SCIENCE SPAZA SPACE
Knowledge is Ncah!
ISSUE 1, MARCH 2014
www.sciencespaza.org Facebook: ScienceSpaza

Hip Hop Science Spaza Launches at Scifest Africa

Science Spaza launches its inaugural "Hip Hop Science Spaza" competition at this year's Scifest Africa. The revolutionary approach to learning science through rap and hip hop song writing and performance is causing a buzz across the nation.

Hip Hop Science Spaza is the brainchild of music communications researcher Hilary Kromberg, who has teamed up with New York-based Hip Hop Science Education Professor Chris Emdin to kick off the competition in South Africa.

"Music is such a deep part of each one of us. In our culture, we use music to share ideas and to learn. South Africans love music and we know how to Jive!" says Kromberg.

The Hip Hop Science Spaza competition invites learners across the country to get together in groups of 2 or more to create and perform a song or spoken word performance piece on a science topic from the school curriculum. "I am excited to work with Science Spaza to bring this competition to South Africa. We have been doing this in the US among groups most marginalized from success and it is only natural to expand the work to South Africa," said Emdin.

Entries can be submitted online, through social media – or even by sending Science Spaza a USB. All submissions will be adjudicated and a selection will be professionally recorded for distribution to all Science Spaza clubs.

"If you don't rap – then sing a song. If you don't sing, then write a praise poem." It's all about using our cultural expressions to explain what we see in the world around us."

What makes a good rap song? The rhythm, the beat and the rhyme. The content is of course critical, so make sure you have identified an area of science, choose 4 facts about that area and put them together in a song or rap. You can pick a topic from one of the Science Spaza resources or get one from your textbook.

Entries for the competition close on the 1st of July so time is running out. Visit www.sciencespaza.org for more information. Find out more on page 2.

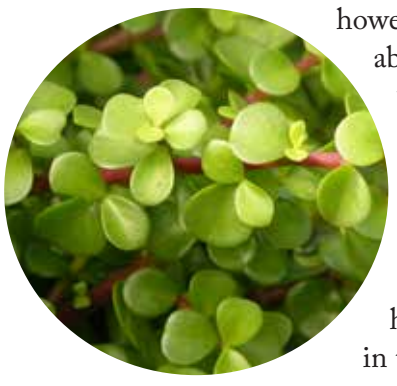
Dr Chris Emdin – Hip Hop Science Ed Professor, New York

Saving the World with Spekboom

Adapted from an article by Luveshni Odayar for the Young Science Communicators Competition

GLOBAL WARMING! CLIMATE CHANGE! CARBON EMISSIONS! MELTING GLACIERS! Phrases like these have dominated the global media and instilled hopelessness into the hearts of the masses with the impression that this problem is too big for us to solve.

Here's where I introduce the metaphorical David to our Goliath, *Portulacaria afra*, commonly called spekboom and described as the 'miracle plant'. "What's spekboom?" you might say, "… and how on earth can it solve global climate change?"



Portulacaria afra
Picture credit: wikicommons

Spekboom is an indigenous evergreen shrub which occurs extensively in the subtropical thickets of the Eastern Cape Province and the eastern regions of the Western Cape. It has a thick woody stem, small succulent leaves, and can grow up to 2.5 m in height. It flourishes in drier climates, but also adapts easily to areas with higher rainfall.

At first glance it's not an impressive plant. What makes it special, however, is its extraordinary ability to take in large volumes of atmospheric carbon dioxide, which it then deposits into the soil … a process known as carbon sequestration. A single hectare of spekboom in the Eastern Cape can potentially sequester around 4.2 tonnes of carbon a year!

The subtropical thicket biome is one of the five major "carbon sinks": places where carbon collects and is stored. Over the last century unsustainable farming practices, particularly overgrazing by goats, have resulted in the loss of huge areas of subtropical thicket in the Eastern Cape, and the release of 40 kg/m^2 of stored carbon back into the atmosphere. Spekboom planting initiatives have been launched in numerous degraded thicket sites, to rehabilitate degraded land and offset harmful atmospheric carbon emissions. Spekboom is easily propagated from cuttings, and can survive in both drier and wetter environments, making it ideal for land restoration in the Eastern Cape.

Spekboom planting also strengthens SA's economy because it enables South Africa to enter the global carbon-trading market, worth many billions of US dollars. Within just 9 months of implementing spekboom planting in Eastern Cape reserves, the province reported a 300% rise in income from carbon credits. The replanting of spekboom is also expected to generate around 100 000 labour-intensive rural jobs.

Reducing carbon emissions, restoring degraded land, uplifting rural communities, generating income … spekboom-planting really does promote sustainable development - that is, 'people, planet and profit'. This hardy shrub, with a 'high-carb' diet, lives up to its name as the 'miracle plant' … a true local hero.

Suddenly, climate change doesn't seem that daunting any more. It's time to start saving the world … one spekboom at a time!

Enter the *Hip Hop Science Spaza* competition and stand a chance to have your track recorded for the Hip Hop Science Spaza 2014 CD!

A selection of the best of the 2014 competition will be professionally recorded and distributed to all registered Science Spazas. Not only will you be learning science, you'll also be teaching it to other science learners across South Africa.

Rules of the Hip Hop Science Spaza Competition:
Closing date: 1 July 2014. The selected tracks will be announced during National Science Week 2014.

- Rap songs must be based on a school textbook topic or a Science Spaza resource topic, e.g. Static Electricity. Download all the resources for free at www.sciencespaza.org
- No swearing, and be respectful of women.
- Submissions can be whatsapped to 076 1737 130 or emailed to info@sciencespaza.org

NRF National Research Foundation | SAASTA South African Agency for Science and Technology Advancement
Jive Africa

Vampires in your neighbourhood

Adapted from an article by Henriëtte Hobbs for the Young Science Communicators Competition

With the film and TV hype of *Twilight Saga*, *The Vampire Diaries* and *Buffy the Vampire Slayer*, it is no wonder there is so much interest and curiosity surrounding blood sucking vampires.

As mythical as these creatures may seem, we have actually been surrounded by real, live, blood-sucking vampires for centuries. We call them mosquitoes and although it may seem that they are out to get you, they really aren't and here's why.

picture credit: pixabay

When it comes to mosquitoes, like most things, there are good and bad. Good mosquitoes just make you itch, bad mosquitoes carry infectious diseases such as the deadly malaria.

Of the thousands of mosquito species around the world only a fraction prefer human blood to animal blood. Of those who do prefer human blood, only a fraction belong to the genus *Anopheles*, and can transmit the human malaria parasite called *Plasmodium*. A female mosquito contracts and spreads malaria when she sucks blood from an infected person and then bites another.

