

# **Design & Technology**

## **AQA GCSE**

# **Paper – 8552/W**

## **2 hours**

### **Materials required for questions**

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- Pencil
- Rubber
- Calculator

### **Instructions**

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- 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**

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- 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**

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## **Section A – Core technical principles**

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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

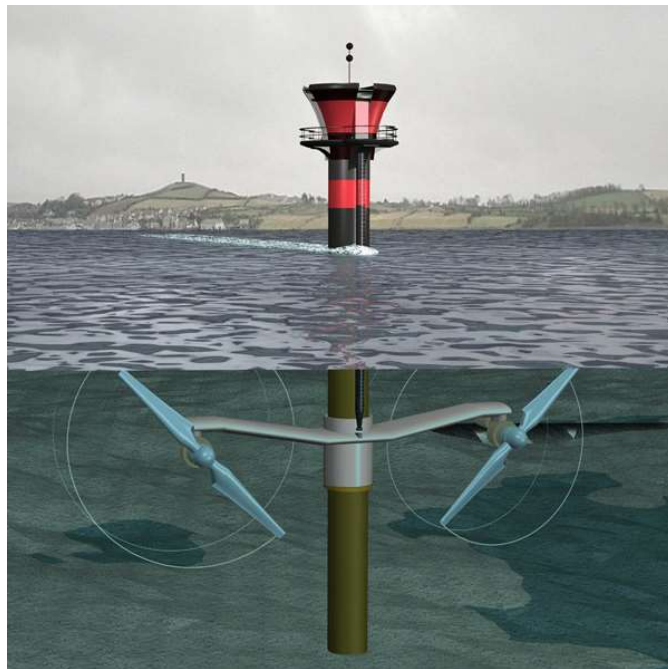
**Q3)** A ductile material is commonly described as one that

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

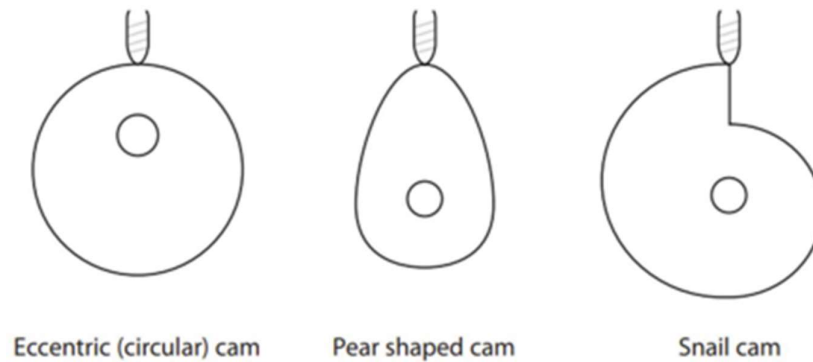
**Q9)** Which scenario exemplifies "market pull"?

- 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  $0.04\text{cm}^2$ . A roll of labels covers  $7\text{cm}^2$  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.



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

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

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**(ii) Pear shaped cam (2 marks)**

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

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**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]**

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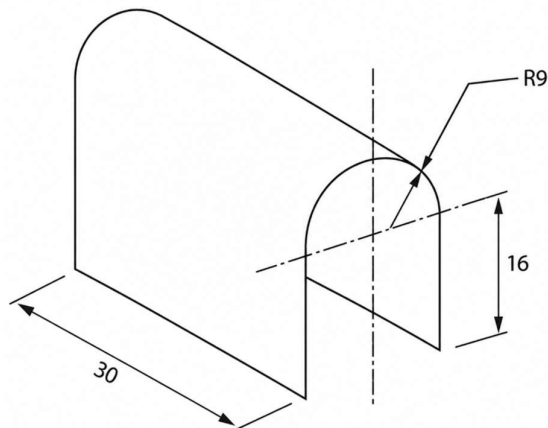
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## Section B – Specialist technical principles

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Answer all questions in this section.

**Q13)** The 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 =  $\pi D$

Use  $\pi = 3.142$

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)**

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

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**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)**

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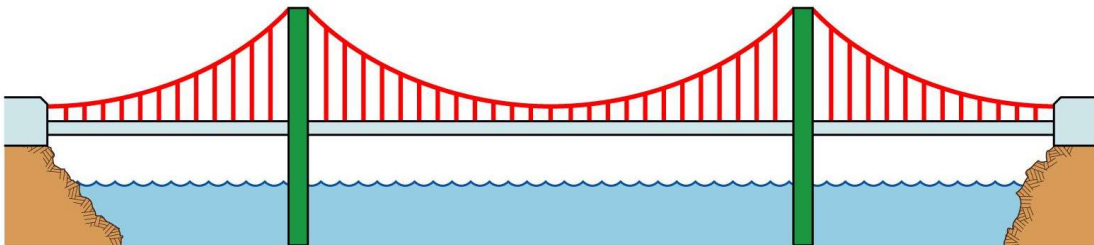
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**Q19)** Name two forces acting on the suspension bridge **(2 marks)**



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## **Section C – Designing and making principles**

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Answer all questions in this section.

