Composite materials and technical textiles

Unit 2 · Energy, materials, systems and devices · matches the "Composite materials and technical textiles" lesson slides (about 60

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 "Composite" means in their own words before the lesson ends. Two or more materials combined to give better properties than each alone. 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.

Composite:
Two or more materials combined to give better properties than each alone.

GRP:
Glass-reinforced plastic: glass fibres in a resin, used for boat hulls.

CFRP:
Carbon-fibre-reinforced plastic: very strong and light, used for bikes and racing cars.

Kevlar:
An aramid fibre five times stronger than steel by weight, used in body armour.

Gore-Tex:
A breathable, waterproof membrane: lets sweat vapour out, keeps rain out.

Conductive fabric:
A textile woven with conductive threads so it can carry electricity.

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: "A material that reacts to changes in its surroundings" is correct.
Why it is wrong: the correct answer is "Two or more materials combined for better properties". A composite combines distinct materials, for example glass fibres in resin give GRP its strength and lightness. A metal mixture is an alloy.

Pupils may think: "It is cheap and easy to mass produce" is correct.
Why it is wrong: the correct answer is "It is very stiff and strong but light". High strength-to-weight ratio makes bikes fast and stiff.

Pupils may think: "It is waterproof yet lets sweat vapour out" is correct.
Why it is wrong: the correct answer is "Very high tensile strength and impact resistance". Kevlar fibres absorb and spread impact energy.

Pupils may think: "It is fire-resistant for camp cooking" is correct.
Why it is wrong: the correct answer is "It is waterproof yet breathable". Tiny pores stop water drops but let water vapour escape.

Pupils may think: "A polyester-cotton school shirt" is correct.
Why it is wrong: the correct answer is "Fire-resistant Nomex for firefighters". Technical textiles are engineered for performance, such as fire resistance.

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 "Composite": say — Two or more materials combined to give better properties than each alone. Ask: "can someone give me an example?"

When the deck reaches "GRP": say — Glass-reinforced plastic: glass fibres in a resin, used for boat hulls. Ask: "can someone give me an example?"

When the deck reaches "CFRP": say — Carbon-fibre-reinforced plastic: very strong and light, used for bikes and racing cars. Ask: "can someone give me an example?"

When the deck reaches "Kevlar": say — An aramid fibre five times stronger than steel by weight, used in body armour. Ask: "can someone give me an example?"

When the deck reaches "Gore-Tex": say — A breathable, waterproof membrane: lets sweat vapour out, keeps rain out. Ask: "can someone give me an example?"

When the deck reaches "Conductive fabric": say — A textile woven with conductive threads so it can carry electricity. 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. What is a composite material?

a) A material that reacts to changes in its surroundings, b) A metal mixed with other elements to improve it, c) A plastic made from renewable plant-based feedstock, d) Two or more materials combined for better properties

Answer: d) Two or more materials combined for better properties. A composite combines distinct materials, for example glass fibres in resin give GRP its strength and lightness. A metal mixture is an alloy.

2. Why is carbon fibre (CFRP) used for racing bike frames?

a) It is cheap and easy to mass produce, b) It is tough and absorbs impact like rubber, c) It can be welded easily if it cracks, d) It is very stiff and strong but light

Answer: d) It is very stiff and strong but light. High strength-to-weight ratio makes bikes fast and stiff.

3. What property makes Kevlar suitable for body armour?

a) It is waterproof yet lets sweat vapour out, b) It is very heavy, so it stops bullets by its mass alone, c) Very high tensile strength and impact resistance, d) It conducts electricity to power sensors

Answer: c) Very high tensile strength and impact resistance. Kevlar fibres absorb and spread impact energy.

4. Why is Gore-Tex used in walking jackets?

a) It is fire-resistant for camp cooking, b) It is waterproof yet breathable, c) It is heavy, so it traps body heat, d) It changes colour to warn of cold

Answer: b) It is waterproof yet breathable. Tiny pores stop water drops but let water vapour escape.

5. Which is an example of a technical textile?

a) A polyester-cotton school shirt, b) A knitted wool scarf, c) Fire-resistant Nomex for firefighters, d) A cotton tea towel

Answer: c) Fire-resistant Nomex for firefighters. Technical textiles are engineered for performance, such as fire resistance.

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.