Male and female mosquitoes play very distinct roles when it comes to reproduction and survival. Both males and females feed on nectar from flowers, but only female mosquitoes feed on humans and animals as a nutritional supplement when they are growing eggs. Did you know? When a female mosquito stabs into her host to suck blood, she injects saliva containing anticoagulants, which prevent the blood from clotting – that's what makes it itch!

Mosquitoes prefer to rest in the heat of the day and are generally more active at night, specifically at dusk and dawn when they track down their hosts using multiple clues such as heat, odour, sight and carbon dioxide. Studies have shown that mosquito activity increases during a full moon!

So, although it may seem that mosquitoes only exist to drink your blood and leave you with an itchy bite, it simply isn't true. Male mosquitoes don't bite humans and although females feed on blood, many prefer animals over humans. Mosquitoes are also a good food source for many birds and frogs – worth remembering the next time you feel the urge to swat the pesky little thing.

Welcome to the first issue of *Spaza Space*, launching for the first time at Scifest Africa 2014, in Grahamstown

This issue brings you exciting news from our Science Spaza clubs and the launch of the Hip Hop Science Spaza competition. We also introduce our readers to Agent Zee, who is a young, funky African woman in science who explores opportunities for young people and especially women in Science, Technology, Engineering and Mathematics (STEM).

We continue to provide Science Spaza clubs with free resources and have included 3 more in this issue. These can help your Science Spaza club participate in hands-on curriculum based activities in a fun and understandable way!

If you haven't already registered your club with the Science Spaza programme to get your science essentials delivered fresh to your spaza, you can register on www.sciencespaza.org or cut out the registration form and post or fax it to us.

South Africa is ranked second-to-last out of 144 countries in science and maths education and less than 5% of schools have stocked laboratories, in STEM education. Something has to be done. Science Spaza brings you fun and interactive ways to learn and experience science. It aims to improve science literacy in schools around South Africa and to support educators to teach science in a fun and effective manner. Science Spaza has established a network of science clubs in disadvantaged schools across the country.

There are currently over 40 clubs registered to Science Spaza and the number is growing...So fill up with cool science by reading the Spaza Space and finding out how you could register for your own Science Spaza club because... Knowledge is Ncah!

The Science Spaza Team

To find out more or to advertise in Spaza Space contact info@sciencespaza.org or call Robert on 033 342 9382

What have Hip Hop and science got to do with each other?

We did a quick survey of learners and they had the following to say about HIP HOP:

OK. Now what do you think they said about SCIENCE?

Some said it is the *complete opposite* to Hip Hop. They used words like difficult, isolated, geeks, academics, white, lab coats, test tubes. BUT some used other words: our future, creative, possibilities, ideas, uniqueness, discoveries.

So here is Science Spaza's challenge to YOU!!!

Read the list of words for Hip Hop again! Can they be used to describe SCIENCE?

If Hip Hop "breeds its creativity and its inventiveness as a result of a necessity to provide new avenues for voice to the marginalised" (Emdin, C. 2010), and if science and new scientific inventions and breakthroughs are to result in solutions to the world's problems, then we need to think about science in a new, funky and Hip Hop kind of way!

If Hip Hop is the voice of those who feel that they are deprived and need to be heard, then what about science being a MOUTHPIECE for African solutions to African problems?

If we avoid science because it is only for "clever, wealthy people" then who is going to come up with solutions to OUR problems??

OK, so here is the challenge. Take 4 key concepts from one of the Science Spaza resources (available on www.sciencespaza.org) and write a rap song that will educate others about those concepts in a COOL and FUNKY way!

Top TIPS: How to write a good rap song!

Keep it simple! It must have rhythm, it must have a beat, it must rhyme! Some tips from our American friends – Google: the Rap Genius Forum

Content – Generally, what the artist(s) are saying in the song. Different minds like different kinds of content in songs. However, most good songs don't have swearing.

Lyrics – The actual words used to convey what is trying to be said in the song. Lyrics play the biggest role in determining if a song is good or not, in my opinion. Clever wordplay and a nice rhyme scheme can make a song way better. In hip hop/rap, just about every good song is poetic in some way.

Emotion – Emotion also plays a big part in how good a song is. People can feel the emotion in songs like it is part of the beat. Expressing emotion, whether it be anger, sadness, happiness, etc., can always make a song better. It is also how people make personal connections to songs.

Beat – I don't think a lot needs to be said about this. Having a great beat can make a song with not-so-good lyrics worth listening to.

There are many more qualities that make a song good, but these are the main ones.

NEWS FROM THE CLUBS

This is where you, the members of the Science Spaza clubs, get to share your news and have your say about science issues

Gqira learners boosted by Science Spaza

by **N.E Madikane** Science teacher, Gqira Science Spaza

Gqira J.S.S. is a disadvantaged rural school located in one of the poorest communities of Eastern Cape at Ngqeleni, being part of Libode Mega-district. In the area most learners are vulnerable whilst others are orphans. There are child-headed families. As expected, the school is community-built and has a shortage of classrooms and furniture. There is no science laboratory or computer laboratory.

Like all disadvantaged learners, our learners used to lack confidence, looking down on themselves, shy to take initiative and dependent on their teachers all the time. The science teacher encouraged learners to attend Scifest at Grahamstown. They showed a great interest in the festival.

They went to the Scifest in 2013 and were very fortunate to come across the Science Spaza stall which displayed interesting activities. These activities fascinated our learners. As a result we registered the school and formed our own science club. Since then the school has received tremendous support and worksheets from Science Spaza. This year we have 20 new club members, making a total of 50.

Science club benefits

Ever since we registered with Science Spaza and used the resources we have seen that:

- Teaching science has been a pleasure. Topics that we struggled to teach have been simplified.
- Use of Science equipment to do practicals has made lessons more interesting and easily understood, thereby promoting independent thinking, increasing feelings of self-worth and boosting their self-esteem, while on the other hand decreasing shyness and dependency.
- Learners enjoy using worksheets and are always keen and eager for the next lesson.
- Science Spaza has caused a tremendous improvement in learner performance and love of science.
- Learners now live science, as they notice that science is all around them.
- Neighbouring schools are also interested in registering their own science clubs after noticing the impact it has on improving learner performance. One example of this is Matanzima J.S.S.

Gqira Junior Secondary, Eastern Cape

SCIENCE SPAZA TESTIMONIES

Busisiwe Siqongane

Grade 10, Sobantu Science Spaza, wants to be a Biologist

"Science Spaza is as fun as it promised to be. When we are doing the activities we learn more about science. One of the many things we learnt is that one can actually recycle or re-use things that we use in our daily lives in order to understand what science is.

