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Design & Technology
AQA A-Level

Methods for investigating and testing materials

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. In the Brinell hardness test, what type of indenter is typically used for metals?

A Diamond cone

B Tungsten carbide ball

C Ruby needle

Q2. When performing a tensile test, what critical step ensures accurate results before loading the specimen?

A Applying lubricant to the grips

B Submerging the sample in water

C Measuring the original cross-sectional area precisely

Q3. To practically test malleability in a workshop, what would you do?

A Hammer a metal sample into a thin sheet and check for cracks

B Scratch the surface with a diamond

C Hang weights until the material fractures

Q4. In a tensile test, the specimen must be pulled at a constant speed until fracture to ensure valid results.

A True

B False

Q5. Explain why industrial tests are more accurate than workshop tests when testing material properties **(2 marks)**

Q6. Describe how a specific industrial test is undertaken to measure material hardness **(4 marks)**

Answers

Q1. B
Q2. C
Q3. A
Q4. A

Q5.

- Workshop tests are comparative and harder to ensure that controlled variables are accurate.
- Industrial tests are more reliable and compared against a set scale or standardised test piece or material.
- Industrial testing machines are regularly calibrated to ensure accurate comparable results.

Q6.

Named test

- Named test – Rockwell / Brinell / Vickers

Reference to how the indentation is made

- Indenter could be a steel ball, diamond or pyramid
- Shaped indenter is preloaded on the test pieces surface
- Addition load is applied for a given time (dwell time)

Reference to measuring the indentation

- Load is removed and indentation measured
- The smaller the indentation the harder the material

Reference to comparison against a controlled sample or table of data

- The measurement of the sample indentation is compared to a controlled sample
- The measurement of the sample indentation is compared to a predetermined table of data.