Science & Technology Equipment News

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For Primary Schools and Teachers of S1/S2 courses

STS National Support Services in Science, Technology, Safety

Helpline: 0131 558 8180 Fax: 0131 558 8191
Email: sts@sserc.org.uk Web:www.sserc.org.uk
ISE 5-14 website : www.ise5-14.org.uk/prim3/head2.htm

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The trivial pursuit of scientific curiosity

How about a game of Trivial Pursuit® - *Famous Scientists Special Edition*? Answers at the bottom of the page.

Q1 Who was described in his school report as 'idle and inattentive'?

Q2 Who was described as a 'slow learner' and a 'lazy young man'?

Q3 Who didn't start talking until age 4 or writing 'til 7 and failed the entrance exam to study for a diploma in electrical engineering?

Q4 Who was thought to be 'too slow' (in mind, rather than speed of inclination) to become a priest?

It is difficult to understand why these great scientists were thought, at an early age, to be academically challenged. However, young Newton made sophisticated mechanical models, young Darwin collected and classified rocks and shells, Einstein was interested in numbers and Linnaeus was successfully gardening from the age of four. Were they all late developers? Did the school curriculum fail to inspire them? Einstein was asked later in life why his talking and reading were apparently undeveloped. He replied that he was busy working out what were the appropriate questions to ask! Stranger still is that the scientists were all male (why strange she asked?). Most research indicates that their female contemporaries were as likely to have been excellent scholars from a very early age.

Is wee Jimmy sitting quietly at the back of the class our next Isaac Newton. Sir, take that apple away from the teacher and *stot if aff his heid!* Have you heard the one about the :-

> **Physics Teacher:** "Isaac Newton was sitting under a tree when an apple fell on his head and he discovered gravity. Isn't that wonderful?"
>
> **Student:** "Yes sir, if he had been sitting in class looking at books like us, he wouldn't have discovered anything."

The 5-14 Environmental Studies Guidelines are designed to offer a wide and interesting study of science and technology. They can, and mostly, they do. Lest teachers' gardens were overgrown by a backbreaking of genetically modified new-initiative weeds, they might be allowed to cultivate the mind growth of our budding genii.

Enough, enough, no more, as this Newsletter, at the request of a Primary teacher, takes another look at Plants and Animals. The relevant Attainment targets from Interactive Guidelines may be found on the ISE 5-14 website at :-

LT-C1.3 - http://www.ise5-14.org.uk/Prim3/New_Guidelines/Levels/topics-c.htm#3-1-3

LT-E1.2 - http://www.ise5-14.org.uk/Prim3/New_Guidelines/Levels/TOPICS-E.HTM#3-1-2

LT-E1.3 - http://www.ise5-14.org.uk/Prim3/New_Guidelines/Levels/topics-e.htm#3-1-3

Who better to start with than, the father of classification of plants and animals, **Carolus Linnaeus**?

Carolus and his family lived in Vaxjo, Sweden; his father Nils was a local priest. Like many of the cloth, Nils was a devoted amateur botanist and gardener. His enthusiasm for plants was transmitted to the young Carolus, who became interested in botany and was given a corner of the garden to care for. In 1717, Carolus began school and his parents decided, like his father, that he become a priest. He was however, more interested in plants and nature such that, at school, he was nicknamed "little botanicus". His teachers were not impressed by his abilities as they advised his father that he would not be capable of entering the priesthood.

Indeed, his natural science teacher recommended that all he would be capable of studying would be medicine – strange but true. In the not so distant past, it seems the less academic but well connected were guided towards a career in medicine. Now they end up in SSERC!

By 1753, Linnaeus devised a system for classifying plants and animals which grouped plants and animals using a two-part name (binomial). In his system, the first part of the name is the generic grouping or ***genus*** and the second is the specific grouping or ***species***. The classification system currently used by modern scientists is based on this.

However, many more species have been discovered since 1753 and this means the present classification system has necessarily become more complicated.

At the time of Carolus, Latin was the *lingua franca*[1] of all educated people so the names would not have sounded so strange as they do nowadays.

1 Lingua franca – universal language

Answers: ***1*** *Isaac Newton,* ***2*** *Charles Darwin,* ***3*** *Alfred Einstein,* ***4*** *Carolus Linnaeus*

Thankfully we call most things by their common name and few of us would say "Oh look, there's a *Trogdolytes trogdolytes*" when we see a wren in the garden.

Fig.1 White clover

How about *Trifolium repens* for white clover (above) or the poor song thrush (left) which is lumbered with the name *Turdus philomelos*.

