

Design & Technology

Computer Aided Manufacture

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try to answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Don't spend too much time on one question

Good luck!

Q1. CAD stands for?

- A** Computing and design
- B** Computer-aided design
- C** Computer-aided diagram

Q2. CAM stands for?

- A** Computer aided modelling
- B** Computer aided making
- C** Computer-aided manufacture

Q3. What are the advantages of automation?

- A** Less waste produced and faster running time
- B** Low set up cost
- C** Lots of jobs are created

Q4. What one of these is an example of CAM?

- A** Designing on a computer
- B** Band saw
- C** 3D printing

Q5. Which of the following statements about 3D printing is True?

- A** Good for mass production
- B** Fast printing speed
- C** Prints are high quality

Q6. Which of the following is not a CAD software?

- A** Excel
- B** Google sketchup
- C** Techsoft 2D design

Q7. Explain **two** reasons for creating a virtual model of a new hockey stick **(4 marks)**

1.

2.

Q9. Describe **two** advantages of laser cutting **(4 marks)**

1.

2.

Q10. Describe how CAM could be used to cut out the shape of the trays for a desk tidy made from acrylic **(3 marks)**

Answers

Q1. B

Q2. C

Q3. A

Q4. C

Q5. C

Q6. A

Q7.

Any **two** reasons explained from:

- Products can be viewed / seen all round / 3D / see what it looks like / coloured / textures added (1) therefore a true and accurate representation can be gained from the computer model (1)
- Designs can be edited / modified / viewed all round on screen without having to redraw / physically modelled (1) which saves time / materials / speeds up any development (1)
- Files can be sent electronically via email (1) which saves time / reduces costs / speeds up the whole design and make process (1)
- Files can be output to 3D printing / rapid prototyping machines (1) which enables real models to be produced to test / hold / evaluated (1)
- Computer simulations such as stress / strain tests can be carried out (1) which will allow the designer to see if the hockey stick will be able to withstand the forces / impacts it will be subjected to when playing (1)

Q8.

Advantages

- Can be output to 3D printing (1)
- Creates products that are identical to each other (1)
- Drawings can easily be repeated for new batches (1)
- Enables very high accuracy levels in large-scale production (1)
- Usually speeds up production of low-volume products (1)

Disadvantages

- High cost / expensive set up (1)
- Highly skilled operative required / training issues (1)
- Power-cuts can stop work (1)
- Machinery can be expensive and time consuming to repair (1)
- Continual development/upgrade of software/hardware required (1)

If the answer only includes advantages or only includes disadvantages, a maximum of **four** marks will awarded

Q9.

Two advantages described from:

- The file/program is created once (1) and can be used over and over again / easily repeated / no marking out required (1)
- Once tested and set up (1) there is no need for human intervention / human error / reduced labour costs (1)
- The machine can run 24/7 (1) which means greater output / efficiency (1)
- It is very accurate / every component will be the same size (1) which means rejects will be fewer / fewer mistakes / less material wasted / parts will fit / identical parts (1)
- Great detail can be achieved (1) which means complex shapes can be achieved (1)
- Little edge finishing is required (1) which means production time / secondary processing is reduced (1)
- Text / pictures (1) can be engraved onto the surface by adjusting laser power (1)
- Clean edges produced (1) leaves no sharp / jagged edges (1)
- Quick / fast process (1) so many items can be cut in a short amount of time (1)
- Identical components cut (1) because it is computer numerically controlled CNC machine (1)
- Adaptable process / power easily adjusted so it can cut different materials (1)

CAD related answers will not be accepted

Q10.

Accept any **three** stages in the CAM production process:

- Select type of CNC machine used (1)
- Design drawings transferred or downloaded to CNC machine (1)
- Setting up of acrylic workpiece (1)
- Setting of machine parameters (1)

Q11.

- Rapid prototyping has allowed companies the ability to develop and produce fully functioning prototypes without a huge financial investment in the manufacture of moulds or ancillary components (1)
- It has allowed for the design and manufacture of complex components that would have been prohibitive to manufacture traditionally (1)
- Rapid prototyping has removed the need for highly skilled manufacturers and tool makers as complex designs can be easily achieved without tooling (1)
- Traditional labour intensive manufacturing processes have been replaced by 3D printing that can run without supervision for extended periods of time without breaks or loss of concentration (1)
- A change in focus of manufacturers primary ability to work with physical materials to being competent to work in the field of CAD / CAM (1)
- A huge reduction in the lead time taken to design, produce, develop and test a physical product (1)
- The ability of a manufacturer to now perform many different techniques without the need to subcontract individual component parts out to specialist manufacturers (1)
- A reduction in the need for large industrial spaces and the investment in materials and machinery (1)
- The ability to create components from an ever-developing catalogue of material substrates (1)
- Rapid prototyping can be undertaken using a variety of substrates or materials (1)
- The move away from manufactures designing components around stock forms and sizes of material (1)