Combining materials

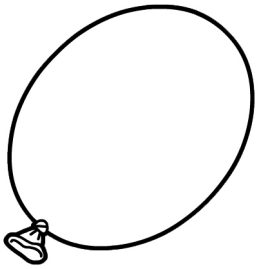
Name:

We can mix or **combine** different materials to make new **products**. There are different ways or **processes** that are involved in combining materials.

Mixing a solid and liquid

Two materials can be mixed together to form a new substance. A solid, like flour, and a liquid, like water, can be mixed together to form a paste. This paste can be used to make **glue**.

Activity 1: Papier-mâché a balloon



You will need: A balloon, newspaper, a bowl, flour, water, spoon.

Method:

1) Blow up the balloon and tie a knot in it.

2) Cover your desk in a layer of newspaper.

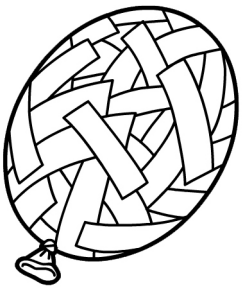
3) Tear the rest of the newspaper into shreds or strips.

4) Mix some flour and water together into a watery paste.

5) Dip the pieces of newspaper, one at a time, into the bowl and cover them in the glue.

6) Paste them onto the balloon. Continue to layer pieces of newspaper that have been soaked in the glue paste.

7) Hang up your balloon and allow it to dry.



Results: *(Write the answers to these questions in your class workbook)*

1) Describe what the flour and water felt like before you mixed them together.

2) Describe how the glue felt once you had mixed the flour and water.

3) Once your balloon is dry, describe how the newspaper looks and feels.

Mix and Set

Similar to the flour and water paste, other solids and liquids can be mixed together. These mixtures set and become very hard. As a result, mixtures like these can be very useful to us.

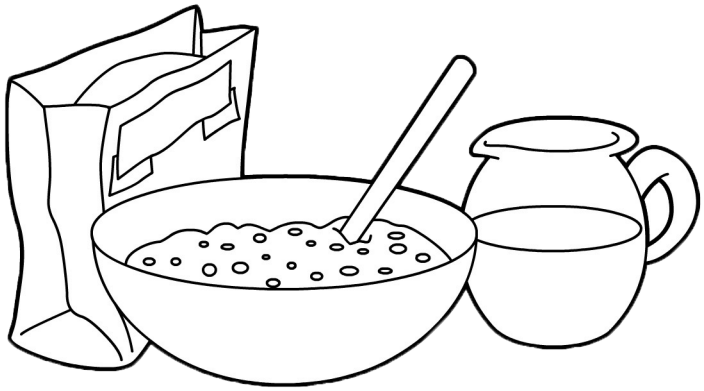
Cement is a powdery substance. It can be mixed with water and poured into moulds to make hollow circular or square pipes and pillars. Cement can also be mixed with sand, gravel (small stones) and water to make concrete. Concrete is used to build roads, foundations for houses and in other building structures. Concrete is incredibly strong when it is set.

Plaster of Paris is another powdery substance made from "gypsum". Gypsum is mined from certain rocks, heated and then ground into powder known as "Plaster of Paris". The white powder is mixed with water to form a paste. The paste can be put into a mould where it can be set into a new product, such as an ornament.

Polyfilla is very similar to Plaster of Paris. It is also a white powder that is mixed into a paste with water. This paste can then be used to fill cracks in walls!

Mix and Cook

There are many foods that we mix together and then cook in order to make a new product that we want to eat.



Activity 2: Waffles

Here is a recipe for waffles:

Ingredients	Method
2 cups flour 1 tbsp baking powder Pinch of salt 2 eggs 2 cups milk 1/3 cup of oil	1) Combine the eggs, oil and milk in a bowl. Mix well. 2) Sift together the flour, baking powder and salt. 3) Add the liquid to the dry ingredients and mix together well, so that there are no lumps in the mixture. 4) Cook using a waffle iron. (Makes about 10 waffles)

Answer these questions in your class workbook:

1) Look at the ingredients. Describe what the flour, baking powder and salt feel like. Describe what the eggs, milk and oil feel like.

2) Would you like to eat any of these ingredients are before they are mixed together?

3) Would you like to eat the mixture once you have mixed the raw ingredients together?

4) If the mixture was cooked in a waffle iron, would you like to eat the waffles?

Most of us would not eat these raw ingredients. Only when they are combined and **cooked** will we be willing to enjoy them.

Mix and Cool

Some substances need to be mixed together and then cooled down in order to set into a new product. If they are not cooled down, then they are unable to change into the product.

