

Design & Technology

AQA GCSE

Paper – 8552/W

2 hours

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!

100 marks

Section A – Core technical principles

Each of Questions 01 to 10 is followed by four responses, A, B, C and D.

For each question circle the appropriate answer.

Q1) What is the primary reason that many renewable energy technologies still depend on finite resources?

- A** They require rare earth elements for magnets and batteries
- B** Sunlight and wind are actually finite resources
- C** No non-finite resources are needed for their construction

Q2) How is electricity generated in a nuclear power plant?

- A** By burning uranium to produce steam
- B** By using nuclear fusion to directly create electricity
- C** By splitting uranium atoms to produce heat, which generates steam

Q3) Why are metal foams valuable in automotive design?

- A** They absorb impact energy while being lightweight
- B** They conduct electricity better than copper
- C** They change colour under stress

Q4) What material is best for a see-through phone case?

- A** Acrylic (PMMA)
- B** High impact polystyrene (HIPS)
- C** Polyethylene terephthalate (PET)

Q5) Which of the following is not an input for a system?

- A** Light sensors
- B** Pressure sensors
- C** Timers

Q6) Which lever has the fulcrum between the effort and the load?

- A** First-order lever
- B** Second-order lever
- C** Third-order lever

Q7) A ductile material is commonly described as one that

- A** Can be drawn into a long length
- B** Does not scratch easily
- C** Resists corrosion and oxidation

Q8) Which scenario exemplifies "market pull"?

- A** A pharmaceutical company developing mRNA technology
- B** Consumers demanding longer smartphone battery life
- C** Engineers creating a more efficient solar panel

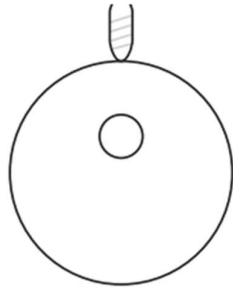
Q9) A company designs a smartphone with non-replaceable batteries to push users to upgrade sooner. Which ethical principle does this violate?

- A** Transparency – Failing to disclose the short lifespan
- B** User autonomy – Removing the right to repair
- C** Both of the above

Q10) A person needs to print 400 labels for a product. Each label covers 0.04cm^2 . A roll of labels covers 7cm^2 and cost £4.99. What is the cost to label all the products?

- A** £14.97
- B** £9.98
- C** £19.96

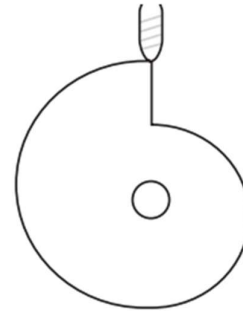
Q11) The image shows the profiles of three types of cam which all generate reciprocating motion in their respective followers.



Eccentric (circular) cam



Pear shaped cam



Snail cam

a) Describe the characteristic movement each cam generates in its follower

(i) Eccentric (circular) cam (2 marks)

(ii) Pear shaped cam (2 marks)

(iii) Snail cam (2 marks)

Q12) Nuclear energy is being considered as a possible major contributor to our future energy needs. Evaluate the use of nuclear energy for our future energy needs. **(4 marks)**

Section B – Specialist technical principles

Q13) Once a tree is felled, the timber is usually seasoned before it can be used.

Explain **two** advantages of using kiln seasoning in preference to natural seasoning. **(4 marks)**

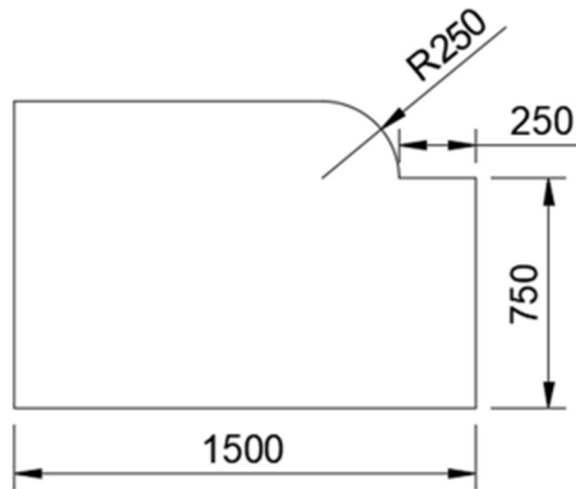
Q14) Describe two ways that a jig can be used to improve accuracy in manufacture. **(4 marks)**

Q15) The table identifies specific processes used to remove different materials and make sure materials are cut to a tolerance.

Choose one process from the table and, using notes and/or sketches, describe the process in detail. **(5 marks)**

Offset lithography	Casting	Extrusion	Flow soldering
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Q16.1) Some sheet metal is being cut for a car door. If the density of the metal is 2.8g/cm^3 and the metal is 6mm thick. What is the mass of the sheet metal?
All measurements are in mm. **(4 marks)**



Q16.2) The sheet metal costs £4.50 per kg, what is the total material cost for four car door panels. **(2 marks)**

[illegible]

Q18) One quality control test that would be used during volume production of the sprocket and crank arm is to check dimensional accuracy.



Outline three further quality control checks that could be carried out on the assembled sprocket and crank arm. **(3 marks)**

Section C – Designing and making principles

Q19) Give four advantages to the manufacturer of internet marketing. **(4 marks)**

1.

2.

3.

4.

Q20) The use of tolerances is an essential part of quality control systems within manufacturing. Explain two reasons why tolerances are set. **(4 marks)**

Q21) State two reasons why Danish oil is used as a surface finish for timber. **(2 marks)**

Q22) The image shows the interior of the electric car.



Q22.1) Evaluate the ergonomics of the interior. (4 marks)

Q22.1) Evaluate the aesthetics of the interior. (4 marks)

Q22.1 Evaluate the interior of the var with reference to user needs. **(4 marks)**

Q23.1) A designer is creating a cylindrical container for a new product. The container must hold 300 cm^3 of liquid. The radius of the base is 3 cm. Calculate the height of the container. **(3 marks)**

Q23.2) The designer wraps a label around the side of the can.
The label covers the curved surface only.

Calculate the area of one label, then work out the total area needed for 500 cans. **(4 marks)**

Q24) Choose a designer from of your choice.

Outline the design features and/or manufacturing techniques that have made your chosen designer successful. You should refer to specific products in your answer. **(6 marks)**

Q25) Designers often collaborate.

Discuss the importance of collaboration in creating effective design solutions.

Give examples to support your answer. **(6 marks)**

Q26) Give three safety checks which should be made prior to using a pillar drill. **(3 marks)**

1.

2.

3.

Q27) Identify and explain three features where anthropometrics has been used to inform the design. (3 x 2 marks)



1.

2.

3.

END OF PAPER