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

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

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

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**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)**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

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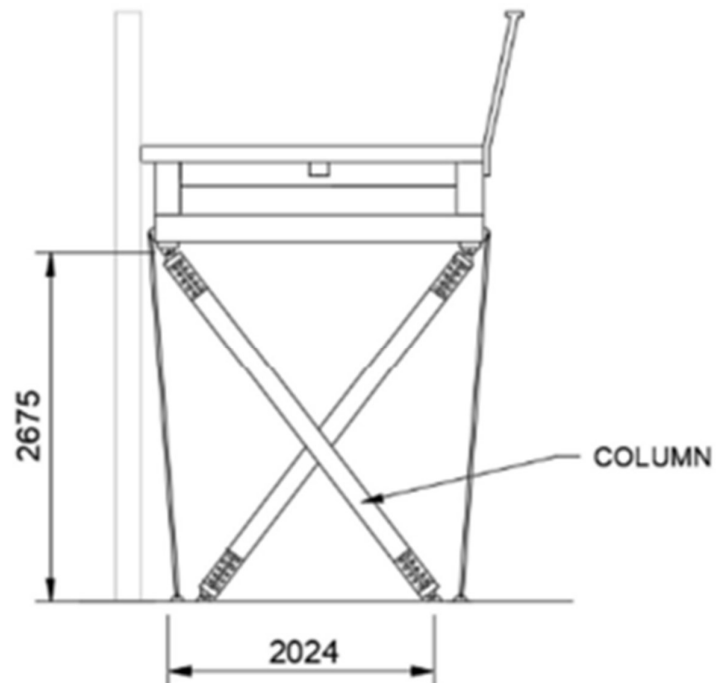
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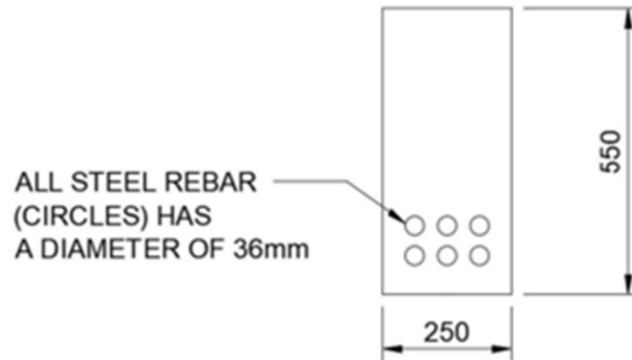
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**Q25)** The image shows a design for a footbridge.

