

Section 1 – Solids, liquids and gases

- Solids hold their shape and keep their volume.
- Liquids form a pool, not a pile and keep their volume.
- Gases have no fixed shape and expand freely to fill the size of the container.

SOLID



- Rigid
- Fixed Shape
- Fixed Volume
- Cannot be squashed

LIQUID



- Not Rigid
- No Fixed Shape
- Fixed Volume
- Cannot be squashed

GAS



- Not Rigid
- No Fixed Shape
- No Fixed Volume
- Can be squashed

Section 2 – Reversible and irreversible changes

- If you heat, cool or mix substances and you can retrieve the original substances, the change is **reversible**.
- When substances are mixed and you cannot retrieve the original substances, the change is **irreversible** – a new material has been made.

PHYSICAL CHANGES

solid liquid gas

Changing state from solid to liquid to gas and back again is a reversible change.

Heating is the process of increasing the temperature. Cooling is the opposite process where temperature is decreased. We use a thermometer to measure temperature.

When chocolate is melted it can solidify again. The change is reversible.

Any reaction, such as burning, that causes new substances to be formed is called a **CHEMICAL CHANGE**. These changes are irreversible.



Cooking eggs, by frying, boiling, scrambling, poaching etc., is always an irreversible change.

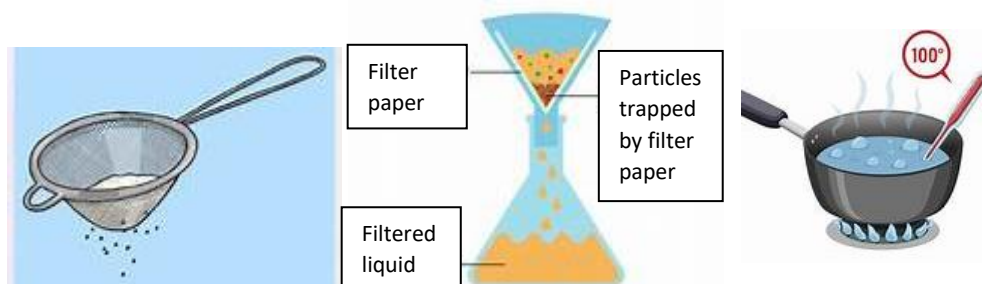
When oil, vinegar and egg yolks are mixed together they make a precipitate called mayonnaise. This change is irreversible.

Dissolving sugar in water is a reversible change. When the water is evaporated it leaves the sugar behind.

When vitamin tablets effervesce (fizz) a gas is produced. This is an irreversible change.

Section 3 – Solubility

- **Solubility** is how easily a material will dissolve.
- When a substance dissolves, it has mixed with water to make a **solution** (it hasn't disappeared).
- Substances that do not mix with water are **insoluble**.



Sieving, filtering and boiling are all ways to separate materials.

Section 4 – Considerations when designing and making a product



sustainability

- Sustainability is important to consider when designing a product.
- Ideas should consider the environmental impact.
- Products could be made from recycled or recyclable materials.

Other considerations:

- Ideas should consider the availability of materials.
- Materials should be selected according to the functional properties of the product.
- Materials should be selected according to the aesthetic.

Section 5 – Design process

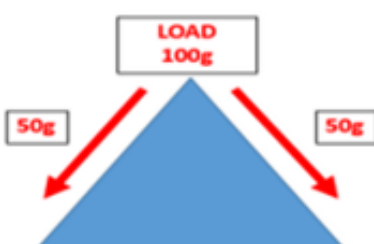
- Information gathered in response to the design brief should inform the design criteria created by the designer.
- Gaining feedback from intended users helps evaluate the success of the product.

The Design Process

Design Brief	Design Criteria	Generating Ideas	Prototype	Make the Product	Evaluation
A planning document that explains what the project is, how it will be achieved and the time frame that it needs to be made in.	Tells you what a product must do to be successful.	Exploring different products and thinking about how they could be adapted. Creating an annotated sketch of your idea.	The first example of what the real thing will look like. It is used for testing, development and evaluation.	Using the annotated sketches and prototypes to help create your product.	Checking that the product meets the design criteria and has achieved its purpose.

Section 6 – Creating a strong structure

- The shape of a structure affects how strong it is.
- Strong structures have a wider base than top. This is the reason that triangles are the strongest geometric shape. A triangle's strength comes from its ability to share the weight of a load evenly on all sides.



Frameworks for a design can be reinforced and strengthened.



