**Design & Technology**

**AQA A-Level** Logo

Description automatically generated with low confidence

**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.