Science before Science Spaza was a bit difficult. We didn't do practical work and we couldn't relate what our texts books would say with any images.

I still want to be part of Science Spaza and I wish all my friends would join."

Mnceba Science Club

"We are proud because we have joined Science Spaza only last year. Our learners are very excited, especially when doing science activities. We have gained a lot because they provide us with many resources for science. We have gained more knowledge. I wish all schools could join Science Spaza."

Above: **Sobantu Senior Secondary, Eastern Cape**

Below: **Dordrecht High School, Eastern Cape**

Below: **Dalindyebo High School, Eastern Cape**

About Agent Zee

Heita! Hola and watsup peeps! I'm sure we've all heard that scientists are nerds or that science is ONLY for boys! Well, NONE of that is true and I'm here to break the rules!

I am Zinhle. African woman. Science student. Science diva and science junkie!

My student friends know me as Zinhle. When faced with a challenging science problem I transform into Agent Zee and venture into the great unknown in search of the answer.

There's a whole world out there to discover!

So stay in touch with me through my website, Facebook page and Twitter account where I profile Mzansi's great scientists, career opportunities and the latest science news from SA and around the world.

Remember, nothing can stop you guys! The power is within you...

Visit my website: agentzee.org

zee@agentzee.org

@agentzee

AgentZee

Interview with Bathabile Ramalapa

Watsup guys! This week I had the pleasure of meeting up with Bathabile Ramalapa from the CSIR, who's doing some AMAZING research! Her research is on designing nanotechnology based delivery systems for Tuberculosis (TB) drugs! Find out more about this amazing lady!

Agent Zee: Hi Bathabile, could you tell me a bit about yourself? What is your life background?

Bathabile: I grew up in Atteridgeville, a township west of Pretoria. I had a very humble childhood surrounded by my mother's family including cousins, aunts and uncles. I attended primary school at Andrew Anthony and Laudium Secondary, both based in Pretoria. I studied for a National Diploma and BTech in Analytical Chemistry at the Tshwane University of Technology, and I have just completed my MSc in Chemistry from the same university.

Agent Zee: Which institution do you currently work for and what does your job entail?

Bathabile: I am a research technologist at the Council for Scientific and Industrial Research (CSIR). I do research in the field of nanomedicine and my job entails designing nanotechnology based delivery systems for Tuberculosis (TB) drugs. The research is aimed at enhancing compliance of patients with TB treatment by reducing the doses of the treatment and the length of the course, as well as reducing side effects suffered by patients.

Agent Zee: Sounds like some ground-breaking research! What inspires you the most about your career?

Bathabile: Currently the research I am working on is aimed at reducing the plight of TB sufferers in South Africa and Africa as a whole. I am highly inspired by just knowing that I could make a difference in other people's lives. Research requires a lot of learning and innovation, it stretches one's mind and I'm also inspired by that.

Agent Zee: Absolutely! What are your thoughts on the future of SA science?

Bathabile Ramalapa

Bathabile: I think SA is doing well right now in terms of collaboration with other countries and funding science. South Africa is capable of producing scientists of world class calibre and in future will be able to reach world standards in terms of science and research. We just need to ensure that we start to get students as early as high school to be inspired and committed to their studies and towards reaching that world class standard.

Agent Zee: Bathabile, what advice would you give to young people wanting to study science?

Bathabile: In everything that you do, hard work and commitment will pay off and that also applies in science. It also becomes easier to study and be successful in this field if you're passionate about it. Start as early as the first years of high school to be determined in getting good grades, especially in science and maths.

Agent Zee: That's great advice, Bathabile! Thank you so much for your time, and all the best in your current research.

A career in Analytical chemistry

Analytical chemistry is the study of the separation, identification, and quantification of the chemical components of natural and artificial materials. Analytical chemists use a diverse range of methods to investigate the chemical nature of substances. The aim of such work is to identify and understand the substance and how it behaves in different conditions.

In the pharmaceutical industry, for example, analytical chemists are involved throughout the drug development process. They study the physical and chemical properties of drug substances and formulations, with a view to determining the quality and stability of drug products.

Analytical chemists may be involved in work as diverse as:

- chemical or forensic analysis;
- process development;
- product validation;
- quality control;
- toxicology;
- drug formulation and development.

Where can analytical chemists work?

Analytical chemists typically work in laboratories, where they operate and maintain instruments. They perform tests and other procedures on compounds to recognise their nature. They design the procedures they employ and create reports on their results. Analytical chemists constantly look for ways to improve those procedures as well.

Where can I study Analytical Chemistry?

Degree: BSc degree: most universities. A degree course specifically for analytical chemists is offered at UJ.
Diploma: TUT, CPUT, DUT, VUT, UJ.

Post-graduate study:

BSc (Hons) in Chemistry - most universities.
BSc (Hons) in Applied Chemistry

Read more on: http://www.prospects.ac.uk/analytical_chemist_job_description.htm
http://en.wikipedia.org/wiki/Analytical_chemistry
http://education-portal.com/articles/Analytical_Chemist_Job_Description_Duties_and_Requirements.html

STARTING YOUR OWN SCIENCE SPAZA

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Jive Africa

Application Form – Science Spaza

Name of school: _____

Municipality: _____

Province: _____

Name of your science club:

_____

Contact person: _____

Name: _____

Surname: _____

Telephone number: _____

Email address: _____

Postal address: _____

_____

_____

To be filled in by responsible adult (parent/teacher)

Name: _____

Surname: _____

Position: _____

ID Number: _____

Signature (parent/teacher):

_____

Date: _____

Send to PO Box 22106, Mayor's Walk, 3208, Fax to 086 610 5453
email: info@sciencespaza.org or submit your application online at www.sciencespaza.org

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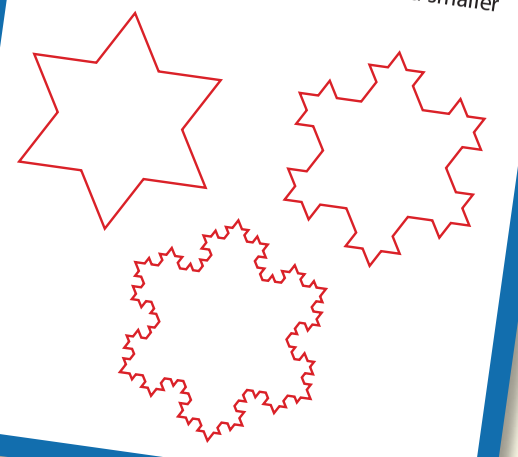
Fractals

DID YOU KNOW?
THERE ARE GEOMETRICAL PATTERNS ALL AROUND YOU?

