

SCIENCE SPAZA SPACE



Knowledge is Ncah!

ISSUE 2, AUGUST 2014

www.sciencespaza.org Facebook: ScienceSpaza

Hip Hop Science Spaza and iFani team up for National Science Week 2014!

Hands up students!! Who knows iFani?? BIG Hip Hop artist right? BUT did you know he is also a SCIENTIST? AND he is working with Science Spaza to kick off our Hip Hop Science Spaza programme. He is the Ish!

In the last Spaza Space, we launched out Hip Hop Science Spaza Competition where YOU are taking 4 science facts from one of your Science Spaza resources and turning those 4 facts into a RAP song, right? Now how dope is that?

With National Science Week just around the corner (2-9 August 2014), we have invited iFani to work with learners in Durban to write RAP songs out of the science facts they have been learning, and then to BATTLE it out for the BEST rap song of the DAY! We will be going live with this workshop on Hectic Nine-9

during National Science Week, so stay glued to your TV sets!

You thought studying Science was difficult, neh? But you need to experiment! iFani was also raised in difficult circumstances, but he could see the poetry and the science in things, just by observing his surroundings... (and some hard work). So put some hard work in here, and lets get some RESULTS. We want your RAP entry by 30 September 2014. DOUBLE IT UP!!

(Hip Hop Science Spaza Competition deadline extended until **AFTER** National Science Week – 30 September 2014!)



Top TIPS: How to write a good rap song!

Keep it simple! It must have **rhythm**, it must have a **beat**, it must **rhyme!**

Take 4 facts from ONE of your Science Spaza resources and work a rhyme around those four facts. Get your teacher to check that your science facts are correct. 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. 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 – Not much 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.

Enter the **Hip Hop Science Spaza** competition and stand a chance of having 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: 30 September 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 and see the Rules and Conditions of this competition 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.



What time is it? National Science Week time!!!

Oh yeah ... it's that time of the year again where we celebrate Science in the world we live in.

Sindi Buthelezi

National Science Week (NSW) is an initiative of the Department of Science and Technology (DST) that is celebrated annually across South Africa. It involves various stakeholders and role players who conduct fun science-based activities during the week. The South African Agency for Science and Technology Advancement (SAASTA) has been appointed by the DST as the implementing agency and the national project manager for National Science Week.

NSW runs simultaneously in all nine provinces and in various places per province. So if you are fascinated about Science of any kind, NSW 2014 is definitely for you. This year's theme is "Today's



science, Tomorrow's world" and the sub-themes are robotics, crystallography and Maths. National Science Week 2014 runs from 2 to 9 August 2014, and it will be launched on the 2nd of August in Bloemfontein.

You can visit your nearest Science Centre or turn to page 4 to see what fun activities they will be doing this year. You will also get an opportunity to meet other kids who are fascinated by science and, who knows, together you might make the world a better place.

Cosmic Conundrum

Adapted from an article by Michelle Knights for the Young Science Communicators Competition

Smoke curled thickly around the dark room and around the detective's head. Brilliant stars shone out of the velvet sky and his eyes watched them, thinking, as a cigarette burned forgotten in his mouth. There was something wrong with the Universe and he was going to find out what it was. All he knew was that they called it "dark energy".

It all started with Einstein, who could never have predicted the intrigue that would surround what he called his "greatest blunder". Einstein's beautiful theory of General Relativity, the world's first real explanation of gravity, implied that the whole Universe could be

expanding or contracting but could not be stationary. Einstein couldn't accept a non-static Universe so he fudged his equation, adding what he called "the cosmological constant", which somehow exactly balanced gravity and kept the Universe static.

In the dark room under deepening night, the detective wondered what it really meant for the Universe to be static or otherwise. But Einstein realised the Universe couldn't be static when Edwin Hubble published his results showing that every galaxy in the distant Universe was moving away from us. The only



Welcome to the second issue of **Spaza Space** celebrating National Science Week! With events around the country we'll be exploring the role that science plays in our lives... today and in the future.

We've got lots in store! Mzansi's own award winning Rap artist (and computer scientist) just got behind the Hip Hop Science Spaza competition (watch Hectic Nine-9 on SABC 2 during National Science Week) and you can find out more about the Science Genius battles in New York City on page 5. See what GZA has to say about science and Hip Hop! And don't delay – send us your entry!

You can find out more about a career in computer science in another adventure with Agent Zee. You can even meet a few computer scientists -then dive into some cool science stories from the SAASTA Young Science Writers competition.

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

There's even a cool maths trick and you can win prizes with the Mathemagic challenge! Find out about robots or dig into our crystals activity and discover why the whole world is celebrating the International Year of Crystallography!

As always you can also catch up on news and pics from the clubs. And remember, we want to hear from you so tell us what you're doing for science week – even if it's just chilling with your friends and Spaza Space! Because knowledge is Ncah!

The Science Spaza Team



logical explanation: the very space between galaxies is expanding, a relic from the Big Bang, the beginning of the Universe. The detective took a bite and thought *a muffin starts off small, with all the chocolate chips close together, but in the oven it expands, driving the chocolate chips away from each other.* And so the chocolate chip Universe had made perfect sense for most of the 20th century. But all that had suddenly changed.

The data was impossible, yet it was undeniable. The detective had seen the images himself, but it still didn't make any sense. It all had something to do with exploding stars. There are stars exploding in the Universe all the time: they run out of fuel, collapse and explode. But there's a special kind of these "supernovae" that is a standard candle. The detective glanced at the only lit window in the apartment block across the street. If he knew what kind of light bulb they were using, say a 60 watt bulb, then he could measure how bright the window appeared

and so how far away the apartment was. Supernovae work the same way, except the distances are much, much greater.

In 1998, two teams of astronomers independently made measurements of distant supernovae. Both teams found something very strange. All the supernovae were farther away than they should be. The most logical explanation is this: not only is space itself expanding, but instead of slowing down as we'd expect, it is expanding faster and faster and faster...

So Einstein's cosmological constant could be right after all, thought the detective. Only some kind of weird anti-gravity could cause the expansion of the Universe to accelerate. They call it "dark energy".

So what causes this accelerated expansion? No-one knows. Even though the leading scientists who made the discovery in 1998 have received the Nobel Prize in Physics for their discovery, still no-one really has any idea what dark energy could be or how it works.

