DTBase©

# 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 material is best for a see-through phone case?

**A** Acrylic (PMMA)

**B** High impact polystyrene (HIPS)

**C** Polyethylene terephthalate (PET)

**D** Polyvinylchloride (PVC)

**Q2)** Which of the following is not a process carried out by a system using a microcontroller?

**A** Counting

**B** Timing

**C** Decision making

**D** Sensing

**Q3)** 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 oxidisation

**D** Can be easily reshaped

**Q4)** A company designs a smartphone with non-replaceable batteries to push users to upgrade sooner. Which ethical principle does this violate?

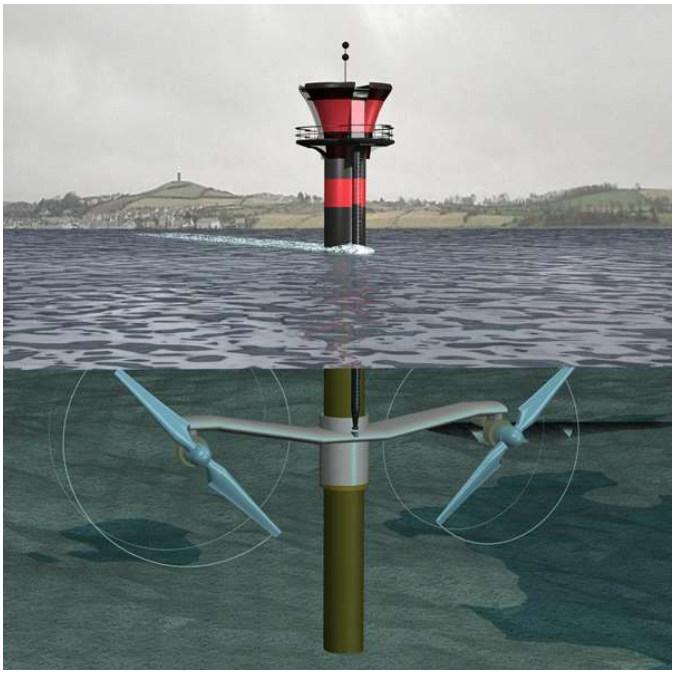
**A** User autonomy – Removing the right to repair

**B** Transparency – Failing to disclose the short lifespan

**C** Both of the above

**D** None of the above

**Q5)** Electricity is produced from which form of energy by the device shown below



**A** Wind

**B** Solar

**C** Tidal

**D** Hydro

**Q6)** Which type of follower translates motion with the most accuracy

**A** Point

**B** Knife

**C** Roller

**D** Flat

**Q7)** Which **one** of the following woods is a hardwood

**A** Larch

**B** Pine

**C** Spruce

**D** Beech

**Q8)** Which one of the following properties is a physical property

**A** Density

**B** Strength

**C** Malleability

**D** Elasticity

**Q9)** 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

**D** A research laboratory inventing a new biodegradable plastic without consumer demand

**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

**D** £14.46

**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)**

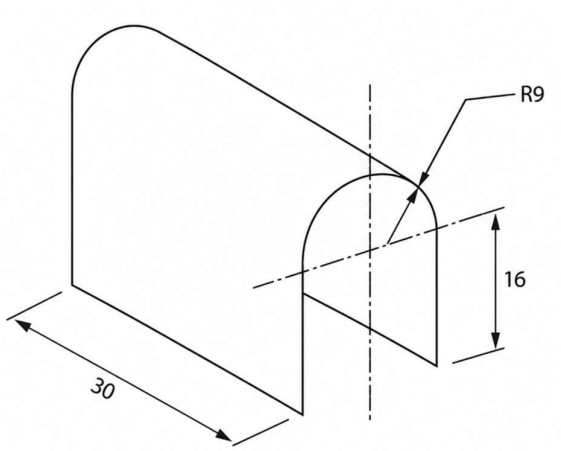
**(iii)** Snail cam **(2 marks)**

**Q12)** Many businesses are changing their manufacturing systems from inflexible automated machinery to Flexible Manufacturing Systems (FMS). Explain the implications of this change. **[4 marks]**

## Section B – Specialist technical principles

Answer all questions in this section.

