Numeracy Project Plans
THE HUMAN BODY

These project plans are designed to be used with the accompanying resource sheets.
Please note – A CD does not accompany this resource pack. All resources are provided below.

Numeracy Project 1: Perfect pairs (Foundation and Key Stage 1)

Aims of the project: To reinforce the learning and understanding of the number 2 using various teaching methods.

Activity: Begin this project by explaining that the number 2 often describes a pair (such as pair of shoes). Ask the pupils what pairs of things they can see in the classroom. Remind them that each pair can only be named once, and note each pair on the board. Next explain that the human body is symmetrical, which means that any body part that is on the one side is on the other side as well. Ask the pupils if they now can find more pairs – for example, a pair of thumbs, hands, feet, eyes, ears etc. Again, note each item named on the board so the class can see how many pairs they have found. Distribute a copy of the Activity Sheet located in the **Numeracy Project 1** folder on the accompanying CD-ROM.

Plenary: As an extension to this activity, you could teach adding and subtracting for the first time. Allow the pupils to play a game of noughts and crosses. Reinforce that each pair of pupils will now become opponents for this game. Pick two pupils and explain: "One [name of child]" is now going to play against "one [name of child]". So, obviously, 1 + 1 = 2. Then, tactfully, explain subtraction. After the game, one of the opponents will have won. Therefore, of the original two opponents, only one will remain: 2 – 1 = 1.

Numeracy Project 2: Watch the brain learn (Key Stage 2)

Aims of the project: To develop an understanding of time while learning how the brain works.

Activity: The more frequently we are called on to do a certain task, the easier the task becomes. This is because the brain learns by doing. Each time we repeat a task, nerve cell connections in our brains are strengthened. Therefore, the brain doesn't have to figure out a problem from the beginning each time, because it has already learned how to get to the answer. This project asks the class to monitor how the brain learns. You will need a jigsaw puzzle of no more than 12 pieces. Begin by timing a pupil doing the jigsaw puzzle and record the score on the board. Have the same pupil do the puzzle two more times, timing her/him each time. How are the pupil's times different? Did they improve, the more times they did the puzzle? If the answer is yes, it means the puzzle doer's brain learned how to do the task. If the answer is no, her/his brain is still learning and needs to keep trying. Remember, what is easy for one person may be difficult for another – and visa versa. This activity can be carried out as a whole class or in groups, with each group taking turns to complete the task a few times and record their times. Once all the times are recorded, ask each group (or the class) to present the times (data) in a table. Who learned to do the puzzle the fastest?

Plenary: As an extension to this activity, ask the class to find out some more about how the brain works. The **Numeracy Project 2** folder on the CD includes an information sheet that could be used for whole-class reading.

Numeracy Project 3: Measures and ratio (Key Stages 1 and 2)

Aims of the project: The child will be able to construct ratios using the hand as data.

Activity: Begin this lesson by showing the pupils the illustration of a human hand (displayed opposite; copy located in the **Numeracy Project 3** folder on the CD). This illustration shows the various part of the hand labelled. Discuss what ratios are and how they are formed. Review how to measure objects using a tape measure in metric and standard 1/2, 1/4, 1/8 cm, mm. Then have the class measure their fingers and put the appropriate measurements into a table. Ask them to make ratios using the information gathered to develop problems for their classmates. There are lots of other maths activities that can be used when learning about hands. For example, ask the class to measure the circumferences of their wrists and ankles and make a comparison ratio, or to make charts of their fingers, length, hand spans, etc. All this data can be used to make up mathematical problems or to learn how to represent data in different ways (tables, pie charts, frequency diagrams or graphs).

Plenary: As an extension to this activity, ask the class to measure their respective heights and represent this information in a chart or table.

Numeracy Project 4: Recording respiration (Key Stage 2 +)

Aims of the project: To gather data about respiration and represent that data in a chart.