Fig.2 Thrush - Thanks, Emerald Primary School, Victoria, Australia

Suggestions for classification exercises

Scientists are not the only ones who classify objects. We all do it :- when we put the knives and forks in the cutlery drawer or cups and saucers in the cupboard we are carrying out classification. This simply means that we are sorting objects and putting them in a specific category or group.

One Two Button my Shoe

P1/P2 classes could practice classification with a box of buttons or LEGO® bricks. Buttons can be classified by colour, size, number of holes etc. LEGO bricks may already be classified, by size, shape or colour, in the kit box but if not this may be an excellent opportunity to tidy the kit.

See http://www.ise5-14.org.uk/members/Prim3/CLIPART_2/WMF/Menu.htm for graphics of LEGO, ladybird (Fig.3), minibeasts and much, much more. Using these, cards depicting various objects can easily be made and used for classification exercises. Students can be asked to classify or sort the cards into various categories such as *animate & inanimate objects* or insects/animals/plants etc.

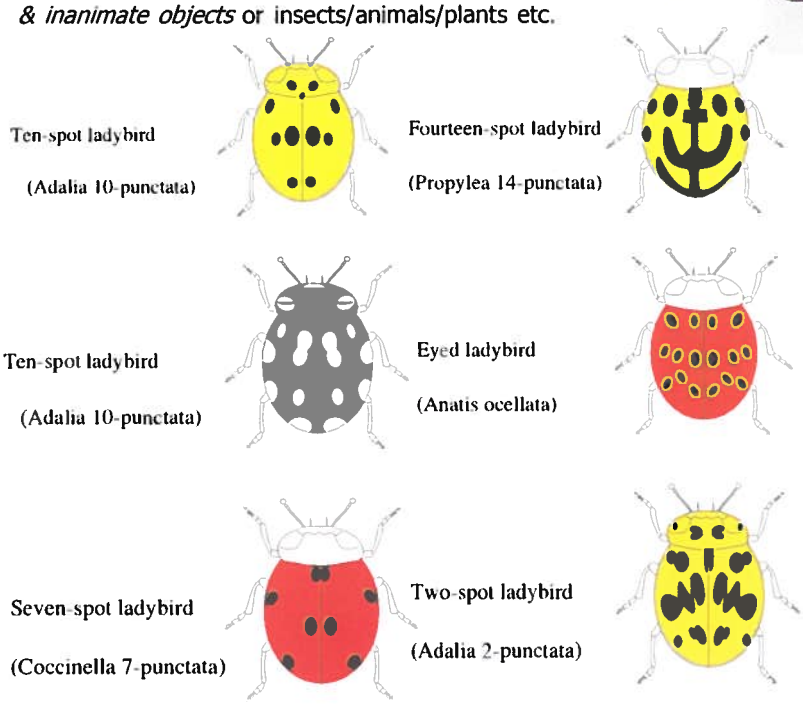


Fig.3 Ladybird graphics from the ISE 5-14 Graphics Collections

And the heart must pause for breath

The primary function of the respiratory system is to supply the blood with oxygen. When we breathe in, we inhale air containing oxygen and carbon dioxide. Breathing out we exhale air with a lower concentration of oxygen and a higher concentration of carbon dioxide than inhaled air.

This exchange of gases is the respiratory system's means of getting oxygen into the blood whilst removing waste carbon dioxide. The oxygenated (red) blood then delivers oxygen to all parts of the body.

Oxygen in the air we breathe enters the respiratory system through our mouth and/or nose. The air then passes through the larynx (voice box) and the trachea *(windpipe)*, which is a tube that enters the chest cavity. Here the trachea splits into two smaller tubes called the *bronchi* (below)

Inhale

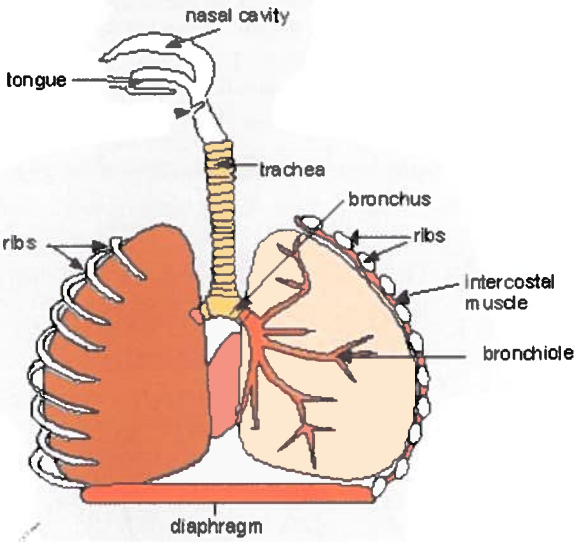


Fig.4 Inhale - diaphragm pulled down

Each *bronchus* then divides again forming the *bronchial tubes* which lead directly into the lungs where they divide into many smaller tubes, each of which connects to tiny sacs *(alveoli)*.