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

Dordrecht Inextricables

We live in a small town called Dordrecht. Our spaza name is “The Inextricables”, which means to be closely linked or impossible to disentangle. We started our club mid-2013 and currently have 28 members. Members include grade 10, 11 and 12 learners. Our meetings are held every Wednesday afternoon in our science classroom. We learn so much during each meeting. The wide variety of topics broadens our knowledge and helps us to better understand the world we live in. We share ideas and hear different opinions. Topics that we found very interesting were the planet and galaxy session as well as the traditional facial we had!! We are looking forward to this year and hope to make new discoveries. Thank you for the Science Spaza, we appreciate it!

We would like to welcome our new grade 10 members. *Elmien*



Goratileone Oepeng

“We started our science club last year, November 2013. As I take a look at our community, we are the only science club that exists and participates in Science Spaza. I started this science club, “Tshimologo” because I saw that there was a need for it.



K.H.S Science Club

At first we were told to enter [Science Spaza], but we lacked self-confidence because we thought that science clubs were only for geniuses and our intellect was not at that standard. Our teachers encouraged us to enter the club and they told us about the benefits of entering the club.

We thought to ourselves, “If they can do it, why can’t we?” And that was the start of our love for science.

We have close to 25 members. Our science club’s main focus is to learn more about things that we don’t know about. Our science club’s name means “Discover That” and our motto is “Everything is discovered before it is known”. Having a science club at our school is great because some of the learners they want to do certain science careers like engineering, medicine and more others they want to become scientists. Our science club is making a big difference in our school, as it helps us to have more knowledge and a love of science. In the beginning I didn’t know anything about science clubs until I found the Science Spaza pamphlets which were very informative and contain great information about science clubs. Then I took my cell phone and clicked on the

Our Science club has helped us a lot towards building our confidence and improving our scientific knowledge. It has created a great platform where we can perform practical science ideas. It has broadened our minds, enabling us to apply our experience from the science club in our studies.

By K.H.S science club students: Fono Kuhle, Koyi Vuyo, Zangqa Someleze (10H) and Shabalala Mbali, Mwanda Ndyebo, and Kumkati Pheleka (10A)

link that was shown on the pamphlet, I saw the registration form on the Science Spaza website and I registered. The following day at school I asked some learners and my friends to join the science club I started. They agreed and started attending. The Science Spaza activities give us more information and knowledge on different science topics. Sometimes they make us think hard to find a solution to the problems. Science spaza helps us in many ways: they give us name tags, files, activities and posters with great science information. Being part of Science Spaza make us feel that we belong somewhere and there are other schools which with Science Spaza clubs that we can compete with because in science we have to compete in order to realise our mistakes. Thanks.



Meet Hleketani Mukhari of the Hleks 101 Science Group. We were thrilled to receive Hleketani’s entry for our Hip Hop Science Spaza competition entitled *Laws and Regulations of Life!!* Please send your entries to us in time for 30th September 2014!!

National Science Week 2014 Events Guide

Check out what's happening at your local Science Centre during National Science Week 2014!

Sci-Bono Discovery Centre



1. Science in a mall

Dates: 2-3 August 2014 & 9-10 August 2014
Time: 09h00 - 16h00
Venue: Kagiso Mall (2-3 August) & Alberton City Shopping Mall (9-10 August)
Target group: general public and youth

Activities:

Science shows and interactive science exhibits

For more information:

Contact Person: Christinah Raphahlelo
Tel: 011 639 8501
christinah.raphahlelo@sci-bono.co.za

2. FIRST Technology Challenge

Date: 2 August 2014
Venue: Sci-Bono Discovery Centre
Time: 09h00-16h00
Target group: general public & youth

Activities:

Robotics tournament

For more information:

Contact Person: Johannes de Vries
Tel: 012 382 5250
E-mail: deVriesJ@tut.ac.za

3. Science on the Street

Dates: 4-8 August 2014
Venue: Beyers Naude Square
Time: 09h00 - 16h00
Target group: general public and youth

Activities:

Science shows and interactive science exhibits

For more information:

Contact Person: Thami Mangena
Tel: 011 639 8427
thami.mangena@sci-bono.co.za

4. Speak2aScientist

Date: 7 August 2014
Venue: Sci-Bono Discovery Centre
Time: 18h00 - 20h00
Target group: general public and youth

Activities:

Evening talk by an awesome scientist

For more information:

Contact Person: Thami Mangena
Tel: 011 639 8427
thami.mangena@sci-bono.co.za

5. Science and Technology Focus Week

Dates: 4-8 August 2014
Venue: Sci-Bono Discovery Centre
Time: 09h00 - 14h00
Target group: school learners

Activities:

Join 10 000 other learners in this spectacle of today's science and tomorrow's world. Engage with possible future employers and experience science in action.

For more information:

Contact Person: Thami Mangena
Tel: 011 639 8427
thami.mangena@sci-bono.co.za

6. Inventors & Inventions Indaba

Date: 9 August 2014
Venue: Sci-Bono Discovery Centre
Time: 09h30 - 14h30
Target group: general public and youth

Activities:

Inventors will display and talk about their proudly South African inventions

For more information:

Contact Person: Thami Mangena
Tel: 011 639 8427
thami.mangena@sci-bono.co.za

North West University Science Centre



1. Science Festival

Dates: 28 July - 1st August 2014
Time: 08h30-15h30
Venue: North-West University (Mafikeng campus)
Target group: grades 4-12 and general public

Activities:

Career Exhibition, science shows, learners' workshops, presentations and games

For more information:

Contact Person: Mr. Bushy Moabelo
Cell: 0839795279
E-mail: slegconsulting@gmail.com

2. National Science Week

Dates: 2-9 August 2014
Venue: North-West University (Mafikeng campus)
Time: 9h00-15h30
Target group: grades 4-12, university students, educators and general public.

Activities:

Career exhibition, science shows, learner's workshops, presentations, science games, science quizzes, science karaoke, science poem, science posters, science Drama

For more information:

Contact Person: Lerato Molebatsi
Tel: 018-3892606/7
E-mail: lerato.molebatsi@nwu.ac.za

Olwazini Discovery Centre



1. Science Boxes

Date: 4 August 2014
Time: 09h00 - 14h00
Venue: Olwazini Centre, Golden Horse Casino (PMB)
Target group: educators from the uMgungundlovu District

Activities:

Educators workshop doing science practicals using available household material

For more information:

Contact Person: Spar Duma
Tel: 033 395 8230
Cell: 082 745 3610

2. Youth's involvement in saving our planet

Date: 7 August 2014
Time: 9h00 - 13h00
Venue: Hall in Edendale/Scottsville area (PMB)
Target group: general public, out-of-school youth

Activities:

Out-of-school youth to be addressed about different environmental issues and the role they can play to save the planet.

