SAASTA AND SCOPEX TEACHER TRAINING

GRADE 7 TERM 4 TEACHER TRAINING MANUAL

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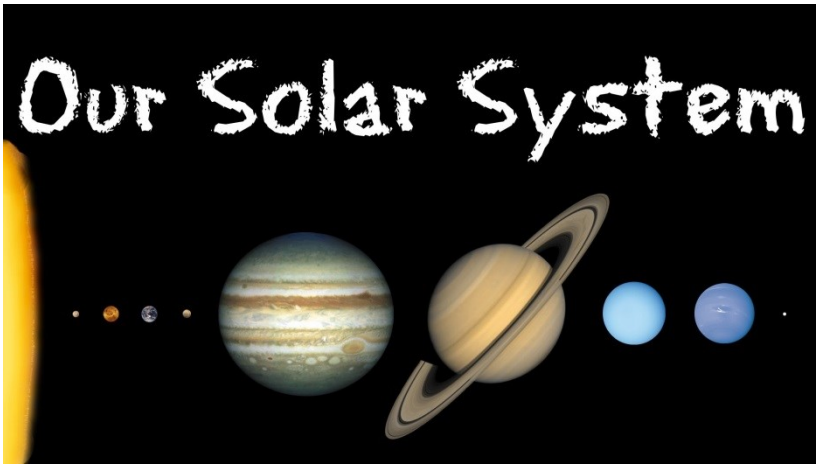
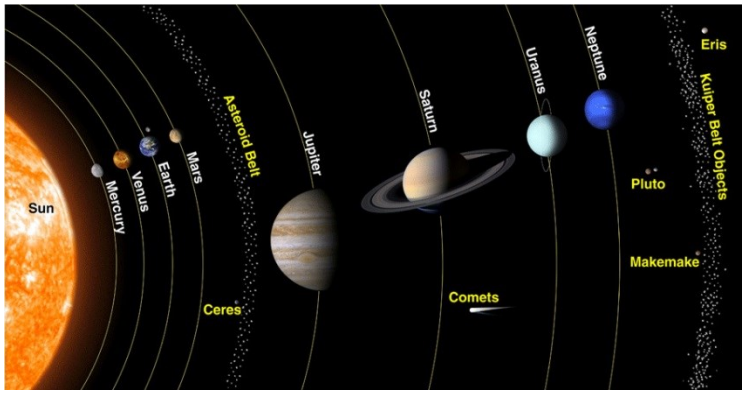
The Solar System

- The Solar system is a system of planets, moons, asteroids and the Sun.
- The Sun, which is a star, is at the centre of the solar system.
- There are eight planets and the asteroid belt in orbit around the Sun.
    1. **M**ercury **(My)**
    2. **V**enus **(Very)**
    3. **E**arth **(Energitic)**
    4. **M**ars **(Mother)**
    5. **J**upiter **(Just)**
    6. **S**aturn **(Served)**
    7. **U**ranus **(Us)**
    8. **N**eptune **(Noodles)**



- The asteroid belt lies between Mars and Jupiter



- Each planet has its own
    - Features, size, composition, orbit and position in relation to the Sun, number of moons and revolution around the Sun.

Moons

- Moons, including our Moon do not give out their own heat and light
- The moons and our Moon can be seen from Earth because they reflect the light from the Sun.
- Earth has one moon, other planets have up to 60 moons (Jupiter) and some planets have no moons.
- On the Moon we can see
    - Craters
    - Mountains, which are the lighter areas.
    - Flat planes, which are the darker areas.

Movement of Planets

You will need: Paper plate, hard paper, cut out of the Earth (about 10 cm diameter), split pins, colour pencils.

Rotation

- Each planet in the Solar System **Rotates** (spins) on its own axis
- A planets axis is an imaginary line that goes through the centre of the Earth from the North Pole to the South Pole.
- One complete rotation of the Earth takes about 24 hours a day/night period.
- During rotation the side facing the Sun experiences day and the opposite side experiences night.
- All planets rotate anti-clockwise but Venus and Uranus rotate clockwise. This rotation is called **Retrograde Rotation**.

