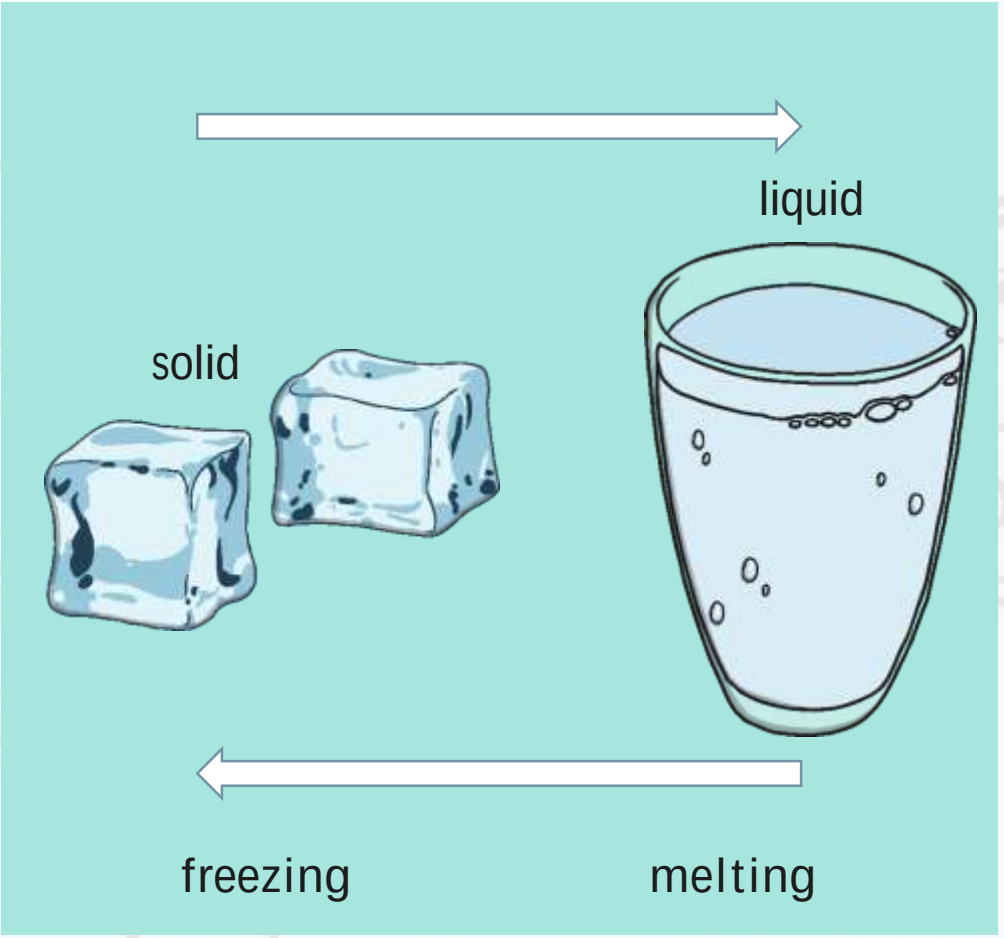
What Makes Materials Change State?

Whole Class

Materials can be in three different states: solid, liquid or gas.

But how do materials change state?

Have a look at the diagram opposite and choose the correct labels for each arrow.



What Makes Materials Change State?

When a solid turns into a liquid it is called melting.

The temperature at which a solid material melts is called its melting point. Different materials have different melting points.

If a solid material is heated to its melting point, it will start to melt and will change state from a solid to a liquid.

In a solid, the particles are closely packed together and are vibrating on the spot. When a solid is heated, the particles start to move faster and faster. If enough heat is applied, the particles will have enough energy to move about. They are still close together, but can move over and around each other. At this point, the solid has melted to form a liquid.

What Makes Materials Change State?