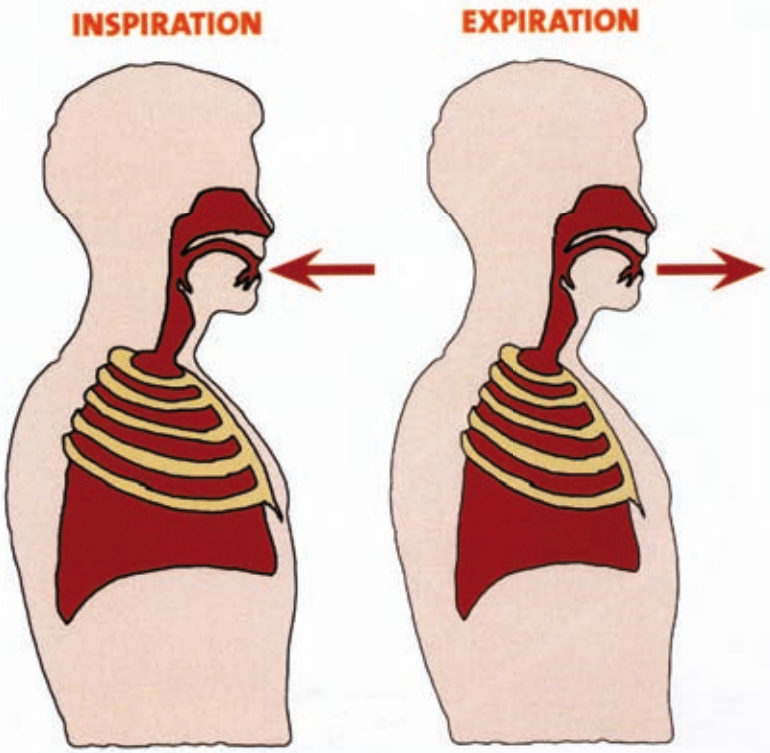
Activity: This project asks the class to record respiration. Respiration rate (number of breaths per unit of time) depends on several factors: altitude, lung capacity, health and level of activity. Higher altitudes and levels of activity would tend to increase repiration rate. Larger lung capacity and generally good health would tend to decrease respiration rate. This activity should be prefaced by a brainstorming session in which the pupils break down the various divisions of respiration. The figures below show the two phases of respiration.

The pupils should arrive at three events which can be used to collect data about the breathing process. These events will answer the following questions:

1. How much air do we breathe out normally?
2. Is there any air left in our lungs after we breathe normally?
3. How much is actually in our lungs when we breathe normally?

The **Numeracy Project 4** folder on the accompanying CD includes an information sheet on the lungs and a strategy sheet detailing how the experiment into respiration could progress. Once the tests have been carried out, the class should have sufficient data on the three aspects of the respiration process. This should be represented mathematically and the class can then devise questions to interrogate the data.

Plenary: As an extension to this activity, ask the class to draw and label a diagram of the lungs and list ways in which they can keep their lungs healthy.

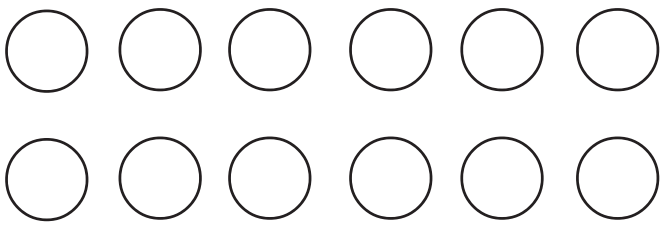


The Human Body

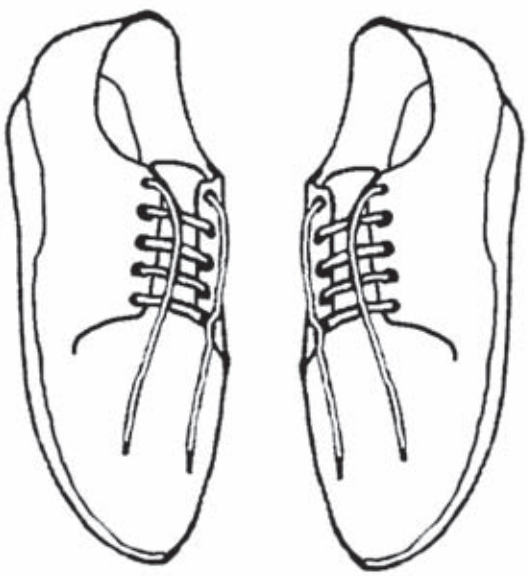
Numeracy Project 1:
Perfect Pairs

Foundation and Key Stage 1

Perfect Pairs Activity Sheet



On the left are 10 circles. Please colour 2 circles in the colour of your choice. The 2 circles need to be next to each other.



On the left is a picture. Please circle 2 identical parts that represent a 'pair'.

Please draw a picture that represents the number 2.

This could be a pair of something (shoes, socks, trousers, glasses, earrings).

