Metals and alloys

Unit 3 · Materials · matches the "Metals and alloys" lesson slides (about 60 minutes)

Teacher notes for someone teaching this lesson without a Design and Technology background, including a cover or supply teacher standing in for the usual class teacher.

IF YOU ONLY DO ONE THING (RUSHED COVER LESSON)

If you only do one thing: make sure every pupil can say what "Ferrous" means in their own words before the lesson ends. Metals containing iron; most are magnetic and can rust. Ask two or three pupils to explain it back to you - do not just ask "does that make sense?".

Key facts in plain language

These are the facts this lesson depends on. They are written in plain English, not subject jargon, so you can say them in your own words while you teach.

Ferrous:
Metals containing iron; most are magnetic and can rust.

Non-ferrous:
Metals with no iron, such as aluminium and copper.

Alloy:
A mixture of a metal with other elements to improve properties.

Ductility:
The ability to be drawn out into wire.

Common misconceptions

Drawn from the wrong answers pupils pick in this lesson's own question bank, paired with the explanation that is already written for the right answer.

Pupils may think: "Copper" is correct.
Why it is wrong: the correct answer is "Mild steel". Mild steel contains iron.

Pupils may think: "It is very hard, so it resists bending" is correct.
Why it is wrong: the correct answer is "It is an excellent conductor and ductile". Copper conducts well and can be drawn into thin wire.

Pupils may think: "Iron and carbon" is correct.
Why it is wrong: the correct answer is "Copper and zinc". Brass is copper and zinc. Copper and tin make bronze, and iron and carbon make steel.

Pupils may think: "It is denser than steel, so cans are stronger" is correct.
Why it is wrong: the correct answer is "It is light, corrosion-resistant and recyclable". Aluminium can be recycled again and again with big energy savings.

Pupils may think: "Zinc" is correct.
Why it is wrong: the correct answer is "Chromium". Chromium forms a protective oxide layer. Zinc is used to galvanise steel instead.

Talking points to follow the slide deck

The slide deck for this lesson follows the usual DT Classroom shape: a retrieval starter, then each key term below in turn, worked examples, exam-style practice, then an exit ticket. Use these lines as you reach each part - they are the same facts as above, just phrased as something you can say out loud.

When the deck reaches "Ferrous": say — Metals containing iron; most are magnetic and can rust. Ask: "can someone give me an example?"

When the deck reaches "Non-ferrous": say — Metals with no iron, such as aluminium and copper. Ask: "can someone give me an example?"

When the deck reaches "Alloy": say — A mixture of a metal with other elements to improve properties. Ask: "can someone give me an example?"

When the deck reaches "Ductility": say — The ability to be drawn out into wire. Ask: "can someone give me an example?"

Worked answers to this lesson's questions

The same question bank used for this lesson's knowledge organiser self-check and worksheet exam practice. Use this page as the answer key, or cover the right-hand explanation and hand out the questions as a silent task (see the cover lesson box below).

1. Which metal is ferrous?

a) Copper, b) Brass, c) Mild steel, d) Aluminium

Answer: c) Mild steel. Mild steel contains iron.

2. Why is copper used for electrical wires?

a) It is very hard, so it resists bending, b) It is an excellent conductor and ductile, c) It is the cheapest metal to produce, d) It is magnetic, which helps current flow

Answer: b) It is an excellent conductor and ductile. Copper conducts well and can be drawn into thin wire.

3. Brass is an alloy of…

a) Copper and zinc, b) Iron and carbon, c) Aluminium and copper, d) Copper and tin

Answer: a) Copper and zinc. Brass is copper and zinc. Copper and tin make bronze, and iron and carbon make steel.

4. Why is aluminium used for drinks cans?

a) It is denser than steel, so cans are stronger, b) It is light, corrosion-resistant and recyclable, c) It is magnetic, so cans are easy to sort, d) It is a hard ferrous metal that resists dents well

Answer: b) It is light, corrosion-resistant and recyclable. Aluminium can be recycled again and again with big energy savings.

5. Stainless steel resists rusting because it contains…

a) Chromium, b) Zinc, c) Carbon, d) Copper

Answer: a) Chromium. Chromium forms a protective oxide layer. Zinc is used to galvanise steel instead.

READY-TO-RUN COVER LESSON

Project the existing lesson slides as normal; read the key facts and talking points above before the lesson starts.

Low-prep silent task (needs no workshop tools or machinery): write or display the numbered questions above without the "Answer:" line, and have pupils answer them in silence on paper. Mark from the answers above at the end, or next lesson.

If the lesson plan calls for tools, machinery, heat or anything hands-on, do not run that part as a non-specialist cover teacher - set the silent task above instead and leave the practical for the subject teacher. See the general workshop safety guide in the Teachers hub.