WHAT ARE FRACTALS?

Fractals are infinite patterns, that keep on repeating themselves at a smaller and smaller size.

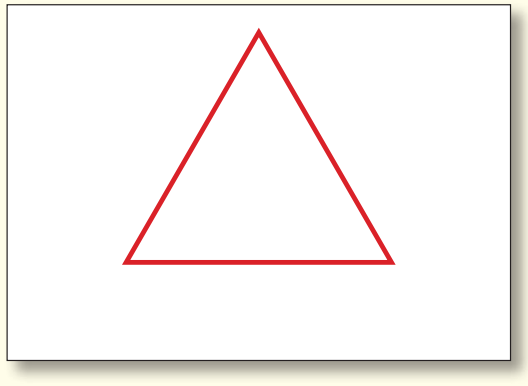


DEMONSTRATION:
FRACTAL SNOWFLAKES!

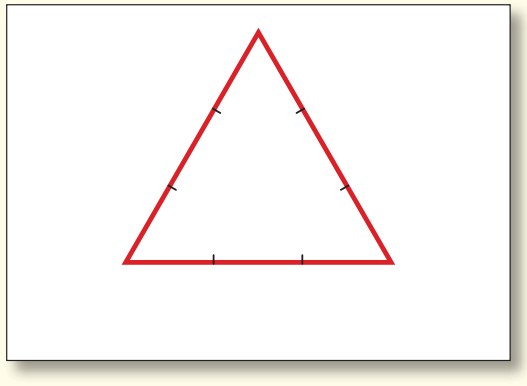
WHAT YOU WILL NEED:
Pencil, ruler, protractor, large sheet of paper (A4 or bigger), eraser

What to do:

1. Draw a large equilateral triangle on the paper.



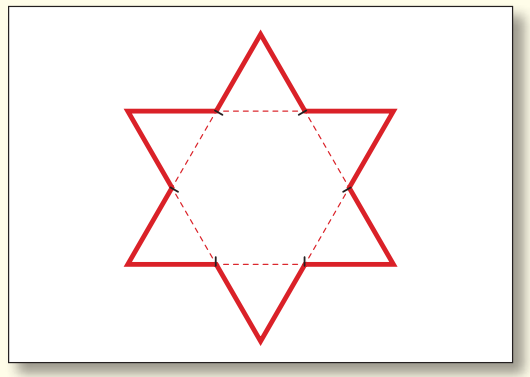
2. Divide each side into three equal sections.



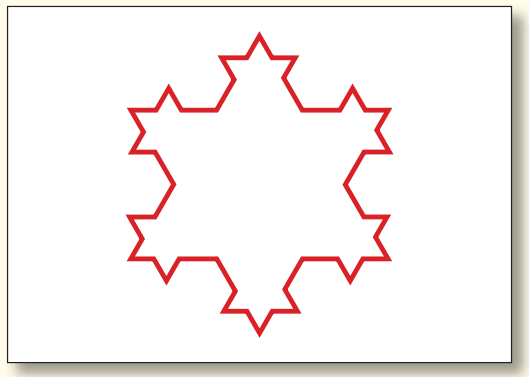
PULL-OUT RESOURCES

Fractals – pages 1 & 4

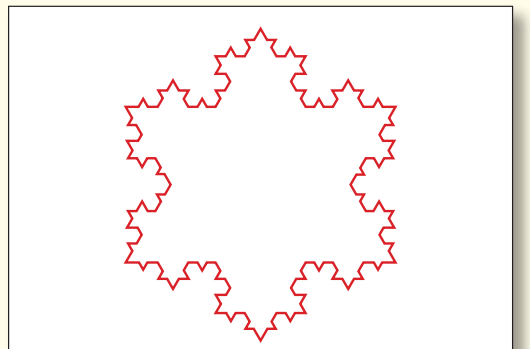
3. Draw smaller equilateral triangles on the middle section of each side and erase the base of each new triangle.



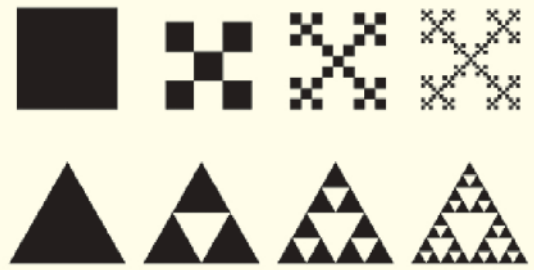
4. Repeat steps 2-3 on each side of your new shape.



5. Repeat steps 2-3 as many times as you can!



6. Start with another basic shape and see what kind of pattern you can create! Here are a few to inspire you:



To Infinity and Beyond!

You have just made a FRACTAL - a geometric pattern made from a simple shape repeated at a smaller and smaller size. You probably had to stop repeating the pattern because the detail got too small, but if you kept magnifying your pattern you could add to it forever. In other words, fractals are infinite!

NATURE'S FRACTALS

Here's the really mind-blowing part! Fractals are all around us – tree branches, river systems, the structure of your lungs, blood vessels and spiral patterns likes seashells and galaxies.
Just look at this fern. See how the lobes on either side of the mid-line are the same shape as the whole leaf but smaller? Each lobe is also made of even smaller lobes – it's a fractal!

