

Design & Technology

AQA A-Level

Metal finishing

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 metal finish involves applying a liquid paint that hardens upon exposure to air?

- A** Powder coating
- B** Cellulose paint
- C** Electro-plating

Q2. What is the purpose of galvanising a metal?

- A** To make it more flexible
- B** To prevent corrosion by applying a zinc layer
- C** To give it a shiny appearance

Q3. Which finishing process uses an electric current to deposit a metal coating?

- A** Dip coating
- B** Powder coating
- C** Electro-plating

Q4. What is the main purpose of using sealants on metals?

- A** To provide a waterproof barrier
- B** To increase electrical conductivity
- C** To change the metal's colour

Q5. Explain why anodising is an appropriate finish for an aluminium torch **(6 marks)**

Q6. Explain why galvanising is an appropriate finish for the low carbon steel scaffold shown below **(6 marks)**



Q7. Give three reasons why a product may have an anodised finish **(3 marks)**

1.

2.

3.

Q8. Explain why powder coating is an appropriate finish for the climbing frame shown below **(6 marks)**



Answers

Q1. B

Q2. B

Q3. C

Q4. A

Q5.

- The anodising enhances the natural oxide layer of the aluminium, increasing its hardness and toughness, allowing for the torch to resist scratching and wear associated with storage and use.
- The anodising process allows for a pigment or colour to be used which enhances the aesthetic of the torch.
- An anodised finish can be laser etched to allow the text and logos to be added to the torch, using the natural colour of the aluminium to provide clear contrast.
- Anodising protects the aluminium from further corrosion or oxidation.
- Anodising is an electroplating process which ensures that all surfaces of the components of the torch are evenly anodised.
- The thickness of the anodised coating is minimal which therefore doesn't affect any threaded components, or interfere with the knurled surface of the torch handle.
- The anodised finish is tough and hardwearing, requiring no maintenance during the lifespan of the torch.

Q6.

- The scaffold is a functional object, where aesthetics are not as important as function therefore the inconsistent galvanised patterned finish causes no issue.
- Galvanising protects the low carbon steel from corrosion. The galvanising process is hardwearing so will resist the scratching likely to occur from assembly, storage and transportation.
- The cathodic protective nature of galvanising means that the scaffold would continue to be protected even if damage did occur.
- The dip coating nature of galvanising means that the hollow steel structure of the scaffold is protected on all surfaces.
- Galvanising provides a zinc protective layer to the low carbon steel which provides cathodic protection for the base metal.

- Galvanising provides a surface finish that requires little or no maintenance allowing for extend use and reducing any ongoing costs to the scaffold user.

Q7.

- Anodising can increase the resistance to corrosion.
- Anodising can be used to add a pigment, colour, or decorative surface finish.
- Anodising increases the hardness of the aluminium product's surface.
- Anodising increases the toughness of the aluminium product's surface.
- Anodising can increase the resistance to wear when in contact with other materials

Q8.

- Powder coating provides a hard, durable finish which will resist the wear from children's shoes.
- Thicker coats can be achieved than feasible with liquid paint finishes.
- A wide range of colours are available, as pigments can be added.
- Powder coating will protect the frame from oxidising.
- Powder coating gives an even coat of material around cylindrical shapes.
- Overspray from the climbing frame can be recycled and reused.
- Powder coated finishes are less prone to fading from UV degradation due to the use of stabilisers.
- Powder coated finishes are less likely to chip than traditional paint finishes.
- Powder coated finishes are not affected by extremes of temperature found outdoors during summers and winters.