For more information:

Contact Person: Sam Khumalo
Tel: 033 395 1536
Cell: 078 376 1536

Science Genius (Hip Hop) B.A.T.T.L.E.S in NYC

By Sindi Buthelezi and Hilary Kromberg

It's spring semester in New York City, and the kids are having the time of their lives.... On the 27th of June they had a Hip Hop Science Battle, on a real Battle Ship!!

Yeah! The battle was hosted by Science Genius B.A.T.T.L.E.S (Bringing Attention to Transforming, Teaching and Learning Science). Science Genius is the brain child of a funky hip hop Science Education Professor Chris Emdin and Hip-Hop icon GZA.

18 kids from 10 schools participated in the B.A.T.T.L.E.S – some performed their science rap in groups, others went solo. They

eliminated the stigma of science being boring. They took science concepts and turned them into cool hip hop raps that made the crowds go crazy as they moved with the different beats.

The winners were a group of two guys and a gal, as well as a gal going solo. The prizes?? They won time with GZA from the Wu-Tang Clan and they will tour other schools performing around the country in the USA. They get to go on radio stations and record in a studio!!

Now who would've thought? Hip hop meets Science!!! Uber cool :-)

What Prof Chris Emdin (Rap Genius) has to say:

Science Genius B.A.T.T.L.E.S. is an initiative that is focused on utilizing the power of hip-hop music and culture to introduce youth to the wonder and beauty of science. The core message of the initiative is to meet urban youth, who are traditionally disengaged in science classrooms, on their cultural turf and provide them with the opportunity to express the same passion they have for hip-hop culture for science.

Here's what some of the people had to say about the BATTLES...

Joshua Haimowitz @HaimysWords Jun 28

So proud of my brilliant student Victoria for winning #sciencegenius, people like you help shape the world @chrisedmin #hiphoped

Nitty Scott MC @NittyScottMC Jun 28

so inspired by the young souls i witnessed today. these kids coming up are oozing with talent & tremendous spirit. #HipHopEd #sciencegenius

IAN LEVY @ianplevy Jun 28

#sciencegenius was absolutely incredible!!! In awe by the performances, so proud of all the young people who rocked today!! #HipHopEd



What GZA from the Wu-Tang Clan has to say:

"Now that hip hop has become the single most dominant cultural touchstone in the lives of most youth, Chris Emdin, Rap Genius and I have come together to sponsor Science Genius. We chose hip hop as an art form to educate the listeners about scientific topics. As I said before I am not a science teacher. I go into classrooms as an artist and provide a model for students

to communicate the information learned from their science teachers ... I believe that science is important because it helps you gain a deeper understanding of yourself and your surroundings. Knowledge of one's environment specifically through science can increase self-awareness, confidence, and critical thinking skills that can translate outside of the classroom."



Hip Hop Science Spaza teamed up with Ikamva Youth KZN and rooted Souls. Getting inspired by Christopher Emdin and Hilary Kromberg Inglis, we brought science and music together with explosive results!



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](https://twitter.com/agentzee)



[AgentZee](https://www.facebook.com/AgentZee)

Heita peeps! Check out these two amazing dudes who are studying Computer Science:

Mabu Manaileng from University of Limpopo

Mabu Manaileng is 23 years old from a village called Ga-Masemola in Sekhu-khune district of the Limpopo Province. He obtained both his B.Sc. and B.Sc. Honours in Computer Science from University of Limpopo - Turfloop Campus. Mabu is presently studying towards a Masters degree in Natural Language Processing aka Speech Technology, a field of Artificial Intelligence where

he's focusing on developing modelling units for under-resourced languages. He likes watching soccer and cricket, science-fiction movies and scientific debates. In his spare time he likes engaging in public debates and promoting science. He is most inspired by Carl Sagan when he said: "Somewhere, something incredible is waiting to be known".