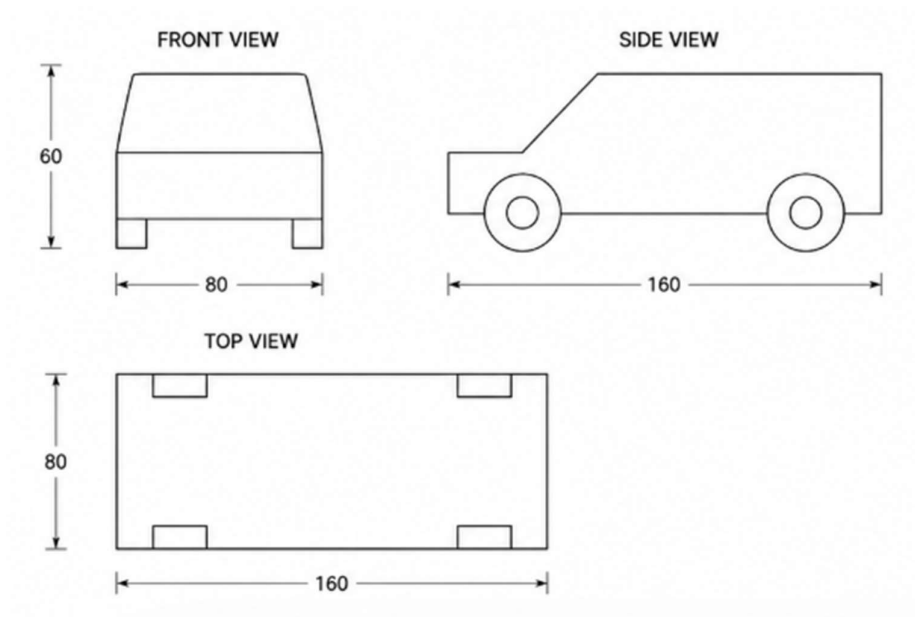


**Q25a)** Calculate the length of the column. All measurements are in mm (**3 marks**)

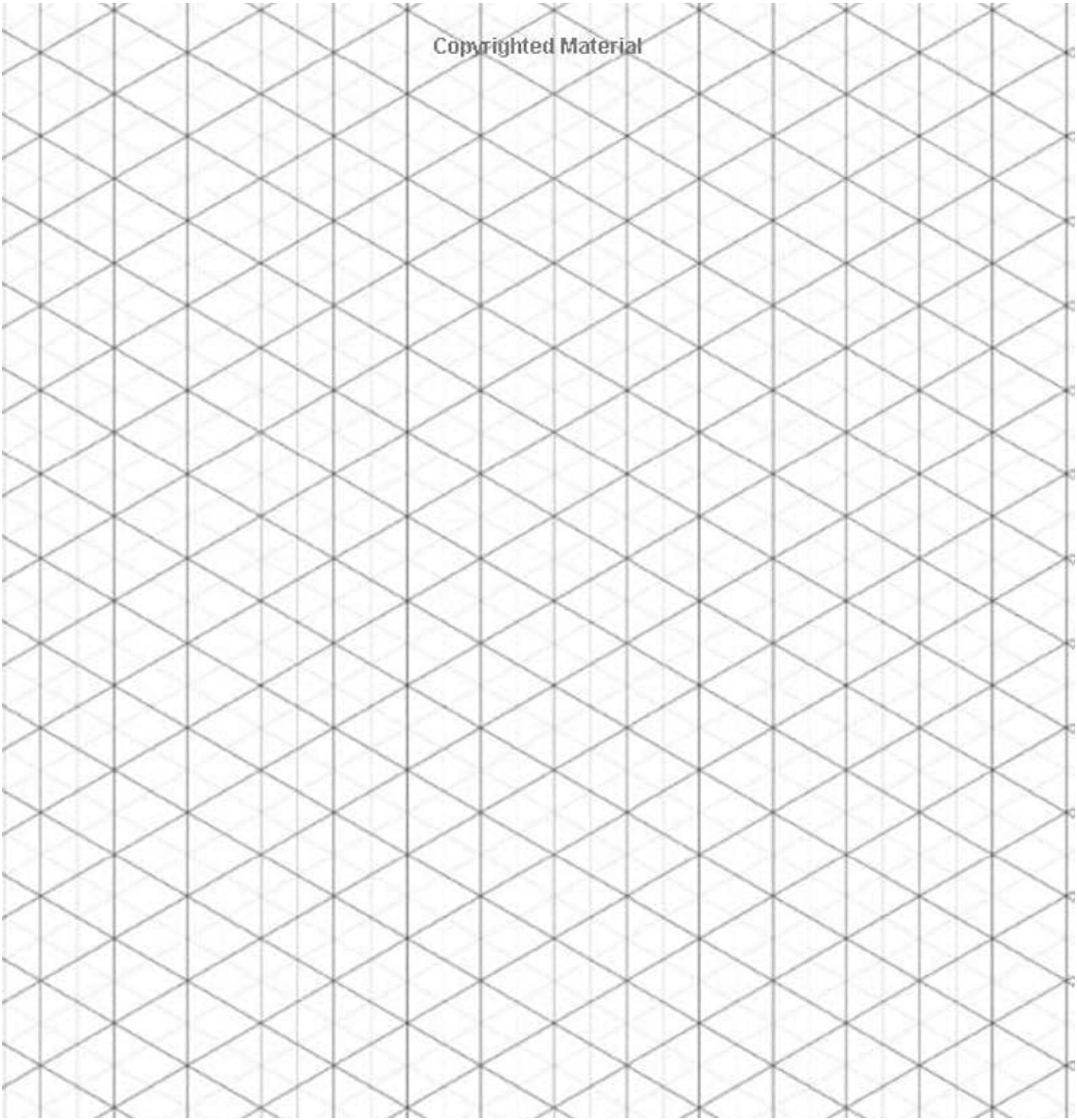
**Q25b)** Two reinforced concrete beams are designed to support the footbridge. The beams are 6m long and a of the beams is show below. What is the volume of concrete needed for both the beams. All measurements are in mm. **(4 marks)**



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



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



[illegible]

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

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**END OF QUESTIONS**