The Human Body

Numeracy Project 2:
Watch the Brain Learn

Key Stage 2

Information sheet: the brain

The human brain is one of the most complicated machines on the planet. Inside this small mass exists the instructions for everything that we say, think, feel, do and hope. If you could zoom in onto any section of the brain, you would see a dense network of cells. These cells, called *neurons* (which are commonly referred to as grey cells), are designed to carry an electrical signal from one to another, relaying information about your emotions and everything you see, hear, taste, touch and smell.

Each neuron connects with approximately 10,000 neighbours. A neuron has two distinct branch types:

- Axon, which conducts signals away from the cell nucleus.
- Dendrite, which receives incoming information.

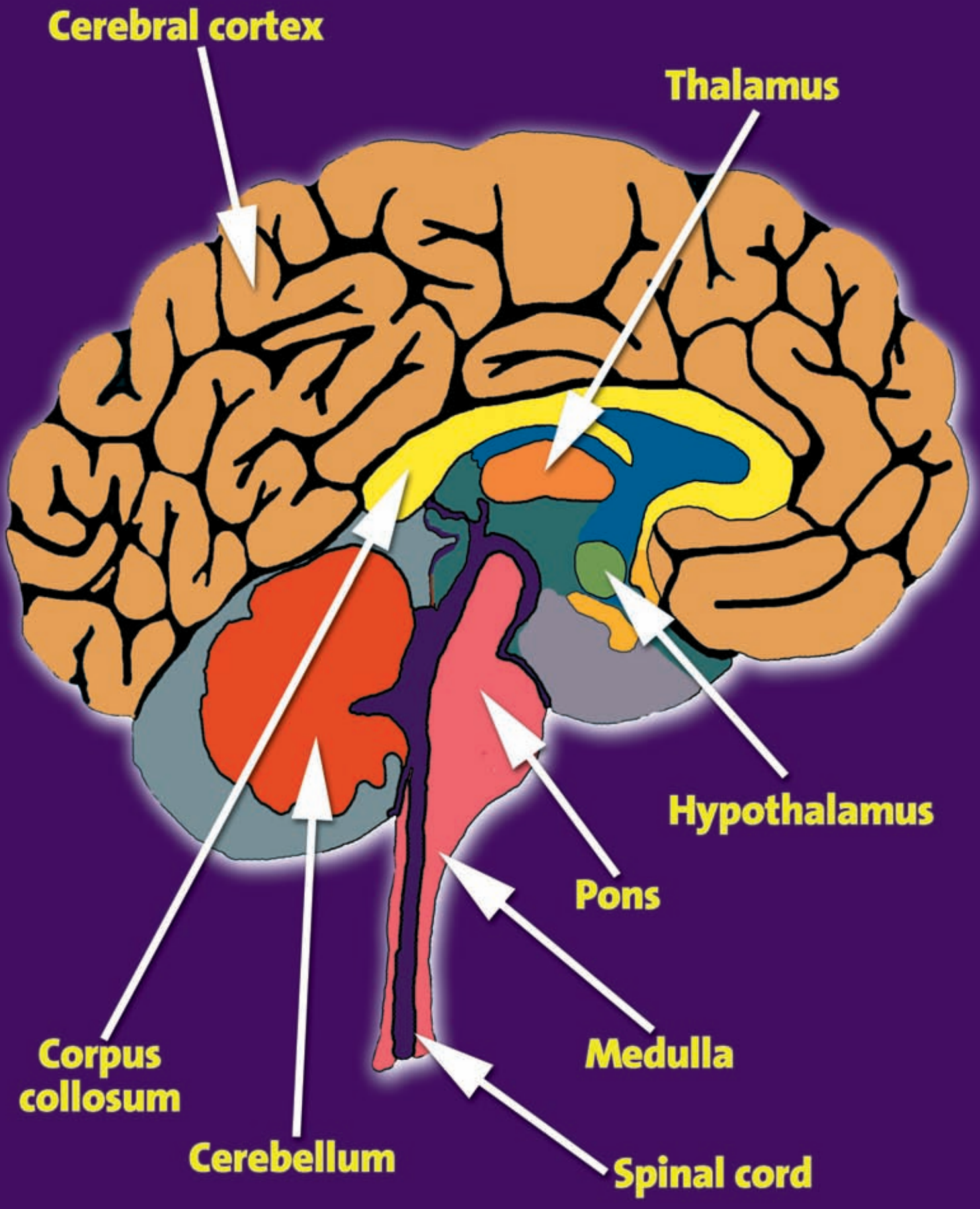
The cell is covered in *myelin*, which acts just the same as the insulation on the power cable for your computer. Between two cells, where an axon meets a dendrite, there is a gap. This gap is the *synapse*. For signals to cross the synapse, the electrical signal must be converted into a chemical signal. This translation, from electrical to chemical, is done by neuro-transmitters. The chemicals then cause not only the closest cell, but also all the neighbouring cells, to respond and produce their own electrical signals. This chain reaction effects millions of cells. In this way, if the conditions are right, we increase the number of connections our brain cells make for each learning stimulus. When you learn something for the first time, a whole series of these connections are made; a new *pathway* is formed. The more times these connections are made and reinforced, the thicker the pathway becomes, and subsequently the signal can pass along it quicker.

