

Some ideas for teaching Biology!

Alison Graham

Enzymes and digestion

1. **There is energy in food:** Place custard powder/icing sugar/flour in a funnel attached to a Bunsen burner tube or an old shower head with tube. Blow powder across a Bunsen flame.
2. **ATP- the energy carrier within the cell.** Model made from cardboard tube with detachable P and 'energy' trapped inside when P is bonded to the molecule.
3. **Jelly babies and the power of enzymes.** Ask a student to eat jelly baby and explain that sugar is being absorbed into his cells to use in respiration, the release of energy from food. This demo needs to be done in a fume hood with great care. Melt some sodium chlorate (c 2 cm) in the bottom of a Pyrex boiling tube. When liquid use tongs to drop in a jelly baby closing the fume hood quickly. Explain that a very similar reaction is occurring inside the student's cells at the same time but enzymes allow it to occur at 37 °C.
4. **Enzymes as biological catalysts in all living things.** In a measuring cylinder/ plastic bottle put some hydrogen peroxide (care needed!)- fairly concentrated if using as a demo- and Fairy liquid. Add yeast/liver/celery. Enzyme-catalase- catalyses the breakdown of hydrogen peroxide to oxygen.
5. **Human digestive system:** Ask a student to lie on a piece of wall paper and draw an outline. Make a model of digestive system using string/rope- mouth - 15cm, oesophagus - 35cm, stomach - 30cm, small intestine - 6m, large intestine - 1.5m, rectum - 15cm. Show how it fits in to the human.
6. **The process of digestion in humans:** Model using kitchen equipment. Start with meal - sausage, beans, potato. Mouth - mash + saliva (water), stomach- pummel in bag, add acid and enzymes(water), small intestine (add pancreatic juice (water) and bile salts (food colour) absorption to blood using sponge, large intestine- absorption of water(sponge), rectum- egestion.
7. **Absorption through cell membrane:** Model using ping pong balls. Small molecules (marbles/lead weights go through), large molecules (air golf ball) don't.

The brain and how eyes work

8. **Brain structure** Draw the brain parts and functions on a student wearing a white swimming hat.
9. **Role of meninges and fluid** . Shake eggs in plastic boxes, one full of water .This can also be used to show how the amniotic fluid protects the foetus.
10. **Why is the pupil small?** Hold a pin at arms length and focus on pin and distant object. Move pin in and note where it goes out of focus. Repeat looking through pin hole in black card.
11. **The iris in action** Observe the iris as lights are switched on and off.
12. **What is inside the eye?** View light through pin hole to see floaters in the vitreous humour of the eye
13. **Seeing the choroid** View bright light through pin hole and vibrate the card to see blood vessels of the choroid.
14. **The image on the retina.** Show using a pin hole camera. Also pin held between the eye and card. Move pin until image is seen- it is inverted.
15. **Which is your dominant eye?** View distant object through the hole in the card, move towards the eye.
16. **Monocular and binocular vision** One person holds out an object – pen/lolly pod stick. The other has already closed one eye and pointing **arm and finger to the side** moves finger tip **from the side** onto the top of the pen. Repeat with 2 eyes!
17. **Reaction time** Hold out a 5 euro note. Other person tries to catch it.

Other things!

18. **Spread of STIs** Each student has a container with some ‘bodily fluid’ in it – water or starch solution. Exchange fluids by mixing contents , shaking and redividing. Test to see if they are infected by doing the ‘antibody test’ (with iodine). Any disease can be used-incidence has trebled since 1995. Chlamydia now 5% of student population in one study.
19. **Feeding niches** Demonstrate using mixture of seeds and competition to remove them from a mixture in the bowl using different sized tweezers.
20. **Osmosis in eggs** Dissolve the shell of an egg by placing in vinegar for several days. Immerse in different solutions of syrup/salt to show osmosis