



Briefing Sheet: **Satellite Simulation**

Teachers' Instructions

Educational Benefits

Produce a live moving model of satellites around the Earth to:

- Demonstrate Low Earth Orbit (LEO) and Geo-stationary Orbit (GEO) and their uses.
- Demonstrate the difference in location of LEO and GEO orbits.
- Demonstrate the use of Geo-stationary satellites in international communications.
- Demonstrate the reason for Geo-stationary orbit, as satellites appear to be stationary above a point on the Earth.

Equipment needed

- Chalk (or a method of drawing on the floor),
- A stopwatch,
- A bell or buzzer,
- A long tape measure (at least half the size of the simulation),

Optional

- A globe,
- 4 torches,
- A clipboard and pen,
- Morse Code Table.

Student Numbers Table

Number of Pupils	Students at LEO	Students at GEO	Students as the Earth	Approx' Earth diameter	Approx' full diameter
3 - 10	1 - 3	1 - 3	1 - 4	1.00 m	7 m
11 - 20	3 - 5	4 - 7	4 - 8	1.45 m	10 m
21 - 30	6 - 8	7 - 11	8 - 11	1.80 m	12 m
31+	8+	11+	12+	2.40 m	16m

Creating your Satellite Simulation

1. Decide how many students you would like to be involved in your Students' Satellite Simulation (SSS).
2. Use the chart below to decide on the size and number of SSSs that you are going to run.
3. For each SSS divide the students into the three groups, LEO, GEO and Earth according to the Student Numbers Table above.
 - a. **Optional Activity**
 The LEO and GEO teams can draw pictures of satellites and mount them on sticks. These can be held up during the SSS. The Earth students can divide the equatorial region of the Earth between them. They can draw a rough map of their selection of the Earth and wear it on their chests. When they stand in a circle this should represent the surface of the Earth during the SSS.
4. Ask the Students in the Earth team to form a Circle by linking arms. They should be facing outwards.
5. Measure the Diameter of the circle. This is the diameter of the Earth for the SSS you are creating.
6. Open, or download, the Satellites Orbits Excel Spreadsheet. This can be found on the SSS page on the e-Mission Teachers website (address below).
7. Enter the diameter of your Earth into the yellow box in the 'Scale (size only)' section and note the altitude of the satellite orbits.
8. The GEO and LEO students can measure and assume their scale altitudes above the Earth.
9. Let the Earth turn once and record the time they took in seconds. This is the scaled 'Day'.
10. Enter the length of day into the 2nd yellow box in the 'Scale (size and time only)' section and note the period of the satellite orbits. This is the time in which the GEO and LEO students have to complete an orbit.
11. If nessecary the GEO students can mark out a path with the chalk to indicate timed segments of their orbit (e.g how far they have to travel in each second).
12. Set your simulation running and if possible video the SSS in action.

For more information about the Students' Satellite Simulation please go to:

<http://www.spacecentre.co.uk/e-mission/teacher> then choose Satellite Simulation in the Extension Activities column.