

Q1.

Computers are an important part of product design and manufacture.

Describe how a designer might use a computer in the development of the product you have chosen.

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(Total 6 marks)

Q2.

Data transfer, e.g. Electronic Data Interchange (EDI), is commonly used in modern manufacturing. Explain how the manufacturer of the product you have chosen might use data transfer.

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(Total 4 marks)

Q3.

Explain how a production line is used in commercial manufacturing.

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(Total 3 marks)

Q4.

This question is about manufacturing products.

A manufacturer uses a production line to assemble its products in batches of 200.

Select **one** of the products from the list below.

Wind chimes	Wall clock	Cup cakes	School bag	Board game
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Circle your choice.

Use notes and sketches to describe your selected product.

Show how it might be suitable for assembly in batches of 200.

Add notes to explain the separate parts.



(Total 7 marks)

Q5.

Explain why many products are manufactured in mass production using Computer Aided Manufacture (CAM).

Give examples of products to explain your answer.

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(Total 8 marks)

Q6.

This question is about the use of computers in product manufacture.

Computers are now a major part of product manufacture.

Explain how computers are used in each of the following:

Just In Time manufacture

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(2)

Stock control

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(2)
(Total 4 marks)

Q7.

Explain how you would make sure all 200 products are the same.

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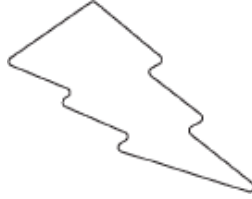
(Total 4 marks)

Q8.

This question is about manufacturing products.

A young designer plans to make and sell a range of simple products at a craft fair.

The range of products will all be based on the same shape shown below.
They will be manufactured in batches of 200.



Use notes and sketches to develop the shape into **one** of the products from the list below suitable for making in batches of 200. Circle the product you have chosen.

Biscuit

Jewellery

Badge

Key fob

(Total 4 marks)

Q9.

This question is about how products have changed over time.

A leading retailer of home products sells many *Flat Pack* items.



Explain the meaning of *Flat Pack*.

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(Total 2 marks)

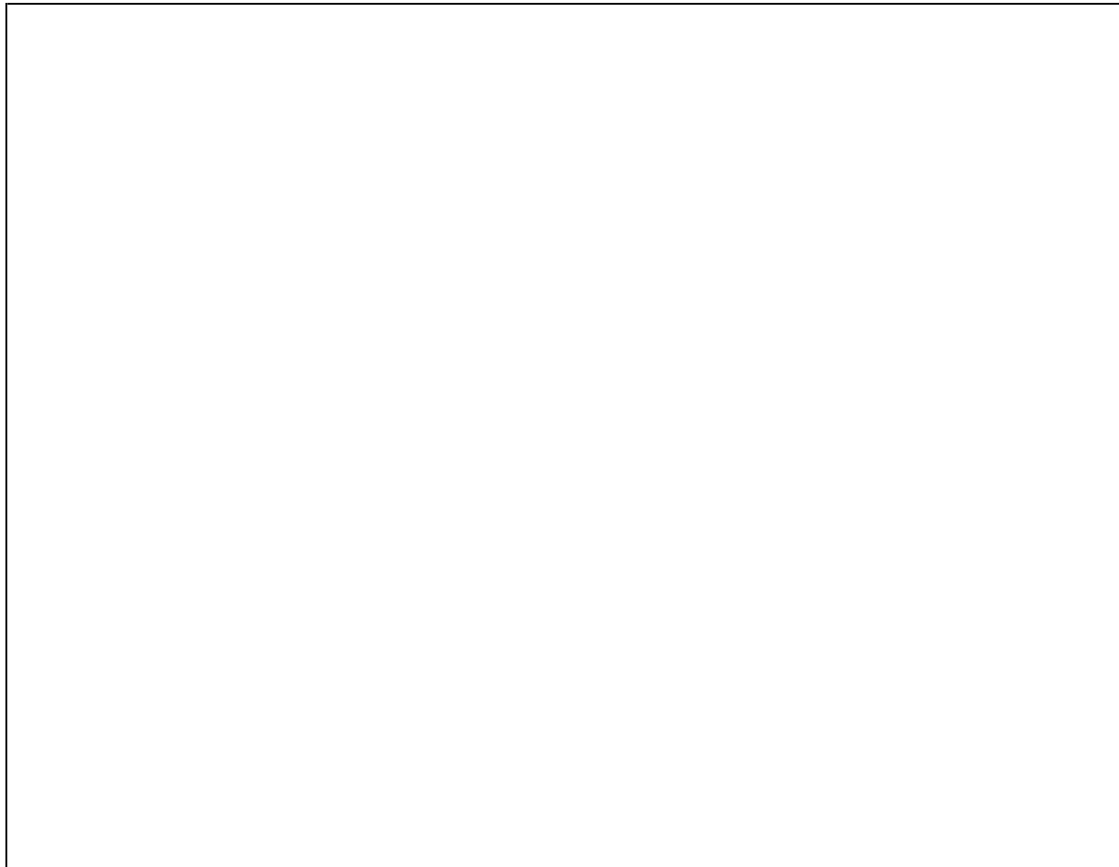
Q12.

