EASY SCIENCE

Totally sudsational!

What do soap, dishwashing detergent, shampoo and washing powder have in common? Everyone knows they are all for cleaning! Every time you wash your clothes, wash the dishes, wash your hands, or take a shower or bath, you are using chemicals to help you clean. The chemicals you are using are the ones in soaps and detergents.

People have been making soap for about 2000 years. The old way of making soap was to mix water that had dripped through ashes from burnt wood with melted animal fat (yes, that's right!). A layer of white soap would form at the top of this mixture. Today, soap is usually made with plant oils in stead of animal fat and often contains perfume, colouring and moisturizers.

Detergents have only been made for the past 75 years. Detergents are made from the chemicals in petroleum, but work in the same way as soaps to help people clean.

If dirt or dust simply gets on a surface, you can usually clean it with a dry cloth or water alone. But if oil or grease gets mixed in with the dirt, then you need soap or a detergent to clean it away. This is because water cannot hook on to oil or grease. Water just slides along the oil or grease but can't "grab" on to it to wash it away. People say "oil and water don't mix". Water molecules and oil molecules need something to help them attach to each other. That's the job of soap and detergent!

But where does all the oil come from? Your skin gives off oil all the time. When oil on your scalp mixes with dirt, you need shampoo to get the cleaning done. Oil and dirt from food make it difficult to clean dishes with just water. That's why you need dishwashing soap (a detergent) to clean the dishes properly.

Have some fun testing the amazing qualities of soap and detergent.

Watch out! Soap and detergent can sting your eyes. Be careful when doing the experiments.

You will need:

- A sheet of white, unlined paper
- Lipstick
- Pencil
- Masking tape
- Blunt-end scissors
- Ruler
- Food grater
- Cotton swabs (ear buds)
- Soap
- Dish washing detergent
- Laundry detergent
- Shampoo
- Measuring cups
- Measuring spoons
- Plastic or paper cups
- White cloth rag
- Wax paper

Cut your piece of paper in half lengthwise and use your ruler to divide it into five space as shown. Label the space "water", "soap", "dish detergent", "shampoo", and "laundry detergent". Lay a piece of wax paper over the chart, fold the wax paper around the chart and tape it on the back.

Use your masking tape and pencil to label your cups "water", "soap", "dish detergent", "shampoo", and "laundry detergent". Place $^1/_2$ cup of water in each cup. Ask your adult partner to help you use a grater to grate two tablespoons of soap onto a dish. Place all of your grated soap into the "soap" cup and stir with a cotton swab until the soap flakes dissolve.

Add 2 tablespoons each of dish detergent, shampoo, and laundry detergent to their labeled cups and stir with separate cotton swabs until they are well mixed. Place each cup in front of its space on the chart.

EASY SCIENCE

EasyScience is produced by the South African Agency for Science and Technology Advancement (SAASTA), an operational unit of the National Research Foundation. SAASTA's mission is to promote the public understanding, appreciation and engagement with science and technology among all South Africans.
Visit the website: www.saasta.ac.za for more information.

SAASTA

Use a lipstick (ask your mom for an old one) to make a streak on the wax paper across your chart. Use your finger to smooth out the lipstick so that it has the same thickness across all five spaces.

Use a separate cotton swab to put one drop of each liquid on the lipstick in each space. Do not touch the lipstick with your swab. Wait 3 - 5 minutes and rinse off the drops in a thin stream of water from the tap. Which liquid cleaned the lipstick the best? Which did not clean it well at all? Make notes of your results.

On your other half piece of paper, make the same chart you made before, but this time don't cover it with wax paper. Make another streak of lipstick and smooth it out. Does the lipstick go on differently than before?

Add one drop of each liquid to the lipstick as before, wait 3 – 5 minutes, and rinse again. Did the liquids clean the paper differently than the wax paper? Hold your chart up to the light to see your results better.

Put a streak of lipstick on the white rag and follow the same steps as before. Do the liquids clean the lipstick as well from the cloth as from the wax paper?