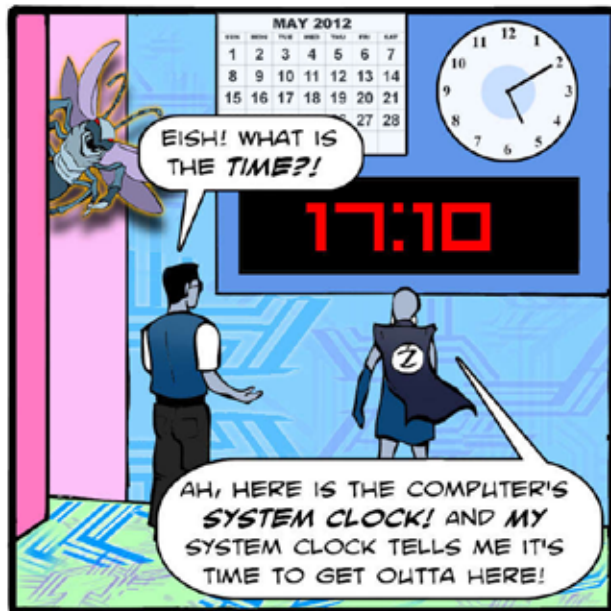
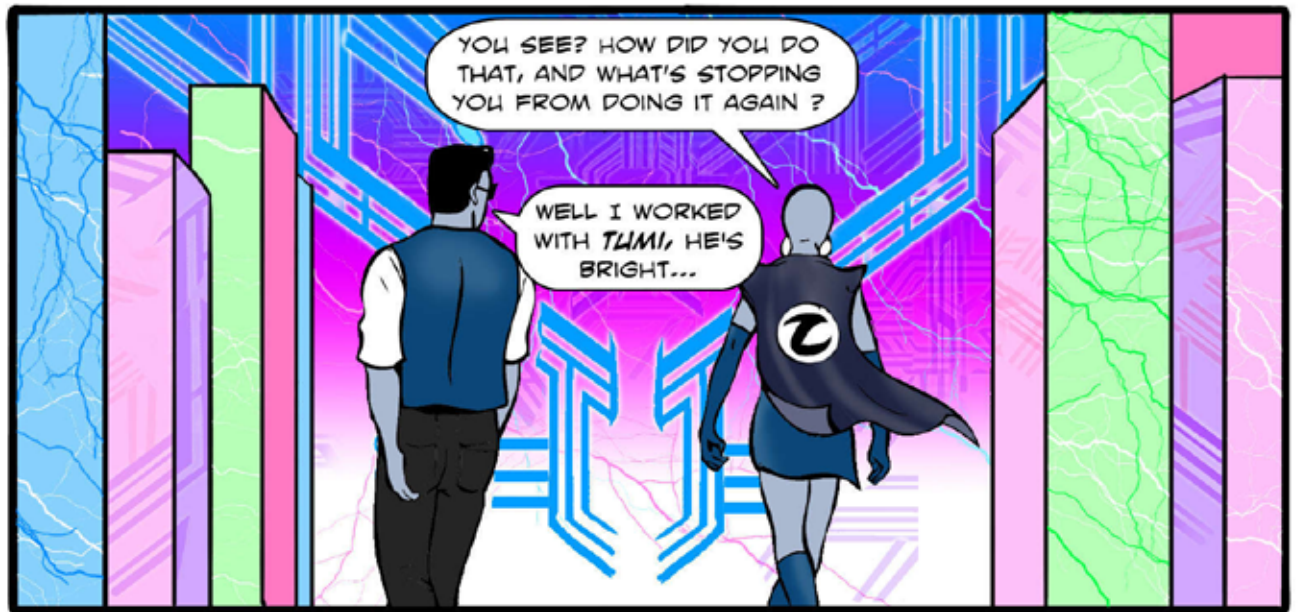
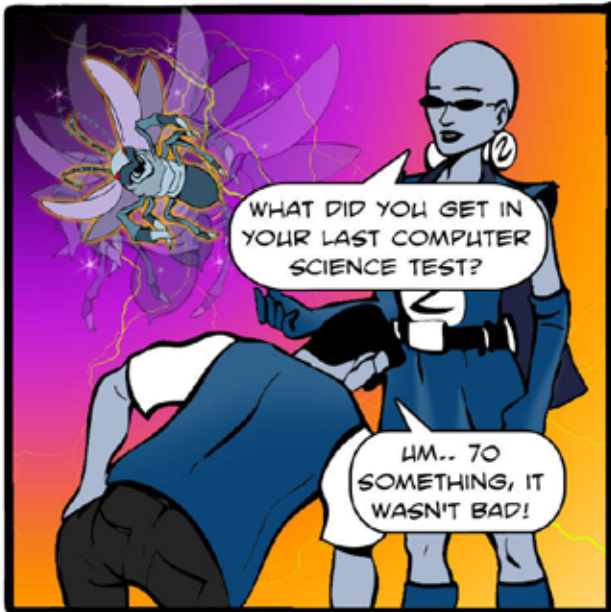
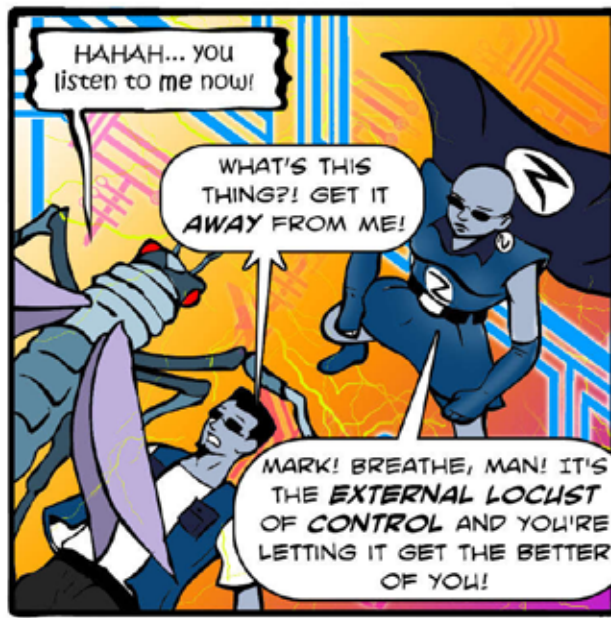


Abejide Ade Ibijola from University of Witwatersrand



Abejide Ade Ibijola is 28 and from Ekiti State in Nigeria. He holds a Bachelor of Science degree with Honours, graduated as the overall best student with First Class in Theoretical and Applied Computer Science in 2007. He progressed and bagged a Masters degree in Advanced Computer Science with Distinction, specializing in Video Game Development and Game AI Algorithms in 2011. He's currently pursuing a PhD in Computer Science, focusing on Automatic Program Comprehension at the University of the Witwatersrand, Johannesburg in South Africa. Since his PhD enrolment at WITS in 2013, he has

supported teaching in the School of Computer Science and won a number of academic awards and distinctions, such as: the Best Tutor for the year 2013; Microsoft's Local and International Publications Award 2013; and the Postgraduate Merit Award 2014. When he's not researching, he likes playing soccer and chess video games, following soccer leagues around the world, stepping on the pitch to play soccer and watching science fiction movies. He is inspired by the words of an unknown author which say: "There aren't many geniuses in this world, the rest of us have to study hard if we desire it".



Get your Agent Zee Files at www.AgentZee.org

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Watsup peeps! Whoever said scientists ain't cool and funky clearly hasn't met **iFani**, the dopest Computer Scientist in Mzansi! The 2014 SAMA Best Hip Hop Award winner did a BSc (Hons) Computer Science & BSc Computer Engineering at the University of Cape Town. Whilst doing his undergrad, iFani attended Hip Hop shows, battles and cyphers around the country and released mixtapes!

This charming and witty MC is living proof that scientists are **HIP and FABULOUS!**



Interested in a career in Computer science? Check out which SA universities offer it:

- **Degree:** BSc with majors such as Information Technology, Electronic Engineering – most universities.
- **Bachelor of Information Technology degrees** are offered at some universities – Rhodes University, University of Cape Town, University of the Western Cape, Nelson Mandela Metropolitan University, University of Free State, Wits, University of Stellenbosch, University of Pretoria, UNISA, University of Kwazulu Natal, University of Johannesburg, University of Zululand, University of Fort Hare, North West University, Monash.

Robotics in South Africa

Bongiwe Mbatha

When you hear the word “robot”, do you picture huge Transformer-like machines with artificial intelligence? Robots seldom look like people, but they are increasingly being used for tasks that make our lives easier and safer.