fold here

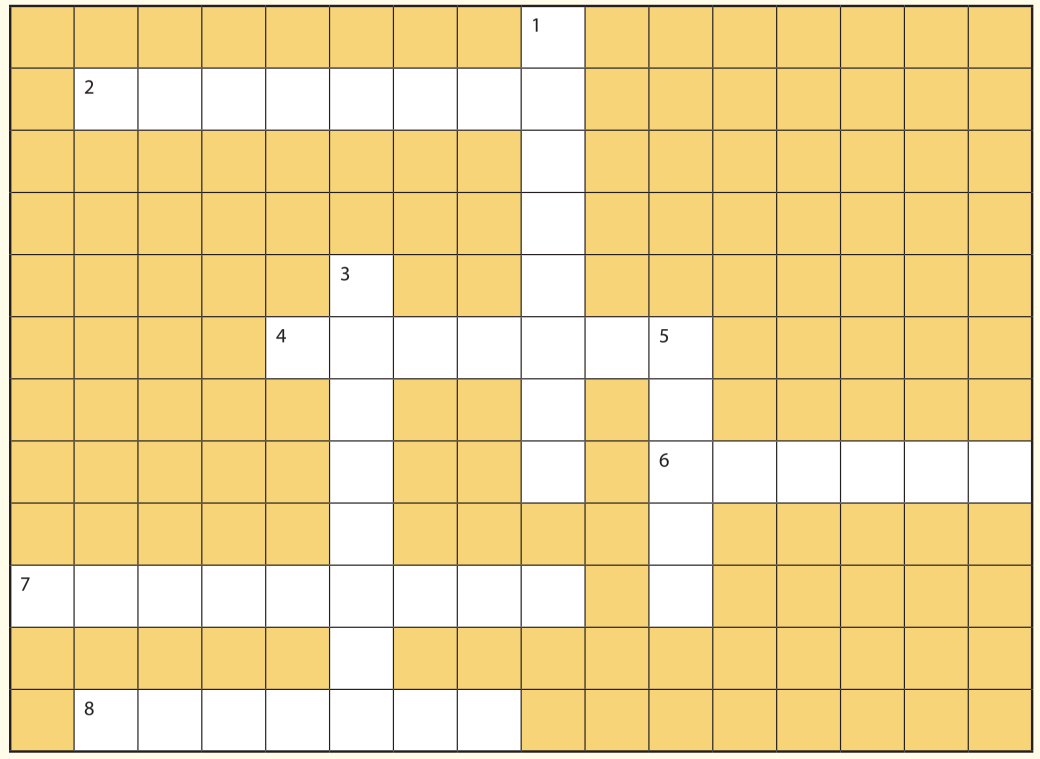
Careers

FRACTAL GEOMETRY IS USED BY COMPUTER SCIENTISTS, BIOLOGISTS AND GRAPHIC DESIGNERS TO NAME A FEW!

CURRICULUM LINKS:

Geometry; Patterns; Fractions

Crossword fun



CLUES

Across:

2. Limitless
4. Pattern made from a simple shape repeated at a smaller and smaller size
6. Plants, animals, etc.
7. Person who studies living things
8. Repeated design or sequence

Down:

1. Study of shapes
3. Three-sided shape
5. Part of human breathing system

Solution: *Across: 2. Infinite 4. Fractal 6. Nature 7. Biologist 8. Pattern; Down: 1. Geometry 3. Triangle 5. Lungs*

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Position: _____

ID Number: _____

Signature (parent/teacher):

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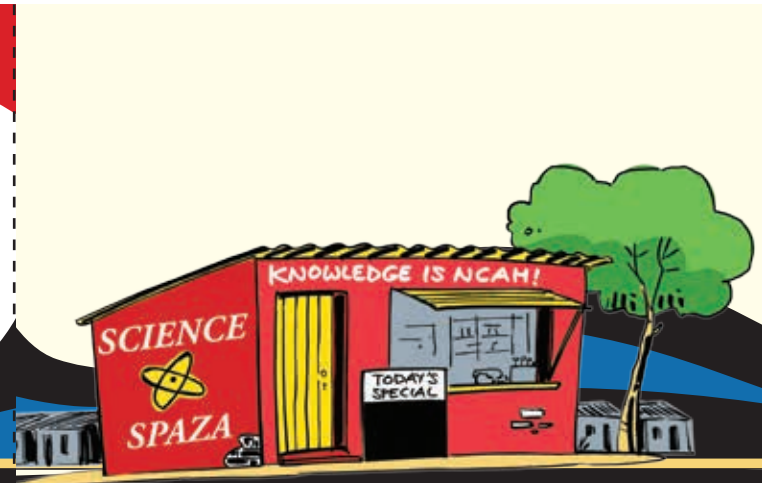


Radio Waves

HAVE YOU EVER WONDERED:

HOW RADIOS PICK UP DIFFERENT STATIONS?

WHAT ARE RADIO WAVES?

Radio waves are part of a larger group of waves called electromagnetic radiation. These radio waves are a form of energy that is emitted by a charged particle and travels through space in a wave-like form.

SO HOW DO WE GET TO HEAR PEOPLE ON RADIO?

Radio stations convert sound into electrical signals and then transmit them as radio waves. The antennae on our roof tops pick up the radio waves, and our radio sets convert them into sound that we can hear.

DEMONSTRATION:

MODULATING WAVES

WHAT YOU WILL NEED:

At least 3m rope, chalk, chair or pole, large outside area

What to do:

1. Find a large area like a car park where you can draw on the ground with chalk.

2. Tie the rope to a chair leg or pole and lay it down in a straight line.

3. Draw three lines parallel to the rope and the same length – one along the rope (A), one 30cm above the rope (B) and one 60cm above the rope (C).

4. Holding the end of the rope, move your hand back and forth repeatedly between line A and B. What happens to the rope?

PULL-OUT RESOURCES

Waves – pages 1 & 4

5. Repeat his movement at the same speed between A and C.

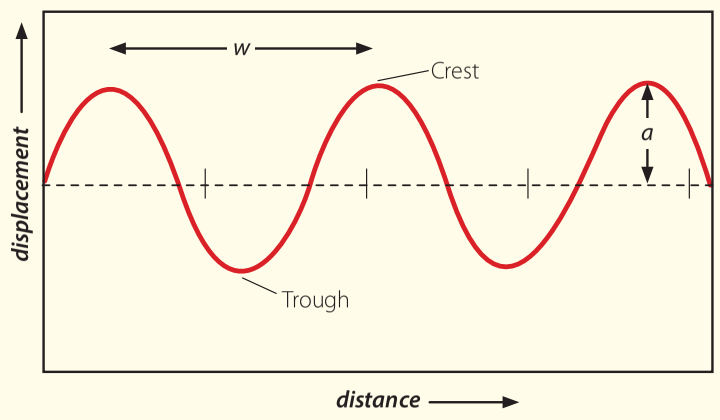
6. Repeat Steps 4 and 5 but use quicker hand movements.

What is happening?

You created a wave pattern when you shook the rope from side to side. You then MODULATED (or varied) the properties of these waves by varying your hand movements (vibrations).

When you increased the length of your vibrations, the amplitude of your waves increased. This is called Amplitude Modulation (AM). When you increased the speed of your vibrations, the number of waves per second (frequency) increased because their wavelengths decreased. This is called Frequency Modulation (FM).

Wave



w = wavelength *a = amplitude*

AM AND FM RADIO

Your radio's antenna receives information in the form of invisible radio waves. Your radio then converts this information into electrical impulses and your speakers convert these into sound that you can listen to.

But why doesn't your radio get confused by all the radio waves from different radio stations??? Well, each station sends out different sized radio waves by modulating either the frequency (FM Radio) or the amplitude (AM). When you tune your radio you are setting the size of the radio wave it can receive. Eesh!