Revolution

- All planets also **Revolve** (travel) around the Sun in their own orbits (pathway)
- The Earth makes one complete revolution around the Sun every $364\frac{1}{4}$ days. This is a year

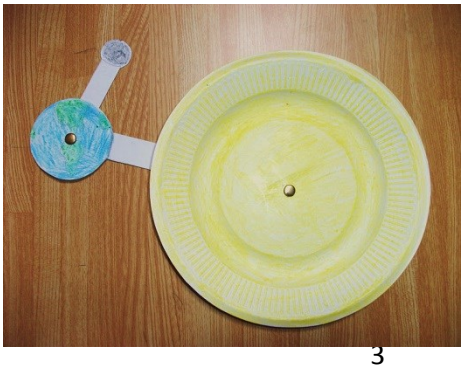
The Movement of the Moon

- The Moon completes one rotation once every 28 days.
- The Moon revolves once around the Earth every 28 days.
- This is called **Synchronous Rotation.**
- As a result, the moon does not seem to be spinning but appears to observers from Earth to be keeping almost perfectly still. This is the reason we only observe one side of the Moon.

Activity

1. Where is the asteroid belt located in the Solar System?
2. Which is the biggest planet in the Solar System?
3. Which planets does the Sun rise in the west and set in the east?
4. Which planet has the longest year?
5. Do moons, planets or the Sun give of their own heat and light?
6. How long does it take Earth to rotate once on its own axis?
7. Learners should be able to identify the equator, northern and southern hemispheres
8. Why is Pluto not a planet anymore?

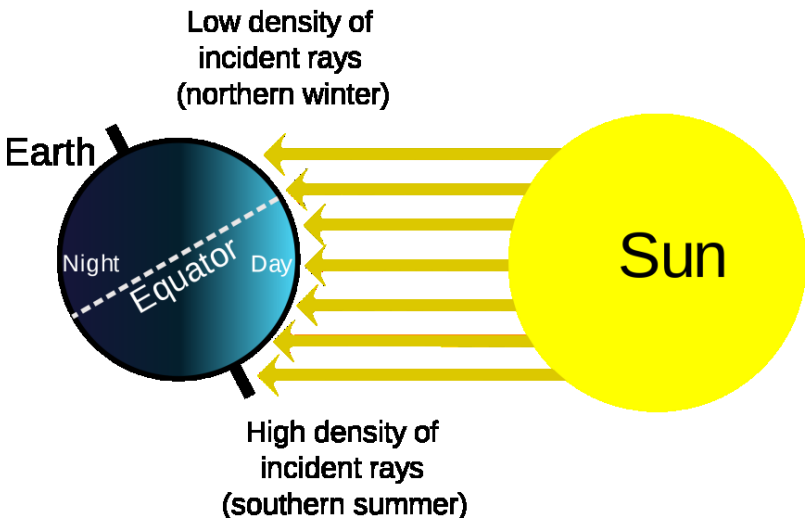
Construct a simple Sun-Earth-Moon system.



