



## MEERKAT FIRST LIGHT

CHECK THIS OUT! IT'S THE **FIRST LIGHT IMAGE** FROM THE **MEERKAT TELESCOPE!**

WHAT'S THE BIG DEAL? IT JUST LOOKS LIKE A **BUNCH OF DOTS!**

THE BIG DEAL IS THAT EACH DOT REPRESENTS A DIFFERENT **GALAXY** CONTAINING **MILLIONS OF STARS** ...GALAXIES THAT HAVE BEEN **INVISIBLE** UNTIL NOW! WE CAN ONLY **SEE** THEM BECAUSE THEY **EMIT RADIO WAVES.**

TAKING PHOTOGRAPHS USING **RADIO WAVES!** LET'S FIND OUT HOW THEY DO IT!

### THE MEERKAT RADIO TELESCOPE

THE **MEERKAT RADIO TELESCOPE**, PRECURSOR TO THE **SKA** IN SOUTH AFRICA, HAS RELEASED ITS FIRST IMAGE OF A SMALL PATCH OF SKY. THE **MEERKAT FIRST LIGHT IMAGE** SHOWS MORE THAN **1300 GALAXIES** IN THE DISTANT UNIVERSE, COMPARED TO **70** KNOWN IN THIS LOCATION PRIOR TO MEERKAT.

IT IS CURRENTLY UTILISING **16 DISHES**, BUT WILL EVENTUALLY USE **64!**



# ACTIVITY: FIND THE FOCAL POINT OF A PARABOLIC CURVE

## YOU WILL NEED:

- TIN FOIL, 10CM X 10CM
- SOMETHING ROUND, LIKE A JUG
- A SOURCE OF LIGHT
- A PIECE OF PAPER

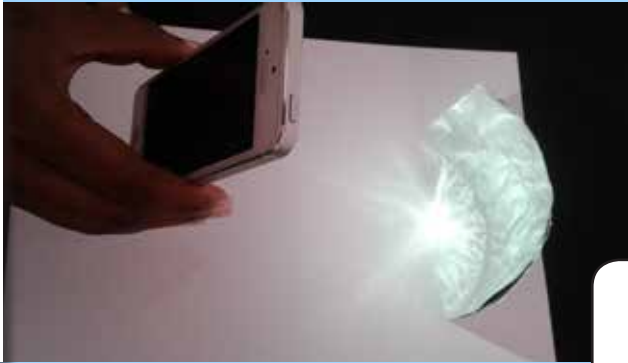
**1** FOLD THE SQUARE OF TIN FOIL IN HALF WITH THE SHINY SIDE FACING OUTWARDS.



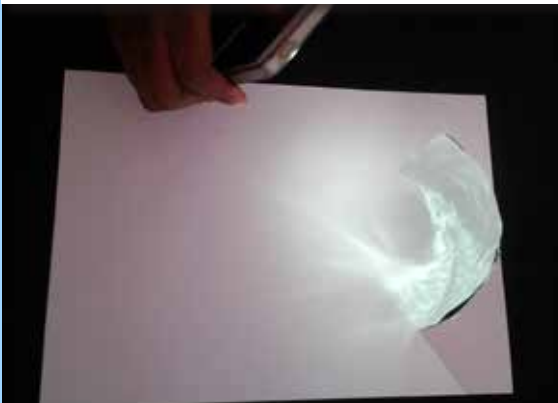
**2** MOULD THE TIN FOIL INTO A CURVE AROUND YOUR ROUND OBJECT.



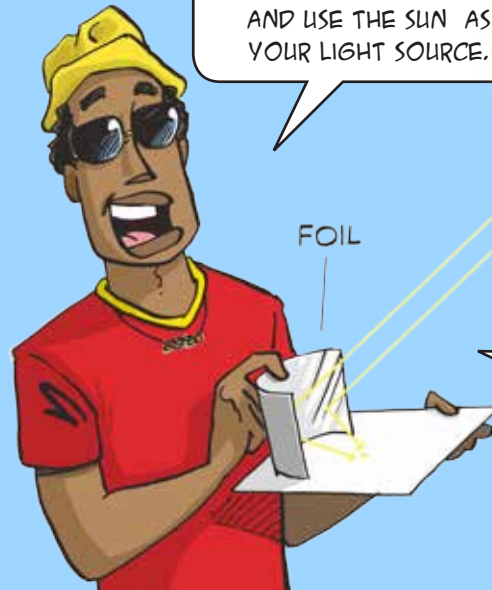
**3** STAND THE TIN FOIL UP ON THE PAPER AND SHINE THE LIGHT DIRECTLY AT IT. SEE WHERE THE REFLECTIONS ALL CONVERGE? THAT IS THE FOCAL POINT!



