In this unit we will

1. Compare and group everyday materials according to their properties
2. Investigate the separation of materials, including filtration and evaporation
3. Explore how some materials will dissolve and what this means in terms of the particle model
4. Learn that some changes are reversible, while others are irreversible

Science Skills that we will develop:

Properties and Changes of Materials

Explaining Science

1. I use complex science words correctly
2. I use a science model to describe and explain
3. I draw & annotate diagrams to help describe/explain

Designing Experiments

1. I use knowledge & understanding to make a hypothesis
2. I plan a reliable fair test
3. I plan to minimise risk & act on safety suggestions
4. I plan to collect repeat readings and calculate the mean

Data, Tables & Graphs

1. I construct a complex table to show repeated data

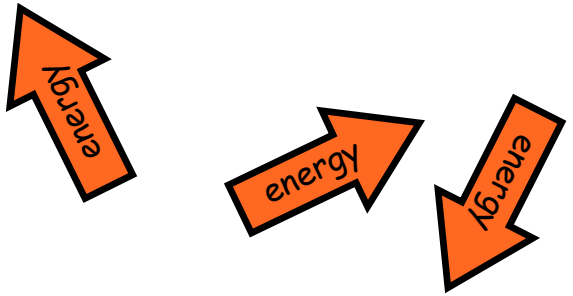
Which way does the **energy** travel?