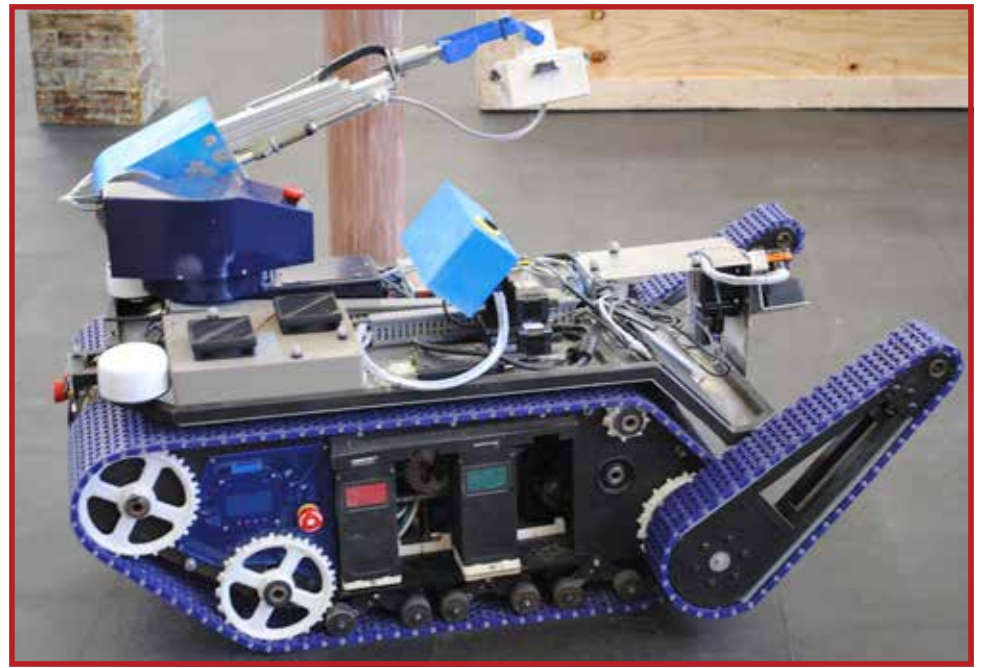
The first robot bore no resemblance to humanoid (human-like) machines, it was a steam powered bird made out of wood by the Greek mathematician Archytas almost 2500 years ago. Robots are now used in sectors such as mining, healthcare, farming and oceanography to name a few.

In 2011, a team of researchers at the Centre for Scientific and Industrial Research (CSIR) completed work on the CSIR Autonomous Rover, a vehicle able to drive itself using information from satellites and local sensors. The team is now working on an ‘autonomous mule’, a cart able

to follow a person carrying heavy equipment for them. It will map its environment along the route so that it can go home by itself!

There are also robots being developed for South African mines where the world’s deepest gold deposits lie. This could make mining possible even where it is unsafe for humans to go because it is too hot and humid.

So what is the future for robotics? Will they take over from humans? Highly unlikely! But it is clear that scientists are getting creative, and the robotic pets, lawn mowers and vacuum cleaners already on the market show that Robots have a big role to play in the future.



Robotics at the CSIR: The South African Mobile Intelligent Autonomous Systems
Image credit: CSIR and <http://thetechguy.com>

Did you know?

- Liam, a young South African boy born without fingers, received a robotic hand thanks to a team that included a South African carpenter and a US prop maker.
- A robot made by Honda, ASIMO, was capable of learning like a small child. It could have conversations, throw a ball and dance and run with smooth movements.

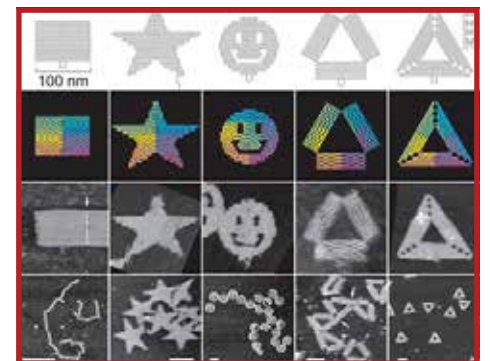
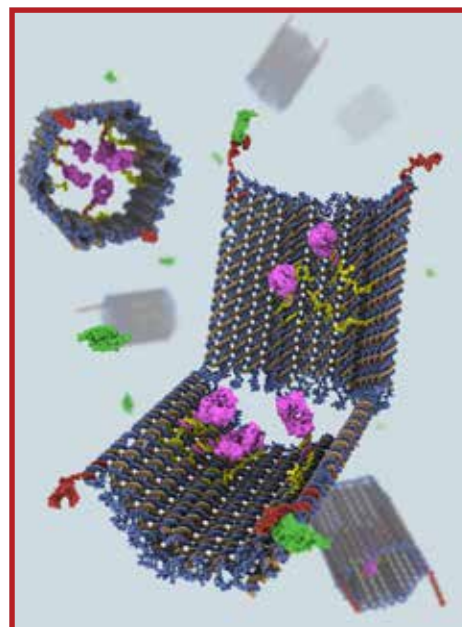
Nano-robots and drug therapies – Can DNA save the day?

Adapted from an article by Michelle Robinson for the Young Science Communicators Competition

DNA nanotechnology is a new scientific field and one that seems more like science fiction. What if you could take DNA, the genetic material inside your cells, and use it to construct microscopic structures or even tiny machines that perform specific functions? The potential applications for this technology are fascinating and inspiring, especially in terms of treating and curing disease.

To understand DNA nanotechnology, you need to think small. Very small. Imagine something being one-thousandth of the size of a strand of human hair. Scientists are investigating and manipulating matter at this minute scale, including DNA. DNA is a molecule found in all living things that holds the instructions for how they are built and work. DNA can be chemically altered and bound to various other compounds, opening up a number of possibilities for creating DNA machines.

In the past ten years the field of DNA nanotechnology has exploded, with researchers from around the world exploring how to develop and harness the power of DNA. In a new field called “DNA origami”, scientists demonstrated how they could fold DNA into two and three-dimensional shapes. In 2012 a team from Harvard used DNA bricks, designed similarly to children’s Lego bricks, that were stacked and shaped in the same way that Lego can be. You can



Above: Electron microscope images of DNA folded into various origami shapes
Image credit: Rothmund, 2006

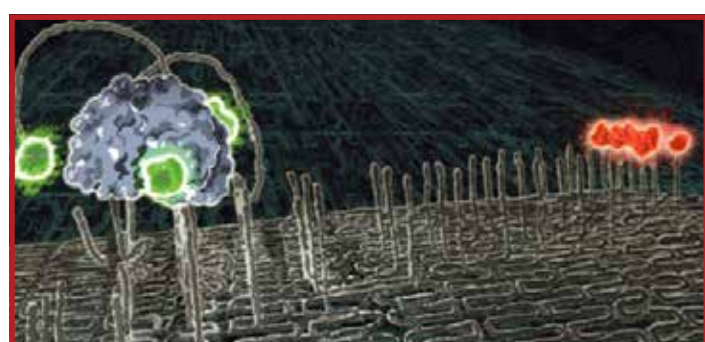
Left: A model of a DNA box with cancer therapeutics (purple) inside of it
Image credit: Douglas et al, 2012

make any shape you want, from simple cubes to smiley faces.

