**Design & Technology**

**AQA GCSE** Logo

Description automatically generated with low confidence

**Production techniques and systems**

**Materials required for questions**

* Pencil
* Rubber
* Calculator

**Instructions**

* Use black ink or ball-point pen
* Try 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
* Try to answer every question
* Don’t spend too much time on one question

**Good luck!**

**Q1.** What is a **disadvantage** of using robots in production?

**A** Not as safe as human workers

**B** Not as flexible as humans

**C** Inexpensive set up costs

**Q2.** Why might a manufacturer choose a robot over a human worker?

**A** Able to repeat repetitive tasks

**B** Can perform multiple roles

**C** Cheap to maintain

**Q3.** CAD stands for?

**A** Computing and design

**B** Computer-aided diagram

**C** Computer-aided design

**Q4.** CAM stands for?

**A** Computer-aided modelling

**B** Computer-aided making

**C** Computer-aided manufacture

**Q5.** Sketching is used by designers to communicate information. Describe **one** advantage and **one** disadvantage of freehand sketching over computer aided design (CAD) drawing **(2 x 2 marks)**

**Q6.** Explain the importance of the efficient supply of materials and components in a Just In Time (JIT) manufacturing process **(6 marks)**

**Q7.** A virtual model of a new hockey stick has been created using CAD. Explain two reasons for creating a virtual model of a new hockey stick **(4 marks)**

**Answers**

**Q1**. B

**Q2**. A

**Q3**. A

**Q4**. C

**Q5.**

Advantages

* Freehand sketching can be done with simple equipment, eg a pencil and paper where CAD requires software and hardware which is more expensive.
* Cheap requiring only a pencil & paper =1
* Cheaper than Cad requiring only a pencil and paper and not a computer = 2
* Sketching can be done anywhere. With CAD drawing you need software and a PC etc.
* Quick and easy to add shade and tone to create a realistic effect. No need to use lots of PC power to complete a render etc.
* A sketched drawing can be completed in as little or as much time as you want to spend.
* A great way of recording new ideas quickly if you do not have access to a CAD package and computer.
* Freehand sketching does not require you to know how to use complex Cad software.
* Less susceptible to cyber-crime and theft.

Disadvantages

* Not as accurate = 1
* Drawings may be unclear if you are not very good at drawing, where you can be more precise drawing in a CAD package.
* A paper drawing can be damaged if it gets wet whereas you can save a CAD drawing electronically.
* You cannot share a sketched drawing like you can with CAD files where several people can access information at one time all around the world. • Cannot output sketch to machine for Cam directly • Storage space for physical drawing unlike a data file is larger.
* Mistakes can be expensive requiring a sketch to be redrawn whereas in CAD it is easy to edit or undo mistakes without restarting a piece of work.

**Q6.**

* Components are not stockpiled so scheduled deliveries must be on time to minimise disruption to manufacture
* Delay in deliveries will affect the productivity of the manufacture, in severe cases
* Limited storage is available so stock piles must be regularly topped up and maintained
* JIT manufacture allows for flexibility on the production line so customers’ orders must arrive on time and consistently in order to prevent down time
* Suppliers can be selected by proximity to the assembly plant to reduce travel time and disruption
* Machinery and layout in the factory should be optimised to allow for efficient delivery of components
* Stock is managed by computer systems
* RFID identification is used to track products through the factory and automatically select the correct parts to install and order stock when necessary

**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)