Careers

THERE ARE GREAT JOB OPPORTUNITIES IN:

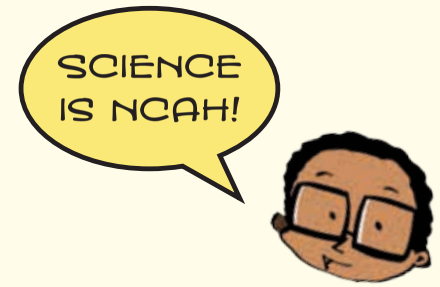
- RADIO ASTRONOMY
- THE MEDIA SECTOR
- ELECTRONICS/ COMMUNICATIONS TECHNOLOGY

CURRICULUM LINKS:

Mechanics and Waves (Transverse, Electromagnetic)

fold here

Puzzle your Mind!!!



Find words which relate to waves and sound in the word search below. There are 16 in total. Look for words that run **across** (from left to right) and **down** (from top to bottom). Two of the words are parts of longer words. How many words can you find without looking at the solutions? Work in groups and then compare your answers.

W	A	V	E	L	E	N	G	T	H	E	R
A	M	P	L	I	T	U	D	E	S	U	S
M	U	R	A	D	I	A	T	I	O	N	S
O	S	A	N	U	D	F	M	A	L	V	I
D	I	N	E	N	E	R	G	Y	O	I	G
U	C	T	R	S	I	E	T	O	U	B	N
L	L	E	C	D	I	Q	Y	M	D	R	A
A	O	N	G	I	T	U	D	I	N	A	L
T	R	N	N	S	V	E	R	S	E	T	G
I	R	A	D	I	O	N	I	C	S	I	N
O	S	V	P	I	T	C	H	M	S	O	V
N	N	R	E	V	R	Y	S	O	U	N	D

Solution:
ACROSS: Wave, Wavelength, Amplitude, Radiation, Energy, Radio, Pitch, Sound
DOWN: Modulation, Music, Antenna, Frequency, Loud, Loudness, Vibration, Signal

International year of Crystallography

By: Bongiwe Mbatha

What do diamonds, snowflakes and salt all have in common? Well, they are all examples of crystals. Crystals are special solids made up of atoms or molecules that join together in a pattern that repeats itself over and over to create a particular shape – a different shape for each chemical.

The study of crystals and crystal formation is known as crystallography and this year, thanks to the work of Nobel Prize winners Max von Laue, William Henry Bragg and his son William Lawrence Bragg, we get to celebrate the International Year of Crystallography 2014 (IYCr2014). IYCr2014, which is jointly organised by the International Union of Crystallography (IUCr) and UNESCO, commemorates the centennial of the birth of X-ray crystallography, discovered by von Laue, and also the 400th anniversary of Kepler's observation in 1611 of the symmetrical form of ice crystals, which began the wider study of the role of symmetry in matter.

The science of crystallography has been around for decades, but it still remains unknown to the general public. The main objectives of IYCr2014 are to create public awareness and introduce the teaching of crystallography where it is still absent; foster international collaboration between scientists worldwide; and promote education and research in crystallography and its links to other sciences.

Crystallography allows us to study the chemical bonds which bind one atom to another. Crystallographers now apply this knowledge to change a chemical structure, and therefore change its properties and behaviour. The Curiosity rover, which was used to analyse soil samples from Mars, used X-ray crystallography and the results suggested that the Martian soil sample was similar to that of the basaltic soils of Hawaiian volcanoes. This method has also been used to improve computer memories, to design powerful new materials and drugs, and to show how proteins are created in cells. It is evident that crystallography has many applications and has a great impact on our daily lives!

Crystallography is well established in South Africa and centres at the University of Cape Town and University of the Witwatersrand have been in operation since the 1930s! Today, there are crystallographers active at these two universities as well as at other universities such as Stellenbosch University, University of Johannesburg and University of Pretoria.

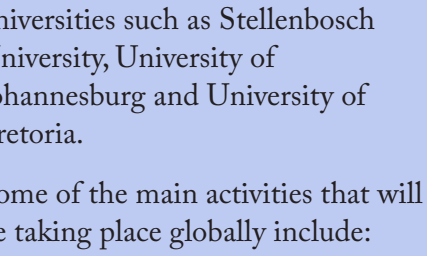
Some of the main activities that will be taking place globally include: open labs, poster exhibitions highlighting the usefulness and wonders of crystallography, travelling hands-on exhibitions, a launch of an open-access crystallography journal, crystal-growing competitions and many more exciting activities

The African Summit Meeting on Crystallography will take place in Bloemfontein, South Africa, 15-17 October 2014.

Visit the IYCr2014 website for more information:
http://www.iycr2014.org/
http://www.sacrs.org.za/

Grow your own crystal needles!

Crystal needles are very easy to make! You can have some really cool crystals growing within three hours!



picture credit: Anne Helmenstine,http://chemistry.about.com

Ingredients:

- a cup or small bowl
- 1/2 cup Epsom salts (magnesium sulphate)
- 1/2 cup hot tap water
- (optional) a drop of food coloring

Directions:

1. Add the ingredients together in your bowl or cup.
2. Stir the solution until all the salt has dissolved. There may be some crystals left at the bottom, but that's ok.
3. Place the cup or bowl in the refrigerator and leave it for 3 hours.
4. Take the bowl out and see what has happened. You can carefully scoop the crystals out of your bowl or cup to get a better look at them.

Are cars or sharks more dangerous in Cape Town?

Adapted from an article by James Craig Brown for the Young Science Communicators Competition

The incident of the surfer killed by a shark in April 2012 in Koeëlbaai, Cape Town, does not require re-telling. Catastrophic events such as this have far greater impact nowadays than in pre-social media times, and the hype that is generated is correspondingly greater. "Could that happen to me?" is a common reaction among the public.

In the popular media the word "risk" is often used incorrectly. To truly describe "risk", one needs an idea not just of how many times an event occurs (for example, the number of fatalities from shark attacks in Cape Town), but also the total relevant population (the TOTAL number of surfers in Cape Town, in this case). Only once risk has been calculated in this way, can comparisons be made.

For example, the risk of suffering a catastrophic injury while playing rugby union in the U.K. has been categorised as "acceptable" on the Health and Safety scale that categorises risk as "negligible", "acceptable", "tolerable" or "unacceptable". Other contact sports such as rugby league, American football and soccer fall into the same risk category as rugby union, while ice hockey, gymnastics and horse racing have higher ("tolerable") risks associated with them. By comparison, motor cycling carries an "unacceptable" level of risk for suffering a catastrophic injury, when measured on the same scale.