Harvard researchers recently created a hinged DNA box filled with an anti-cancer drug that opens when it comes into contact with diseased cells, releasing the drug. Scientists from the Technische Universitaet Muenchen created a “nano-needle” that could be used to kill harmful bacteria by injecting them with drugs. At Columbia University tiny spider-like robots made only out of protein and DNA were designed to walk along a DNA track. Using microscopes, the scientists could watch their

tiny robots as they moved along their path. Could these robots one day find diseased cells and destroy them? Or move along blocked arteries, cleaning them?

The medicinal applications of DNA nanotechnology are quite far away, as this technology is new. These devices have to be developed further and must be much more rigorously tested, especially in the human body. Yet we may see the day when this incredible technology, which sounds like something out of a Hollywood blockbuster, is readily available.



An artist’s rendering of a nano-bot walking along a DNA track

Image credit: <http://www.dailymail.co.uk/sciencetech/article-1278133/Meet-nano-spiders-The-DNA-robots-day-walking-body.html>

Science Spaza – Mathemagic

Here's a cool mathemagic trick! Try it on your friends – they'll think you're reading their minds!

1. Choose any whole number between 1 and 100.
2. Multiply the number by 2.
3. Add 14 to the total.
4. Divide the total by 2.
5. Subtract your original number from the total.
6. Your answer is 7.

So what's going on?

Let's write these steps as an algebraic sum to work it out. Pretend "x" is the number you first thought of. Let x be the starting number. Now let's write out all the steps from the Magic Maths Activity as an algebraic expression and simplify it:

$$\begin{aligned} & \frac{(2x+14)}{2} - x \\ &= \frac{2(x+7)}{2} - x \\ &= (x+7) - x \\ &= 7 \end{aligned}$$

divide the top and bottom by 2

$$\begin{aligned} &= (x+7) - x \\ &= 7 \end{aligned}$$

This magic trick can be done with any algebraic expression that can be simplified to a single number. Can you make up algebraic steps for your own magic trick?

Magic Square Puzzle

A magic square is a square made up of numbers so that, whichever direction you add the numbers, they come to the same total. For example, the magic square below has a total of 15.

2	7	6	→ 15
9	5	1	→ 15
4	3	8	→ 15
↙ 15	↓ 15	↓ 15	↓ 15
			↘ 15

Can you find the missing numbers in the magic square shown below?

		8
11	7	3

Thalia's Mathemagic Challenge

CLOSING DATE EXTENDED!

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, and 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 30 September 2014. See www.sciencespaza.org for Rules and Conditions of this competition

JUDGING

We're looking for ideas that 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!

There are boundless opportunities when you consider a career in space.

However you look at it, there is SPACE for you!

POSSIBLE CAREERS:



SATELLITE OPERATIONS TECHNICIAN



REMOTE SENSING RESEARCHER



RADIO FREQUENCY ENGINEER



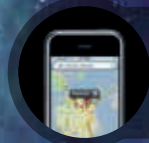
SPACE WEATHER FORECASTER



Space in our everyday lives



We use communication satellites every day when we watch Digital Satellite television (DStv), access the internet or use our cell phones.



Navigation apps use GPS satellites to accurately steer you to your requested destination.



Spacecraft are launched into space on rockets and need to be monitored along the way. SANSa provides launch support and recently assisted two Mars launches – NASA's Mars Science Laboratory and India's Mars Orbiter Mission.



Weather in space can damage satellites and interfere with our technology like GPS, cell phones and internet. SANSa keeps a close eye on space weather to protect our technology in space and on Earth.



Images from satellites are used to develop maps and monitor natural disasters like floods and droughts.



South African National Space Agency
Tel: +27 12 844 0398 | Fax: +27 12 844 0396
Email: information@sansa.org.za | Website: www.sansa.org.za

It's not a reptile, it's a mammal!

James Ragedi, National Zoological Gardens Education Intern

As reptilian as these animals may look, pangolins are fully-fledged mammals. One of the major differences between mammals and reptiles is of course the presence of scales in reptiles. However, Pangolins have hard plate-like structures overlapping each other over the entire surface of the animal, except under the belly and inner surface of the limbs.

With only 8 species of pangolins left worldwide, only four are found in Africa. All four pangolin species are under some form of threat from either the bush meat trade (the three central African species) or the muti trade (the Ground pangolin in southern Africa) This is attributed to poaching and illegal trade, as some people think their keratin scales have medicinal value. According to the International Union for Conservation of Nature (IUCN), these species are likely to be the most traded mammals globally.

It is very difficult for one to encounter a pangolin in the

wild because they are extremely endangered. They are also very difficult to keep in captivity because of their diet.

These mammals are closely related to animals such as anteaters, sloths, and armadillos; hence they are also dubbed "scaly anteaters". A fascinating thing about pangolins is the length of their tongue, which can extend to a length greater than that of its own body.

The African Pangolin Working Group champions pangolin conservation in Southern Africa, and their partners



One of the four species of African Pangolin

include scientists, concerned citizens, government and non-government organisations such as the Endangered Wildlife Trust (EWT), FreeMe, the National Zoological Gardens of South Africa and Lapalala Wilderness School.

You can also play a role in protecting these unique creatures by contacting the African Pangolin Working Group on www.pangolin.org.za if you spot or photograph a pangolin in the wild.

Structural Biology, WTF? (Why the fuss?)

Adapted from an article by Simon Broadley for the Young Science Communicators Competition

Structural biology in South Africa has never held as much promise as it does right now. But what is structural biology and what does it have to do with the International Year of Crystallography being celebrated around the world this year?