Now, put a little lipstick on each of the five fingertips of one hand. Rub your thumb and fingertips together to even out the lipstick. Dip one finger at a time into each liquid. Ask a friend to rub each of your fingertips with a separate cotton swab for three seconds and rinse. Which liquid cleaned the lipstick off your finger the best?

The fate of phosphate

For a long time, most laundry detergents had chemicals in them called phosphates. Phosphates helped clean clothes, but they are also a very good fertiliser for plants. When people washed clothes, the phosphates would go down the drain with the water, and some of them landed up in dams and lakes.

The phosphates made small green plants, called algae, grow much faster than normal. The algae began using up so much oxygen in the water that the fish began to die. Bacteria on the dead fish used up even more oxygen. Pretty soon there was not enough oxygen in the water for the algae and it died too. Scientists traced the problem to the phosphates in the detergent. They started experimenting with chemicals that worked as well as phosphates for cleaning but did not cause algae to grow. They soon found different chemicals to replace the phosphates, and today most laundry detergents have no harmful phosphates.

THE DRAGONS HAVE ARRIVED!

A breeding pair of Komodo dragons arrived safely at the National Zoological Gardens (NZG) in Pretoria on 31 January this year. This gift was part of an exchange programme between the Zoo and Indonesia's Surabaya Zoo. The NZG will give the Indonesian zoo two cheetah for their animal collection in exchange for the Komodo dragons.

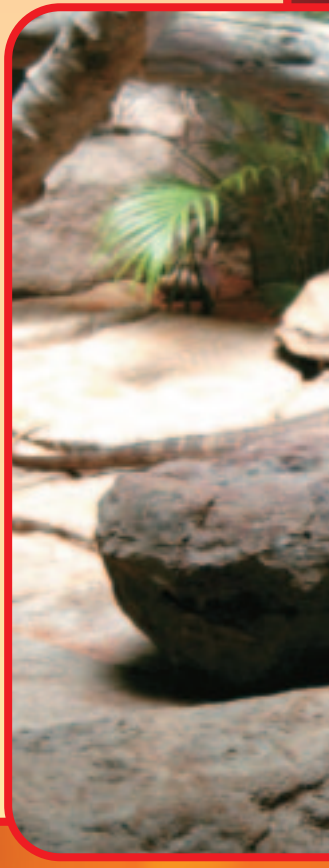
These Komodos are the only ones currently in Africa. They will spend the next month to acclimatise and will go on display to the general public on the afternoon of 20 March 2006.

Komodo dragons are not real, fire-breathing dragons you find pictures of in books. They are the world's largest lizard species and are fierce predators. This animal is a reptile and therefore cold-blooded. The females lay eggs.

The Komodo dragon is a fast runner and it can also climb trees and swim. It is a meat eater and eats almost anything it can find, including goats, pigs, other lizards and carrion (dead meat). It has deadly bacteria in its mouth. When it bites its prey, the victim will get sick from blood poisoning soon, which often allows the Komodo to find and eat it.

A Komodo dragon can eat as much as 80% of its own body mass in one sitting! This is the equivalent of a 60 kg person eating almost 50 kg of food (think 400 large hamburgers!) at one time.

There are only about 3 000 Komodo dragons left in the wilds of the Komodo National Park, off the coast of Indonesia (see map). It is in danger of extinction due to loss of habitat. They have been declared a national treasure by the Indonesian government and only the President can allow these reptiles to be taken to countries outside Indonesia.



A 2 m Komodo dragon explores its new surroundings at the National Zoo in Pretoria. It arrived there on 31 January 2006. You will be able to see these creatures from 20 March 2006 at the zoo's Dragons and Monsters display. (below)

KOMODO DRAGON FACTS:

- Its scientific name is ***Varanus komodoensis*** (genus and species)
- Maximum length: 3,13 metres
- Maximum weight: 166 kg
- Maximum speed: 20 km/h
- Life span: 30 – 50 years
- Diet: Carnivorous (meat eater)
- Active during the day (diurnal)
- Female lays 20 – 40 eggs that hatch in about 7 months
- It senses chemicals with a long, yellow, forked tongue.