Now we can answer our original question: is driving a car or surfing a greater risk in Cape Town? There are an estimated 850 motor vehicle accident fatalities per year in the city. However, we would have to assume that almost the entire city population has travelled in a car at some point (about 4 million people), equating to about 20 annual fatalities per 100 000 people travelling by car in the city.

By comparison, an average of 0.9 shark-attack fatalities occur annually in a population of about 4 000 Cape Town surfers, equating to around 22 fatalities per 100 000 surfers. So despite media hype suggesting the contrary, your risk of dying is similar for both activities. Furthermore, both of these risks would fall within the "tolerable risk" region of the U.K. scale described earlier.

Thalia's Mathemagic Challenge

Are you a mathemagician?

Mathematicians **do** maths. Mathemagicians **make magic happen** when they share their love of maths. We want to hear from you. Share a maths concept and win books for your science club worth R1000.00

Who was Thales?

Thales was a Greek philosopher and mathematician who lived about 600 BC. He is called the "Father of Science" because he tried to explain natural events by using reason instead of supernatural beliefs. One of his ideas was the Intercept Theorem in geometry, known as Thales' Theorem.

Who is Thalia?

Thalia Rogers

Thalia is an inspiring South African schoolgirl who won a prize for maths. She donated the prize to Science Spaza to run the Mathemagic Challenge. It's her way of sharing her passion for maths!

WHO CAN ENTER?

All Science Spaza Clubs

HOW TO ENTER?

- Choose a mathematical idea that your group finds interesting. Choose a title.
- Write an explanation for people who don't know about it. Include diagrams or pictures or stories to help others to understand it.

SENDING YOUR ENTRY

- Include your club's name, address and phone number.
- Include the names of the members who participated, and the name of a contact person.
- Send your entry to: Mathemagic Challenge, Jive Africa, P O Box 22106, Mayor's Walk, 3208 *or* email it to info@sciencespaza.org by 1 July 2014.

JUDGING

We're looking for ideas which help inspire others to understand and enjoy maths. We'll be asking:

- Is it interesting?
- How clear is the explanation?
- Is the presentation original?

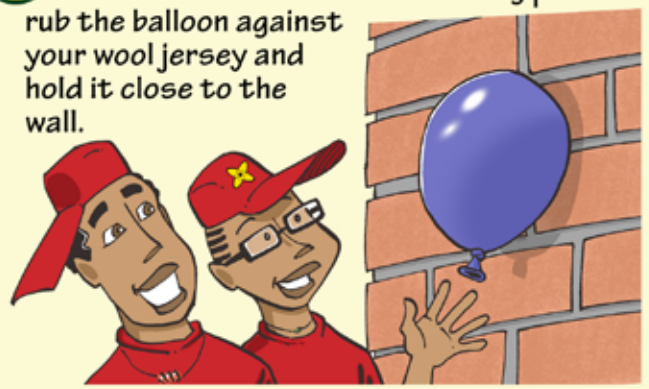
The winning club's entry will be printed in *Spaza Space*.

Be a mathemagician!

3 Bring the balloon close to the paper fragments and watch them fly!

You can also hold the balloon close to someone's bare arm or their head and watch their hair moving towards the balloon. Rub the balloon some more and try again!

4 And now for the most interesting part: rub the balloon against your wool jersey and hold it close to the wall.



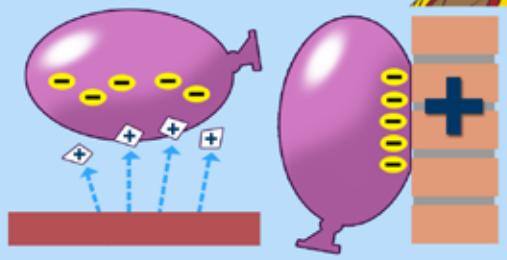
Experiment by moving the balloon gently towards the wall until it sticks to it, This may last for only a few seconds, because the static electricity is not very strong. What can you do to make it stick to the wall more strongly?

WHAT IS GOING ON?

HAVE YOU EVER THOUGHT OF WHAT IS HAPPENING WHEN YOU GET A SHOCK FROM TOUCHING A DOOR HANDLE?

You gain electrons when you walk, especially across a carpeted floor. The interaction occurs between the carpet and the soles of your shoes. This affects the overall electrical charge of your body.

So when you touch a door handle, the excess electrons jump from your hand to the door handle. You feel this as a tiny shock, like a miniature lightning strike!!

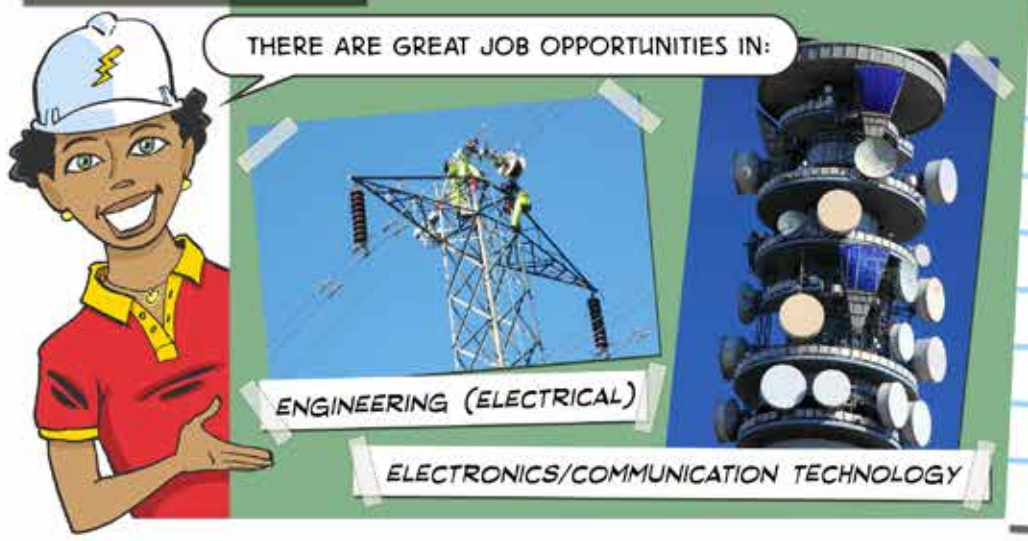


When you rubbed the balloon against the wool jersey, the balloon became electrically charged, (it gained static electricity). It is this charge that made the pieces of paper fly towards the balloon, because they carried a charge that was opposite to the charge on the balloon. That is also what made the balloon stick to the wall.

