Looking at satellites

Launch *Satellite explorer*, read the introductory page, then press **Next** to advance to the Hubble Space Telescope (HST). Notice that as it moves behind Earth, the colour of its orbit changes to grey as it is traced out around the 'back' of the planet.

Part 1: Satellites in Earth-orbit

1. The HST orbits Earth every 96 minutes at an average altitude of 570 km in an orbit inclined at 28.5° to the equatorial plane. How does this compare with the orbits of most other satellites shown on the image?

   .....

   .....

   .....

   .....

2. Zoom out and observe the orbit of Iridium-98. It orbits at an altitude of approximately 755 km every 98 minutes. How does its orbit differ from that of the HST and what advantage might this orbit provide?

   .....

   .....

   .....

   .....

3. Zoom out and observe the orbit of NOAA18 (average altitude 860 km, period 102 minutes). What other types of orbit can you see?

   .....

   .....

   .....

   .....

4. Lockheed-Martin Intersputnik LMI-1 is an example of a geostationary communications satellite. What characteristics do you notice about its orbit?

   .....

   .....

   .....

   .....

5. Zoom out to the Global Positioning Satellite (altitude 20 361 km, period 12 hours). The GPS system comprises 24 satellites, with four in each of six circular planes. What do you notice about the satellite's orbit, and why do you think the GPS system needs 24 satellites?

.....

.....

.....

.....

6. Zoom out to view the elliptical orbit of Double Star 2. Describe changes in the satellite's motion for one complete orbit. Why might this occur?

.....

.....

.....

.....

7. Zoom out to view the orbit of Sirius 3 and compare orbital data for Sirius 3 and LMI-1. Describe similarities and differences in the orbits of these two satellites.

.....

.....

.....

.....

8. The next two satellites shown are Cluster and INTEGRAL. Together with Double Star 2 they are in elliptical orbits. Zoom out and view the elliptical orbits of Cluster and INTEGRAL. What common purpose do these satellites share? Why do you think they all have elliptical orbits?

.....

.....

.....

.....

Part 2: Satellite tracks

Click **Next** and read the information on satellite orbits. Click **Next** again to advance to the 'Satellite tracks' screen.

Geosynchronous and geostationary satellites complete one orbit around Earth in the same time that it takes Earth to make one rotation.

9. Compare the view of Earth from a geostationary satellite with that from a geosynchronous satellite, using different animation speeds and altitudes. Describe differences between a geostationary and a geosynchronous orbit.

   Hint: For each satellite, align your cursor with a distinct point on the African coast and take your hand off the mouse. Observe the cursor's position during the next 1-2 minutes of real time.

   .....

   .....

   .....

   .....

10. Where should a geostationary satellite be positioned to provide communication services to all Australian states?

    .....

    .....

    .....

    .....

For more information on the location and live tracking of satellites, see the website:
Real time satellite tracking, http://www.n2yo.com/?s=27451