The three brains

Your brain is about as big as a coconut, the shape of a walnut, the colour of uncooked liver and the consistency of chilled butter. It has three main elements:

- *Brain Stem*. The primitive brain, sometimes refereed to as the 'reptilian brain', controls heartbeat, sleep and anxiety, breathing and the body clock.
- *Cerebellum*. The mid brain or 'mammalian brain' controls emotions, moods and feelings, long-term memory and the ability to learn.
- *Cerebral Cortex*. The higher brain, or 'neo-cortex', is made up of billions of brain cells (neurones) which are intertwined like a giant web. This 'lump' is split into two halves:
  - Left – Academic. Deals with processes in a step-by-step way, language, numbers, sequences, parts, symbols, facts and procedures.
  - Right – Creative. Deals with artistic development, patterns, music, intuition, rhythm and creativity.

The Human Brain

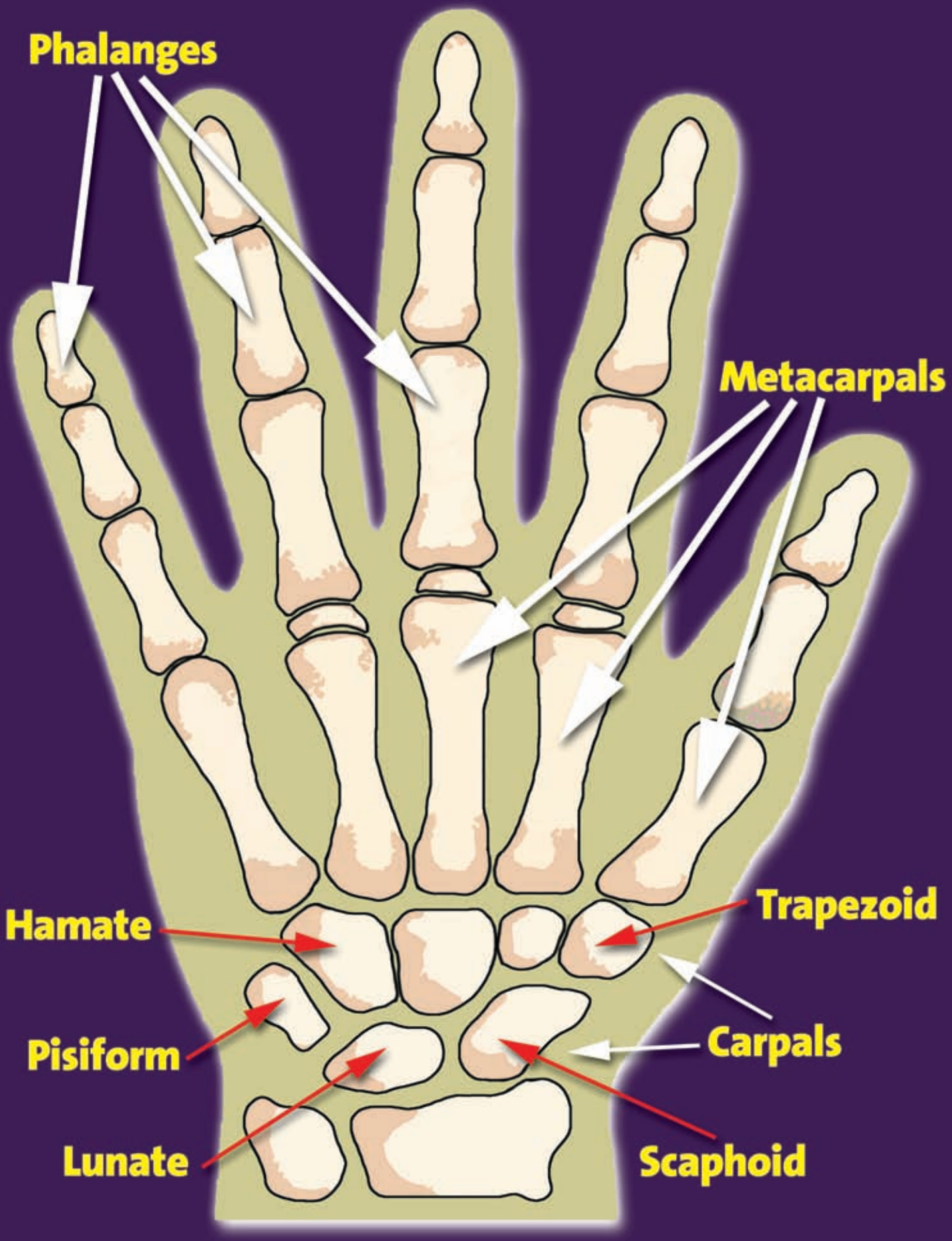


The Human Body

Numeracy Project 3:
Measures and Ratio

Key Stages 1 & 2

Human Hand


Phalanges
Metacarpals
Hamate
Trapezoid
Pisiform
Carpals
Lunate
Scaphoid

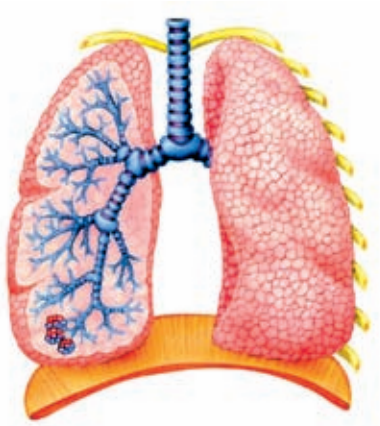
The Human Body

Numeracy Project 4:
Recording Respiration

Key Stage 2

Information sheet – The lungs

Every part of the human body needs oxygen to survive. Oxygen is in the air all around us and we breathe it into our lungs. The purpose of the lungs is to absorb oxygen and transfer it into the blood stream.



The lungs are found inside the chest and are protected by the ribcage. Between the ribs are muscles that are essential for breathing. The most important muscle for breathing is called the diaphragm. It is dome-shaped and lies below the lungs, separating them from the abdomen. Two thin layers of tissue called the pleura cover each lung and the inside of the ribcage. These layers, or membranes, slide back and forth over each other as we breathe.

The lungs are made up of several sections called lobes – three on the right and two on the left. The inside of your lungs looks like a giant sponge. It is a mass of fine tubes, the smallest of which end in tiny air sacs called alveoli. These air sacs have very thin walls which are criss-crossed with hundreds of tiny blood vessels called capillaries. There are 200 million or so of these air sacs.

