1. The photo below shows low carbon steel streetlights.

Select the most appropriate applied finish for the streetlight.

A Anodising ⬭

B Dip-coating ⬭

C Galvanising ⬭

D Pressure treating ⬭

(Total 1 mark)

2. Complete the table below to show the appropriate classification for each of the **four** metals by ticking (✓) the correct box. Only **one** answer per metal is allowed.

Metal	**Ferrous metal or ferrous alloy**	**Non-ferrous metal**	**Non-ferrous alloy**
Stainless steel			
Copper			
Bronze			
Low carbon steel			

(Total 4 marks)

3. Define each of the following material working characteristics:

Hardness _____

_____

_____

Toughness _____

_____

_____

(Total 2 marks)

4. (a) Name a suitable specific metal for the toaster body (part A).

_____

(1)

(b) Explain why this metal is suitable for the toaster body.

(6)

(Total 7 marks)

5. Explain the difference between ferrous and non-ferrous metals.

(Total 2 marks)

6. (a) Name a suitable specific polymer for Part A of the hairdryer.

(1)

(b) Briefly explain **three** reasons why this polymer is suitable.

(6)

(c) Name a suitable specific metal for Part B of the hairdryer.

(2)

(d) Give **two** reasons why this metal is suitable.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 13 marks)

7.

(a) Name a suitable specific metal for part A of the cup.

_____

(1)

(b) Briefly explain **three** reasons why this metal is suitable.

(6)

(c) Use notes and diagrams to explain how the metal part A could be manufactured.

(10)

(d) Name a suitable specific polymer for part B of the cup.

(1)

(e) Briefly explain **three** reasons why this polymer is suitable.

(6)

(Total 24 marks)

8. For each of the following materials, describe **two** relevant properties and, in each case, give a reason why it is useful for the product listed. Your answer should make reference to:

- Product function
- Product aesthetics
- product manufacture.

Material	**Product**
(a) Carbon Fibre Reinforced Polymer (CFRP)	Tennis racquet
(b) Concrete	Garden ornament
(c) Liquid Silicon Rubber (LSR)	Mobile phone cover / skin
(d) Beech	Chopping board
(e) Titanium	Wrist watch strap and casing

(a) Carbon Fibre Reinforced Polymer (Tennis racquet)

Property _____

Relevance to product _____

_____

_____

_____

Property _____

Relevance to product _____

_____

_____

_____

(4)

(b) Concrete (Garden ornament)

Property _____

Relevance to product _____

_____

_____

_____

_____

Property _____

Relevance to product _____

_____

_____

_____

_____

(4)

(c) Liquid Silicon Rubber (Mobile phone cover / skin)

Property _____

Relevance to product _____

_____

_____

_____

_____

Property _____

Relevance to product _____

_____

_____

_____

_____

(4)

(d) Beech (Chopping board)

Property _____

Relevance to product _____

_____

_____

_____

_____

Property _____

Relevance to product _____

_____

_____

_____

_____

(4)

(e) Titanium (Wrist watch strap and casing)

Property _____

Relevance to product _____

_____

_____

_____

_____

Property _____

Relevance to product _____

_____

_____

_____

_____

(4)

(Total 20 marks)

9.

(a) Name **three** ferrous and **three** non-ferrous metals by completing the table below.

Ferrous metals			
Non-ferrous metals			

(6)

(b) (i) For **one** of the metals you have named in part (a) give a suitable use.

Metal _____

Use _____

(1)

(ii) Give **two** reasons why this metal is suitable.

Reason 1 _____

_____

Reason 2 _____

_____

(2)

(Total 9 marks)

10. Match the finishes listed below to the materials and applications given.

A Galvanizing
B Dip coating polymer
C Chrome plating
D Acrylic based paint

In each case put the correct letter in the boxes on the right.
You must only use each finish once.

