

Science – Year 3/4A Summer 1

States of Matter

What's the Matter?

Session 3

Resource Pack

How to play "Solid, Liquid, Gas!"

This is a fast and furious game that teaches everyone the differences in state between solids liquids and gases and reminds them how the molecules behave in each. Everyone needs to keep alert and ready to change.

Resources

A playing space, e.g. outside area, hall or gym (enough space for people to move around safely)

A means of showing the presence of a "container", e.g. a chalked rectangle/circle or 2-4 PE mats pushed together (your container should be large enough for a third of the class to stand in/on and although crowded, the children should be able to move gently around each other to simulate the particles in a liquid)

A tambourine

A dice

A printout of the direction of change diagrams with a blob of sticky tack to display it

How to Play

There are no winners or losers in this game, it is an inclusive "warm up" style activity that is active and fun. At the same time it reinforces knowledge and understanding of the arrangement of particles in solids, liquids and gases and introduces the idea that these can change.

1. Divide the class into 3 groups and tell them that each group is matter (remember matter is another word for a material or substance, e.g. water). Sometimes their matter will be a solid, sometimes a liquid and sometimes a gas.
2. Each person in the group represents one particle of matter.
3. Explain that particles behave differently in solids, liquids and gases and this game is all about changing state from one to the other.
4. Let's try forming ourselves into different states beginning with gas.

Gas

What are the molecules like in a gas? Yes, all spread out into the space available. Ask the children to spread out into all the spaces of the room/playing area. They should not be touching anyone else. They should move **very slowly** (drifting, spinning, gliding) through the air with arms slightly raised saying quietly "gas, gas, gas ..." Gas particles move slowly and freely through the space.

Liquid

Liquid particles have weak bonds between them. Ask the children to join hands with a partner or with two people to make a chain of three. This represents particles that are joined by weak bonds. We usually keep liquids in containers. Show the chalked shape on the playground or PE mats that represent the container. Ask one group to go into the container and to move gently around the space, sliding past each other.

Liquid particles have weak bonds and are free to move around their container. As they move they should say “Liquid, liquid, liquid ...”

Solid

The particles in solids have strong bonds and so they are held firmly together in a rigid shape. Ask 4 children to stand in a row. They should place their left hand on the shoulder of the person to their left (the person on the end can just hold out their left arm. Now ask 4 more children to make a row behind them. These children should put their right hand on the right shoulder of the person in front of them and their left hand on the shoulder of the person to their left. Add more rows in the same way until a solid block of particles has been made. The particles cannot move but they can vibrate (shake slightly without breaking the bonds). Ask the children to give a little shake as they say the word “solid, solid, solid ...” in a gentle rhythm.

5. Now we know how to make ourselves into solids, liquids and gases we are ready to play the game. Each group will start as either a solid, liquid or gas. Allocate your 3 groups to a state and show them the diagram that shows the direction of change. Look at the arrows to see what state you will change into.
6. Choose a child from the gas group to be the “controller.” When all the groups are in position as their “State of matter,” the controller will begin rolling the dice until they get a six. When a six is thrown they should shimmer the tambourine to signal that it is time to change state. Each group should move on to become the next state as shown by the arrows on the diagram. A child from the new gas group should take the tambourine from the previous child and continue to shimmer until everyone is in position (the previous controller should re-join their group). Once everyone has changed, the new controller should roll the dice as before until a six is thrown. Once this has happened they should shimmer the tambourine once more to signal the next change in state.
7. Continue to play in this way. Any child from the incoming gas group can take over the job of controller by taking up the tambourine (unless they have already done it).
8. After a few rounds, change the diagram so that the states are changing in a different direction.



