

MYNYDD PARYS WORKSHOP IDEAS

Art & observation: **Copper colours** Demonstrate that copper can take on different colours under different circumstances (a new penny is pink, older copper is brown, shades of green and orange etc). Make rubbings of pennies using these colours in crayons and make an individual artwork that combines what you have learnt and observed. (for very small children)

Numeracy & History: **Counting with pennies.** As well as using pennies as decimal indicators and counting tokens, they can be used for simple weighing experiments, and a history connection can be added by comparing pennies from different periods. Most people can access the old pennies, so comparative weighing could reveal how heavy they are in relation to a modern penny. What would a penny buy in the year it was minted? What about in the year Parys Mountain opened A hundred years later? When your parents were children? A pennyweight was a valid unit of weight in the past, especially for expensive commodities like sugar or spices. How many sweets would a pennyweight get you today (not much). Also, design a coin? Using basic division skills to work out how much of a bar of chocolate a penny will buy you today.

Science & History: **Cleaning pennies** There are lots of household stories on how best to clean a penny that has been dug out of the ground. Experiment with several methods and decide whether a modern day conservator would approve! Try coke, ketchup, vinegar, 'cillit bang' (looks scary on the adverts!) and measure if they get the penny clean and how fast they do it. Do any of them noticeably remove surface detail from the coin?

Art: **Making copper jewellery:** Copper is easy to bend and model and can be a great resource for an art based activity. Copper wire and small malachite chip beads are a cost effective resource with lots of impact. Add hand twisted cords in copper inspired colours, use wriggly wire shapes accented with small malachite chips and be inspired by wider work on copper and create unique wearable art. Discuss also the trend for copper jewellery as a treatment for rheumatism etc. Thin copper sheet that is easily modelled, and copper 'scraperboard' is also available and makes a nice addition to a copper themed art programme. The thin sheet is easily worked using school level design and technology tools and could make an artwork to be displayed outside where it can weather naturally?

Science & Art: **Copper pigments** have been in use for centuries, medieval artists used powdered malachite and azurite to represent rich blues and greens, and the Egyptians and Romans used the same mineral pigments in eye medicines and cosmetics. As well as using minerals that contain copper, it is possible to manufacture pigments from copper. Making verdigris (a copper acetate, though it also has other chemical names) by soaking copper scraps in strong vinegar for several weeks can produce a green pigment that, with care, can be dried to demonstrate how a common medieval pigment was produced (note: prolonged contact with verdigris is considered toxic, this is an experiment best done as a demonstration, with the teacher performing the steps that involve handling the material. However observing a sealed jar with the copper inside slowly turning green should pose no risks). The coppery vinegar is also a common mordant used in natural dyeing, Onion skins easily and safely produce a yellow dye, adding a little verdigris or copper sulphate to the dyebath will produce a green. (Dyeing must always be done where there is adequate ventilation). What is happening to the copper when the vinegar acts on it?

Science and Environment: **Copper in the home:** How many instances can the students find of copper in the home? Wiring, pipes, bases for some saucepans? What about as slug repellent strips in the garden? In older style hot water tanks? In garden ornaments? Batteries? Roofing nails? Lightning rods? Copper bracelets? Where else? Why do these familiar items use copper? Are these a bit 'old fashioned' now, if so, what do we use instead? This is a good project question, it's not too hard to find out but takes in lots of different areas of study. The group may like to discuss the supply and disposal of copper. Are they aware that copper has a very high recycling value, far more than the value of the aluminium cans we commonly recycle.

(<http://www.letsrecycle.com/prices/metalsPrices.jsp>) What happens to all these familiar objects if demand exceeds supply? What happens if we send copper to landfill rather than recycling it?

Science: **Electrolysis experiments.** How do copper based batteries work. What happens if you construct a maze out of sections of standard copper pipe and connectors and put a snail or slug inside it, how does it respond when it tries to cross the copper? What is happening?

History & Science: **Copper, Bronze and Brass.** When was copper discovered, what evidence do we have of its use. What are the properties of copper and tin (both soft for example) What was so different about bronze? (harder than copper or tin, holds an edge better). Are these 'ingredients' found everywhere that we

have evidence for prehistoric bronze? What does this tell us about trade in the distant past and the importance of these materials? Devise experiments to test the properties of copper alloys such as brass or the various types of bronze. Corrosion products on these materials archaeologically tend to indicate copper is present, do your experiments support this?

Science & Health: Copper and Health: Copper bracelets are widely worn, copper is used in minute amounts in homeopathy, and we need it as a trace element in our diets. However ingesting excess copper can be toxic. Discuss what the anecdotal evidence for the effectiveness of copper bracelets tells us about copper and health, and explore the reasons why something can be essential in tiny amounts but fatal in large ones. (useful overview here: http://www.copper.org/health/papers/cu_health_uk/cu_health_uk.html) Discuss also the difficulties in 'proving' some alternative therapies and why anecdotal evidence can support them whilst extensive lab testing can be inconclusive.