**Design & Technology**

**Composites**

**Materials required for questions**

* Pencil
* Rubber
* Calculator

**Instructions**

* Use black ink or ball-point pen
* Try to 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
* Don’t spend too much time on one question

**Good luck!**

**Q1.** GRP is a combination of which materials?

**A** Glass fibre and resin

**B** Wood fibre and resin

**C** Carbon fibre and resin

**Q2.** Kevlar is a material that has which of these properties?

**A** Strong and resistant to impact

**B** Soft and resistant to spills and stains

**C** Conductive and resistant to fire

**Q3.** Which of these is a large sheet-based composite?

**A** ABS

**B** CRP

**C** MDF

**Q4.** What material is added to concrete to give it better tensile strength?

**A** Steel rods

**B** Glass fibres

**C** Aggregate/stone

**Q5.** What are two mechanical properties of plywood?

**A** Uniform strength and toughness

**B** Lightweight and dimensionally stable

**C** Strength and Hardness

**Q6**. What is a suitable composite material for the body of a Formula 1 car?

**A** GRP

**B** GRC

**C** Lightweight ceramic

**Q7.** What is CFRP

**A** Carbon fibre resin polymer

**B** Cement fibre reinforced plastic

**C** Carbon fibre reinforced polymer

**Q8.** What gives plywood such good strength?

**A** The repeating perpendicular grain

**B** The softwoods used in the layers

**C** The hardwoods used in the layers

**Q9.** Explain the meaning of ‘composite material’ **(2 marks)**

**Q10.** Name **two** suitable wood composite materials that could be used for the web of a wooden L-beam **(2 marks)**

1.

2.

**Q11.** Name the **three** different types of composites and give an example of each **(6 marks)**

**Q12.** Describe **two** techniques for strengthening **or** reinforcing products and/or materials.

Give examples in your answer **(4 marks)**

1.

2.

**Q13**. A Kayak is to be made from GRP.

**Q13a**. Name a polymer used in the GRP Kayak (**1 mark)**

**Q13b**. Describe the procedures involved in creating a glass reinforced plastic (GRP) moulding. **(6 marks)**

**Answers**

**Q1.** A

**Q2.** B

**Q3.** C

**Q4.** A

**Q5.** A

**Q6.** A

**Q7.** C

**Q8.** A

**Q9.**

* A mix of two of more materials (1)
* To produce a material with enhanced properties (1)

**Q10.**

* Plywood (1)
* Medium density fibreboard (MDF) (1)
* Blockboard (1)
* Laminboard (1)
* Chipboard
* Particle board (1)

**Q11.**

* Fibre-based composites (1) – GRP/CFRP (1)
* Particle-based composites (1) – Reinforced concrete/Cement (1)
* Sheet-based composites (1) – Plywood/MDF (1)

**Q12.**

* To make plywood stronger, it is built up in layers (1)
* Different directions of grain are used when laying down the layers of plywood (1)
* By doing this, the grain's weak lines of the grain are reinforced (1)
* Reinforced concrete is used in many construction projects due to its strength (1)
* Reinforced concrete is a more suitable building material because it combines the compressive strength of concrete and the tensile strength of steel (1)
* An interfacing can be used to stiffen a cotton shirt's collar (1)
* Fabrics can be stiffened and strengthened by laminating them (1)
* Cardboard layers with a corrugated middle layer are used to create corrugated cardboard. This makes the material stronger (1)
* Corrugated card structural pieces, such as a wine carrier, are used to reinforce packaging. This separates the products using internal pieces (1)

**Q13a.**

* Polyester resin (1)
* Epoxy resin (1)
* Polyurethane resin (1)

**Q13b.**

* Create the mould (1)
* Coat the mould with a wax, polish, or release agent (1)
* Gel coat and resin mixed (1)
* Gel or resin coat application (1)
* Spray or add a layer of glass fibre (1)
* Incorporate a layer of resin or work resin into the first layer of glass fibre (1)
* Allow to set or cure (1)
* Take away and trim (1)