Creative Teaching & Learning Numeracy Lesson plans

Materials

These lessons have been specifically written to support the teaching of numeracy through the theme of materials.

Numeracy Lesson 1: Materials Data (Key Stage 1)

Aims of the lesson: To organise and use data to create a bar chart.

Activity: This activity asks the pupils to first research and then organise data relating to the different types of materials found in their classroom. An average classroom will house a variety of different materials, including wood, metal, glass, rubber, paper, fabrics and possibly ceramics. The class should begin by creating a sheet to log the data. This could be in the form of a table (such as the one given below) to be completed as materials are found. Once the data is logged, each pupil should present the data in a bar chart.

Wood	Metal	Glass	Rubber	Paper	Fabrics	Ceramics
Chair	Ruler	Window	Elastic band	Books Posters	Curtains	Plant pots

The data can then be interrogated and the following questions posed:

- Out of all the materials found, what was found most often?
- Can you think of any materials not found in your classroom/school?
- Which materials are man-made and which are natural?
- What objects did you find that use a number of different materials (for example chairs might use wood and steel)?

Extension: As an extension activity, the data could also be presented in a graph or pie chart. Alternatively, the initial data-gathering survey could be extended to cover the whole school and not just the classroom.

Differentiation: This activity should be suiitable for children of all abilities.

Numeracy Lesson 2: Waste not; want not (Key Stages 1 and 2)

Aims of the lesson: To answer questions relating to data represented as a pie chart.

Activity: This activity not only supports the development of basic numeracy skills, but can also be linked to a wider investigation into recycling. Your local council may run a scheme for recycling and may offer a service whereby a representative will visit your school to talk about recycling. The sheet opposite shows a bar chart representing the amount of materials collected for recycling from houses between 2002 to 2003. A copy of this sheet should be given to all pupils (or groups of pupils) and the data reviewed. Then the pupils should answer the questions given below the data.

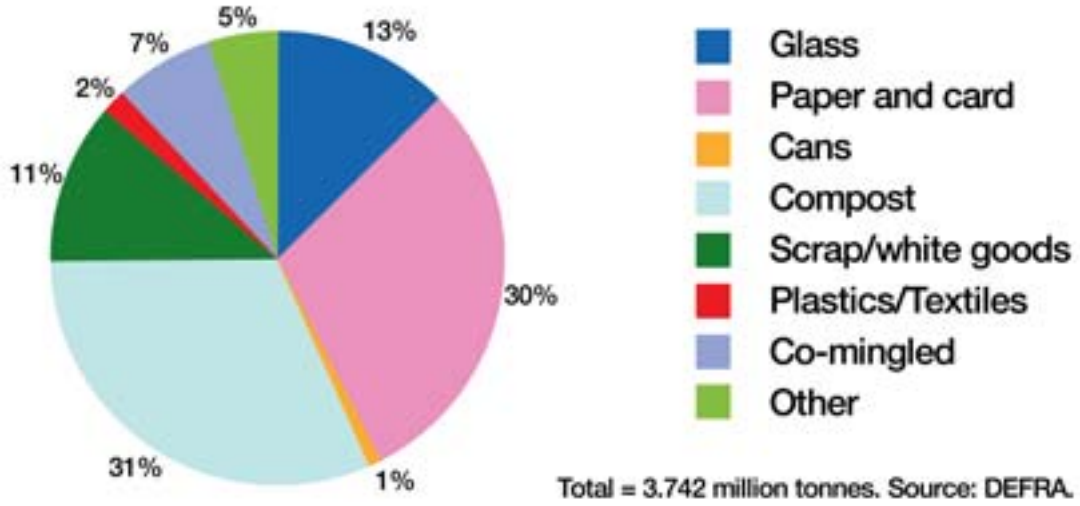
Extension: As an extension to this activity, ask the pupils what they think recycled materials can be made into. For example, plastic bottles can be recycled into lots of different things. Some of things recycled plastic bottles are used for are unexpected. For example, 14 large plastic bottles yield enough fibre to make a large T-shirt!

Differentiation: This activity should be suitable for children of all abilities.

Worksheet 2 – Waste not; want not...

Name: Date:

The bar chart below shows the amount of materials collected for recycling from houses between 2002 to 2003.



1. If you added the amount of glass taken for recycling to the amount of plastics and cans, what percentage would you get?

2. If you added together the amount of glass and the amount of paper and card taken for recycling and then subtracted that total from the amount of compost, what percentage would you get?