Structural biology is the study of the molecular structure of biological molecules to determine how a change in structure affects how they work in the body. Designing antibiotics to keep us free of disease is one of the things that structural biologists do. For this they must understand the shapes of very tiny molecules – called enzymes, which are the biological factories

that keep our cells working. By accurately knowing the shapes of enzymes, effective medicines can be developed to kill disease-causing bacteria. To determine the structure of these enzymes, a technique called X-ray Crystallography, which reveals how atoms are arranged within a crystal, has been developed. This process requires beams of X-rays, which when passed through a

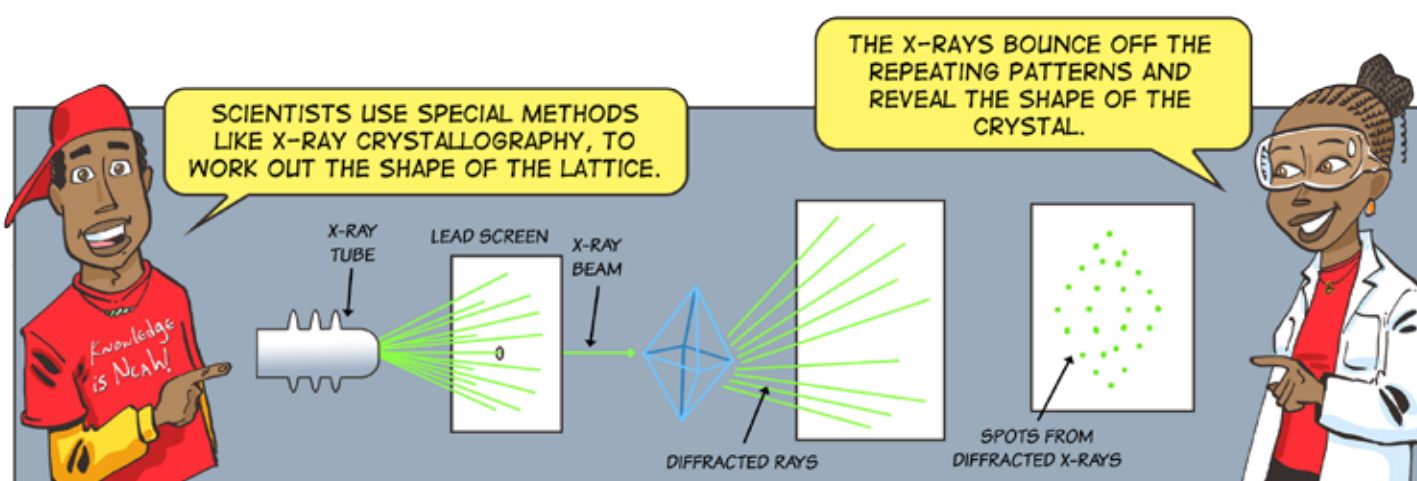
crystal, form a diffraction pattern that helps identify the structure of the enzyme. There are different machines that produce X-rays; however, the best and brightest X-rays are produced by a huge machine called a synchrotron.

In May 2013, South Africa became one of 20 countries (and the first African country) to sign an agreement with the



European Synchrotron Research Facility (ESRF) in France. This agreement will let scientists from South Africa use the synchrotron for free. Not only is this exciting because we now have access to a synchrotron, but also because the ESRF is the most powerful synchrotron source in Europe! Once scientists have identified the structure of an enzyme, they can then share their data and post their findings on a website called the Protein Data Bank for the whole world to see. This way, all scientists can benefit and use each other's data.

Studying structural biology in South Africa will give you a chance to play a part in developing the drugs that will fight disease-causing bacteria.



Science Spaza is grateful to Dave Ryan, Royal Bafokeng Maths Specialist for his contributions to this resource.

LOCAL KNOWLEDGE IS LEKKER!

ZULU PEOPLE IN SOUTH AFRICA HAVE A METHOD FOR **COUNTING TO 9 USING ONLY ONE HAND**. FOR 1 TO 5 THE FINGERS ON ONE HAND ARE USED, STARTING WITH THE SMALLEST AND ADDING FINGERS TILL THE WHOLE HAND IS SHOWN. FOR 6 THE THUMB (OR **ISITHUPA** - MEANING 6 IN ISIZULU) IS USED. FOR 7 THE THUMB AND FOREFINGER ARE USED AND THE MIDDLE AND RING FINGERS ARE ADDED FOR 8 AND 9!



START YOUR OWN SCIENCE SPAZA

1 REGISTER NOW TO RECEIVE **FREE RESOURCES AND SUPPORT. YOU WILL 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: _____
 Date: _____

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

Science Spaza is an initiative of Jive Media Africa. What moves you?
 Find out more at www.sciencespaza.org



Jive Media Africa



SCIENCE SPAZA
www.sciencespaza.org

Department of Science and Technology
 REPUBLIC OF SOUTH AFRICA



SUPER POWERS



ACTIVITY

1 DIVIDE EACH PIECE OF PAPER INTO 5 ROWS AND 10 COLUMNS.



2 COPY THE NUMBERS FROM PAGE 3 OF THIS RESOURCE ONTO THE PIECES OF PAPER. DO YOU NOTICE ANYTHING ABOUT THE NUMBER PATTERNS?



3 TELL SOMEONE YOU'RE ABOUT TO READ THEIR MIND. ASK THEM TO THINK OF A NUMBER BETWEEN 1 AND 100.

YOU WILL NEED:

- 7 SHEETS OF PAPER
- A PEN
- SOME FRIENDS TO TRY THIS OUT ON

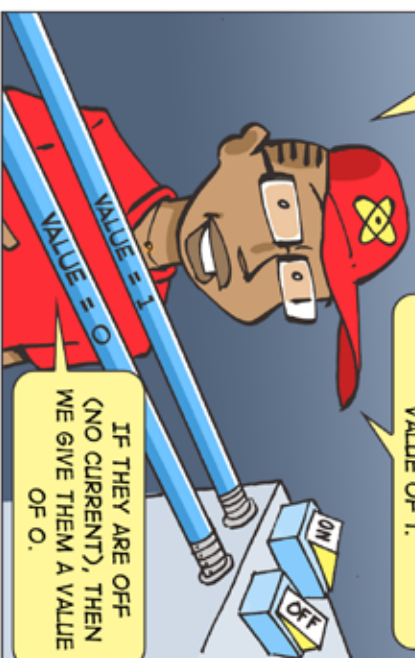


Knowledge is Nkwa!