Material and application	**Finish**
Sheet mild steel waste bin for exterior use	
Cast brass bathroom taps	
Moulded polymer car bumper	
Forged steel pliers	

(Total 4 marks)

11. (a) Match the fabrication methods listed with the materials and applications given.

A Mortice and tenon
B Dovetail
C Spot welding
D Brazing

In each case put the correct letter in the boxes on the right.
You must only use each fabrication method once.

Material and application	Fabrication method
Joining mild steel sheet to make a box	
Joining tubular mild steel to make a frame for a chair	
Joining 50 × 50 mm section timber to make a frame for a table	
Joining 100 × 15 mm timber planks together to make a drawer	

(4)

(b) For **one** of the fabrication methods given in part (a), explain why it is used in the application you have indicated.

Fabrication method _____

Application _____

Reason for use _____

_____

_____

_____

(2)

(Total 6 marks)

12.

(a) Name a specific metal for the bench.

_____

(1)

(b) Explain in detail why the metal you have named in part (a) is suitable.

(6)

(Total 7 marks)

13. Name a ferrous metal and give **two** reasons why hardening has been used to improve its function in a specific product.

(Total 4 marks)

14. Compare and contrast the manufacture of the two mop buckets shown in **Figures 1** and **2**.

Figure 1

Figure 2

You should refer to each of the following in your answer:

- Benefits of the chosen manufacturing techniques
- Methods of assembly.

(Total 20 marks)

15. The diagrams below show a 70 mm long turned aluminium component.

The component has a volume of 200 000 mm^3.

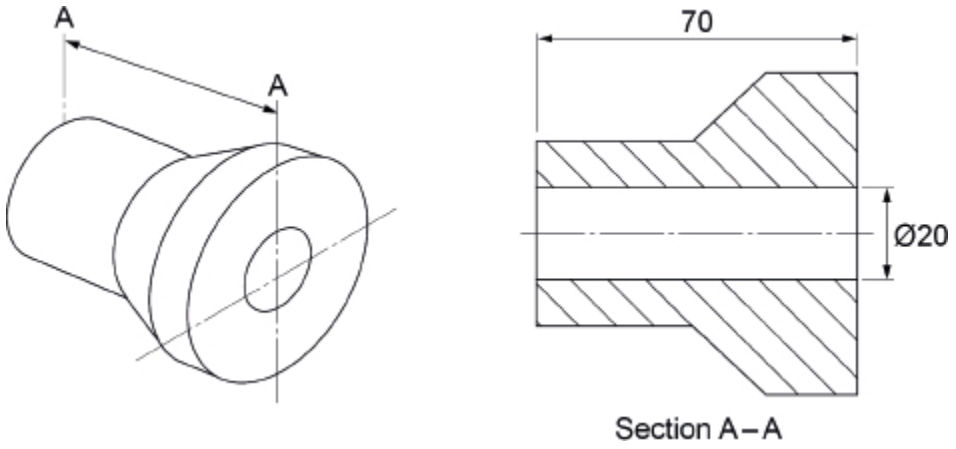
The diameter of the through hole is increased from 20 mm to 25 mm.

Work out how much aluminium is removed as waste as a percentage of the original component.

Give your answer to two decimal places. Show your working out.

All dimensions in mm

Not drawn to scale



Answer _____

(Total 5 marks)

16. (a) Name a specific metal for the sink.

_____

(1)

(b) Explain in detail why the metal you have named is suitable for the sink.

(6)

(c) Use notes and diagrams to explain in detail how the sink has been formed.

(8)

(Total 15 marks)

17. Match the following fabrication methods to the applications in the table below.

- Soldering
- Metal Inert Gas (MIG) Welding
- Electric Arc Welding

You should use each fabrication method **once** only.

Application	Fabrication method
Joining aluminium tube to aluminium tube to make a cycle frame	
Joining copper to copper to make jewellery	
Joining mild steel angle to mild steel angle to make a workbench frame	

(Total 3 marks)

18. Describe an economical way of batch producing the bench.
You should use notes and diagrams in your answer.

(Total 9 marks)