Mud, Mud, glorious mud *
Make your own bricks

Even if the thought of children and mud fills you with horror, we all know it's important to let children play and learn outside. Outdoor play is a great way for them to explore nature, use their senses and investigate the world around them. Messy play also has lots of benefits, so, if going outside isn't practical, it's still worth letting them have a go indoors.

Divide the children into groups of 3 or 4. Give each group a small plastic bowl and a plastic measuring beaker (or similar) and a spoon (a metal dessert-spoon is best). Have a bucket of soil and some weighing scales ready. Ask them to take turns to weigh out 500g of soil in their bowls and to collect some water in their measuring beakers. Tell them that are going to make mud but it must not be too dry or too wet.

Fig 1. Bowl with 500g soil, measuring beaker containing water and metal spoon

They will need to experiment with the consistency by adding a small amount of water and stirring each time. They should try kneading the mud, like you do when you make pastry or bread dough. It involves squeezing the mud with your hands, turning it and squeezing again. They must remember to record how much water they use each time they add some. They are aiming to have mud which can be moulded into shapes. When they are satisfied with their mud, ask them to record how much water they used. The soil used to trial this activity was a loam containing about one third clay. For the right consistency we added 40ml of water to our 500g of soil. Clay rich soils make the best mud for bricks.

Fig 2. Mud

Now to make the bricks: ask the children to put their mud into containers, ice cube trays, margarine tubs, yoghurt pots or whatever you can provide. They should try to get as much air out of their mud as they can and try to smooth the tops of the bricks.

Fig 3. Mud in ice cube moulds (left) to stay in the sun. Mud in cup-cake tray (right) for the oven

The containers should be put in the sun or somewhere safe to dry. If an oven is used, the containers must be oven-proof, like cup-cake trays.

Fig 4. The finished bricks - as you can see, we needed to remove more air and smooth the tops more evenly!
Photos Elizabeth Devon

Ask the children

- why the bricks will dry if heated by the sun or left for some time or put in an oven,
  A the water in the mud will evaporate.
- why will the mud in the large containers take longer to dry than that in the small containers,
  A because there is more mass (quantity of mud) in the large containers than in the small.

While the bricks are drying, discuss with the children how real bricks are made?
Most traditional bricks are made of clay which is mixed with water and sand, then shaped and fired in a kiln (a furnace or oven for burning, baking, or drying). While clay is the primary material, other components like lime and iron oxide are often added to improve the final brick's properties.

Clay is a rock made from very fine grains - - remember our mud was made from soil. In fact our bricks are like the very first bricks to be made which are about 9000 years old and were made in Southern Turkey The earliest known fired bricks are about 5,500 years old and were stronger and more weather -resistant than those made from baked mud.

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The back up:

Title: Mud, Mud, glorious mud (* from Flanders and Swan 'The Hippopotamus Song')

Subtitle: Make your own bricks

Topic: This activity involves carefully measuring ingredients to make a pliable mud. The mud is then baked in the sun or in an oven to make bricks. The bricks can then be painted and/or used to make structures.

Age range of pupils: 6 - 9 years

Time needed to complete activity: About 30 minutes, longer for the mud to dry

Pupil learning outcomes: Pupils can:
- measure soil in grams;
- measure water in millilitres;
- decide when enough water has been added to make a mud suitable for moulding into shape;
- judge when the mud is the right consistency to be put into the moulds;
- judge the amount of mud needed to fill the moulds;
- explain that the mud must be compacted to put it into the moulds;
- realise that water evaporates from the bricks as they dry and harden;
- realise that evaporation takes place faster in the heat from the oven and faster in the small bricks;
- explain that bricks vary according to their ingredients;
- mud bricks were made for structures thousands of years ago.

Context: This activity can be used in maths, science, geography or history lessons. For those who choose not to wear gloves, there is a sensory experience from getting their hands in mud.

Following up the activity:
The bricks could be painted and/or used to make structures.
The children could be encouraged to look for different coloured bricks on their way to school or when they are out and about. The different colours are caused by a variety of ingredients, e.g. London bricks are yellow because of the high lime content in the local clay. Bricks made from red clay in Staffordshire, UK are called Staffordshire blue; they are fired at very high temperatures and in a low oxygen atmosphere. The latter is responsible for their blue colour.

Fig 5. London bricks (left), Staffordshire Blue (right) *from Reclaimed Brick Company*

Underlying principles:
- Soil mixed with water will make mud.
- Mud can be used as a substitute for clay to make bricks.
- Bricks are made from clay which is mixed with water and sand.
- Bricks are different colours because their ingredients differ and their manufacturing method differs.
- Bricks made from baked mud date from about 9000 years ago from Turkey.
- Fired bricks date from about 5,500 years ago.

Thinking skill development:
Working out the correct amount of water to add to soil to make a pliable mud involves construction. Discussion of how to do this and then how to make the bricks is metacognition. Cognitive conflict occurs when it is realised that not all soils will make suitable mud for making bricks. Relating the home-made baked mud bricks to bricks used in buildings involves bridging.

Resource list:
- access to soil
- containers for the soil
- weighing scales
- measuring beakers for water
- metal spoons
- suitable containers for the mud bricks
- an oven (not essential)
- aprons and disposable gloves
- access to hand-washing facilities.

Useful links:
Earthlearningideas:
Make your own rock
https://www.earthlearningidea.com/Make_your_own_rock.pdf

Make your own soil
https://www.earthlearningidea.com/152_Make_own_soil.pdf
ScienceStart! https://sciencestart.com/
Brick Making, Heritage Crafts
https://www.heritagecrafts.org.uk/craft/brick-making/

Source: Adapted by Elizabeth Devon from a post on the Geological Society of London blog from Laura Hobbs of ScienceStart!, April 2016