SCIENCE

South Africa builds its own micro satellite

The Department of Science and Technology, Stellenbosch University, SunSpace & Information Systems (Pty) Ltd, and the CSIR Satellite Application Centre (SAC) have joined forces to build, launch and track a new South African micro satellite. Over the next three years, R26 million will be invested in research, capacity building, and building the satellite.

The University will manage the project, train postgraduate students, and do the scientific research in aspects of satellite engineering and software development. Postgraduate students will be trained at a Masters and Doctoral level in satellite related engineering, software engineering, geography and agriculture remote sensing. SunSpace Ltd will be building the satellite, and CSIR SAC will be responsible for operating, tracking and monitoring it.

The launch of the satellite is planned to take place during the second half of 2006.

South Africa's first satellite, SUNSAT, was developed by and successfully launched in February 1999.

WHY A SATELLITE?

We need to understand the Earth system in order to improve human health; safety and welfare; to protect the environment; to reduce disaster losses, and to achieve sustainable development.

Satellites are used extensively for telecommunications (i.e. phone calls), broadcasting (i.e. television and radio) and various other applications. Space assets, like satellites, are no longer a matter of prestige for any country. They have become essential tools.

The Department views this satellite as the beginning of a long-term national space programme.

SATELLITES

A satellite is any object that orbits or revolves around another object. For example, the Moon is a satellite of Earth, and Earth is a satellite of the Sun.

Man-made satellites that orbit Earth and the Sun are highly specialised tools that have different designs, depending on the type of information they need to communicate. The new South African micro satellite will weigh about 80 kg will rotate the Earth at a height of approximately 500 km. The small satellite programme will provide South Africa affordable access to space as well as useful data. The satellite is also aimed at demonstrating that high resolution remote sensing can be obtained with a satellite as small as 80kg

(For more information on satellites, see MiniMag, October 2005)

South African's new micro satellite will be applied to support:

- Monitoring and managing disasters like floods, oil spills and fires.
- Agriculture - to help farmers detect plants under stress, optimise application of fertilizer, predict crop yields and detect overgrazing.
- Water resource management. South Africa is a dry country. Satellite images can help us manage our scarce water resources better.
- Urban planning. Cities seem to be growing fast in an uncontrolled way. By using satellite images, town planners can help prevent problems like traffic congestion, illegal building and too few recreational sites.
- Health hazard monitoring, to provide information to disease specialists.
- Regulatory monitoring to do surveys to ensure people are complying with agreements and laws.
- Food security to give people responsible for food security (the difference between available food and the food needed by South Africa) information on crops planted in a specific season.

CAREERS IN SPACE SCIENCE

South Africa is buzzing with space science activities. If you would like to follow a career in space science, you will need to do well in school subjects such as mathematics and physical science. This will allow you to enroll for courses in mathematics, physics or engineering at university. Many South African universities present postgraduate courses in space science at their maths and physics departments.

ENTRY FORM

NAME FOR SOUTH AFRICA'S MICRO SATELLITE: .....

YOUR NAME AND SURNAME: .....

NAME OF YOUR SCHOOL: .....

PROVINCE: ..... IN WHICH GRADE ARE YOU? .....

POSTAL ADDRESS: .....

HOME TELEPHONE NUMBER: .....

SCHOOL TELEPHONE NUMBER: .....

SCHOOL FAX NUMBER: .....

GET YOUR ENTRY TO US BY 26 April 2006 IN ONE OF THE FOLLOWING WAYS:

1. Mail it to NAME THE SATELLITE COMPETITION, c/o SAASTA, PO BOX 1758, PRETORIA 0001
2. HAND DELIVER TO: SAASTA, DIDACTA BUILDING, 211 SKINNER STREET, PRETORIA

COMPETITION RULES

1. Send in one name per entry form only.
2. You may make photocopies of the entry form, or download copies from the website www.saasta.ac.za.
3. Your entry must reach us by 26 April 2006.
4. The organisers will appoint independent judges and their decision will be final.
5. The name becomes the property of the Department of Science & Technology.

For enquiries and more entry forms, contact Tryphina Mabena, Telephone (012) 391-9320; email: tryphina@saasta.ac.za