air

water

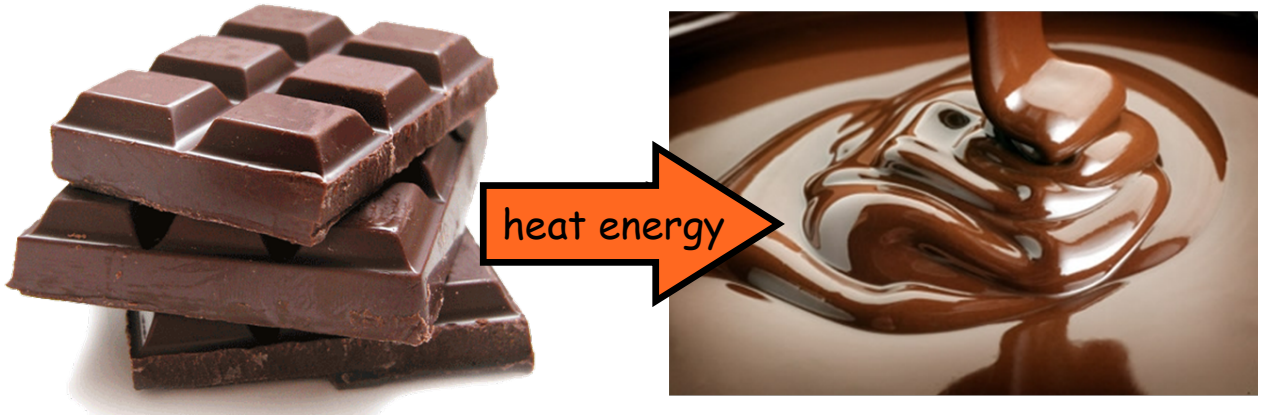
glass bowl

flame



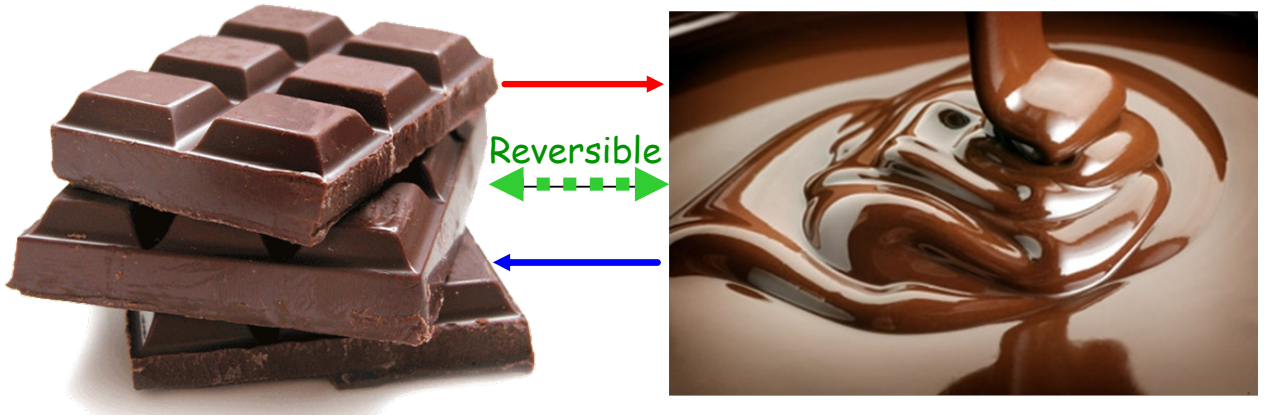
Can you use the particle model to help explain how the energy is transferred?

Changes brought about by heat...

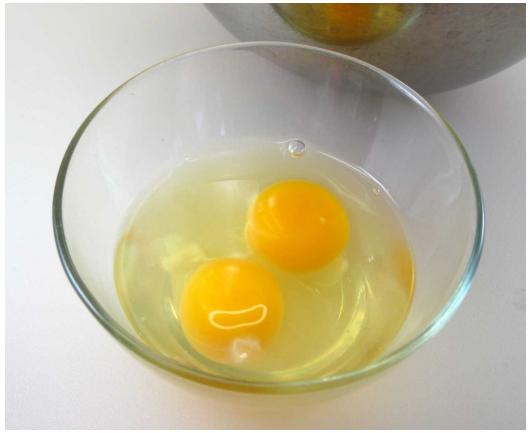


Is this a reversible or non-reversible change?

When (heat) energy is given to the chocolate particles, they vibrate so quickly that the strong bonds of the solid chocolate are weakened or broken, so it melts.

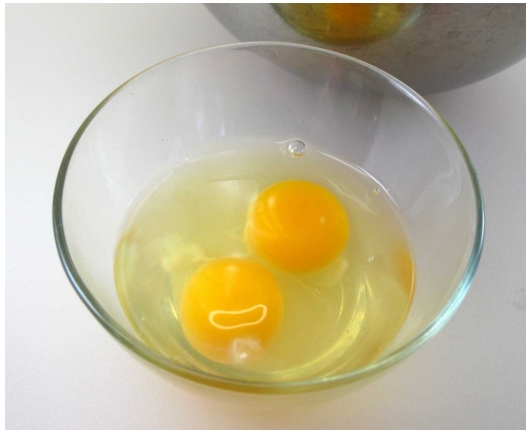


When the liquid chocolate is cooled again, energy is reduced, and the particles move more slowly; bonds reform and the chocolate becomes a solid once more.



heat energy

Reversible or non-reversible?

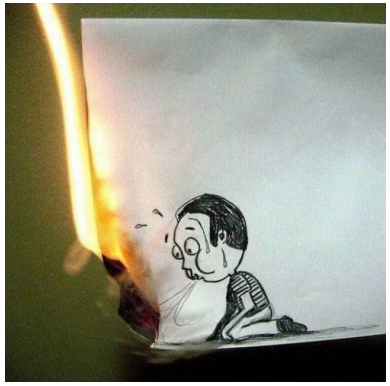


Irreversible change

Raw (liquid) egg is made of very complex mixtures of particles called proteins. When these are heated, some of the bonds break, which changes the shape of the proteins. These then clump together and harden - an irreversible change.

But what eventually happens when a material is given a lot of energy and becomes *very* hot?

Extreme heat causes things to burn, which creates new materials, including carbon dioxide gas, ash and soot particles (smoke). These new materials cannot be put back together - an irreversible change.