How do we breathe?

The lungs have no muscles themselves. Breathing occurs when the breathing centre in the brain sends a message along the nerves to your breathing muscles. The muscles contract and you breathe in. The diaphragm is pulled flat and, at the same time, the muscles between your ribs shorten and pull your ribcage upwards and outwards. This ensures that the lungs have the largest possible amount of space to expand into. Each time we breathe, air is drawn into the nose or mouth down through the throat and into the windpipe, or trachea. The windpipe is a tube about ten to twelve centimetres long in adults, and it splits into two smaller air tubes called the bronchi, one of which goes to the left lung and the other to the right lung. The air passes down the bronchi, which divide another 15 to 25 times into thousands of smaller and smaller airways, called bronchioles, until the air reaches the alveoli. Breathing out is usually just a matter of relaxing the diaphragm and the muscles between the ribs, so that the air is pushed out and the lungs return to their resting size.

How does oxygen get into the bloodstream?

Inside the alveoli, oxygen moves across the thin walls of tiny blood vessels, called capillaries, and into the blood, where it is picked up by chemicals in the red blood cells, ready to be carried around the body. At the same time, a waste product from the body called carbon dioxide comes out of the capillaries back into the alveoli, ready to be breathed out.

Respiration – a testing strategy

1. Ask the pupil being tested to breathe in normally and then expel that air in a normal fashion into a balloon. Then measure the balloon across its broadest part with a ruler or tape measure.

2. Next, ask the pupils to breathe in and out normally and then expel all remaining air into a balloon, exerting as much pressure on the lungs as possible to push out any remaining air. Again measure the balloon as above.

3. Ask the pupil to breathe in normally, then try to expel all the air that is in their lungs. Again measure as above.

Safety note: Please ensure that none of the pupils taking part in this activity suffer from asthma or other respiration problems.