



Name Class Date

INEOS TEAM UK is the British Challenger for the 36th America’s Cup – the oldest international sporting competition in the world. There are only eleven crew on the boat, but a hundred experts back at the team’s base working hard to help INEOS TEAM UK design the most technically advanced and innovative foiling boat to win the America’s Cup. The design team has to choose the right materials when designing the boat in order to give them the best chance of victory. Have a go at the questions below on materials.

You work as part of the design team for INEOS TEAM UK. High performance depends on the right design and the right materials, so each part of the boat has the properties it needs to deliver top speed.

1 Four parts have been highlighted on the image of the boat below. Choose the right material to use for each part of the boat by identifying the two most important properties that part must have. Use the scores on the materials property table on the next page to help you!



Boat part	Property 1	Property 2	Best material
Hull			
Sail control rope			
Sail			
Hydrofoils			



Fun fact! The INEOS TEAM UK boat can lift the weight of a 3 fully laden London taxis, which is over 7600kg including a team of eleven people.

1 = low, 5 = high

Name	Properties			
	Strength	Stiffness	Elasticity	Absorbency
<u>Carbon fibre composite</u> Has a very high strength-to-weight ratio, and is extremely rigid	5	5	0	0
<u>Marine plywood</u> Performs longer in both humid and wet conditions and resists delaminating and fungal attack.	3	4	2	2
<u>Stainless steel</u> A heavy alloy of iron and carbon which is more resistant to rust and corrosion.	5	5	3	0
<u>Aluminium</u> A relatively soft, durable and lightweight material	4	4	2	0
<u>Spectra strand</u> Very low stretch and high strength, floats on water	5	1	1	1
<u>Multi-layer shrink film</u> Lightweight and waterproof fabric	2	2	2	0
<u>Dyneema</u> Low stretch and less slippery	5	2	5	1

2

a In your own words, explain why you have chosen your material for the hull.

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b In your own words, explain why marine plywood would not be suitable for the hydrofoils.

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c Explain why INEOS TEAM UK choose to use carbon fibre composite instead of aluminium.

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3 Choose a sport you enjoy or would like to try.
Here are some ideas: football, mountain biking, skate boarding / snowboarding.
Imagine you are in charge of creating some new pieces of kit for that sport.

a Research and list three items of clothing or footwear worn to enjoy this sport, using the table below. What are the user needs for each piece of kit?

Item of clothing or footwear	User need 1	User need 2	User need 3

b Considering the user needs you have listed above, what properties should each item have?

Item of clothing or footwear	Property 1	Property 2	Property 3

c Identify some suitable materials for each item of clothing or footwear.

Item of clothing or footwear	Suitable material	Reason for material choice