

OCR A-Level

Material Properties & Suitability (5.3a)

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. What word describes a material that can be drawn out into long thin wires?

- A** Malleable
- B** Ductile
- C** Brittle

Q2. Which property describes the ability of a material to withstand sudden and shock loading without fracturing?

- A** Toughness
- B** Hardness
- C** Malleability

Q3. A material that resists abrasive wear and indentation has which one of the following properties?

- A** Elasticity
- B** Hardness
- C** Plasticity

Q4. Shear strength is defined as:

- A** The ability of a material to return to its original shape once a deforming force is removed
- B** The ability of a material or joint to withstand being pulled apart
- C** The ability of a material to withstand being squashed

Q5. Describe two physical properties of gold (2 marks)

1.

2.

Q6. Define the following material properties (2 marks)

Thermal conductivity

Toughness

Q7. Define the following material properties (2 marks)

Malleability

Elasticity

Q8. Define the following material working characteristics (1 mark)

Hardness

Answers

Q1. B

Q2. A

Q3. B

Q4. B

Q5.

Gold:

- is an excellent conductor of electricity
- is an excellent conductor of heat
- is a particularly heavy metal with a high density
- has excellent resistance to corrosion

Q6.

Thermal conductivity

- A measure of how successfully heat energy can travel through a material.

Toughness

- A material's ability to absorb impact force without fracture.

Q7.

Malleability

- A material's ability to be permanently deformed or shaped by impact, rolling or pressing without cracking.

Elasticity

- A material's ability to be deformed and return to its original when the force is removed.

Q8.

Hardness

- is the ability of a material to resist abrasion/ scratching/indentation.

Q9.

Any two explanations that include a correct working property and a linked justification of why the property makes it a suitable material to use.

- Tough (1) so will resist impact / will not fracture / chip / break. (1)
- Hard (1) so will not scratch easily. (1)

- Smooth surface created during manufacture (1) which prevents foodstuffs from sticking / more hygienic / easy to clean (1).
- Will not corrode (1) so can be used in damp / wet conditions / will not contaminate food (1)
- Withstand high temperatures (1) so will not deform when in use / will not be damaged by hot items taken from the oven. (1)
- Chemical resistance / stain resistant (1) so can be cleaned with a range of cleaning fluids / materials / maintains aesthetics (1)

Q10.

Any three of the following points with a valid linked explanation:-

- Sufficient strength (1) to resist breaking (1)
- Plasticity / Malleability / flexibility (1) so the wire can bend and not snap. (1)
- Ductility (1) so the wire can be drawn out / stretches into long lengths during manufacture. (1)
- Fatigue (1) so the wire can be bent many times without fracturing (although it will fracture eventually). (1)
- Soft (1) making it easy to cut / trim to length (1)
- Creep resistant (1) so it resists being deformed under constant forces / connections will remain tight for long periods. (1)

Do not accept functional / physical properties such as good conductor, corrosion resistant, light weight, durable etc.