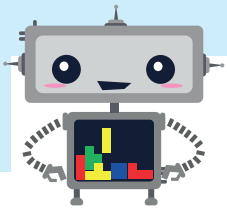
Why do we need telescopes?

Summary
This activity demonstrates the scale of the Universe, starting with our closest cosmic neighbour the Moon and travelling through the Solar System to the nearest star. The vast scale of the Universe makes space travel beyond our Solar System almost impossible and demonstrates the importance of telescopes like Las Cumbres Observatory.

Age: 8 – 12 years

Duration: 45 minutes

Materials: Globe, smaller ball (e.g. tennis ball), strips A3 paper, pencils, SEROL presentation part 1.



1. Demonstrate the distance to our nearest cosmic neighbour, the Moon.

Use a globe to represent the Earth and a smaller object to represent the Moon.

The Moon is 384,000 km from Earth. That's equivalent to around 30 Earths. Estimate the correct distance based on the size of your globe.

Tip: Try to choose objects with a similar size difference to the image here

2. Invite two students to help demonstrate the distance between these objects. One student will hold the Moon and the other the Earth.

Although the Moon is our closest cosmic neighbour, many students may be surprised at the true distance between our planet and the Moon.

3. Discuss missions to the Moon with the class.

- Do they know whether humans have visited the Moon?
- How long did it take them to travel to the Moon? (~3 days).
- How long would it take with today's technology? (on New Horizons spacecraft ~8 hours)

Follow this up by creating a scale model of the Solar System. This helps familiarize students with the eight planets of our Solar System and demonstrates the vast distances even in our local cosmic neighbourhood. (Show slide 3 for Solar System planet order)

4. Hand each student a piece of A2 or A3 paper cut lengthways in strips roughly 5cm across (see image). Ask students to follow the instructions below while demonstrating the folds on your own strip of paper

a. Fold the strip in half (always fold length ways). Draw a small circle in the crease and label it Uranus.

b. Fold both the top and bottom ends of the paper to the centre. In the bottom crease draw and label Neptune, in the top crease add Saturn.

c. Fold the top of the paper to Saturn. Draw and label Jupiter in the crease.

d. Fold the top of the paper to Jupiter. In this crease write 'Asteroid belt'.

e. Fold the top of the paper to the Asteroid belt. In this crease draw and label Mars.

f. Finally, fold the top of the paper to Mars. Before unfolding the paper fold in half again. When you open the fold your will have three creases within which you will add the final three planets. Above Mars will be Earth, then Venus and finally Mercury.

g. The very edge of the paper is the Sun by Mercury is the location of the Sun while the other end is the location of dwarf planet Pluto.

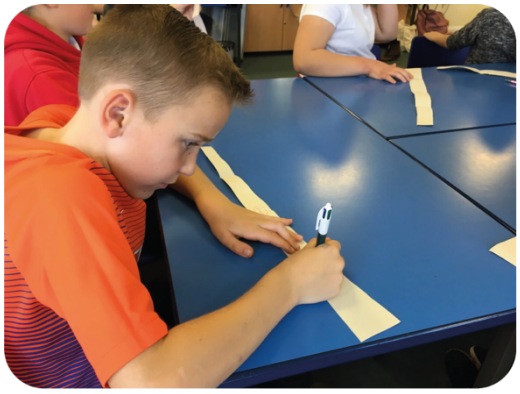
5. Discuss the model, what do students notice?

- The terrestrial (rocky) planets are very close together.
- The gas giants are much further apart.

6. Invite the group to guess how long it would take to travel to Mars, on average, using current technology. (New Horizons would take 162 days or 6 months.) (Slides 4-7)

7. Finally, ask the students how long they estimate it would take to travel from Earth to the edge of our Solar System where Pluto lies. (The answer is around 10 years for New Horizons).

8. Remind students that the Solar System is simply the system around our nearest star, the Sun. The stars we see at night are much, much farther and may have solar systems of their own.



9. Can any of the students estimate how long it would take New Horizons to travel to the nearest star beyond our Solar System? (The answer is almost 80,000 years!) (slides 8-9)

The distances in space make interstellar travel an impossible prospect with current technology, leaving telescopes our best, and indeed only, tool to explore the cosmos. With this in mind, let's learn about a network of telescopes that the students can use.