Each alveolus is in close contact with a tiny blood vessel called a *capillary*. The blood in these capillaries has been around the body so has a low concentration of oxygen and a relatively high concentration of carbon dioxide. Oxygen diffuses from the air in the *alveolar sacs* across the alveolar and capillary membranes into the blood. Carbon dioxide diffuses from the blood across the alveolar and capillary membranes into the alveolar sac and is breathed out.

So how do we make the bits move to allow us to breathe in and out? A large, dome-shaped muscle (*diaphragm*) lies across the bottom of the chest cavity. As it contracts and relaxes, breathing takes

place. When it contracts, 'fresh' air rushes into the lungs (Fig.4). When the diaphragm relaxes, air containing waste carbon dioxide is released from the lungs as the pressure inside is greater than that outside (Fig. 7).

Both the diaphragm and the muscles between the ribs (*intercostal muscles*) contribute to changes in the size of the chest. Hence the pressure within the chest (*thoracic*) cavity results in changes in the size of the lungs. As the diaphragm and intercostal muscles contract, the volume of the chest cavity increases and the pressure within, reduces. This allows air from outside to flow into the lungs.

Lung model

A simple model showing the mechanism of the diaphragm is easily made. All you need is a plastic drinks bottle, 2 drinking straws, 2 balloons and a plastic bag. Two holes are drilled in the cap of the bottle to take the drinking straws. The straws are then pushed through the cap and a small balloon is taped to each straw.

The bottom of the plastic bottle can easily be cut off with scissors. A plastic sandwich bag (from the supermarket) is then taped over the bottom of the bottle and hey presto you have a model of the working of the diaphragm. As the plastic is pulled down the balloons (lungs) inflate, as the plastic is pushed up the lungs deflate. One limitation of this model is that it can't represent movement of the rib cage.

The photos (Figs. 5 and 6) show the finished model.

Fig.5 Lung models

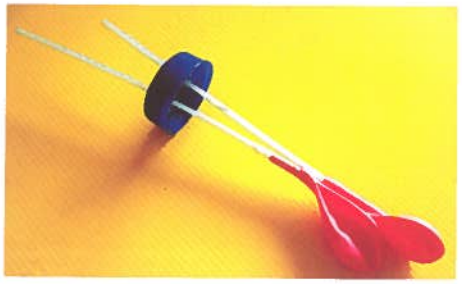
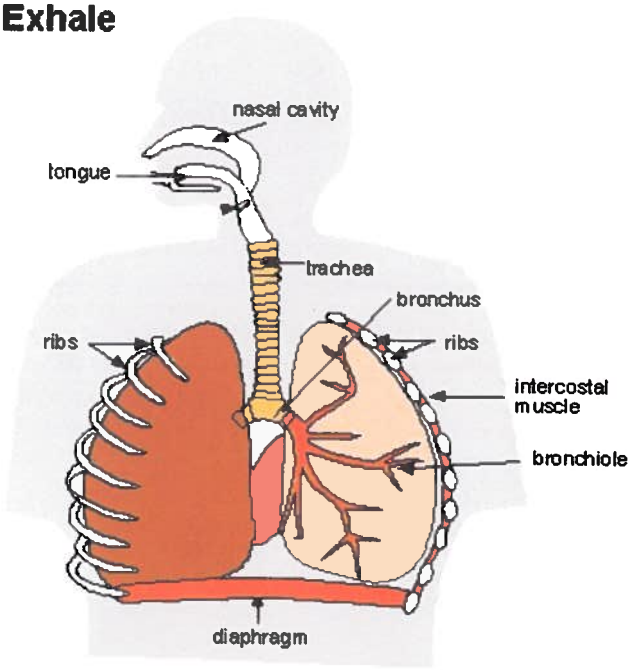


Fig.6 Straws fed through bottle top

Exhale



(Fig. 7) Exhale - diaphragm & chest muscles relax

ISE 5-14 Website - access more info.

These can be accessed via the Interactive Guidelines, the Planning Spreadsheet or the Framework for Planning.

