

Design & Technology

Eduqas GCSE

Ferrous and non-ferrous metals

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. Which property describes a metal's ability to be drawn out thin into wires?

- A** Malleability
- B** Ductility
- C** Hardness

Q2. What happens to a ferrous metal as its carbon content increases?

- A** It becomes softer and more ductile
- B** It becomes harder and more brittle
- C** It becomes non-magnetic

Q3. Which ferrous metal has 2.0% to 4.0% carbon and is used for vices and manhole covers?

- A** Cast iron
- B** Mild steel
- C** High carbon steel

Q4. Which metal is used for chisels, files and drill bits because it keeps a sharp edge?

- A** Aluminium
- B** Mild steel
- C** High carbon steel

Q5. Bronze is an alloy of copper and which other metal?

A Zinc

B Tin

C Iron

Q6. Which finish gives aluminium a hard protective oxide layer that can be dyed?

A Galvanising

B Anodising

C Lacquer

Q7. A traditional set of weighing scales used in the home is made from ferrous and non-ferrous metals.

Q7a. State the difference between ferrous and non-ferrous metals. **(1 mark)**

Q7b. Name one ferrous and one non-ferrous metal suitable for the manufacture of the weighing scales. **(2 marks)**

	Metal
Ferrous	
Non-ferrous	

Q8. This question is about alloys.

Q8a. Brass is an alloy. Identify the two primary metals that brass contains. **(2 marks)**

Q8b. Describe the term alloy. **(2 marks)**

Q8c. Describe one advantage of using an alloy. **(2 marks)**

Q9. This question is about aluminium.

Q9a. A cuff bracelet is made from aluminium. Identify two properties that make aluminium a suitable metal for the cuff bracelet. **(2 marks)**

Q9b. Unfinished aluminium can be affected by oxidation. Describe how oxidation affects the appearance of aluminium. **(2 marks)**

Q9c. Fizzy drinks cans are manufactured from aluminium. Give two advantages why this is a suitable material to use. **(2 marks)**

Q10. A tablet stand holds a tablet computer upright on a desk.

Q10a. State the most appropriate non-ferrous metal to make the tablet stand. **(1 mark)**

Q10b. Discuss the properties of the material stated in Q10a that make it suitable for the tablet stand. **(3 marks)**

Q11. This question is about non-ferrous metals.

Q11a. A necklace is made from copper and pewter, which are non-ferrous metals. Define the term non-ferrous. **(1 mark)**

Q11b. Other than copper and pewter, give one example of a non-ferrous metal suitable for jewellery. **(1 mark)**

Q11c. Explain how the properties of non-ferrous metals make them suitable for jewellery. **(2 marks)**

Q11d. A glass shelf clamp bracket is made from brass with a chrome plated finish. State why a chrome plated finish has been applied to the bracket. **(1 mark)**

Q12. Many products in the home are made from non-ferrous metals. Analyse the benefits of using non-ferrous metals when manufacturing bathroom fittings/products. **(5 marks)**

Answers

Q1. B

Q2. B

Q3. A

Q4. C

Q5. B

Q6. B

Q7a.

Ferrous metals contain iron and non-ferrous metals do not contain iron (1).

Q7b.

One mark for each correct example. Ferrous: cast iron, mild steel, wrought iron, stainless steel, tool steel. Non-ferrous: brass, aluminium, bronze, silver.

Q8a.

Copper (1) and zinc (1). Only acceptable responses.

Q8b.

An alloy is a mixture of at least two different metals (or a metal and another element) (1), mixed together to change the working properties of a material to suit a purpose or use (1). For example, brass is a mixture of copper and zinc.

Q8c.

An alloy combines the properties of the materials mixed together. Candidates may name an alloy (e.g. steel, brass, bronze, pewter, solder, sterling silver, duralumin) as an example. Advantages may include:

- Improves the working properties and characteristics of the material
- Corrosion resistance
- Better solderability
- More durable parts
- Lighter weight for the strength
- Thermal or electrical conductivity

Q9a.

One mark for each property, up to two: malleable, lightweight, corrosion resistant, non-toxic, low density, durable, high strength to weight ratio.

Q9b.

The surface becomes white (1) and loses its clean, shiny appearance (1). Unfinished aluminium reacts with oxygen (1), and the oxide forms a hard whitish surface (1). Accept dull, chalky, powdery grey, gritty or uneven.

Q9c.

1 mark for each reason, two required: aluminium is lightweight; it is recyclable; it does not rust; it can be drawn into shapes.

Q10a.

Aluminium (1). Only aluminium accepted.

Q10b.

1 mark for a benefit and 1 mark for a justification. A maximum of 2 marks for identifying properties without justification. For example: aluminium is malleable (1) and corrosion resistant (1), which helps to extend the life of the product (1). Other properties: lightweight, easily recycled, ductile.

Q11a.

Non-ferrous metals do not contain iron (1).

Q11b.

One mark for any of: aluminium, gold, silver, nickel, brass.

Q11c.

1 mark for a suitable property and 1 mark for explaining why it is suitable. For example: non-ferrous metals are very malleable (1), so can be shaped easily into a range of forms (1). They do not rust (1), so the jewellery keeps its appearance even in damp conditions (1). Do not accept answers about skin sensitivity.

Q11d.

1 mark for any of: protects the clamp from moisture which would cause corrosion; improves the aesthetics with a shiny silver finish; allows it to be cleaned easily; makes the surface harder so it is less likely to be damaged.

Q12. (5 marks)

Indicative content (not prescriptive):

- Non-ferrous alloys can be chrome or brass plated to suit customer preference
- They can be tailored/formed to the use of the product, e.g. taps and shower fittings
- Good resistance to wear and tear
- Fittings are usually copper alloys or aluminium alloys, as pure metals would not suit the purpose
- Less likely to corrode and may not need a protective finish, which matters in a bathroom where there is a lot of moisture
- Malleable, so ideal for the complex shapes of bathroom fittings

Band	Marks	Descriptor
3	4 to 5	A coherent answer with detailed, relevant knowledge and understanding of the advantages of non-ferrous metals for bathroom fittings. Relevant examples and a well-developed logical chain of reasoning, sustained throughout.
2	2 to 3	Some coherence, with partial knowledge and understanding. Mostly relevant examples and a logical chain of reasoning, which may not be sustained.
1	1	Basic knowledge and understanding. Limited relevant examples or logical reasoning.
0	0	Incorrect or irrelevant answers.