

ENGINEERINGBIKES

frame materials

link activity 4 | student sheet | page 1 of 1

FRAME MATERIALS AND THEIR PROPERTIES

Imagine you're a sports engineer, helping to design a bike. You've been asked to provide information about which materials would be best for making the frame.

Use the following data to complete the table below. Write in the advantages and disadvantages of each material. Then provide an overall opinion of each.

	density / g cm ⁻³	stiffness - modulus	strength - yield point	melting point / Celsius	notes
steel	7.8	230	46	1538	oxidises
aluminium	2.7	70	26	660	fatigues
titanium	4.5	116	44	1168	expensive
magnesium	1.7	45	17	650	corrodes

STEEL

Advantage

Disadvantage

Overall

ALUMINIUM

Advantage

Disadvantage

Overall

TITANIUM

Advantage

Disadvantage

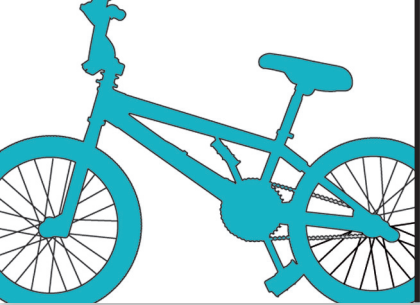
Overall

MAGNESIUM

Advantage

Disadvantage

Overall



ENGINEERINGBIKES

frame materials

link activity 4 | teacher notes | page 1 of 1

Not all decisions are completely clear cut. Answers may be discussed in class.

Possible answers include:

STEEL	
Advantage	high strength; stiff
Disadvantage	oxidises; high density
Overall	very good if strength but not lightness is wanted in the frame, but needs protection against rusting (oxidation)
ALUMINIUM	
Advantage	low density
Disadvantage	low strength
Overall	good for reducing the weight, but will bend or break relatively quickly if subjected to heavy work
TITANIUM	
Advantage	high strength
Disadvantage	expensive
Overall	very good if cost is not a problem – combines strength with relatively low density
MAGNESIUM	
Advantage	very low density
Disadvantage	very low strength
Overall	very light indeed but too weak; it bends and corrodes too easily to use as the pure metal