

Design & Technology

A-Level

Computer Aided Design

Multiple Choice

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
- Use a cross in the box to mark you 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. CAD stands for? – edexcel 2014

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

☐☐☐

Q2. CAM stands for? – edexcel 2014

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

☐☐☐

Q3. What is prototype? - bitesize

- A** A scaled-down model of a product
- B** A non-working model of the product
- C** A working model of a product made to
Test before production

☐☐☐

Q4. What is 3d printing a type of? - bitesize

- A** Computer-aided manufacture

☐

- B** Computer aided design ☐
- C** isometric drawing ☐

Q5. A schematic diagram is made up of what? - bitesize

- A** Vanishing points ☐
- B** Symbols ☐
- C** Perspectives ☐

Q6. What is a vanishing point? - bitesize

- A** A coordinate in CAM ☐
- B** A point on the horizon where all lines meet ☐
- C** A symbol on a circuit diagram ☐

Q7. Which of the following is the process called etching? – techstudent, aqa paper 3

- A** A prcoess whereby paint is sprayed onto the Surface of a material ☐
- B** A process that creates a long-lasting protective Coating on a metal ☐
- C** Acid is used to remove the unprotected surface Of a metal for a decorative finish ☐

Q8. Which one of the following processes involves dipping a metal into molten zinc? – made up

- A** Galvanising ☐

B Cathodic protection

☐

C Electroplating

☐

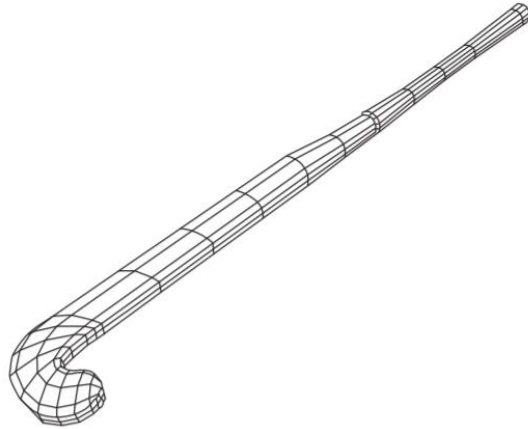
Q9. Three dimensional (3D) drawings communicate information in different ways to two dimensional (2D) drawings.

Describe two advantages 3D drawing has over 2D drawing. **(4 marks)**
– **aqg 2019**

Advantage 1:

Advantage 2:

Q10. The image below shows a virtual model of a new hockey stick.



Explain 2 reasons for creating a virtual model of a new hockey stick
(4 marks) – edexcel 2018

1.

2.

Q11. Discuss the advantages and disadvantages of using CAD for virtual modelling and testing designs **(6 marks)** – edexcel 2017

Q13. Describe 2 advantages of virtually modelling and testing the final design using CAD before starting manufacture **(4 marks)** – Edexcel 2013

1.

2.

Q14. A retailer has ordered a large number of wood based recycle bins. It has been decided to manufacture the bins using CAM, such as on a CNC router. To start with, the sides are drawn using CAD software.

Describe 6 advantages of using CAD and CAM in the manufacture of large numbers of this design of bin **(6 marks)** – tech student edexcel sample paper 1

Answers

Q1. C

Q2. A

Q3. C

Q4. A

Q5. B

Q6. B

Q7. A

Q8. B

Q9.

A maximum of 2 marks for each advantage

One mark for each correct advantage with a second mark awarded where response is clarified/ additional detail is provided

Indicative content:

This question is about drawing and about Cad.

1 mark responses:

- You can see at least 3 sides of the object drawn
- Drawing is more realistic
- Create an artist's impression of an object

2 mark responses:

- 3D drawing provides a more realistic view of how the drawn product might look in real life
- 3D drawing gives the viewer opportunity to imagine how the drawn product might feel when held/used
- 3D drawing can be used to create a perspective view of an object, eg 1, 2 or 3-point perspective
- Can be used to show how a product can be assembled, eg exploded drawings
- Makes it easier to understand how to assemble flat pack furniture as you can see how the different parts/components relate to each other.
- You can see at least 3 sides providing detail of sizes and proportion

Q10.