Year 6 pupils will work together in a production line to make 20 identical products.

In the space below, draw a layout to show how you would organise the production of your product.

There are marks for:

- layout and order of processes
- identification of tools and equipment
- how you organise the year 6 pupils
- how you make sure each product is made to a high quality.



(Total 10 marks)

Q13.

In the box below use notes and/or diagrams to show how to make your product.

You should show quality control checks at each stage.



(Total 8 marks)

Q14.

This question is about manufacturing products.

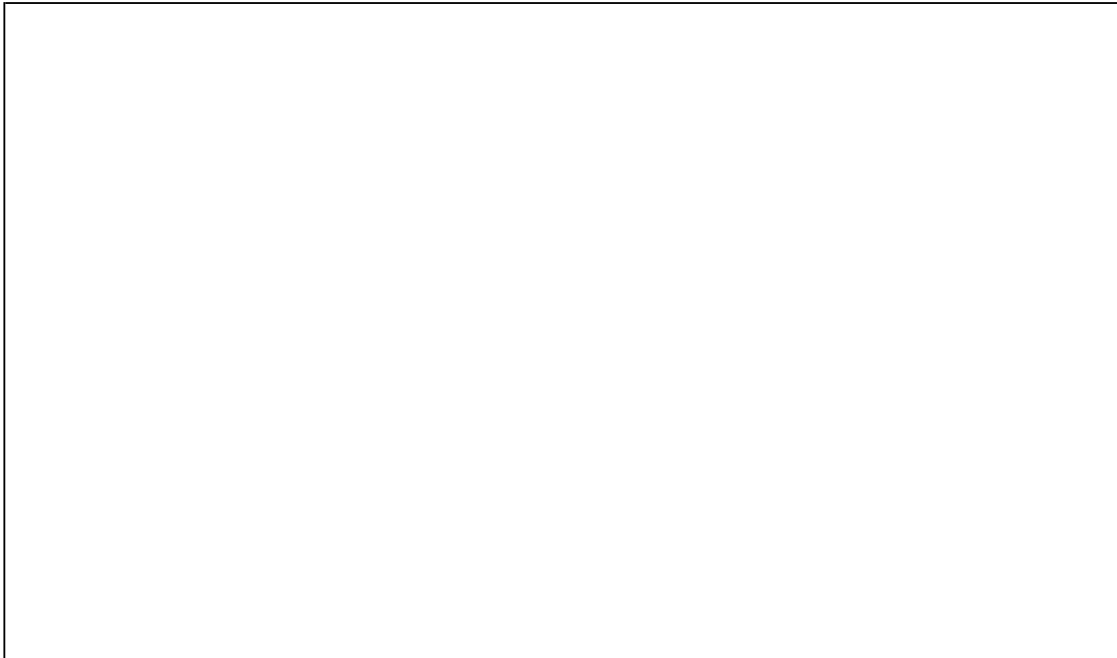
A secondary school plans to run open days for year 6 pupils from local primary schools. The Design and Technology department want to make a simple product in a production line with groups of year 6 pupils.

You have been asked to design the product that the pupils will make. You will be asked to describe how the pupils will manufacture the product later in the question.

Your product should:

- be suitable to be made in a batch of 20 in a production line
- include a decorative feature.

Use notes and/or sketches to show your product in the box below.



(Total 4 marks)

Q15.

Draw a flowchart to show how your product would be made.

You should include quality control checks at each stage of manufacture.



(Total 8 marks)

Q16.

(i) Name a suitable main material for your product.

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(1)

(ii) Explain why the material you have chosen is suitable for this scale of production.

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(2)

(Total 3 marks)

Q17.

This question is about manufacturing products.

A Design and Technology teacher wants to teach the topic 'batch production'. Students will work in teams and each team will make 200 identical products.