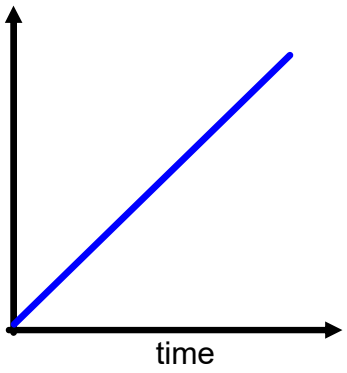


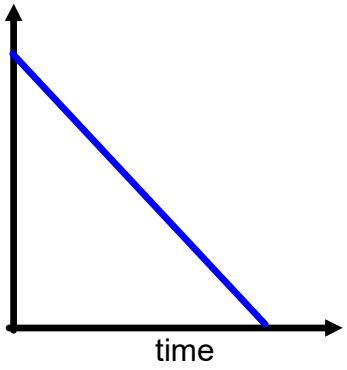
Are the changes due to burning reversible or irreversible?

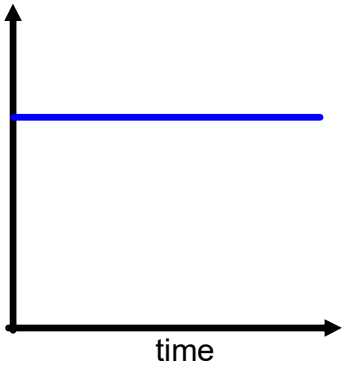
You are going to observe and take measurements as a candle burns. What will you see over a few minutes?

You will use your measurements to create a line graph to show the height of the candle as it burns over time.

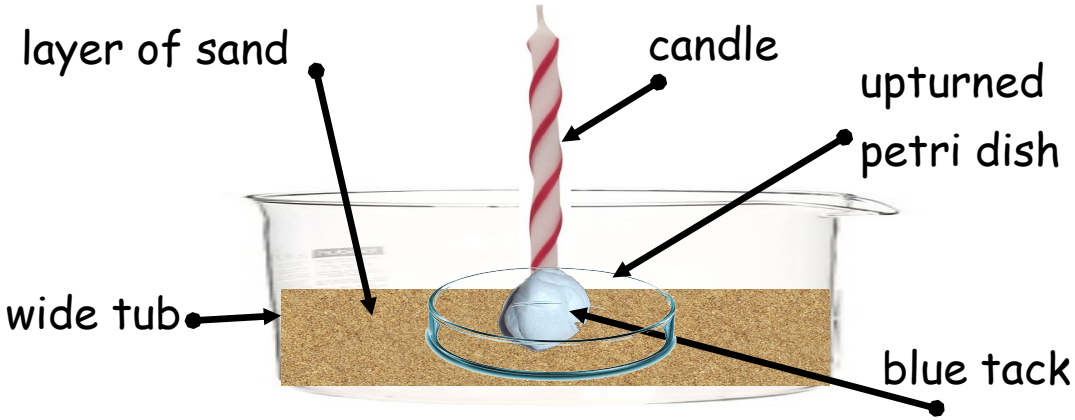
Which of the following graphs do you think yours will look like? why?







In groups of four, set this up in a large tray:



1. Blue tack the candle to an upturned petri dish

2. Put the petri dish into a wide tub and cover with sand

3. Check that the candle is perpendicular to the dish

Now discuss the risks that might be involved in this experiment. As a group, decide what you can do to minimise the risk of danger, and also what you could do to prepare for something that might go wrong.