**Q13) T**he image below shows a dimensioned drawing of one of the plywood sheets for the curved seat before it is cut into shape.




All dimensions in cm

Diagram not to scale

Circumference of a circle = πD

Use π = 3.142

Calculate how many of the plywood sheets shown in the image can be cut from a large flat sheet of plywood that measures 244 cm × 122 cm. Ignore the width of any saw cuts. **(5 marks)**

**Q14)** 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 |
|---|---|---|---|

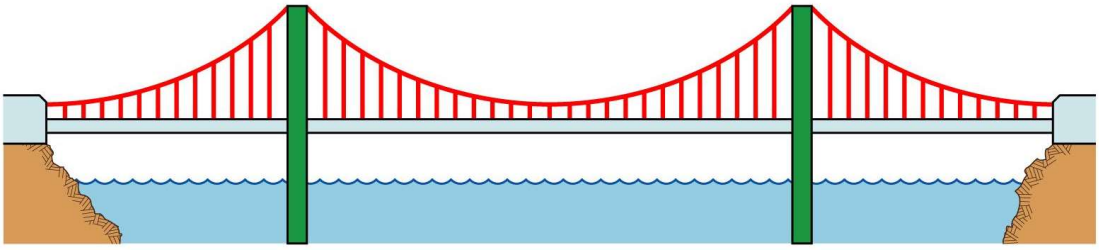
**Q15)** Describe two ways that materials and/or products are strengthened or reinforced. Give examples in your answer. **(2 x 2 marks)**

**Q16)** Describe how aesthetics influence the selection and choice of materials and components in manufactured products. Give an example in your answer. **(3 marks)**

**Q17)** Copper costs £4 per kg. Zinc costs £3.10 per kg. Copper and zinc are mixed in the ratio 4:1 to make brass. Work out the cost of 7 kilograms of brass. **(3 marks)**

**Q18)** Describe the methods used by manufacturers to conserve energy and materials during product development and manufacture. **(8 marks)**

**Q19)** Name two forces acting on the suspension bridge **(2 marks)**



## Section C – Designing and making principles

Answer all questions in this section.

**Q20.1)** Outline how designers make use of market research strategies when developing design concepts. **(4 marks)**

**Q20.2)** State two methods used when evaluating a prototype product. **(2 marks)**

**Q21)** The use of tolerances is an essential part of quality control systems within manufacturing. Explain two reasons why tolerances are set. **(4 marks)**

**Q22)** The image below shows a games controller

**Q22.1)** Designers have to prioritise form or function when designing products.

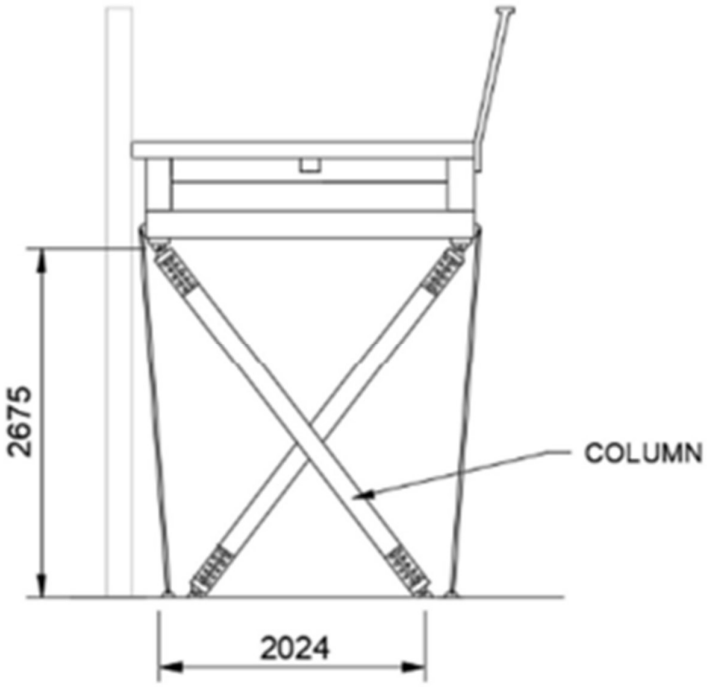
Discuss how the designer has balanced form and function in the design of the games controller. **(6 marks)**

