



SUNDIAL



AN ANCIENT CLOCK

THE CRADLE OF HUMANKIND IN SOUTH AFRICA HAS A **SUNDIAL** THAT IS DESIGNED AND BUILT USING **SCIENCE AND MATHEMATICS** FROM ANCIENT TIMES. IT IS **ACCURATE** TO WITHIN 5 MINUTES!

BUT IT IS NOT ONLY THE SUN THAT SCIENTISTS IN SOUTH AFRICA ARE LOOKING AT. WE HAVE **THREE PLANETARIUMS** WHERE YOU CAN GO AND LEARN ABOUT THE STARS AND PLANETS.



BUILD YOUR OWN SUNDIAL

1

FIND A THIN, STRAIGHT STICK. STAND IT UP IN THE GROUND SO THAT IT IS POINTING STRAIGHT UP.



2

PLACE A MARKER, SUCH AS A STONE OR STICK, AT THE END OF THE SHADOW OF THE STICK AND LABEL WHAT TIME IT IS.



3

EVERY HOUR, GO AND PLACE A MARKER AND LABEL WHAT TIME IT IS.



4

CONTINUE TO DO THIS UNTIL YOU HAVE ALL THE HOURS MARKED FOR A DAY - YOU MAY HAVE TO DO THIS OVER 2 DAYS SO THAT YOU CAN MARK ALL THE HOURS.



AFTER THAT, AS LONG AS THE SUN IS SHINING, YOU WILL BE ABLE TO USE THE SUNDIAL TO TELL THE TIME.



WHAT'S HAPPENING HERE?

In a sundial, the "stick" that makes the shadow is called a **gnomon** (pronounced no-min). A sundial works because the shadow made by the gnomon moves as the sun moves across the sky.

How accurate is a sundial?

The sun rises *higher* in the sky during summer than winter, meaning the *angle* between the sun's rays and the gnomon changes.



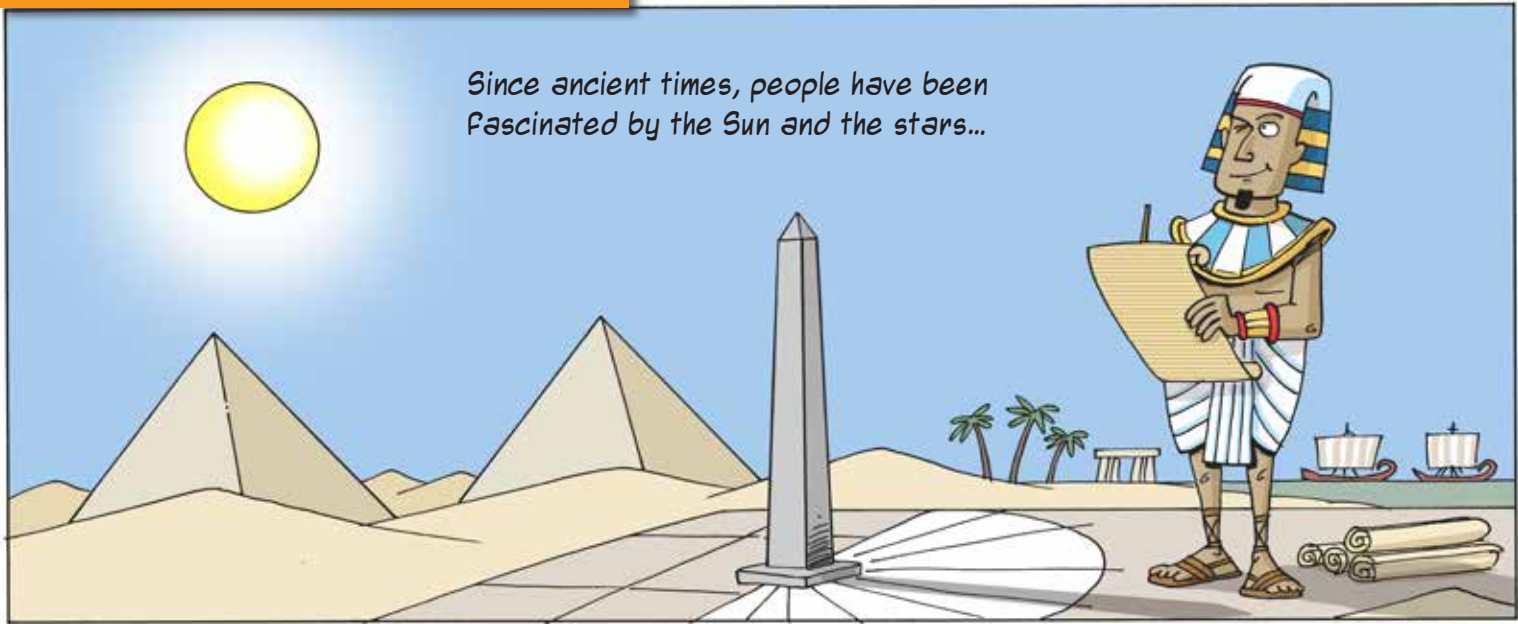
This will mean that the sundial you made will not be as accurate later in the year as it is now.