3. What percentage of materials collected for recycling is plastics/textiles?

4. What percentage of materials collected for recycling is scrap/white goods?

5. If 31% was written as a fraction, what would it be?

Numeracy Lesson 3: Bounce, bounce bounce… (Key Stages 1 and 2)

Aims of the lesson: To record results of an experiment using a graph.

Activity: Explain to the class that they are going to investigate the 'bounciness' of various balls made from different materials. Balls can be made from rubber, cork, sponge or plastic and a selection of balls made from these materials is needed for this activity. Either working in groups or individually, ask the pupils to investigate each type of ball in turn by bouncing it and measuring the height each bounce reaches. Part of this activity is for the pupils to plan the investigation carefully making sure any unfair bias is removed and that each ball is tested in exactly the same way. Then, once each of the different balls have been bounced (tested) and a height (in centimetres) has been recorded the pupils can present their findings in a graph.

Safety note: The class should be told that the balls should be bounced as part of a controlled experiment. Great care should be taken during this activity to make sure that nothing is broken.

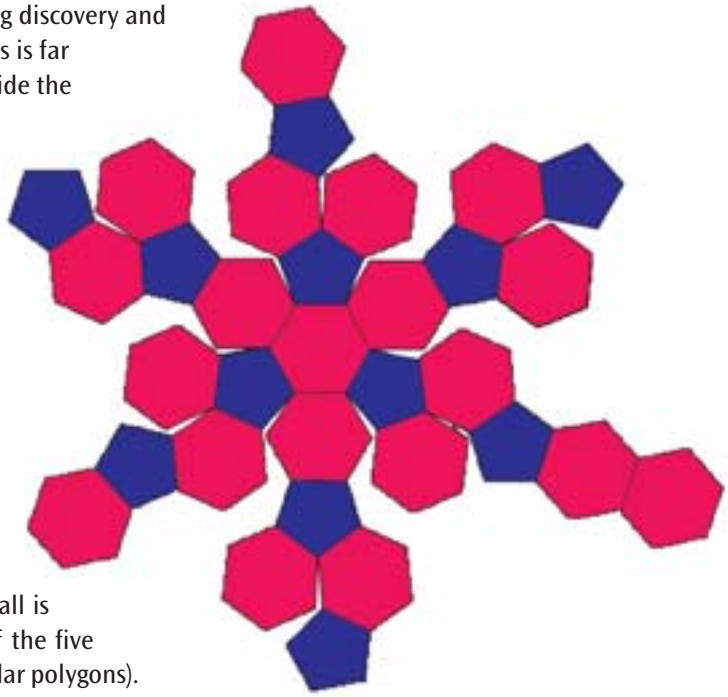
Extension: As an extension, a similar investigation into the flexibility of elastic bands could be carried out. Try comparing different thicknesses of rubber bands using a fixed weight. Again, safety is of paramount importance. Goggles should be worn and the experiment should be carried out on the floor.

Differentiation: This activity should be suitable for pupils of all abilities. However, some pupils may need more assistance when planning their investigation.

Numeracy Lesson 4: Bucky balls (Key Stage 2 +)

Aims of the lesson: To investigate pentagons and hexagons using bucky balls as the stimulus.