**Q22.2)** Evaluate the controller in terms suitability for the user. **(6 marks)**

**Q23)** Designers often collaborate. Discuss the importance of collaboration in creating effective design solutions. Give examples to support your answer. **(6 marks)**

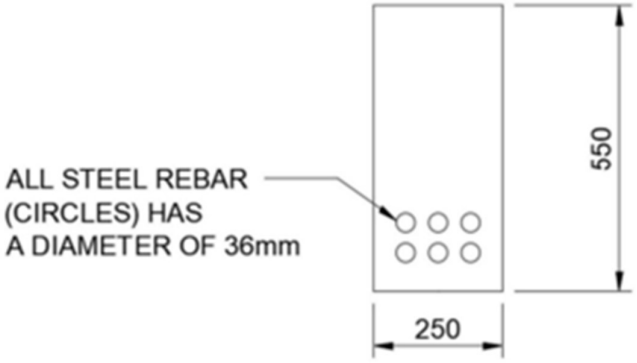
**Q24)** Describe three key characteristics of an effective design specification. **(3 marks)**

**Q25)** The image shows a design for a footbridge.

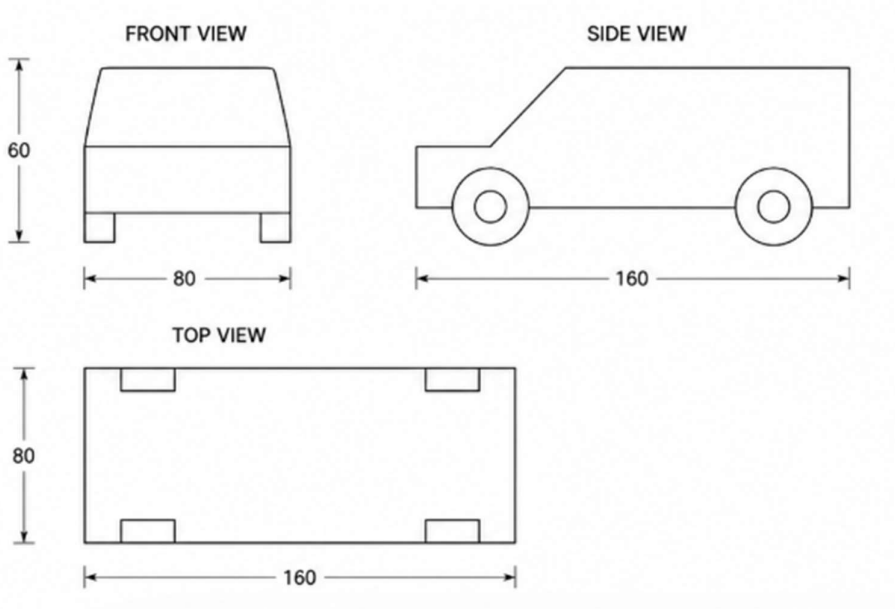



**Q25a)** Calculate the length of the column. All measurements are in mm **(3 marks)**

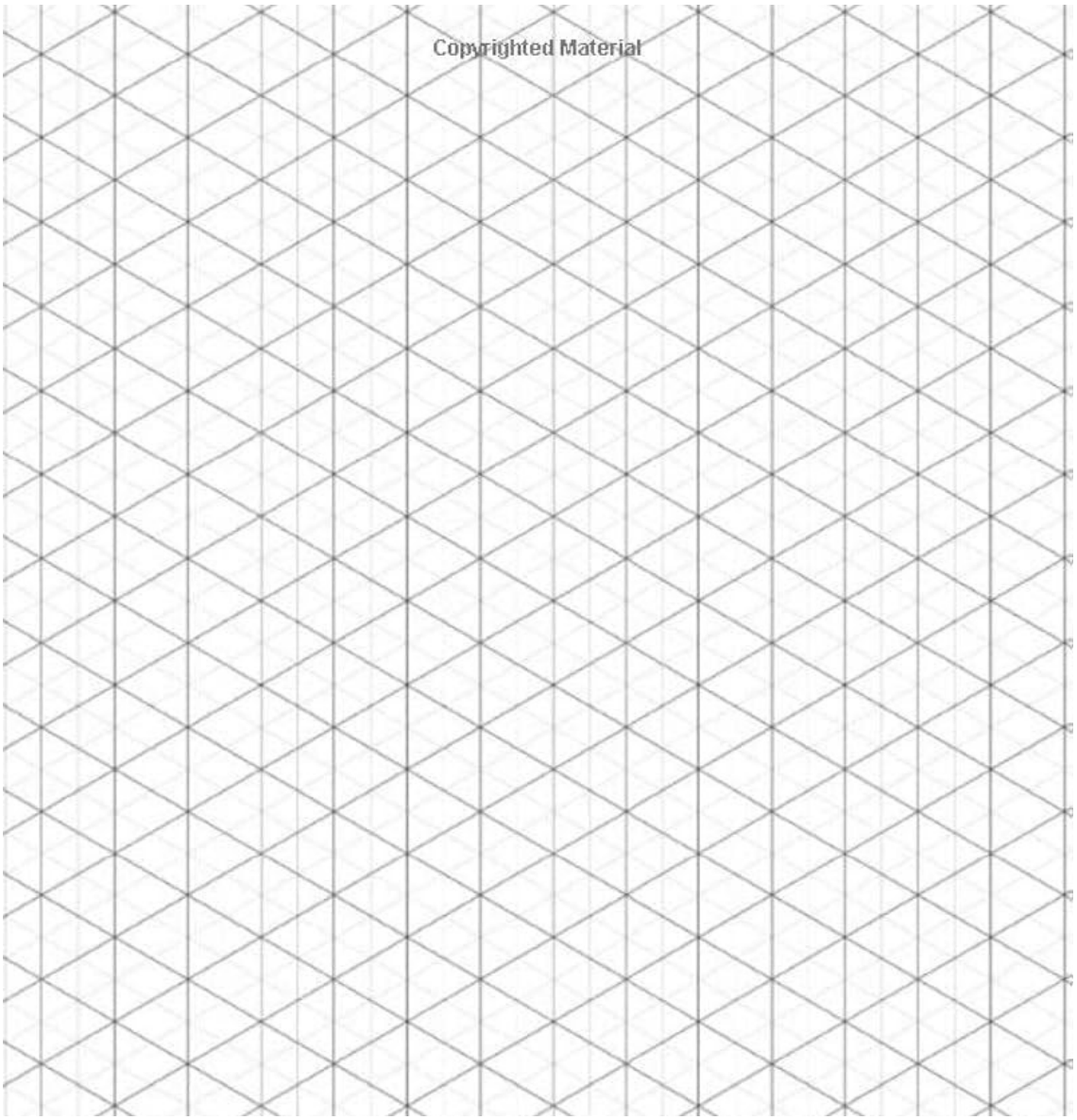
**Q25b)** Two reinforced concrete beams are designed to support the footbridge. The beams are 6m long and a of the beams is show below. What is the volume of concrete needed for both the beams. All measurements are in mm. **(4 marks)**




**Q26)** The image below shows a model car.



Complete the isometric for the car. **(4 marks)**



**Q27)** 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)**

**Q28)** Describe one method of 'quality control' that is used when making prototype products. **(2 marks)**

**END OF QUESTIONS**