1. Making pencils

Some simple instructions so that children can make their own coloured pencils.

OBJECTIVES

- To describe the simple physical properties of ae variety of everyday materials To identify and compare the suitability of a variety of everyday materials for particular uses.

A teacher, teaching assistant or parent helper should support this activity.

RESOURCES

- pencils
- clay
- iron oxide[1] or powder paint[1]
- sealable plastic bag
- cellulose paste
- small teaspoon
- dessert spoon
- painting aprons
- paper towels

Optional extension:

- candle wax (household candles)
- cooker hob
- old metal or glass dish (to melt wax in)
- pan of water

1 Iron oxide produces brown pencil leads that write on paper. It is available from pottery suppliers, or could be obtained from a local friendly secondary school. Powder paint offers a wider variety of colours, but the leads can only be used on surfaces such as concrete or brick - thus making 'playground pencils' for playing hopscotch, etc.

KEY IDEAS

- Pencils are made from a mixture of things
- Coloured pencils are made from clay, paint, wax, glue and wood
- Pencil leads can be made by following a recipe.

In preparation for the activity, make a large copy of the recipe, given overleaf, and attach photocopies of the drawings beside the appropriate stage. Display labelled samples of all the ingredients on a table top below the illustrated recipe.

Quantities have been simplified for the children's use. About 30 g balls of clay should be used, which equates approximately to a 3 cm diameter ball. The 'big' spoon is a level dessertspoon, and the 'small' spoon is the teaspoon.

The cellulose paste must be mixed 10 minutes before the lesson. One level dessertspoon of powder added to a pint of water gives a suitable consistency.

teacher of 5-6 year olds
Dunfermline

I used the 'making pencil' illustrations along with captions. Some children could read the captions, while most followed the illustrations after discussion.

At the start of the activity ask the children what they think a pencil is made from. Many will already be familiar with wood (this is looked at in activities on, but few children will know what is inside the casing. Some may know it is called the 'lead'.

Tell the children that the lead is a mixture of ingredients, and that a recipe is needed to make one. Groups of children then make their own leads by following the recipe and with adult guidance.

Depending on the thickness of each lead, the recipe will make about three 8-9 cm pencil leads. Therefore 3 children can work together. They can make extra leads with any remaining mixture.

Pencil lead recipe

Ingredients

big spoon of powder (paint) ball of clay, like a big marble small spoon of paste

1. Put all ingredients in a bag.
2. Close the bag.
3. Squash them together.
4. Turn bag inside out, onto your hand.
5. Scrape mixture off the bag.
6. Roll into a lead shape.
7. Leave to dry overnight.

If using powder paint, each group can choose their own colour of pencil lead. The mixture should resemble 'crumbly' plasticine when taken from the bag, so it can be moulded in the palm to fully mix in the colour. Disposable gloves can be worn, though the colour from the mixture does wash off with soap and water.

Dry the leads overnight on paper towels.

Waxing the leads - optional stage of activity

This mimics the next stage of the lead-making process. It must be done by an adult, either at home or on a school hob where children can watch the start of the process from a safe distance. Half fill a bowl or biscuit tin with candles and place over a pan of boiling water. When the wax has melted, lower the leads (except spare leads made) into the wax, making sure they are submerged. Leave the leads to soak in the wax, over the boiling water, for 3-4 hours.

Note: Do not let the pan of water boil dry.

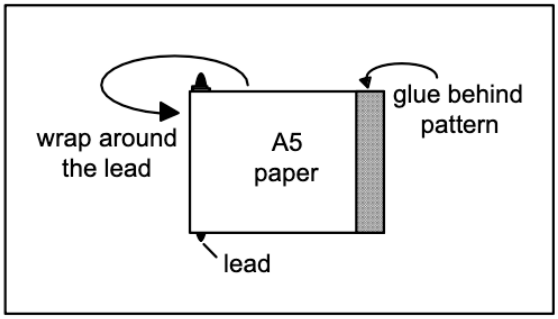
Using an old draining spoon, carefully remove the leads from the molten wax. Spread them out on paper towels to drain off as much excess wax as possible. Leave the leads overnight to dry.

Unsoaked and soaked leads can be compared by drawing with them. The soaking process is intended to prevent the lead crumbling or snapping when in use. The terms 'hard' and 'soft' can be discussed before carrying out the next activity.

Safety Note

Children must not handle, or come near, the pan of boiling water.

Each child designs a 'wrapper' for their pencil on an A5 sheet of paper (the width may need cutting to fit the pencil lead). The design takes up the 3-4 cm of the paper (as shown below), which is visible after wrapping around the lead. Children may choose to simply colour the strip to match the colour of the lead, or create a design. Add glue to the paper on the back of the coloured section, and wrap around the pencil.



The pencil is now ready for each child to test.

teacher of 5-6 year olds
Dunfermline

We had fun decorating the concrete slabs on the path in our Conservation Area.

SOFT OR HARD?

Key ideas:

- The words 'hard' and 'soft' can be used to describe and group items
- Hard things can be graded further
- Pencil leads vary in how hard they are.

Preliminary sorting can be done using a wide range of everyday objects. Suggestions are listed in the 'Resource ideas'. Initially, ask children to sort the items into P.E. hoops which have been labelled 'hard' and 'soft'. These hoops can be overlapped for more able children, so items which have hard and soft parts can be placed in the overlapping area.

After discussing this initial task, ask the children:

- Can the hard things be sorted again?

Then challenge the children to line up all the items from softest to hardest. This can be done by positioning items along a line or metre ruler labelled 'hardest' at one end and 'softest' at the other. Children may disagree about the finer detail of this sorting, which can lead you to show children a simple 'hardness test' for sorting hard things. Children push their thumb nails into the surface of an item. If a mark is left, the material is soft and if a mark is not left, the material is hard. Children can now sub-divide the materials into 4 categories, which could be 'very soft,' 'soft', 'hard', 'very hard'.

Resource ideas:

items for sorting can include pencils, chalk, coins, scissors, plastic pots, candles, stones, rulers (wooden and plastic), balls, clay pots, blu-tack, sponges, books, paint brushes, etc. variety of wood types (if available) variety of pencils, HB, H, 2H, B, 2B, etc.

Children now explore the hardness of pencils. They will find that the wood is quite soft, but the lead is hard. They may also notice that the wood used to make a pencil is softer than the wood used to make a ruler. This is because a soft wood is chosen so that it is easy to sharpen.

If available (from a joiner or the technology department of a secondary school), display wood blocks with pictures of the trees from which they come. The display could also include slices of tree, bark, logs, wooden carvings, etc. Allow children to handle the blocks, and try another simple hardness test on each one. This is done be scraping the corner of one block on the face of another. If the face of the block is scored, then it is a softer wood than the one used for scraping. Some woods will be clearly softer than others. The range can include jelutong, pine, oak, beech, cedar and mahogany.

Children also explore the hardness of different pencil leads by making patterns using HB, H, 3H, B and 3B pencils. They will feel and see the difference that each lead makes, for example:

Hard leads have a greater tendency to snap when sharp, and also produce finer lines than soft leads. The pencil in the story produces 'a lovely, soft line'. Ask the children if they know what sort of pencil this might be, e.g. a 2B pencil.