SUPER POWERS AT WORK

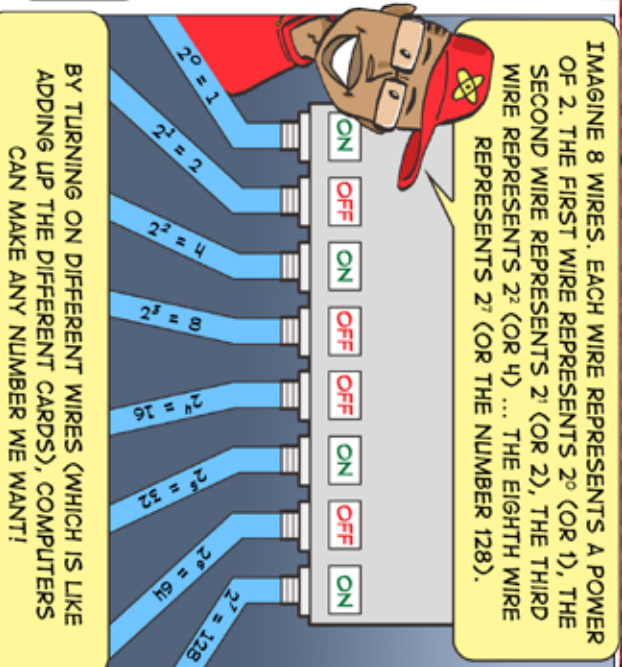
COMPUTERS WORK WITH NUMBERS BY ADDING UP POWERS OF 2!

INSIDE A COMPUTER ARE ELECTRIC WIRES. IF THEY ARE ON (CURRENT FLOWING) WE GIVE THEM A VALUE OF 1.



IF THEY ARE OFF (NO CURRENT), THEN WE GIVE THEM A VALUE OF 0.

IMAGINE 8 WIRES. EACH WIRE REPRESENTS A POWER OF 2. THE FIRST WIRE REPRESENTS 2^0 (OR 1), THE SECOND WIRE REPRESENTS 2^1 (OR 2), THE THIRD WIRE REPRESENTS 2^2 (OR 4) ... THE EIGHTH WIRE REPRESENTS 2^7 (OR THE NUMBER 128).



BY TURNING ON DIFFERENT WIRES (WHICH IS LIKE ADDING UP THE DIFFERENT CARDS), COMPUTERS CAN MAKE ANY NUMBER WE WANT!

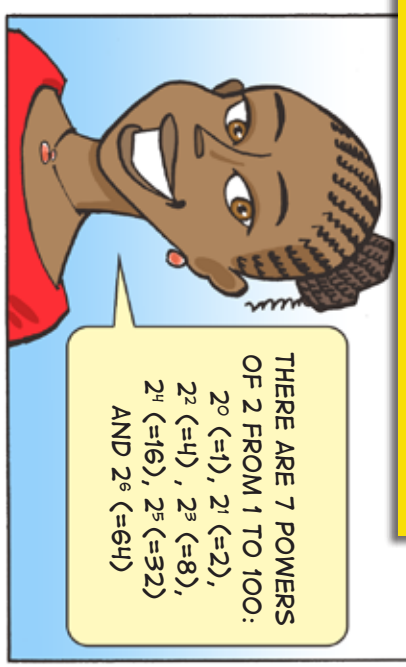
WHAT'S GOING ON HERE?

4 ASK THEM TO TELL YOU WHICH CARDS THEIR NUMBER APPEARS ON. PRETEND TO CONCENTRATE FIERCELY ON THEIR HEAD... JUST BETWEEN THEIR EYES.

6 WHEN YOU ARE SURE YOU HAVE ADDED UP CORRECTLY TELL THEM THE ANSWER (WHICH WILL BE THE NUMBER THEY WERE THINKING OF!)

5 ADD UP THE NUMBERS AT THE TOP LEFT OF EACH OF THE CARDS THEIR NUMBER IS ON.

ALL THE NUMBERS FROM 1 TO 100 CAN BE WRITTEN USING SOME OR ALL OF THESE POWERS OF 2.



FOR EXAMPLE 9 CAN BE WRITTEN AS 2^3 (8) PLUS 2^0 (1)



EACH OF THE 7 CARDS STARTS WITH A DIFFERENT POWER OF 2. SO 9 ONLY APPEARS ON THE CARD STARTING WITH 1 (THE 2^0 CARD) AND CARD STARTING WITH 8 (THE 2^3 CARD).



ADD THESE UP AND YOU GET TO 9!
TRY SOME OTHER NUMBERS!
FOR EXAMPLE:
 $97 = 64 + 32 + 1 = 2^6 + 2^5 + 2^0$



CAREERS

THERE ARE GREAT JOB OPPORTUNITIES, SUCH AS:

- COMPUTER SCIENTIST
- ELECTRONICS AND ELECTRONIC ENGINEERING
- MATHEMATICIAN
- STATISTICIAN

CURRICULUM LINKS

EXONENTS (POWERS) ARE FORMALLY INTRODUCED IN GR 7 AND CONTINUE TO BE VERY IMPORTANT IN LATER MATHEMATICS. GOOD MATHS STUDENTS HAVE A GOOD GRASP OF EXPONENTS.

COPY THESE NUMBERS FOR THE ACTIVITY ON PAGE 1

EXPONENTS OR POWERS ARE USED ALL OVER MATHS BECAUSE THEY ARE SO POWERFUL!

1	3	5	7	9	11	13	15	17	19
21	23	25	27	29	31	33	35	37	39
41	43	45	47	49	51	53	55	57	59
61	63	65	67	69	71	73	75	77	79
81	83	85	87	89	91	93	95	97	99
2	3	6	7	10	11	14	15	18	19
22	23	26	27	30	31	34	35	38	39
42	43	46	47	50	51	54	55	58	59
62	63	66	67	70	71	74	75	78	79
82	83	86	87	90	91	94	95	98	99
4	5	6	7	12	13	14	15	20	21
22	23	28	29	30	31	36	37	38	39
44	45	46	47	52	53	54	55	60	61
62	63	68	69	70	71	76	77	78	79
84	85	86	87	92	93	94	95	100	



16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	48	49	50	51
52	53	54	55	56	57	58	59	60	61
62	63	80	81	82	83	84	85	86	87
88	89	90	91	92	93	94	95		
32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61
62	63	96	97	98	99	100			
64	65	66	67	68	69	70	71	72	73
74	75	76	77	78	79	80	81	82	83
84	85	86	87	88	89	90	91	92	93
94	95	96	97	98	99	100			

