

Systems for looking into space.

Humans have looked into space for many years and used their imagination to think about what they saw.



Telescopes were invented to look into space to study what is out there in the night sky.



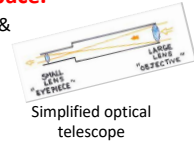
SALT telescope at Sutherland in N. Cape.

New types of telescopes have enabled us to look even further into space and SA already has one of the biggest in the world and is building an even bigger one.

1

Systems for looking into space.

Telescopes were invented in 1608 & Galileo Galilei took astronomy (study of stars and planets) to the next level and planets that we did not know about, became easier to find, see and study.



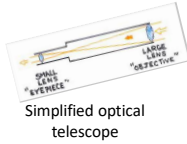
We now know many facts about planets, stars, asteroids and various other bodies in space as a result of studies by many men over many hundreds of years.

Many top scientists such as Einstein, Newton, Kepler and others have been fascinated by what they could see, discover and study in the night sky by using telescopes.

2

How a basic optical telescope works:

Here are the names & components of a simple telescope:



- A long tube of metal or plastic
- A glass lens at front end, nearest to what you are looking at – called the **Objective lens**.
- A second, smaller lens near your eye – called the **eyepiece lens**.
- Objective lens brings light from object to a point of focus.
- Eyepiece lens spreads out the light (magnifies it) so you can see it.
- This acts like a magnifying glass.
- The 2 lenses together make it easier to see distant objects.

3

Telescopes & their magnification.

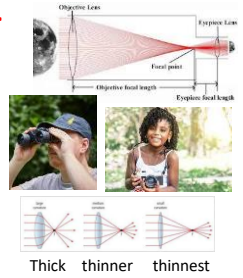
Optical telescopes are ones that you look through, such as a simple telescope, binoculars and even cameras.

The magnification of the image depends upon the sizes and curvature of the lenses being used.

In general – the more curved the lens the greater the magnification.

Magnification increases with thickness of lens.

If a lens magnification is 10, that means the image will be 10X bigger than seen without the lens, and a magnification of 100, means the object will be 100X bigger!



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Radio telescopes.

We are limited with the magnification & what we can see with optical telescopes.

However, objects such as stars, planets, black holes and even galaxies all give out radio waves that can be detected with Radio Telescopes.

They do not have optical lenses & have a curved dish instead, to collect radio waves from these objects. Objects can be studied properly



Radio telescopes can be used in the day or at night, but optical telescopes can only be used at night – when there is little extra light to affect the sighting.

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Arrays and space telescopes.

Several radio dishes, used together to collect radio waves from an object is referred to an Array of dishes making up the telescope.



Array of dishes in radio telescope.

In space where there is no atmosphere to affect and distort images, we can get much clearer images from space telescopes orbiting the Earth or other planets.



Hubble telescope orbiting & photographing Earth from space.

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Studying objects in space from SA.

SA has some of the best places in the world to view & study objects out in space! These are positions far away from towns, in the Karoo and other places. **Scientists from all over the world come here to use and study with our facilities.**

SALT telescope at Sutherland in the Karoo in the Northern Cape:

SALT stands for:
Southern African
Large Telescope



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KAT-7 & MeerKat telescopes.



Telescopes: KAT-7



&

MeerKAT

8

SKA telescope – the biggest in the world – ever!

SKA stands for Square Kilometer Array and is being built near Carnarvon in the Northern Cape and near the MeerKAT telescope.

It will enable scientists to study things 10 000 times faster and will be linked to dishes in other countries as well – with the main offices in SA!



What SKA will look like.



Can you name them?
Links of SKA to other countries.

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