Static electricity can range from low energy levels, such as the ones you were experimenting with in this activity, to high energy levels such as those that are shown by a lightning storm. Lightning is the most powerful display of static electricity in nature. It is formed as a result of clouds becoming statically charged as they move through the air. Normally clouds become negatively charged. When this negative charge interacts with positive charges (in the atmosphere or on the ground) the result is a flash of lightning.

fold here

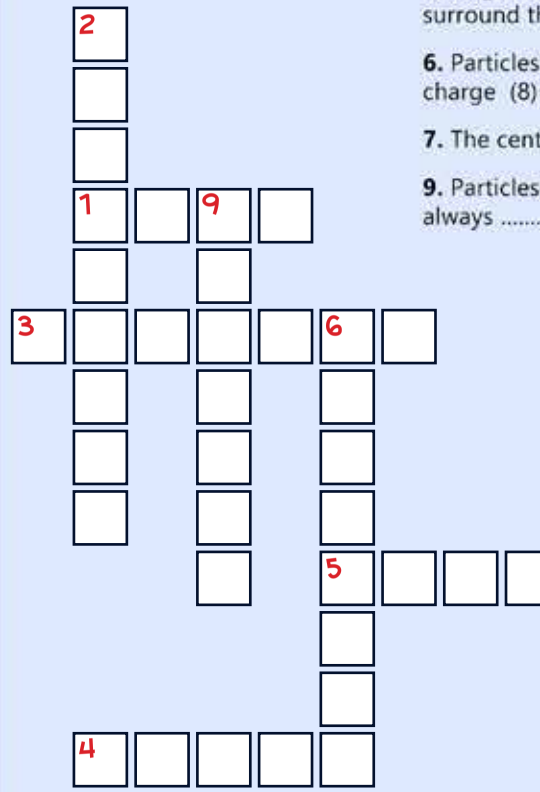
CAREERS



CURRICULUM LINKS

- PHYSICS (ELECTRICITY)
- ELECTROMAGNETICS
- COULOMB'S LAW

PUZZLE YOUR MIND!!!



DOWN

2. Negatively charged particles that surround the nucleus of an atom (9)

6. Particles that have no electric charge (8)

7. The centre of an atom (7)

9. Particles with opposite charge always ..... each other. (7)

ACROSS

1. The most common source of energy that is used to generate electricity in South Africa (4)

3. Positively charged particles in an atom (7)

4. Particles that make up matter (5)

5. Particles with the same charge always ..... each other. (5)

8. The type of electricity that is produced by friction between two objects, where there is an exchange of electrons (6)

ANSWERS:
Across: 1. Coal, 3. Protons, 4. Atoms, 5. Repel, 8. Static
Down: 2. Electrons, 6. Neutrons, 7. Nucleus, 9. Attract

STARTING YOUR OWN SCIENCE SPAZA

THINK OF A PLACE WHERE PEOPLE GET TOGETHER TO HAVE FUN, LEARN FROM EACH OTHER AND PICK UP A FEW ESSENTIALS. THAT'S RIGHT! YOUR LOCAL ***SPAZA SHOP!*** – ONLY THIS TIME YOU'LL BE PICKING UP ***SCIENCE ESSENTIALS!***

SCIENCE SPAZA IS A ***SCIENCE CLUB*** SUPPORTED WITH FUN ACTIVITIES AS WELL AS TIPS AND TOOLS TO MAKE YOUR SCIENCE TIME REALLY WORTHWHILE.

IT'S A SPACE WHERE ***LEARNERS*** CAN ENGAGE WITH SCIENCE IN A ***FUN*** AND ***INTERACTIVE*** MANNER AND WHERE ***TEACHERS*** CAN GET NEW IDEAS FOR ***PRACTICAL SCIENCE TEACHING!***

WHAT WILL YOU NEED?

1. A GROUP OF FRIENDS WHO ARE ***EXCITED*** ABOUT SCIENCE!

2. A PARENT OR TEACHER TO ASSIST YOU
3. A TIME AND PLACE TO MEET
4. SOME ***CURIOSITY*** AND AN INTEREST IN FINDING OUT MORE ABOUT THE WORLD!

SCIENCE SPAZA APPLICATION FORM

Name of school: _____

Municipality: _____

Province: _____

Name of your science club:

_____

Name of contact person: _____

Telephone number: _____

Email address: _____

Postal address: _____

_____

To be filled in by responsible adult (parent/teacher)

Name: _____

Surname: _____

Position: _____

ID Number: _____

Signature (parent/teacher):

_____

Date: _____

Send to PO Box 22106, Mayor's Walk, 3208, Fax to 086 610 5453 email: info@sciencespaza.org or submit your application online at www.sciencespaza.org

fold here

SCIENCE SPAZA

www.sciencespaza.org

STATIC ELECTRICITY

HAVE YOU EVER WONDERED?

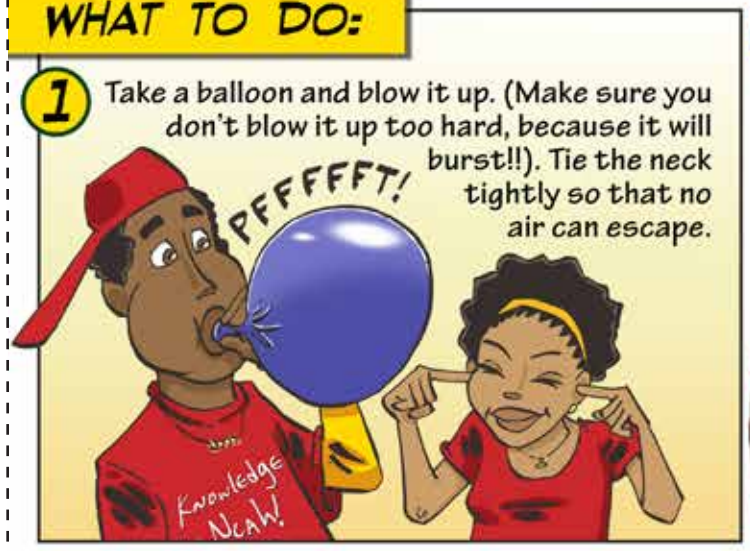
ACTIVITY:

For this activity you will experiment with static electricity, by making a balloon stick to a wall, and by making pieces of paper fly.

WHAT YOU WILL NEED:

WHAT TO DO:

1. Take a balloon and blow it up. (Make sure you don't blow it up too hard, because it will burst!!). Tie the neck tightly so that no air can escape.



2. Rub the balloon rapidly against the wool jersey.

While you are doing this; ask another person from your group to tear tiny little pieces of paper from the sheet of paper.

Knowledge is Ncah!