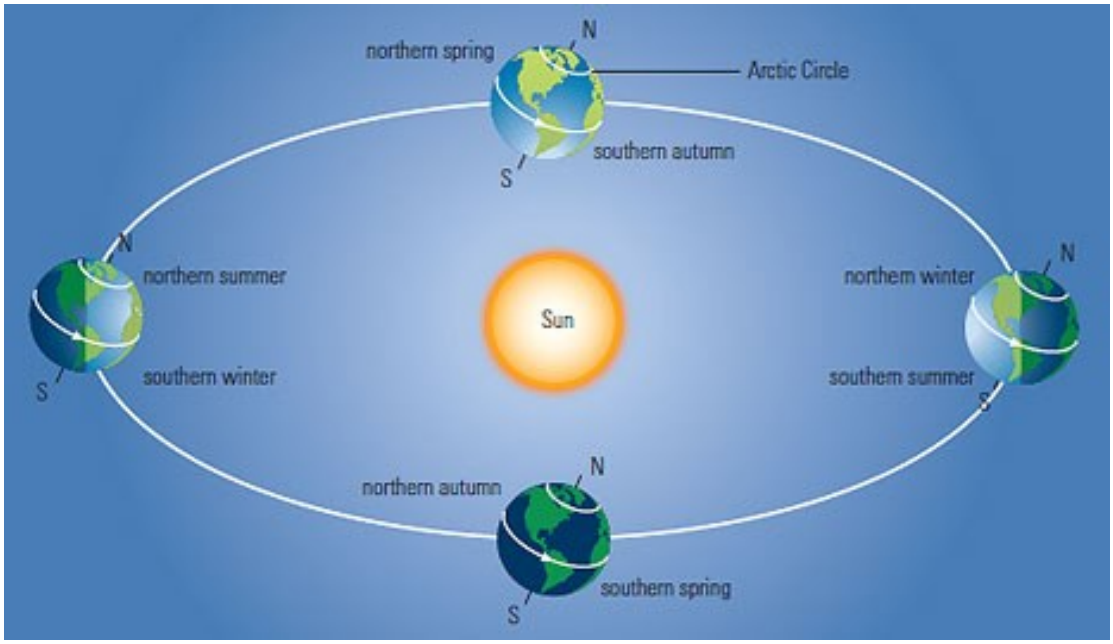
Relationship of the Sun to the Earth

Solar energy and the Earth's seasons

- The Earth's axis is tilted from the vertical by 23,5°
- This tilt does not change as the Earth orbits the Sun
- Due to this tilt the intensity of the solar energy that reaches different parts of the Earth changes through the year
- This is what causes the four seasons of the year.
- When the solar energy falls more directly on the southern hemisphere (higher intensity), the solar energy is spread over a smaller area and it is summer in the southern hemisphere



- At the same time in the northern hemisphere solar energy will fall at an oblique angle thus spreading the solar energy over a wider area and it becomes winter in the northern hemisphere
- The tilt of the Earth's axis also changes the length of the days. In summer, days are longer than in winter.

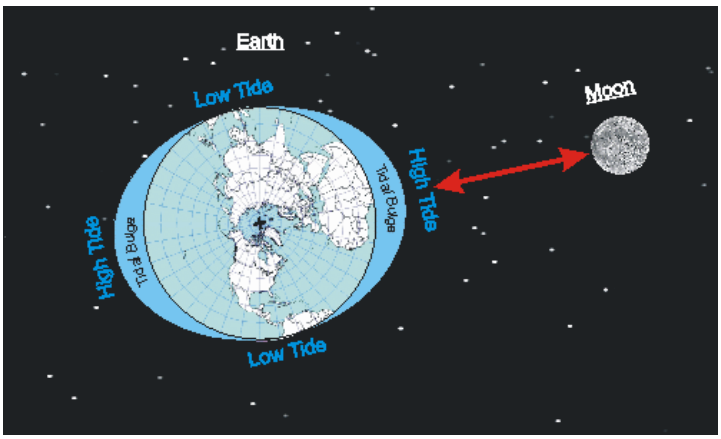


Relation of the Moon to the Earth

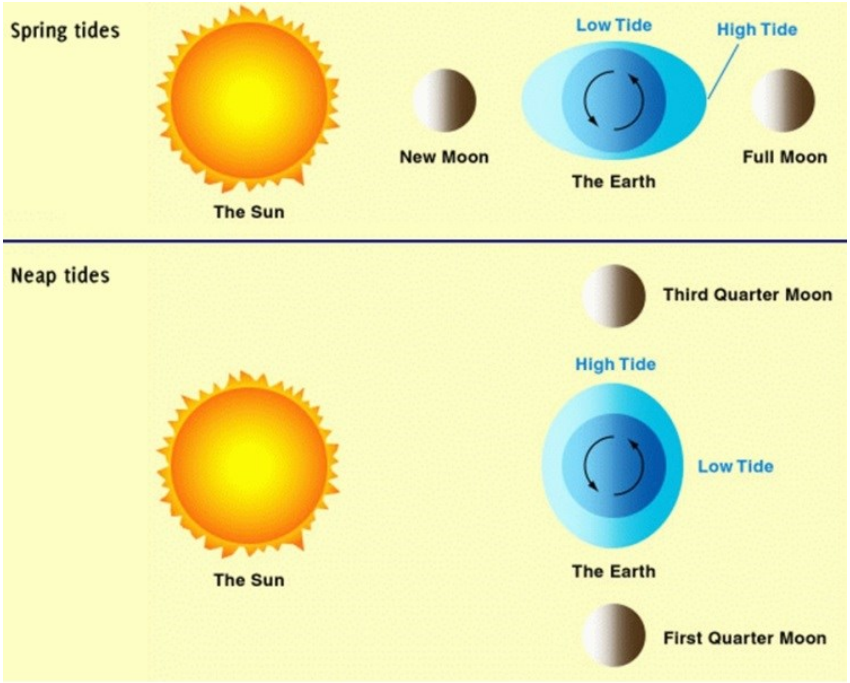
Gravity

- Gravity is the tendency of all objects to attract each other
- The pull or force of gravity between two objects depends on two things, Mass and Distance;
    - More massive objects exert a stronger pull than smaller objects over the same distance
    - For objects of the same mass, the closer they are to each other, the stronger the pull of gravity between them
- The Earth is held in its orbit around the Sun by the pull of the Sun's gravity
- The Moon is held its orbit around the Earth by the pull of the Earth's gravity