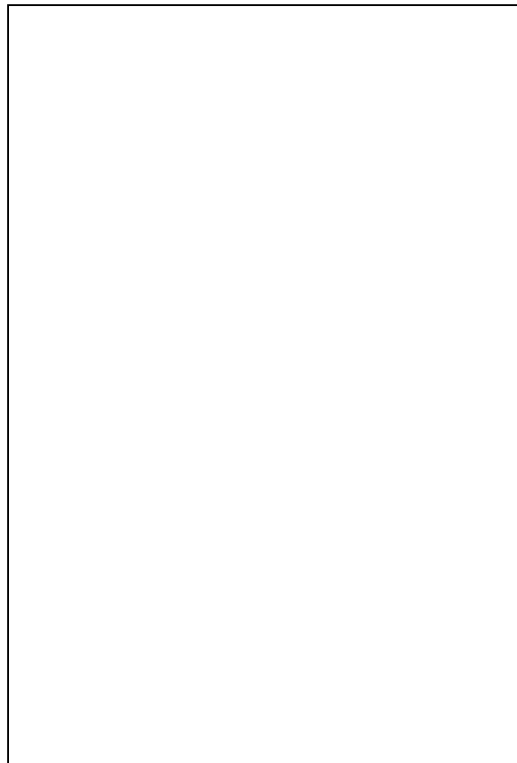
Circle **one** of the following products.

chocolate shapes	greetings card and envelope
badge	juggling balls
pendant	LED key fob

In the box below show a simple sketch of the product to be made.

You will be asked to describe how the students will manufacture the product later in the question.

Marks will be awarded for the feasibility and quality of communication.



(Total 4 marks)

M1.

CAD 3D modelling using AutoCAD / pro desktop etc. – To show virtual product which can be machined out using a 3D prototype to test before incurring cost of setting machinery to manufacture; to help the designer visualise the product in 3D; to interface with CAM equipment (CNC). Would need to include stress analysis, destructive testing, marketing / seeking customer feedback, production planning etc. CAD 2D designing applications such as photoshop, corel draw, 2D design can be used to develop product in 2D. Drawings can be output to laser cutter / vinyl cutter / digital printer etc. Files can be edited to test different colourways, effects, sizes etc and each development saved. Files can be saved, shared with others in different locations by email, edited without needing to start again. Greater accuracy.

Concise, detailed and well-reasoned response which makes reference to three or more of the ideas in detail.

5 – 6 marks

Sound response which makes reference to two of the ideas in detail or several in brief.

3-4 marks

Basic response which makes reference to one of the ideas in detail or two in brief.

2 marks

Brief / single word answer with reference to one idea only.

1 mark

[6]

M2.

Data Transfer e.g. Electronic Data Interchange (EDI) involves the transfer of structured data from one computer to another without human intervention e.g. to transport data between a retailer and a manufacturer; CAD remote manufacturing. Benefits are a shortened supply chain to speed up ordering and production of specific parts. Reference to barcode labelling, stock systems, Electronic Point of Sale (EPOS) readers to inform pace of manufacture. Information shared at all points of sales and manufacture to ensure sufficient stock readily available.

A concise and detailed response showing a good understanding of data transfer systems and appropriate to the selected product and its manufacture. 2 relevant points developed in detail or 4 in brief.

4 marks

A good response showing a sound understanding of EDI systems and appropriate to the selected product and its manufacture. 1 relevant point developed in detail and 1 in brief or 3 in brief.

3 marks

A sound response showing a basic understanding of EDI systems and appropriate to the selected product and its manufacture. 1 relevant point developed in detail or 2 in brief.

2 marks

A simplistic statement which mentions one point only.

1 mark

[4]

M3.

A **production line** is a set of sequential operations established in a factory whereby materials are put through a refining process to produce an end-product that is suitable for onward consumption; or components are assembled to make a finished article.

An **assembly line** is a manufacturing process (sometimes called *progressive assembly*) in which parts (usually interchangeable parts) are added to a product in a sequential manner using optimally planned logistics to create a finished product much faster than with handcrafting-type methods.

Product parts are pre-manufactured and finished before being assembled. e.g. a car – many parts are manufactured in specialist facilities and brought together for assembly on a production line.

A concise and detailed response showing a good understanding of use of an assembly line in manufacturing complex products.

3 marks

A sound response showing a basic understanding of use of an assembly line in manufacturing complex products.

2 marks

A simplistic statement or only partially correct response.

1 mark

[3]

M4.

A precise drawing showing high level skills. Solution shows understanding of the term assembly and is therefore fully feasible and suitable for **assembly** in this quantity. Design is fully annotated to identify parts of product ready for assembly.