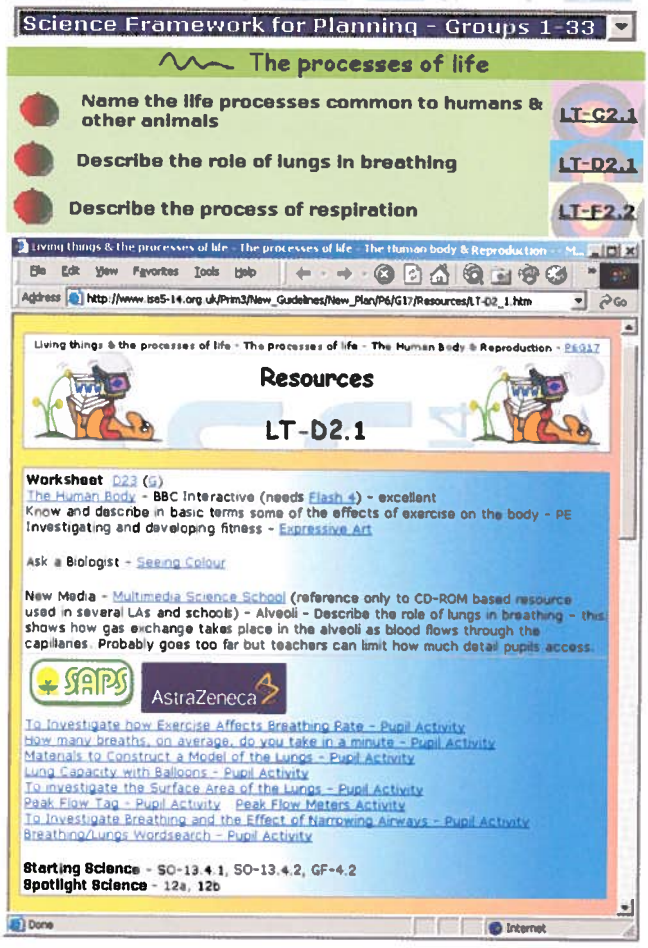


Fig.8 Resources page relevant to the Target LT-D2.1

Access the website at
http://www.ise5-14.org.uk/Prim3/head2.htm

Technology Teachers' Association / SSERC Primary Competition 2004

(A competition that requires no additional work to your normal curriculum)

The Technology Teachers Association exists to promote and support technological education. It is keen to promote stronger links between Secondary and Primary education. The TTA is very conscious of how full the curriculum is, and knows that it is almost impossible to enter competitions since they normally involve additional work and time that we do not have. TTA competitions are designed to involve little or no additional work for both the pupils entering and the teacher organising entries.

With that in mind, entries to our Primary Competition can be any piece of work produced by a pupil or group of pupils as a normal part of the curriculum where the process of **design/make/evaluate** has been clearly demonstrated. To enter, simply photocopy the pupil's report and/or sketches and/or evaluation and include photographs of the realised finished product (but not of the pupils themselves).

Some examples of projects that could be suitable include:
- castle with working drawbridge
- Viking longboat
- Fruit salad – (as found in the LTS/Nuffield Pack)

TTA associate membership is available for primary teachers throughout Scotland - £15 per annum. As a member you will receive a quarterly journal and you can attend the November Annual Conference and AGM where you will find primary centred workshops and discussion groups. Visit our web site or ask a secondary Design and Technology teacher for a membership form and please join. We aim to support **you**. **www.scottish-tta.org.uk**

The competition will be judged by both primary and secondary members of the Technology Teachers' Association.

Prizes will be presented at the TTA Conference and Exhibition on Sat. 6th Nov. 2004 at Dundee College

Sponsored By SSERC

Every Primary School pupil or a group of pupils is welcome to enter the competition. Just photocopy this form, complete the tear off slip below and enclose photocopies of the pupils' design work (at least 2 photos of different views if the model is 3 dimensional). **Closing Date 22nd October 2004**

Send entries to: Chris Jepps, West Winds, 17 Blackhill Drive, HELENSBURGH, G84 9AF

The Technology Teachers' Association

Name of pupil(s)..... **Age(s)**.....

.....

Name of teacher ..... **Year group**.....

I understand that no entries will be returned, signed.....

School Address .....

.....

.....

(An entry form should be attached to each pupil's/group's work)

SSERC, St Mary's Building, 23 Holyrood Road, Edinburgh, EH8 8AE Tel: 0131 558 8180 Fax: 0131 558 8191
Email: sts@sserc.org.uk Web: www.sserc.org.uk