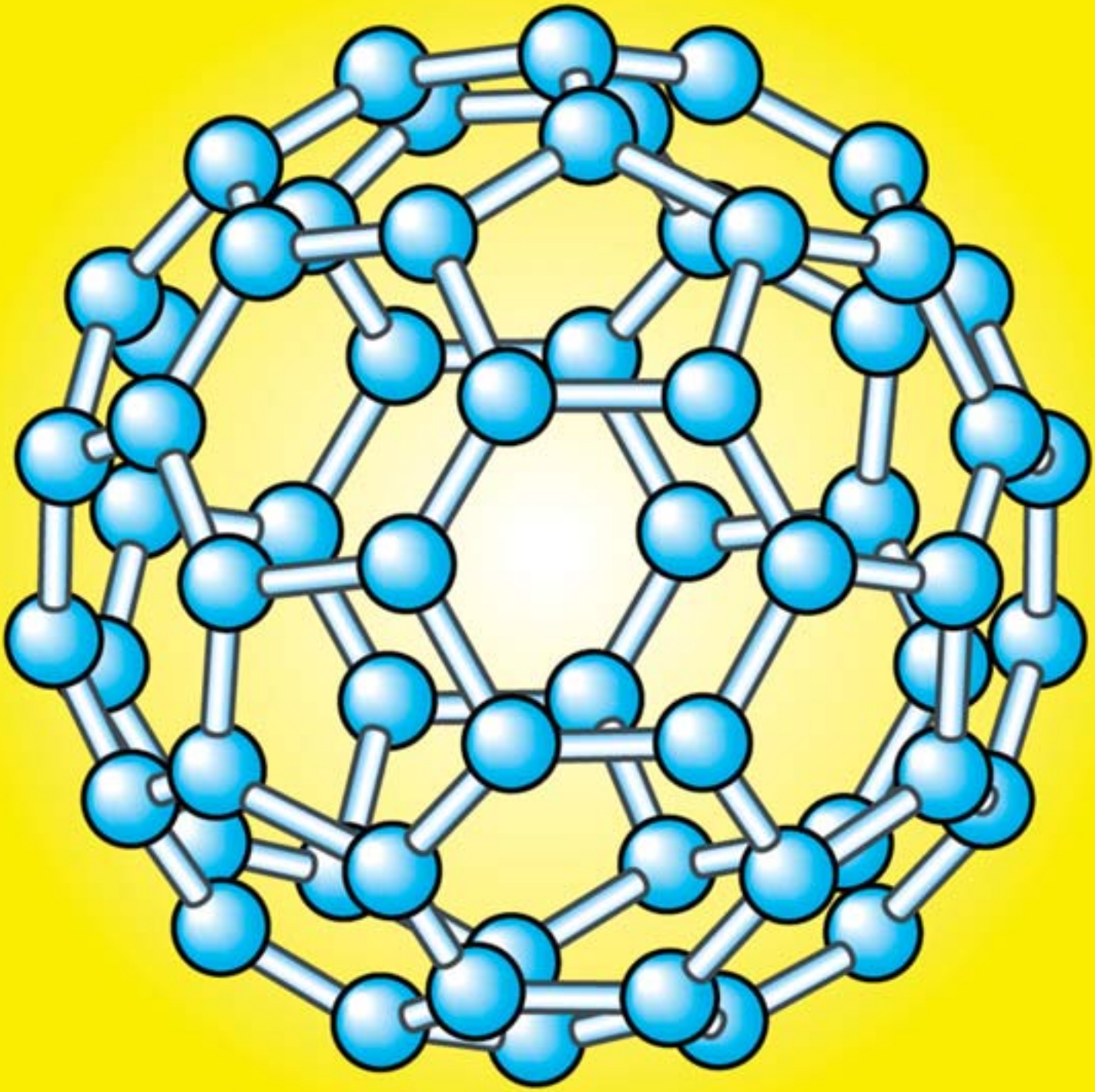
Activity: Until a few years ago, there were two known forms of pure carbon, graphite and diamond. Then a third form of carbon was discovered – a hollow cluster of 60 carbon atoms shaped like a soccer ball. **Buckminsterfullerene** or so-called 'bucky balls' is the roundest, most symmetrical large molecule known. The page opposite contains a representation of this molecule. Bucky balls consist of 60 points on the surface of a spherical shape where the distance from any point to its nearest neighbouring three points on the sphere is identical for all points. This molecule was a truly amazing discovery and whilst an in-depth investigation of its properties and uses is far beyond the scope of the primary curriculum, it can provide the basis for a stimulating investigation into shapes. The molecule is essentially a set of connected pentagons and hexagons (see picture opposite). The class should begin by investigating what a pentagon is and what a hexagon is and then draw some to establish their understanding. Then using pentagons and hexagons, ask the class to create their own patterns or even stick lots of pentagons and hexagons together to make their own version a the bucky ball. To help with this the drawing on the right is a representation of the bucky ball unfolded. Note that the surface consists of twelve pi-based pentagons, each one of which is connected to five of the twenty hexagons.



Extension: The mathematical name for the C60 bucky ball is the *truncated icosahedron*. An icosahedron is the one of the five Platonic solids (3-D shapes whose faces are identical regular polygons). It has 20 faces, each one an equilateral triangle. The other four are the tetrahedron, the cube, the octahedron, and the dodecahedron. As an extension activity, ask the class to draw (or create) one of the other Platonic solids.

Differentiation: This acivity is most suitable for more able pupils.

