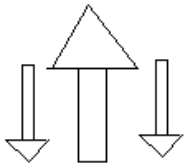
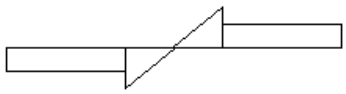
Re-Cycling Materials; Materials & Manufacturing

http://www.cardboardtech.com/

1. When considering a material for a build, the constraints that the material will have to endure are of special importance. Which parts of the bicycle are subject to the following constraints?

Constraint	Symbol	Bicycle Parts
Compression		-Seat -Frame -Wheels
Tension		-Chain
Torsion		-Crank/Wheel hub -Sprocket hubs
Deflection		-Handlebars -Pedals
Shearing		None

2. Most bicycles use metal (mostly aluminium) as their main material. However it isn't the only material used in building bikes. In the table below describe some advantages and disadvantages for using each of the following material types in the frame of a bicycle.

Material	Advantages	Disadvantages
Metal	-Strong -Elastic -Resilient -Stiffness -Hard -Recyclable	-Heavy -High Thermal Conductivity
Wood	-Strong -Resistant to Corrosion -Elastic	-Vulnerable to Decomposition
Plastic	-Lightweight -Stiff -Hard -Malleable	-Subject to UV degradation -Expensive to have all advantages at once
Glass	-Hard -Corrosion Resistant	-Heavy -Fragile -No Elasticity
Cardboard	-Lightweight -Recyclable -Corrosion Resistant	-Soft unless carefully folded -Vulnerable to water unless protected

3. The cardboard used for the bicycle shown in the video was covered with a protective coating to make it heat and water resistant. How do we protect metal bicycles and what do they need protection from?

Protection	Threat
-Painting	-Water & Oxygen (Rust)
-Lubrication with grease	-Wear and damage from friction

4. Very high end bicycles for recreational and sporting use have very few metal parts. Instead their frames are made of fibreglass. This material combines the advantages of ceramics and plastics.
   a) What is the term used to describe this kind of material

A Composite

   b) What are the two parts of these materials called?

The fibreglass is an example of: A reinforcement	The plastic is an example of: A matrix