**4** SHINE THE LIGHT FROM DIFFERENT ANGLES AND SEE WHAT HAPPENS TO THE FOCAL POINT.



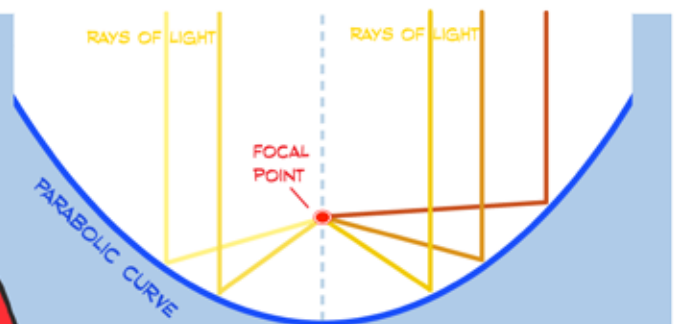
IF YOU DON'T HAVE A LIGHT, YOU CAN TAKE YOUR TIN FOIL OUTSIDE AND USE THE SUN AS YOUR LIGHT SOURCE.



PLACE IT DOWN WITH THE CURVE FACING THE SUN AND SEE WHERE THE FOCAL POINT IS. TURN IT GENTLY TO SEE WHAT HAPPENS TO THE FOCAL POINT.

## WHAT'S HAPPENING HERE?

Because of the parabolic curve of the tin foil, each ray of light that hits the curve at a different point will be reflected at a different angle, so that all the reflected rays of light converge to a focal point.

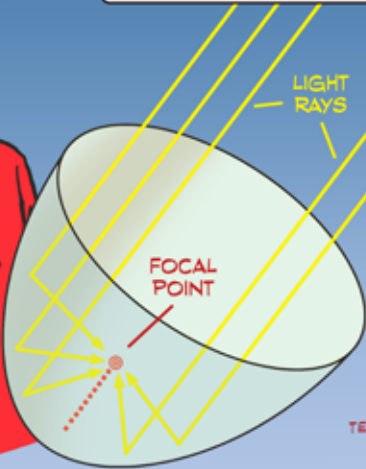


# THE SKA

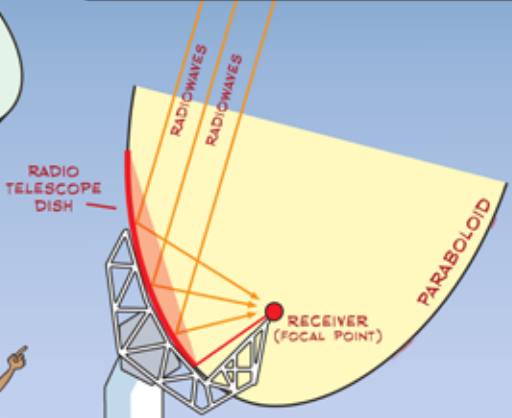
THE 3D VERSION OF A PARABOLA IS CALLED A PARABOLOID - ALMOST LIKE A BOWL SHAPE.

A TELESCOPE DISH IS A BIG REFLECTOR IN A PARABOLIC SHAPE, SO ALL THE LIGHT RAYS THAT HIT IT ARE REFLECTED TO A FOCAL POINT. A RADIO TELESCOPE REFLECTS RADIO WAVES IN THE SAME WAY.

THE RECEIVER IS PLACED AT THE FOCAL POINT; THIS IS THE PART OF THE TELESCOPE THAT ACTUALLY CAPTURES THE INFORMATION OF THE RADIO WAVES.



NOTICE HOW THE DISH IS ONLY A PART OF THE PARABOLOID - NOT THE PART IN THE CENTRE - SO THE FOCAL POINT, WHERE THE RECEIVER IS LOCATED, IS AWAY FROM THE MIDDLE OF THE DISH.



## CAREERS:



**Mechanical Engineers**  
design the radio telescopes - they decide the shape and size, and the materials that are used to build it.

**CURRICULUM LINKS**

What in this Activity Resource did you already know about from one of the following sections from school?

- **GRADE 7:** Historical Development of Astronomy
- **GRADE 8:** Beyond the Solar System; Looking into Space
- **GRADE 9:** Birth, Life and Death of a Star
- **GRADE 10:** Waves; Electro-magnetic Radiation

## Electrical Engineers

are responsible for the technology behind the parts of the telescope such as the receiver, and how the information it receives is converted into an image like the First Light image.