The sundial From The Cradle of Humankind has a Figure of 8 that the gnomon is moved along depending on the month of the year.

The shadow is longer during winter and shorter during summer, so the gnomon is placed closer to the time line during summer and further away during winter. This makes it accurate all year round!

LEARNING ABOUT STARS



Since ancient times, people have been Fascinated by the Sun and the stars...

...and that still happens today...

The *planetarium* at the Wits University in Johannesburg was opened in 1960 and has been teaching people since then about the stars, planets, the sun and our solar system.

Picture by Thuvack (Own work) [CC BY-SA 3.0 (<http://creativecommons.org/licenses/by-sa/3.0/>)], via Wikimedia Commons



CAREERS:

An **Astronomer** studies the objects in the sky such as the Sun, planets, stars, galaxies and black holes. They are often expert physicists. South Africa is a world leader in this field and has awesome facilities – such the SKA radio telescope and the South African Large Telescope (SALT).

Laser technicians can work in a variety of jobs, including working with surgeons to perform delicate operations or giving cosmetic treatments. They are good at maths, physics and electronics and need to be able to maintain and repair the laser equipment too.



Jonathan Padvantan holds a BSc Honours in Physics. He runs the live shows at the WITS planetarium. He tells people all about the night sky – including information about astronomy and related physics. The shows mix music, visuals and information to make a great experience. He also looks after the 2 ton star projector to make sure what the audience sees is clear and accurate. Working as a team is essential in his job – this inspires him every day when he comes to work.

CURRICULUM LINKS

- **GRADE 7: Mathematics** – Geometry of straight lines, transformation geometry, construction of geometric figures.
- **GRADE 8: Mathematics** – Angle relationships, enlargements and reductions.
Natural Sciences – Planet Earth and beyond.
- **GRADE 9: Mathematics** – Enlargements and reductions.
Natural Sciences – Planet Earth and beyond.
- **GRADE 10, 11 & 12:**
Tourism – Tourism attractions, Culture and Heritage

Knowledge is Ncah!



PUZZLE YOUR MIND!!!

