
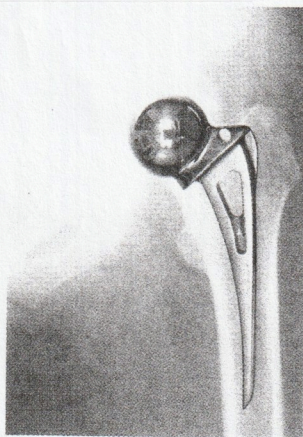



# METALS

## 1 Brainstorming

Work in pairs. Name all the metals you can think of. Compare your list with the other groups. Who has the longest list?

- 2  What kinds of materials do they use to make body implants, like artificial hips and knees? Listen and find out.



- 3  Listen again and make notes in the table.

	Advantages	Disadvantages
Steel		
Nickel		
Titanium		

- 4 Match these adjectives to their meanings.

- |              |  |
|--------------|--|
| 1 artificial | a not hard or firm   |
| 2 soft       | b able to last a long time                                     |
| 3 ductile    | c weakened or destroyed by chemical action, for example, rusty |
| 4 durable    | d easily broken, cracks easily                                 |
| 5 brittle    | e not natural, made by people                                  |
| 6 corroded   | f flexible, can bend repeatedly without breaking               |



## Vocabulary

Match the sentences.

- 1 This material doesn't burn or melt if you heat it.
- 2 This material doesn't break if you strike it or drop it.
- 3 You can't bend this material.
- 4 This material doesn't corrode if you put it in water.
- 5 You can't scratch this material or cut it.

- a) It's rigid.
- b) It's hard.
- c) It's tough.
- d) It's heat-resistant.
- e) It's corrosion-resistant.

Match the words with their opposites.

- |          |             |
|----------|-------------|
| 1 tough  | a) soft     |
| 2 hard   | b) heavy    |
| 3 rigid  | c) weak     |
| 4 strong | d) brittle  |
| 5 light  | e) flexible |

Complete the following sentences using *from*, *with* or *of*.

- 1 Bronze contains significant amounts of copper.
- 2 Galvanised steel is steel coated with zinc.
- 3 Steel is an alloy derived from iron.
- 4 Pure metals can usually be recovered from alloys.
- 5 To produce stainless steel, iron is mixed with other metals.
- 6 Stainless steel contains quantities of chromium and nickel.
- 7 Glass tableware contains traces of metals, such as lead.
- 8 When new metal is extracted from ore, the costs can be high.

## Listening exercises

1

**a** ▶ 24 Listen to a conversation about the properties of materials used in a specific type of tool and answer the following questions.

- 1 Where does the conversation take place?
- 2 What tool is being discussed?
- 3 Which materials can be used for its different parts?

**b** Complete the following extracts from the conversation using the properties in Exercise 8c. Listen again and check your answers.

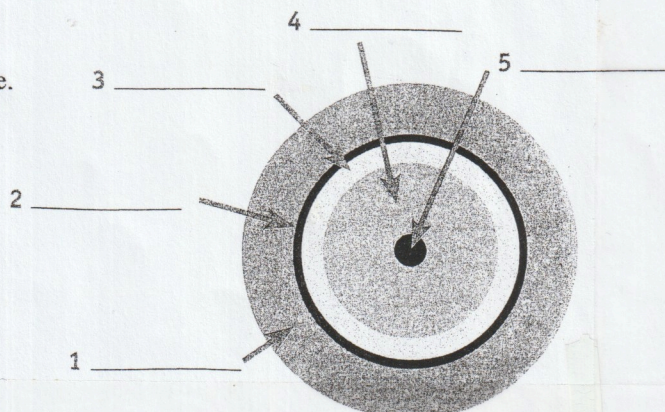
- 1 The handle mustn't be heavy. *Ideally, you want it to be* \_\_\_\_\_.
- 2 Resisting friction is essential. *The key requirement is* \_\_\_\_\_.
- 3 The bur has to be built to last. *Obviously, they need to be very* \_\_\_\_\_.
- 4 Heat builds up in the bur. *You need a good degree of* \_\_\_\_\_.

2

Margit, a sales engineer, is describing a high-voltage cable. Listen and label the cross-section with the parts and the materials used.

Match the parts of the cable to the following categories of materials. You will have to use some parts more than once.

1. non-metallic :
2. metallic :
3. ferrous metal :
4. non-ferrous metal :
5. polymer-based :



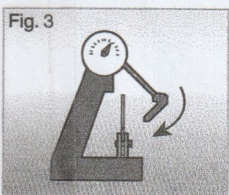
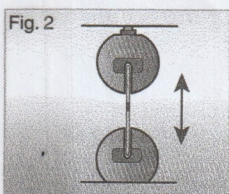
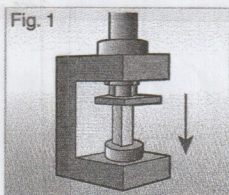


### Scan the table which follows to find a metal which is:

- malleable and conductive
- ductile and corrosion resistant
- strong and cheap
- grey and can be hardened
- used for the conductors in printed circuit boards
- used in aeronautics
- an alloy suitable for castings
- suitable for a salt-water environment
- used for general construction but needs to be protected from corrosion

Materials	Properties	Uses
<b>Metals</b>		
Aluminium	Light, soft, ductile, highly conductive, corrosion-resistant.	Aircraft, engine components, foil, cooking utensils
Copper	Very malleable, tough and ductile, highly conductive, corrosion-resistant.	Electric wiring, PCBs, tubing
Brass (65% copper, 35% zinc)	Very corrosion-resistant. Casts well, easily machined. Can be work hardened. Good conductor.	Valves, taps, castings, ship fittings, electrical contacts
Mild steel (iron with 0.15% to 0.3% carbon)	High strength, ductile, tough, fairly malleable. Cannot be hardened and tempered. Low cost. Poor corrosion resistance.	General purpose
High carbon steel (iron with 0.7% to 1.4% carbon)	Hardest of the carbon steels but less ductile and malleable. Can be hardened and tempered.	Cutting tools such as drills, files, saws

### Reading



### Materials-testing: destructive tests

The purpose of the tensile strength test (Fig. —) is to discover whether a material will *deform* (change shape) or break when it is pulled apart. The material is secured with two clamps, one at each end. The clamps are pulled apart with a specified force. The *yield point* (the point where the material deforms) and/or the *breaking point* (the point where the material breaks) is measured. This measurement shows you the tensile strength of the material.

The aim of the impact-resistance test (Fig. —) is to find out whether a material will bend or break when it is struck with force. The bottom of the material is

placed in a clamp, so that it stands vertically. A hammer strikes the material with a specified force. The yield point and/or the breaking point is measured. This indicates the impact resistance of the material.

The objective of the compressive strength test (Fig. —) is to find out if a material will deform or break when it is compressed. The material is secured in a clamp between a fixed head and a moving head. The moving head presses down on the material and the load is increased. The yield point and/or the breaking point are measured. This indicates the compressive strength of the material.

4 Divide each paragraph in 3 into three sections. Use these headings.

- Objective
- Procedure
- Result