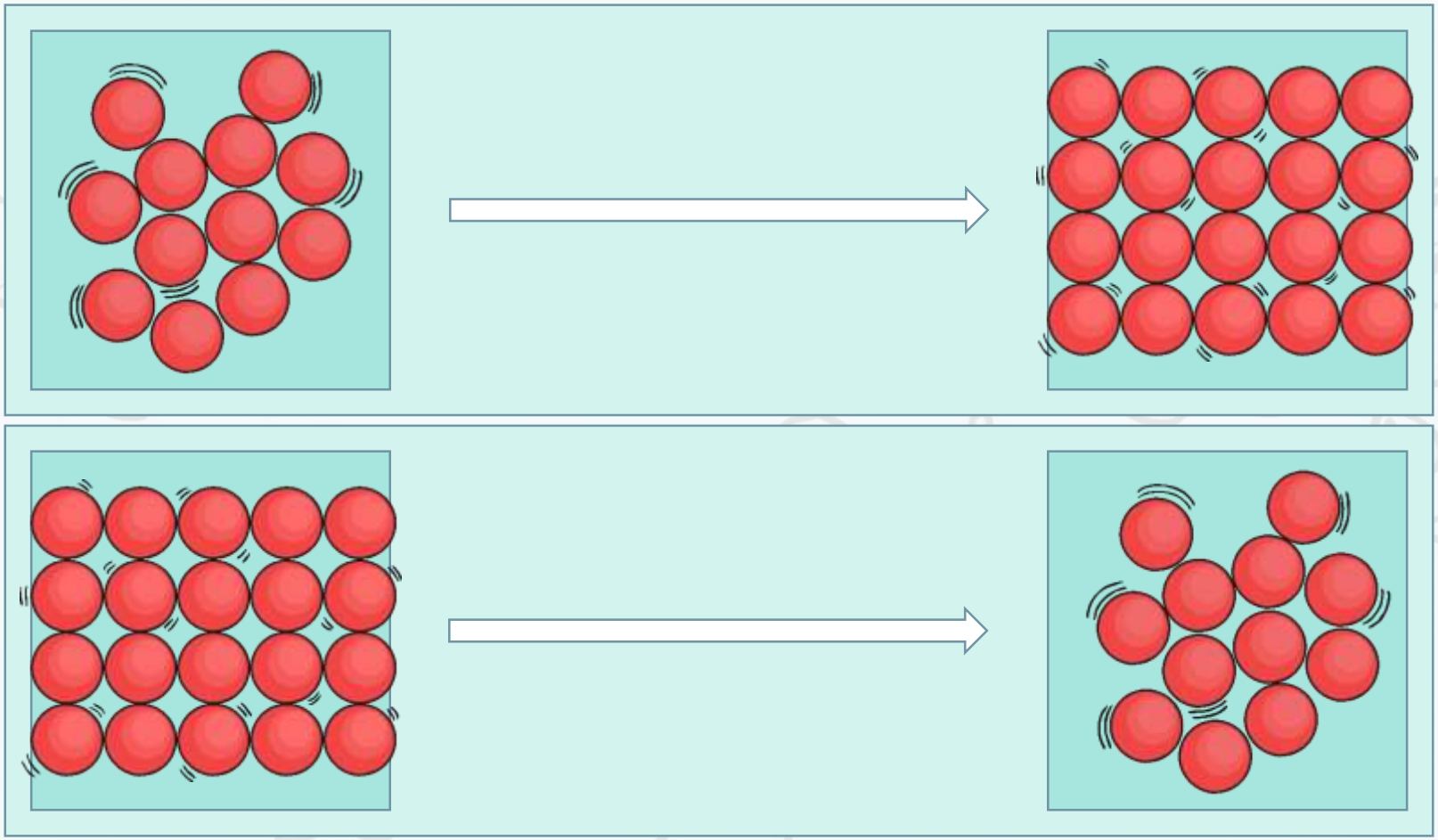
When a liquid turns into a solid it is called freezing.

The temperature at which a liquid material freezes is called its freezing point. Different materials have different freezing points. It is important to remember that some materials have freezing points above 0°C. For example, the freezing point of iron is around 1550°C! Interestingly, this means its melting point is also its freezing point, just in reverse! Above this temperature, it will be liquid iron. Below this temperature, it will be solid iron.

If a liquid material is cooled to its freezing point, it will turn from a liquid to a solid.