Before you start recording anything, you will need a results table. For this investigation, **you will either create your own table, or use a blank frame**. You need to consider the following elements:

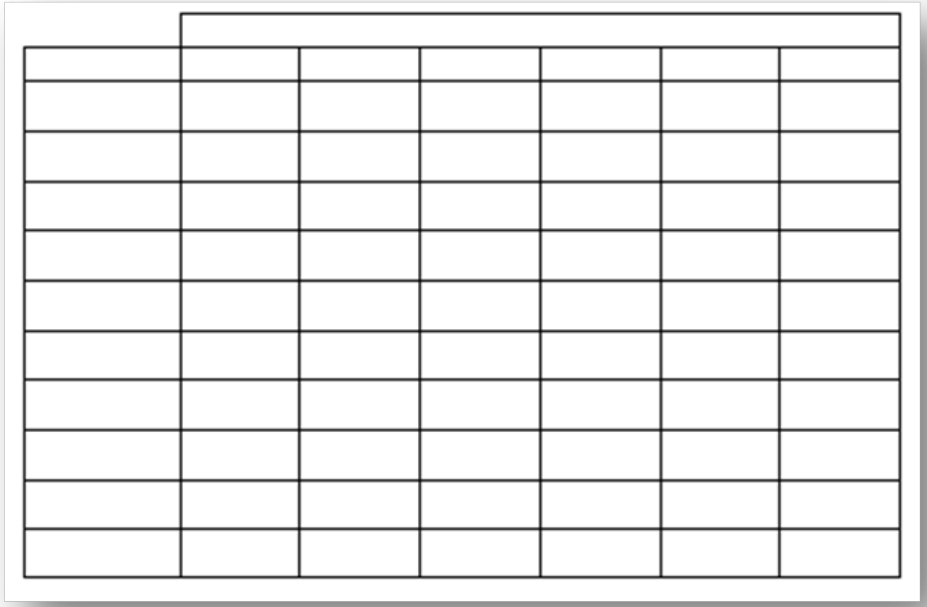
- You will be taking measurements over time - what **time intervals** will you use (how often will you take a measurement)?
- What **unit of measurement** will you use when measuring the height of the candle?
- We will need to make your test accurate: this will involve taking **repeat readings**, gathered from all of the candles in the class, to get an average set of readings . How will you make room for these in your recording table?

If you need ideas, try looking back over previous investigations.

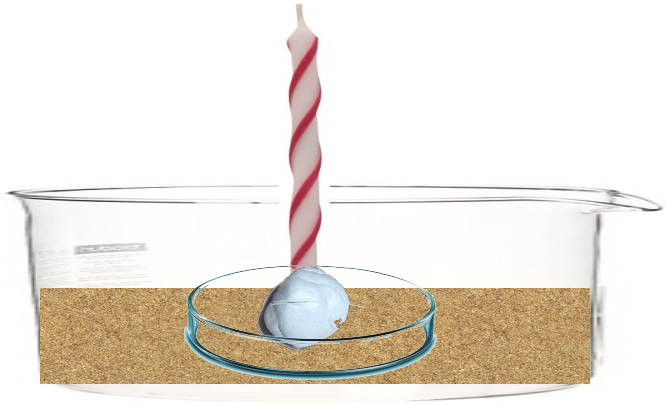
L.O. understand that burning causes irreversible changes

Science skills success criteria: Data, tables & graphs / Designing experiments	Me	Teacher
I use a blank frame to construct a complex table of results that includes repeat readings and I calculate the mean average with **help** **		
I can construct my own complex table that includes repeat readings and I calculate the mean average ***		

So, you'll be taking measurements once a minute over a 10 minute period, with 5 sets of readings and a final average. Don't forget the headings at the top of your table. Have a think, a discussion and a rough sketch, then see how your ideas compare with the blank frame on the next page.



You can either go with your group's ideas or take one of these blank frames to fill in. If you draw your own table, use a pencil and ruler.



Now you can use your results to construct a line graph:

Line Graph to show the length of a burning candle over time

Height (cm)

0

Time (mins)

Finally, can you write a few sentences about what actually happens to the candle as it burns?

Use some or all of the following words if you can:

energy heat particles new materials

gas soot carbon dioxide irreversible