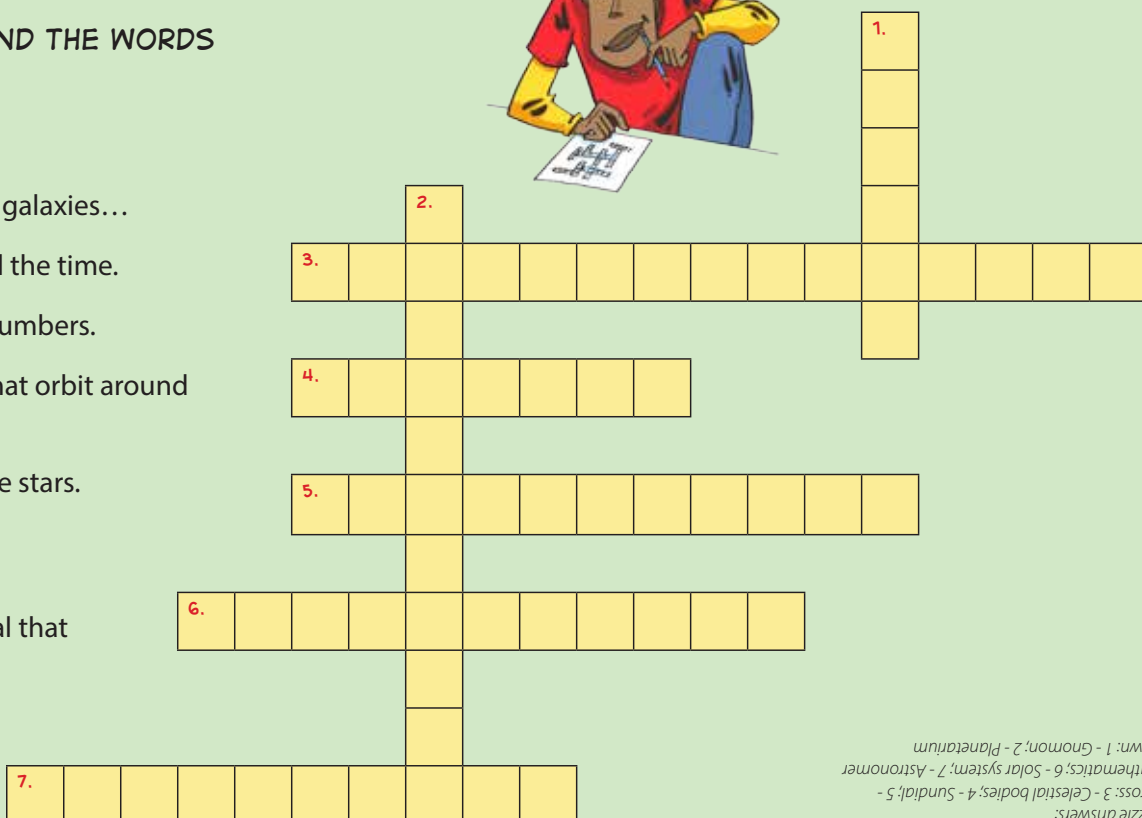
USE THESE CLUES TO FIND THE WORDS IN THE PUZZLE:

Across

3. Sun, stars, planets, moon, galaxies...
4. An instrument used to tell the time.
5. Solving problems using numbers.
6. The planets and moons that orbit around the Sun.
7. A scientist who studies the stars.

Down

1. The "stick" part of a sundial that makes the shadow.
2. Where you can go to learn about stars and planets.



Puzzle answers:
Across: 3 - Celestial bodies; 4 - Sundial; 5 - Mathematics; 6 - Solar system; 7 - Astronomer
Down: 1 - Gnomon; 2 - Planetarium

START YOUR OWN SCIENCE SPAZA

Do you want to start a science club at your school? Send us the following information, and Science Spaza will contact you.

School: _____

Name: _____

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Visit www.sciencespaza.org, email info@sciencespaza.org, sms or WhatsApp us on 076 173 7130 or write to us at PO Box 22106, Mayor's Walk, 3208.

WE WANT YOUR
FEEDBACK!

SEND US A PICTURE
OF THE SUNDIAL THAT
YOU MADE.



The Department of Science and Technology contributes to increased well-being and prosperity through science, technology and innovation. For more information visit: www.dst.gov.za.

The CoE for Mathematical and Statistical Sciences, hosted at Wits University, focuses on themes that reflect the pure and applied nature of the mathematical sciences. CoE-MaSS encourages cross-disciplinary research and develops national capacity in mathematics and statistics.



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