5-7 marks

Some parts of the drawing not easy to understand. Solution might not be completely feasible or suitable for **assembly** in this quantity. Limited annotation which identifies some of the products parts ready for assembly.

2-4 marks

Simplistic product drawn, insufficiently detailed to show separate parts for assembly or suitability for **assembly** in this quantity. No annotation.
Max 5 marks for notes without sketching.

1 mark

[7]

M5.

CAM manufacturing more efficient - accurate and much faster than manufacture by hand. Materials purchased in bulk much cheaper than in smaller quantities. Products nested to make maximum use of material in stock form. Once prototype developed to be suitable for mass manufacture, CAM makes every product the same within pre determined tolerances; hand made products often bespoke to customer requirements, time taken in design of each one off product, hand skills slower than machine. Less people involved in manufacture by CAM – less cost in terms of workforce.

Initial cost of machine set up offset by mass quantities of product made.

CAM manufacturing not 'quick and easy' unless sufficiently justified.

A concise and detailed response showing a good understanding of the above factors. Examples of relevant products used to show comparison of two types of manufacture and cost implications.

Response well structured with good use of appropriate design and technology terminology and showing a good grasp of grammar, punctuation and spelling.

6–8 marks

A sound response showing a basic understanding of the above factors. Examples of relevant products may be used to show comparison of two types of manufacture and cost implications.

Response fairly well structured with some use of design and technology terminology with small number of errors in grammar, punctuation and spelling.

3–5 marks

A simplistic statement which mentions one point only. Response may not include examples of relevant products or products selected may not be appropriate to argument. Response poorly structured with little or no use of design and technology terminology and with numerous errors in grammar, punctuation and spelling.

1–2 marks

No relevant argument presented.

0 mark

[8]

M6.

JIT

Computers used by retailer to order product either by email or through stock / on line catalogue. JIT products often bespoke e.g.computer products where customer requests specific processor, memory, disk drive etc.

Manufacturer disassembles order to select appropriate components to send to assembly line. On demand manufacture. **Availability** of component parts – parts exactly where needed when needed, no delay.

Stock control

Bar code on products scanned at till point, updates stock database, computer places order with supplier when stock reaches pre determined level to ensure do not go out of stock. Point of purchase informs distribution. Stock levels and location.

2 × 2 marks

A sound response showing understanding of the role of computers in manufacturing function. 1 relevant point developed in detail or 2 in brief.

2 marks

A simplistic statement which mentions one point only.

1 mark

[4]

M7.

CNC / CAD/CAM, use of jigs, templates, moulds for repeatability. QC visual inspection.

A concise and detailed response showing a good understanding of quality assurance system and quality control check(s) appropriate to the developed product solution / its manufacture. 2 relevant points developed in detail or 4 in brief.

4 marks

A good response showing a sound understanding of quality assurance system and quality control check(s) appropriate to the developed product solution / its manufacture. 1 relevant point developed in detail and 1 in brief or 3 in brief.

3 marks

A sound response showing a basic understanding of quality assurance system and quality control check(s) appropriate to the developed product solution / its manufacture. 1 relevant point developed in detail or 2 in brief.

2 marks

A simplistic statement which mentions one point only.

1 mark

[4]

M8.

High quality product well explained. A precise drawing showing high level skills. Developed solution is fully feasible and suitable for manufacture in this quantity.

3-4 marks

Some parts of the drawing not easy to understand. Developed solution might not be completely feasible or suitable for manufacture in this quantity.

Maximum 2 marks if shape not used or developed product not on list.

1-2 marks

[4]

M9.

Products which are packaged flat to use up less space and then assembled when unpacked. E.g. **Ready-to assemble furniture (RTA)**, also known as **knock-down furniture** or **flat pack furniture** is a form of furniture that is purchased in multiple pieces and requires assembly. This form of furniture generally arrives in a box and contains instructions for the buyer to follow in order to assemble it after purchase. Flat pack furniture designed and packaged to fit in the boot of car so easy to take home.

Sound response which makes reference to two of the opposite ideas in brief or one idea in detail.

2 marks

Brief / single word answer with reference to one idea only

1 mark

[2]

M10.

Describe some of the ways Information Communication Technology (ICT) can be used in developing and modelling ideas.

CAD 3D modelling using AutoCAD / pro desktop etc. – To show virtual product which can be machined out using a 3D prototype to test before incurring cost of setting machinery to manufacture; to help the designer visualise the product in 3D; to interface with CAM equipment (CNC).

Would need to include stress analysis, destructive testing, marketing / seeking customer feedback, production planning etc.