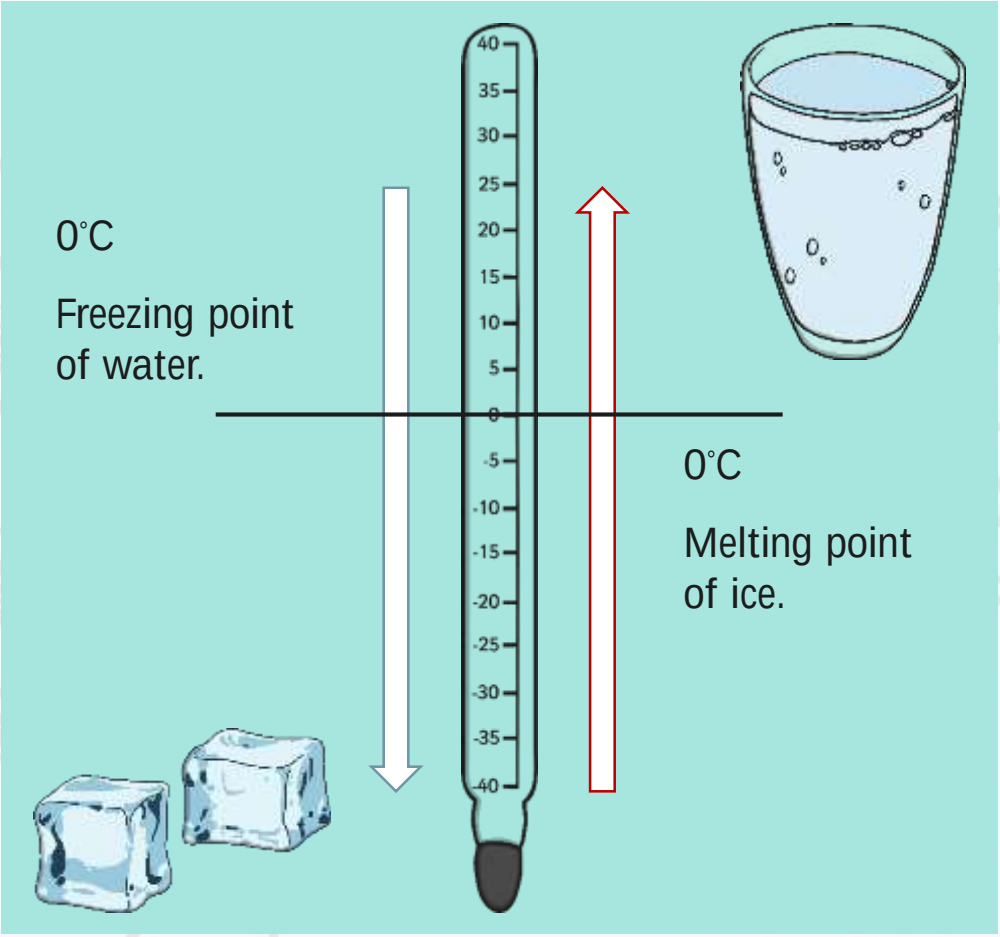
The particles in a liquid are close together, but can move quite quickly around and over each other. As it is cooled, the particles start to slow down. Eventually, they slow down so much that they only move gently on the spot, and a solid structure is formed. The material has frozen.

What Makes Materials Change State?



Melting and Freezing Points

For most materials, their melting and freezing points are the same. Although it sounds strange, think of the melting and freezing point as a barrier. If the material is heated to a temperature higher than this, it will melt. If the material is cooled to a temperature lower than this, it will freeze.



Melting Points

Can you match these materials with their approximate freezing and melting points?

wax	butter	gold
aluminium	silver	ice cream
35°C	50°C	1060°C
660°C	0°C	960°C

Melting Points

How did you do? Why would it be useful for someone to know the freezing and melting points of these materials?

wax	butter	gold
aluminium	silver	ice cream
35°C	50°C	1060°C
660°C	0°C	960°C

Melting Chocolate

This is Maya. She is getting the food ready for her birthday party, and wants to make some chocolate crispy cakes.

Her party is only a few hours away, so she needs to make them fast! She needs to know the best temperature for melting chocolate.

When she has melted the chocolate, she can then add the cereal, shape the mixture into cakes and leave them to freeze in time for her party!

Can you help her find the best temperature for melting chocolate?

Melting Chocolate

You will place a piece of chocolate in a foil tin and float each tin on a different temperature of water.

You will see how long it takes for the pieces of chocolate to melt at the different temperatures.

Complete your Melting Chocolate Investigation Activity Sheet with your ideas about the equipment you will need, how you will carry out the investigation and your prediction.

Then carry out your investigation in groups.

Freezing Chocolate

I want to make sure the chocolate crispy cakes are solid before my party guests arrive!

I am going to put them outside so the chocolate freezes and changes into a solid quicker.

Do you think Maya's idea is a good one?

Talk to your partner then share your thoughts with the class.