Tides



- The Moon has its own gravity
- Tides on Earth are mainly caused by the gravity of the Moon
- Tides are the predictable, repeated rise and fall of the sea and ocean levels
- There are usually two high tides and two low tides every 24 hours
- When the Moon is aligned with the Sun (at Full Moon and New Moon) the Sun's gravity adds to the Moon's gravity and spring tides results. These are higher than usual high tides lower than usual low tides

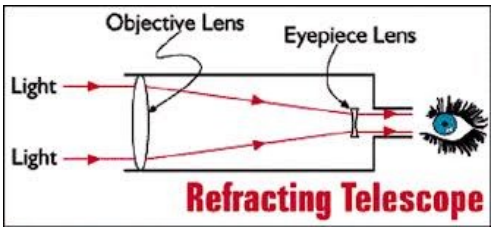


Activity

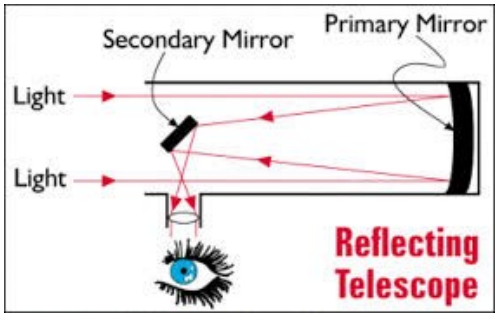
1. By how much is the Earth's axis tilted by from the vertical?
2. What causes the seasons and the different lengths of a day?
3. Explain what the Equinox and Solstice is and when they occur.
4. Find out and explain what a neap tide is and when it occurs.
5. When do spring tides happen?

Telescopes

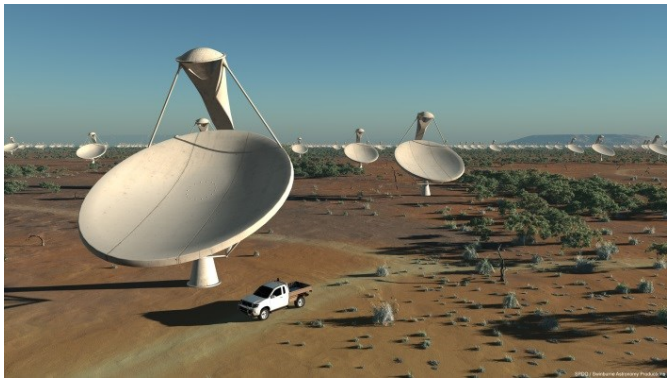
- A telescope is a device that has the ability to make faraway objects appear much closer
- They are used to look into space and gather information
- There are telescopes in Space such as the Hubble telescope
- Two types of telescopes
    - Refractor, uses lenses



    - Reflector, uses mirrors



- South Africa has built and uses the largest telescope, SALT (Southern African Large Telescope) in the Southern Hemisphere located in Southerland in the Northern Cape.
- SALT is an optical telescope.
- South Africa is currently building the largest telescope ever built by mankind, the SKA (Square Kilometre Array).
- SKA is a radio telescope.



Mars Rovers

- Research is going on into finding another home planet
- A handful of people have been on the Moon but due to its size and other factors the Moon is not suitable to be inhabited by human beings
- Venus is similar in size to Earth but it has a very nasty atmosphere filled with poisonous gasses
- The next planet closest to Earth and similar is Mars
- To date three probes (Rovers) have been sent to Mars and looking for sign of life by searching for water, bacteria, and fungus.
- The latest rover to be sent is called Curiosity in 2013. It takes seven months to reach Mars

Activity

1. Find the names of the other two rovers that are on Mars and also when they were sent to Mars.
2. What is the difference between a reflector telescope and a refractor
3. Research on SALT and SKA and explain all their characteristics, location and how they work.