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)

2 x 1

2 x 1

Q11.

Indicative content

Discussion to address the following issues:

Advantages

- Can test weights/destructive testing
- Can simulate production times
- Calculate material costs
- Files can be transferred electronically
- Ideas easily edited/amended
- Library of standard components/stock size materials
- Anthropometrics/Ergonomic data accessed via databases
- Can be output to 3D printing
- Can view design from all angles
- Colours and textures can be changed easily
- Easily dimensioned for cutting lists
- No need to purchase modelling materials
- Reduced demand on resistant / compliant materials for modelling

Disadvantages

- High cost/expensive set up
- Highly skilled operative required / training issues
- Power-cuts can lose work/loss of files if not backed up
- Unable to physically test until prototype is produced
- Continual development/upgrade of software/hardware required
- Potential threat of hacking / cyber theft / ransom

(Cap marks at a maximum of 4 if candidates only present advantages or disadvantages and not both)

Q12.

Two ways described from:

- They are able to communicate (1) with designers / manufacturers / other retailers/ suppliers (1)
- It is cheaper for them to do a bulk mail shot via email (1) in comparison with normal post costs (1)
- It is quicker (1) which means they can send their information out faster than normal post/ internal departments (1)
- They are able to attach documents / order forms / special offers/ advertise (1) which means that they can target their mailing more specifically (1)
- They can send data files / spread sheets (1) to their accountant / do tax files (1)
- They can send CAD files (1) to manufactures in order to make prototypes / get prices (1)
- Internal communications (1) maintains/ keeps record of discussions/ requests/ decisions (1)

2 x 1

2 x 1

Q13.

Two advantages described from:

- Products can be coloured/textured (1) to show what they will look like in real life/viewed from all angles (1)
- Designs can be changed easily (1) without having to redraw the whole thing (1)
- Files can be sent electronically via email (1) which saves time and money (1)
- Electronic files can be linked to CAM machines (1) so that prototypes/models can be manufactured (1)
- Performance modelling can be carried out (1) to test to destruction/see how strong/safe it is (1)
- Reduce costs/saves money (1) as products do not need to be made for testing (1)
- Material dimensions / properties can be changed (1) to identify the areas where less / more material may be needed (1)
- All aspects are correct (1) before committing money which would be wasted if there were errors (1)
- Customer feedback can be gathered (1) to see if it would sell/market research (1)
- To see if individual pieces fit together (1) will reduce waste/materials/save time before manufacturing

2 x 1

2 x 1

Q14.

CAM

- CNC machines can be used continuously 24 hours a day, 365 days a year and only need to be switched off for occasional maintenance.
- CNC machines are programmed with a design which can then be manufactured hundreds or even thousands of times. Each manufactured product will be exactly the same.
- Less skilled/trained people can operate CNCs unlike manual lathes / milling machines etc.. which need skilled engineers.
- CNC machines can be updated by improving the software used to drive the machines
- Training in the use of CNCs is available through the use of 'virtual software'. This is software that allows the operator to practice using the CNC machine on the screen of a computer. The software is similar to a computer game.

- CNC machines can be programmed by advanced design software such as Pro/DESKTOP®, enabling the manufacture of products that cannot be made by manual machines, even those used by skilled designers / engineers.
- Modern design software allows the designer to simulate the manufacture of his/her idea. There is no need to make a prototype or a model. This saves time and money.
- One person can supervise many CNC machines as once they are programmed they can usually be left to work by themselves. Sometimes only the cutting tools need replacing occasionally.
- A skilled engineer can make the same component many times. However, if each component is carefully studied, each one will vary slightly. A CNC machine will manufacture each component as an exact match.

CAD

- The design can be simulated on the computer screen and mistakes can be corrected before real manufacturing takes place.
- To see if individual pieces fit together will reduce waste/materials/save time before manufacturing
- Customer feedback can be gathered to see if it would sell/market research
- Reduce costs/saves money as products do not need to be made for testing
- Material dimensions / properties can be changed to identify the areas where less / more material may be needed
- Designs can be changed easily without having to redraw the whole thing
- The recycle bin can be made by hand tools or very accurately using a computer controlled laser cutter or CNC Router.