Materials Question

1 (b) A typical bicycle is shown in **Figure 2**.

Figure 2

1 (b) (i) Name a suitable specific material for **one** of the following wheel parts:

- Wheel rims
- Wheel spokes
- Wheel hubs.

[1 mark]

Wheel part .....

Suitable material .....

1 (b) (ii) Explain why the material you have chosen in part (b)(i) would be suitable for a bicycle wheel.

[2 marks]

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1 (b) (iii) Identify a suitable material for handlebar grips.

[1 mark]

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1 (b) (iv) Explain why the material you have chosen for handlebar grips would be suitable.

[2 marks]

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1 (c) Modern bicycle frames are often manufactured from composite materials. Explain the advantages and disadvantages of using composite materials.

Quality of Written Communication will be assessed in your answer.

[6 marks]

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Answers

Question	Part	Sub Part	Marking Guidance	Mark	Comment
			• Creates tension in a cable in order to apply friction to brake pads. **[1 mark per point made Max 2]**		
1	b	i	**Name a suitable specific material for one of the following** **Wheel rims** **Wheel spokes** **Wheel hubs** Answers such as: • Aluminium • Aluminium alloy • Composite such as carbon fibre or carbon Kevlar • Thermoset Polymers • Steel or steel alloys • Titanium **[1 mark]**	1	No generic terms such as metal, composite or plastic.
1	b	ii	**Explain why the material you have chosen in part Q1(b)(i) would be suitable for a bicycle wheel.** Explanation including two points such as: • Can be fabricated/formed into complex shapes • Correct reference to chosen material properties such as lightweight/durable/resistant to weather • A range of finishes can be applied • Good strength/stiffness as a material property **[1 mark per point made Max 2]**	2	
1	b	iii	**Identify a suitable material for the handlebar grips.** Answers such as: • Rubber (synthetic or natural)	1	Don't accept Nylon, Thermoset or thermoplastic or generic materials.

Question	Part	Sub Part	Marking Guidance	Mark
			• Neoprene • Elastomer • Polymer • Polyurethane tape • Silicon **[1 mark]**	
1	b	iv	**Explain why the material chosen in Q1(b)(iii) would be suitable for the handlebar grips.** **Accept suitable responses within the context of the material stated** Explanation including two points such as: • Easily moulded/shaped • Durable • Comfort • Grip • Resistant to moisture/sweat • Can be personalised/coloured • Mention of ergonomics or anthropometrics **[1 mark per point made Max 2]**	2 **6 MARKS**
1	c		**Modern bicycle frames are increasingly manufactured using composite materials. Explain the advantages/disadvantages of using composites over traditional materials.** **Quality of Written Communication will be assessed in your answer.** Up to 3 marks available for technical content such as: advantages • Lightweight	6

Marking Guidance

- High strength to weight ratio
- Composites can be moulded/laid-up into complex shapes
- Composites can be constructed to allow maximum strength in certain planes/axis (compression/tension)
- Decorative/aesthetically pleasing
- Self-finishing

disadvantages

- Time consuming to manufacture
- Expensive
- Higher level of skill required to manufacture
- More difficult to repair if damaged
- Cannot be recycled

[MUST discuss both adv and DisAdv. 1 mark per point up to a maximum 2 marks from adv and 2 marks from disadv. Max 3]

plus

Up to 3 marks available for command of English.

- **Some attempt made (1)**
- **Logical, structured answer possibly with some punctuation and grammar inaccuracies. (2)**

Technically correct and well punctuated in good flowing English (3)