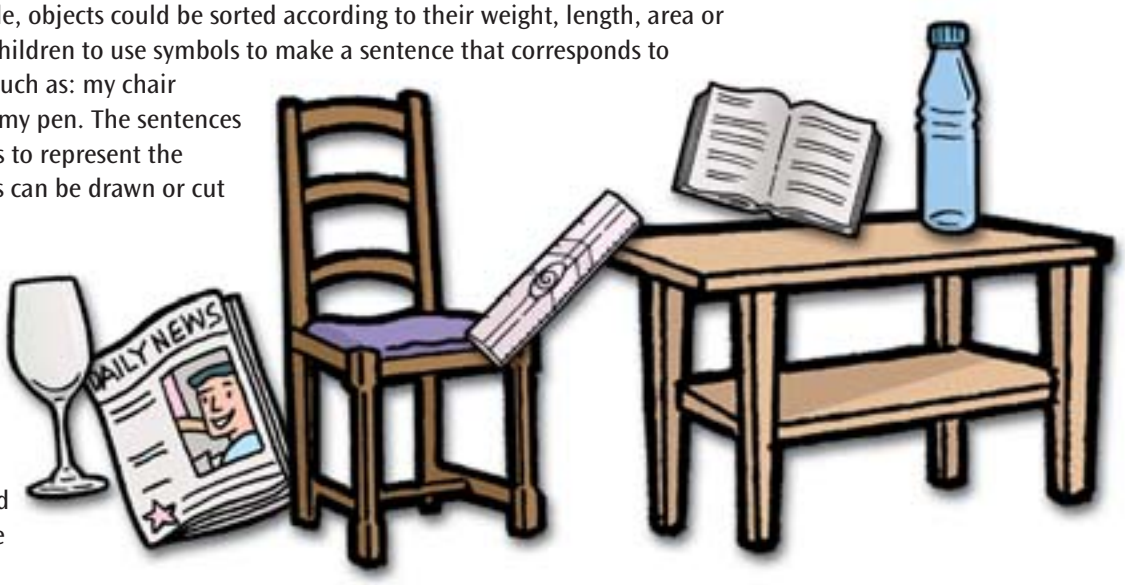
Bucky balls



Numeracy Lesson 5: Sorting objects (Key Stages 1 and 2)

Aims of the lesson: Place value, ordering and rounding (whole numbers): use symbols correctly, including less than (<) and more than (>).

Activity: When studying materials as part of their science lessons, the pupils will be asked to sort objects according to their uses or according to the properties of the materials used in their construction. However, for this lesson, the pupils should concentrate on discovering numerical ways to categorise different objects. Begin the lesson by asking the pupils to think of numerical ways to sort a variety of objects in their classrooms. The objects could be anything including, chairs, books, glasses, pencil cases, bottles, paper clips and pens. How they objects are sorted is up to the pupils taking part in this activity. So, for example, objects could be sorted according to their weight, length, area or height. Then ask the children to use symbols to make a sentence that corresponds to their chosen criteria, such as: my chair weighs > (more than) my pen. The sentences could also use pictures to represent the objects. These pictures can be drawn or cut out of magazines.



Extension: As an extension to this activity, the sentences produced by the children can be transferred to computer, clip art used for the objects and the finished sentences printed out.

Differentiation: This activity should be suitable for pupils of all abilities.

Numeracy Lesson 6: Objective areas (Key Stage 1)

Aims of the lesson: To measure and calculate the area of simple shapes using counting methods and standard units.

Activity: The sheet opposite shows two objects (a pen and a crayon) drawn against a background of 1 cm squared graph paper. Begin by copying this page and distributing it to groups of pupils or individual pupils. Different objects will have different areas and the aim of this activity is not (initially) to work out the real area of a real pen, but to use this task as a means of developing counting methods and the use of standard units. Explain that the standard units used to measure area are cm^2 and then point out that the objects shown on the handout have been drawn on cm^2 paper. The pupils (inidividually or as a group) should then count the number of squares covered by each object. When counting the number of squares, the pupils will need to know what to do if the object covers only part of a square. Once the pupils have counted the squares, they should write the approximate area into the box provided next to each object. Once this activity has been completed, the class can then turn their attention to real objects in the classroom. Pupils could be asked to draw pens, crayons, etc onto a piece of paper and then estimate the 'real' area. Then once the object has been measured, the estimate can be compared to the 'real' measurement of area.

Extension: As an extension activity, the class could estimate (and then measure) the area of some bigger objects in the classroom. Bigger objects, such as chairs should be broken down into their components. So the class could work out the area of each leg, then the area of the seat, then the area of the back etc and finally total all the component areas up to find the overall area of the object.

Differentiation: The initial activity relating to the sheet opposite should be suitable for pupils of all ability. The extension activity is most suitable for more able pupils or groups of mixed ability pupils working together.

Objective areas

Name: Date: