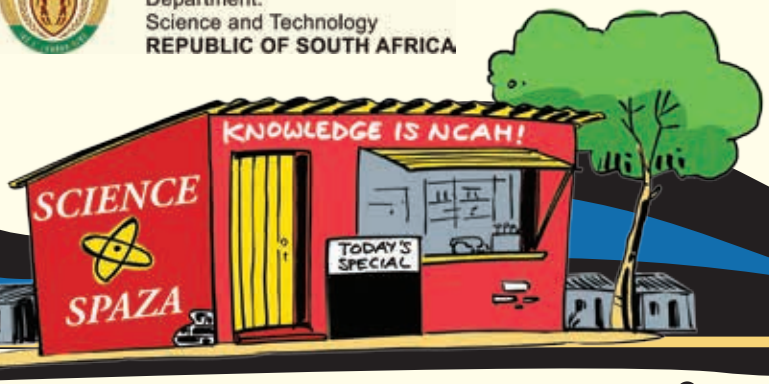
science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



SCIENCE SPAZA
Knowledge is Ncah!

Astronomy

HAVE YOU EVER WONDERED:

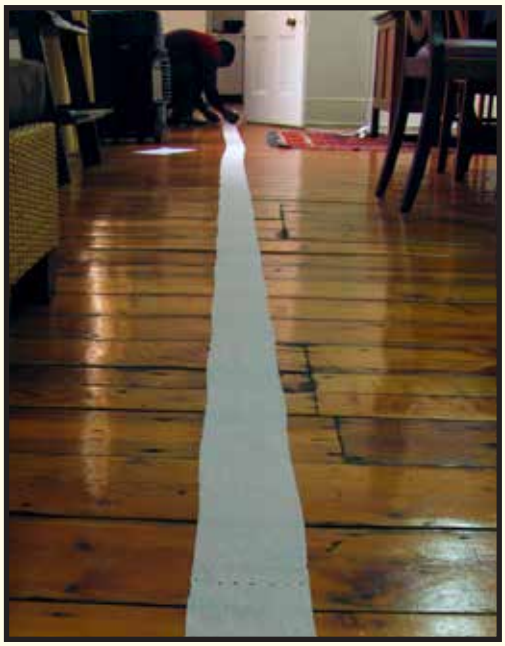
- HOW BIG THE UNIVERSE IS?
- HOW WE DISCOVER THINGS ABOUT THE UNIVERSE?

DEMONSTRATION:
A TOILET PAPER SOLAR SYSTEM SHOWING THE ENORMOUS DISTANCES IN SPACE!

WHAT YOU WILL NEED:
A roll of 1-ply toilet paper (TP), some cardboard/paper, maths compass, scissors, felt-tip marker, prestik, sticky tape

What to do:

1. Find a long corridor/hallway to work in. Unroll the toilet paper (TP) and write "SUN" on the edge of the first block of toilet paper.



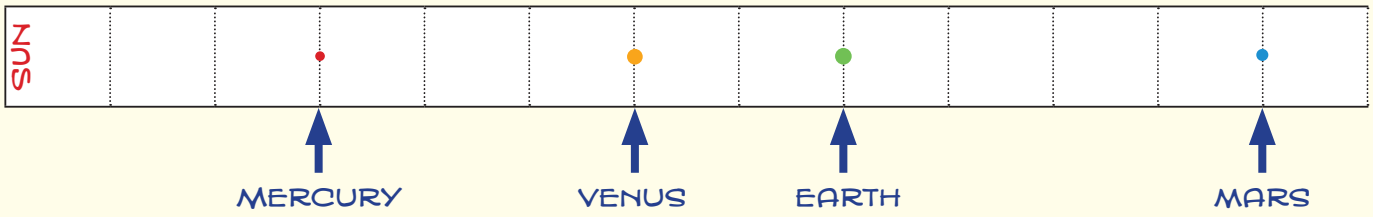
2. Use the compass and scissors to draw and cut out the planets using sizes from the "Diameter on TP" column in the table below. If you like, you can make each planet a different colour.

Object	Actual Diameter	Diameter on TP	Actual Distance from Sun (km)	No. of TP Blocks
Mercury	4 900 km	3 mm	57 900 000	3
Venus	12 100 km	8 mm	108 200 000	6
Earth	12 800 km	9 mm	149 598 000	8
Mars	6 800 km	5 mm	227 940 000	12
Jupiter	143 000 km	100 mm	778 340 000	40
Saturn	125 000 km	87 mm	1 427 000 000	74
Uranus	51 100 km	36 mm	2 869 600 000	149
Neptune	49 500 km	35 mm	4 496 700 000	233

3. Use the blocks of toilet paper as a ruler for the distance between planets. So, stick Mercury at the END of the 3rd block ("Number of TP Blocks" is 3) and label it Mercury.

4. Then place Venus at the end of block 6, Earth at the end of block 8, etc. until you have stuck down all the planets.

5. If the toilet paper tears, repair with tape. Lay the unrolled toilet paper down the corridor and check out the sizes of the planets and distances between them!



What is happening?

The distances in space are so huge that we must CONVERT these distances to smaller numbers that we can understand. How do we do this???
We use a **SCALE**.

eg. We used 3 blocks to show the distance between the Sun and Mercury which is almost 60 million km. The distance between the Sun and Neptune is a crazy 4,5 *billion* km so we had to use 233 blocks! The closest star to the sun (Proxima Centauri) is more than 40 000 000 000 000 km away (40 *TRILLION*!!!) which would be *over 2 million blocks of toilet paper*! WHAT??? Mind-boggling!

Because of the gigantic distances in space, scientists use a measurement called LIGHT YEARS. One light year is about 9,5 trillion km and is the distance that light travels in one year.

Can you believe that there are telescopes that can collect information from BILLIONS of light years away? And guess what???

Photo: Dr. Nadeem Oozeer, www.ska.ac.za

The world's biggest telescope – the Square Kilometre Array (SKA) – is being built here in South Africa! So South Africa has a huge role to play in global astronomy!

Careers

CURRICULUM LINKS:

- **Knowledge area:** Planet Earth and Beyond
- **Themes:** The solar system, Beyond the solar system, Looking into space

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National Science Week

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