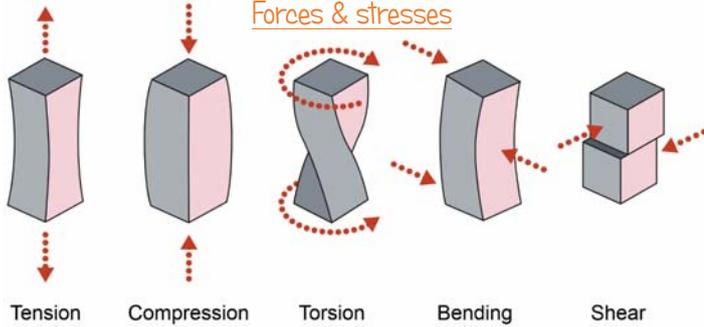


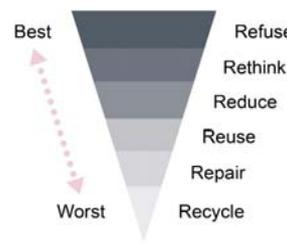
Year 11.2 Knowledge Organiser: Unit 4: Common specialist principles

Forces & stresses



Force	Description	Example
tension	forces pulling in opposite directions	tug of war
compression	forces that are trying to crush or shorten	a spring
bending	flexing force	a flexible ruler
torsion	twisting force	squeezing a damp towel
shear	a strain produced when an object is subjected to opposing force	tearing a piece of paper

The 6 R's



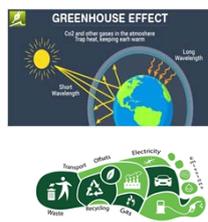
These are an important checklist used by designers to reduce the environmental impact of products. They can also be used to evaluate the impact of other products. The sustainability hierarchy places the strategies that are best for the planet above those that have more of a negative impact on the environment.

- Refuse** – ask yourself if a given process or product is really necessary and avoid using it altogether.
- Rethink** – Revise the way a current product or system functions, either completely or partially. Solve the problem in a different way.
- Reduce** – use less, buy less, throw away less. Create designs with fewer materials.
- Reuse** – Use something again & again. Repurpose or modify or parts to avoid disposal.
- Repair** – Replace parts or design products to be fixed.
- Recycle** – Reprocess materials to be used again. Do not source materials from pure source..

Ecological & social footprint

The greenhouse effect - The greenhouse effect is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without this atmosphere. Nature helps, plants remove carbon dioxide from the air and release oxygen.

Carbon footprint - the amount of greenhouse gases and especially carbon dioxide given off by something (as a person's activities) during a given period.



Types of recycling



Consumers, manufacturers & designers have a responsibility to buy and create designs that are as sustainable as possible.

When a product is finished with, one of your options is to recycle...

- Primary recycling** – this is reusing without any modifications e.g. reusing a shopping bag.
- Secondary recycling** – is modifying a product for a different purpose e.g. making a bird feeder from a plastic bottle.
- Tertiary recycling** – is reprocessing material from a product e.g. re-pulping paper & card to make recycled products.

Improving the functionality of materials

Reinforcing – strengthening a material so it withstands for or stress



Laminating – stiffening a material to improve strength, stability & flexibility

Interfacing – An additional layer of fabric to support certain areas of fabric.



Webbing - is a strong fabric woven as a flat strip or tube of varying width and fibres, often used in place of rope.

Process	Description	Result	Example
lamination	layering of thin materials	depending on the direction of the lamination it can make the product stiffer or more flexible	plywood
bending / folding	folding a 90 degree edge on sheet metal/plastic	makes the panels more rigid	car panels
webbing	modern polymer fabrics woven together	extremely strong and durable fabric	seat belts
fabric interfacing	a strengthening material added to the wrong side of fabric	adds strength & shape	shirt collar

Scales of production

One off production – this is when only one product is made at a time. This one off product could be a prototype, a one off object or a hand made object e.g. handmade jewellery, pottery.

Batch production – this is when a series of product which are all identical are made in either large or small numbers. 2 – 100 is usually classed as a batch e.g. furniture, newspapers, books, electrical products.

Mass production – involves a product going through many stages of a product line. There are workers and machines at certain stages along the line that are responsible for making certain parts of the product e.g. cars.

Continuous production – this is where a product is continuously produced over a period of hours, days, weeks or even years e.g. screws, bricks, pasta, bread rolls.