CAD 2D designing applications such as photoshop, corel draw, 2D design can be used to develop product in 2D. Drawings can be output to laser cutter / vinyl cutter / digital printer etc. Files can be edited to test different colourways, effects, sizes etc and each development saved.

Files can be saved, shared with others in different locations by email, edited without needing to start again.

Concise, detailed and well reasoned response which makes reference to three or more of the above ideas in detail.

5–6 marks

Sound response which makes reference to two of the above ideas in detail or several in brief.

3–4 marks

Basic response which makes reference to one of the above ideas in detail or two in brief.

2 marks

Brief / single word answer with reference to one idea only.

1 mark

[6]

M11.

Explain the value of modelling and prototyping in the development of a new product.

Can test 2D idea in 3D to check proportions, functionality, aesthetics, materials, wear in use, market testing, construction techniques. Testing the design in 3D helps to identify unresolved design issues which the designer may not have thought of or realised. Would need to include stress analysis, costings, manufacturing / assembly issues such as moulds, etc. Fully developed prototypes are the result of many developments of the original design – the design improved significantly upon the original.

Concise and detailed response which makes reference to two or more of the opposite ideas in detail.

4 marks

Sound response which makes reference to two of the opposite ideas in brief or one in detail.

3 marks

Basic response which makes reference to one of the opposite ideas in brief.

2 marks

Brief / single word answer with reference to one idea only.

1 mark

[4]

M12.

A well planned layout and feasible order of processes, sequence is clear with no major omissions. Appropriate division of labour. Suitable for producing 20. Correctly named tools and equipment for major stages of manufacture. Comprehensive and appropriate quality control measures and feedback included.

8–10 marks

A generally correct layout and sequence of manufacturing detailed but maybe some omissions. Division of labour is feasible but may be disproportionate for some tasks. Suitable for producing 20. Correctly named tools and equipment for major stages of manufacture. Quality of communication is reasonable. Some appropriate quality control measures and feedback included.

5–7 marks

Only part of the layout or process superficially detailed or unsuitable for producing 20. Division of labour may not be feasible or may have not been considered. Some tools and equipment are correctly named. Quality control measures or feedback may not be included or may not be appropriate to process.

2–4 marks

Limited or no response.

0–1 mark

[10]

M13.

All main stages of manufacture listed correct and in correct order. Appropriate quality control measures identified and in the correct place.

7–8 marks

Most main stages of manufacture listed and correct but may not be in correct order. Appropriate quality control measures identified but may not be in correct place.

5–6 marks

Some main stages of manufacture identified but information may be insufficiently detailed and in wrong order. Appropriate quality control measures may not have been identified or may be incorrect for the manufacturing process.

3–4 marks

Little or no main stages of manufacture identified or information is vague and/or in wrong order. Appropriate quality control measures have been identified or may be incorrect for the manufacturing process.

0–2 marks

[8]

M14.

Solution is fully feasible and suitable for manufacture in this quantity. Surface decoration is appropriate and compliments the design.

4 marks

Solution might not be completely feasible / suitable for manufacture in this quantity. Surface decoration may not have been added or be appropriate or compliment the design.

2–3 marks

Solution is insufficiently detailed, not feasible or suitable for manufacture in this quantity. No surface decoration.

1 mark

[4]

M15.

Response does not need to be in flowchart form. Accept a sequential process.

Correct main stages of manufacture listed. Quality control checks correctly identified for major stages of manufacture. Suitable for producing 200.

7-8 marks

Generally correct main stages of manufacture listed. Quality control checks correctly identified for most stages of manufacture although some might be inappropriate or superficially explained. Suitable for producing 200.

5-6 marks

Some of main stages of manufacture correctly identified but some might be missing or incorrect. Some quality control checks are correctly identified or several may be identified but might not be the most appropriate for the process or sufficiently explained. Process may not be suitable for producing 200.

3-4 marks

Few stages of manufacture correctly identified, quality control checks may be missing or incorrect for process, process may not be suitable for producing 200.

1-2 marks

[8]

M16.

(i) A suitable material that is specifically named.
E.g. plywood, MDF, aluminium, polystyrene, acrylic, felt, clay, card, biscuit mix, pastry etc.

1 mark

(ii) Reason shows good understanding of the working properties of the material.

2 marks

Reason is vague and lacking in understanding of the properties of the materials.

1 mark

[3]

M17.

A precise drawing showing high level skills. Solution is fully feasible and suitable for manufacture in this quantity.

3-4 marks

Some parts of the drawing not easy to understand. Solution might not be completely feasible.

1-2 marks

[4]