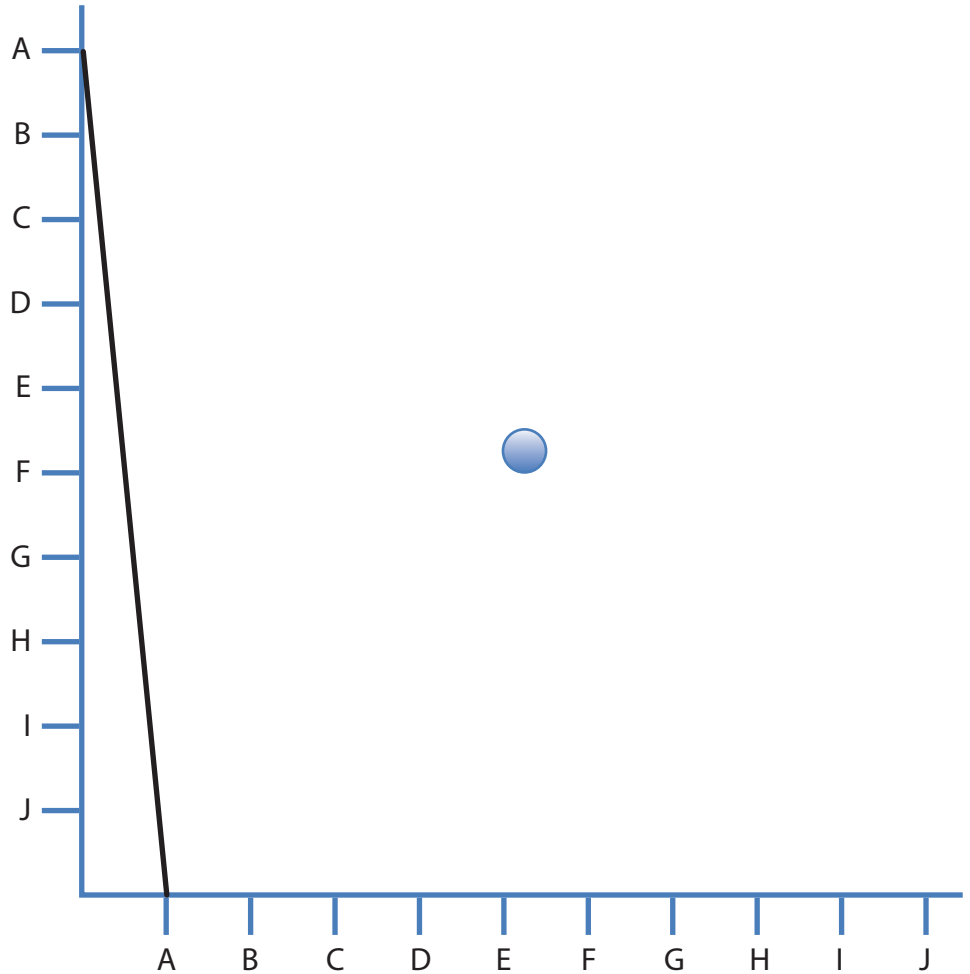
*Heather Prince* from KwaZulu-Natal is being sponsored by the SKA to study for her PhD in astrophysics at Princeton in the USA, after obtaining her Master's degree from the University of KwaZulu-Natal. Prince's research will be looking at radiation from the early universe to study things such as dark matter.







## PUZZLE YOUR MIND!!!

HELP THE ENGINEER TO BUILD HIS RADIO TELESCOPE DISH IN A PARABOLIC SHAPE AROUND THE FOCUS. GET A RULER AND DRAW A STRAIGHT LINE FROM MARKING A ON THE VERTICAL LINE TO MARKING A ON THE HORIZONTAL LINE, THEN FROM MARKING B ON THE VERTICAL TO MARKING B ON THE HORIZONTAL LINE, AND SO ON. WE'VE DONE THE FIRST LINE FOR YOU!



## WE WANT YOUR FEEDBACK!

We want to hear from you! Send us a picture of you doing the activity, or a picture of your completed puzzle, or just any news from your science club.

You can send us your feedback in any of the following ways: Whatsapp or SMS number  **076 173 7130**; email us at [info@sciencespaza.org](mailto:info@sciencespaza.org); Facebook us at  **ScienceSpaza** or contact us through our website [www.sciencespaza.org](http://www.sciencespaza.org)

Remember to include your name, age and gender, as well as the name of your school and name of your science club. Also say which Activity Resource you are replying to.



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The SKA project is an international effort to build the world's largest radio telescope, with a square kilometre (one million square metres) of collecting area. The Square Kilometre Array will be the most sensitive radio telescope, about 50 times more sensitive, and up to 10 000 times faster (in terms of its survey speed) than the best radio telescopes of today. For more information visit: [www.ska.ac.za](http://www.ska.ac.za)



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