



Science Topic Overview: **States of Matter**

Previous linked learning

I think I already know...

I would like to find out...

Reception

- Explore how water might freeze in cold temperatures and see how ice melts

Year 1

- Explore weather such as wind and rain

Key Vocabulary

squash, bend, flexible, twist, stretch, rain, weather, water

solid

liquid

gas

evaporation

condensation

atom

temperature

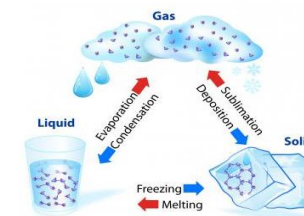
freezing

heating

melting

By the end of this unit you will be able to....

- Compare and group materials together, according to whether they are solids, liquids or gases
- Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens to water in degrees Celsius (°C)
- Consider what might increase the rate of melting and investigate 'Does the size of chocolate effect the rate of melting?'
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature





States of matter: Teacher notes, medium term plan

Previous linked learning Reception

- Explore how water might freeze in cold temperatures and see how ice melts

Common misconceptions

- Children find it very difficult to understand just how small atoms and molecules actually are
- One way of introducing the idea of 'magnitude' is to use a football. If you measure the diameter of a football and divide it by 10^8 , that gives the size of an atom. If you multiply it by 10^8 , that gives the size of the Earth <http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/>
- If a solid or liquid is heated, the particles get bigger.
- Children tend to overestimate the space between the particles in liquids. They regard a liquid as half-way between a solid and a gas.

Technically, there has been no previous linked learning here – especially when doing the topic overview think more about what children may have experienced in real life. It may also be beneficial to work in reverse and show the children what they will be learning first and then consider what they already know as the term 'states of matter' may be confusing without explanation.

This unit only has 4 lessons. This allows you to dedicate one lesson to your expectations in science and explain 'working scientifically' skills to the class. Show them the science display, topic overview example and take time to discuss 'what a good science lesson looks like in year 4'. You may also wish to do the topic overview in this lesson so the children know what to expect this half term. Because there are 4 lessons, one of the bullet points could also be spread over two lessons to really look in more depth.

Lesson 2: Compare and group materials together, according to whether they are solids, liquids or gases

This is will need some introduction to atoms – there are some prompts here under misconceptions to assist. Then, look at the classic comparison of solids, liquids and gases (giving examples of each). You can also get the children up acting like the atoms. A photo, quick diagram or explanation in their books along with a key of important terminology could be helpful for future lessons. A plenary could be 'what I the difference between solids, liquids and gases? Which children could answer in books as analysis (working scientifically skills link).

Lesson 3/4: Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens to water in degrees Celsius (°C)

(I would stretch this over two lessons perhaps?) I would begin by looking at heating and cooling and introduce the terminology of evaporation, freezing, melting, condensation etc and keep looking at examples of this in real life solids, gases etc. Then, start to question at what temperature does this happen? This can lead you into the next lesson – I would keep it simple and stick with water as the example. What temperature does water turn to gas? What temperature does it turn to ice? I wouldn't do this as an investigation, just exploration. Perhaps leave some water in the fridge and the freezer and ask, what will happen? Maybe make ice cubes to enjoy in class together in drinks – where shall we put them for them to freeze? Take the children to the hive and boil some water on the stove top. Can they see that change happen and record the temperature these changes happen. You could do these things over the course of a week then come together in a science lesson to share what you learnt and summarise. Don't assume all children have the same understanding of seeing this happen in real life – some may not have put water in the freezer to make ice cubes etc before (observation, analysis)

Lesson 5: Consider what might increase the rate of melting and investigate 'Does the size of chocolate effect the rate of melting?'

Take the children's learning on beyond water to think about other things that melt/freeze etc. Look to chocolate and discuss what temperature it melts. Children will often find it simple melts in their hand. Ask the question, if the temperature stays the same, what might speed up the melting process. See if the children's conversations guides you there, but we want to end up talking about the size -begin some early discussions about surface area etc keeping it light and simple but with enough science for children to get an insight into what you are investigating. If the weather is good (fingers crossed!) you can leave the different size buttons on a window seal or children can melt them in their hands. Again, get the results to simply be observations and discussions rather than data collection for now. Get children to analyse and conclude in their books but do this whole class/shared writing style to offer as much support as possible. (analysis/conclusion). Buy the choc buttons and we can reimburse for the purchase.

Lesson 6: Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Lots of recap from the previous lessons and really emphasise the key terminology. Make the connection again with water, like we explored before, but in the water cycle. I imagine quite a lot of emphasis will need to be placed on evaporation/condensation as it is harder to replicate that in class for children to see.

Talk through each step and then children can make a water cycle in a bag

https://www.google.com/search?rlz=1C1ONGR_enGB1067GB1067&sxsrf=AB5stBiYiZ0treGq0iywDEwa5953sA_PXg:1691503003060&q=water+cycle+in+a+bag&tbm=isch&source=lnms&sa=X&sqi=2&ved=2ahUKFwil1oidm82AAxYKVkEAHenAo4Q0pQJeaQIDBAb&biw=1280&bih=595&dpr=1.5 a photo in their science book will suffice. Hopefully leaving the bags taped to the window will show evaporation and condensation over time.