Some examples of these are gelatine or **jelly**. Both are solid granules when poured out of the packet. When they are mixed with the right amount of water, they form a liquid. This liquid then needs to be cooled down in the fridge for it to set into a semi-solid jelly.

Another example is **ice-cream**. Different ingredients are combined to form a milky liquid. Only when this liquid is cooled, and frozen, can it form the delicious solid treat!

Activity 3: Make a bowl of jelly

You will need: Jelly powder, hot water, cold water, bowl, whisk.

Follow the instructions on the box to make a bowl of jelly. Put the bowl in the fridge and allow it to cool and set. When it is solid you can remove it from the fridge and enjoy!

Mix, dry, fire

When making **bricks**, for example, substances are first mixed together, then they are dried and finally they are fired. We will learn about how bricks are made in both the rural and industrial setting so you can see the difference.

In **rural** areas, bricks can be made from clay soil, animal dung and straw or grass mixed with water. Clay soil has small particles that hold water very well. This means that with the right amount of water, the clay can be molded into different shapes. To make bricks, the materials (clay, dung, grass and water) are mixed together and then shaped into bricks. These bricks are left out to dry in the Sun. When they dry, the mixture hardens into a strong material that people can build with.

In the **industrial** setting, where bricks are made in factories and in large numbers, a different process is used. Rock and coal are ground into very small particles. This is mixed with water to make the brick mixture. This mixture is then poured into molding machines that **compress** the mixture into bricks. These bricks are then placed into a **kiln** which bakes the bricks at 600-900^{o}C. This is called "firing". By heating the bricks to such a high temperature, all of the water from the mixture evaporates so that a hard, strong, water-proof brick is produced.

Activity 4: Revision

Answer these questions in your class workbook.

1) If you want to papier-mâché a balloon, what raw materials would you use to make the glue?

2) If you want to make a paste to fill a crack in a wall, what raw materials will you use?

3) What processes will take place for you to fill a crack properly? (How will you do it?)

4) What product can you make by mixing cement, gravel, sand and water together?

5) Name two things this product (in question 4) can be used for?

6) If you wanted to make a cake, what processes would you use?

7) Draw a flow diagram, like the one below, to show how bricks are made in a **rural** setting.

Raw materials	→	Processes	→	Product

8) Draw a flow diagram, as in question 7, to show how bricks are made in the **industrial** setting.

Raw materials	→	Processes	→	Product

Memorandum

Activity 1: Papier-mâché a balloon

Results:

1) Describe what the flour and water felt like before you mixed them together.

Flour felt dry and powdery; Water was wet and liquid.

2) Describe how the glue felt once you had mixed the flour and water.

The glue felt like liquid but was thick and sticky.

3) Once your balloon has dried, describe how the newspaper looks and feels.

The newspaper and glue has become hard and holds the shape of the balloon.

Activity 2: Waffles

Answer these questions in your class workbook:

1) Look at the ingredients. Describe what the flour, baking powder and salt feel like. Describe what the eggs, milk and oil feel like.

The flour, baking powder and salt are dry. The baking powder and flour are powdery and the salt is granular. They are all solids.

The oil, milk and eggs are liquid. They feel wet and runny. The eggs are sticky and the oil is slippery.

2) Would you like to eat any of these ingredients as they are before they get mixed together?

No

3) Would you like to eat the mixture once you have mixed the raw ingredients together?

No

4) If we cooked the mixture in a waffle iron, would you like to eat the waffles we make?

Yes!!

Activity 4: Revision

Answer these questions in your class workbook.

1) If you want to Papier-mâché a balloon, what raw materials would you use to make the glue?

Flour, Water

2) If you want to make a paste to fill a crack in a wall, what raw materials will you use?

Polyfilla, Water

3) What processes will take place for you to fill that crack properly? (How will you do it?)

Mix the Polyfilla and water together into a paste. Push the paste into the crack. Allow the paste to harden.

4) What product can you make by mixing cement, gravel, sand and water together?

Concrete

5) Name two things this product (in question 4) can be used for?

Foundations for buildings, Roads, Silo's, Water / sewage pipes.

6) If you wanted to make a cake, what processes would you use?

Mix together the ingredients and cook them (bake them in the oven).

7) Draw a flow diagram, like the one below, to show how bricks are made in a **rural** setting.

Raw materials	→	Processes	→	Product
Clay, animal dung, grass/straw, water		**Mix, Bake/Dry in Sun**		**Clay bricks**

8) Draw a flow diagram, as in question 7, to show how bricks are made in the **industrial** setting.

Raw materials	→	Processes	→	Product
Rock particles, coast dust, water		**Mix, Bake in kiln (600-900°C)**		**Very hard, water-proof bricks**