	0	No material deserving of reward
1	1-2	The learner identifies at least two impact related points linked to efficiency/product quality/manufacturing costs or gives a brief description of one inter-related 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 impact related points linked to efficiency/product quality/manufacturing costs or one inter-related detailed description. 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 three impact related points linked to efficiency/product quality/manufacturing costs or two inter-related detailed descriptions. 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