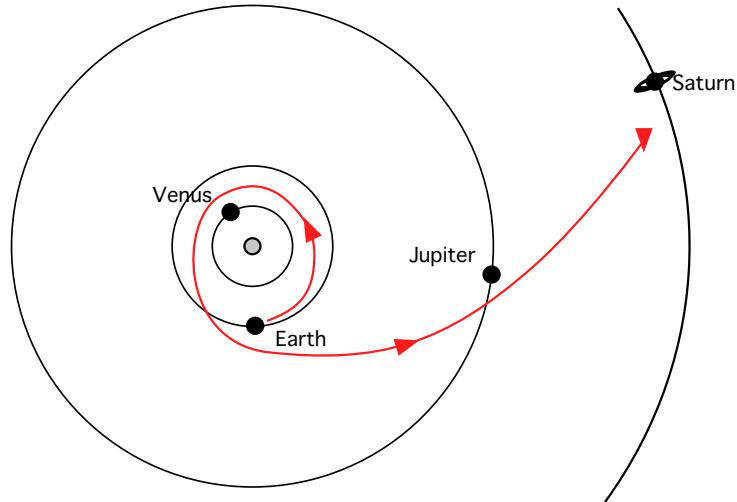


Satellites 2

Name & Set

- 1 (a) The Cassini spacecraft launched in 1997 will take seven years to reach Saturn. The journey will take the spacecraft close to several other planets.



Each time the spacecraft approaches a planet it changes direction *and* gains kinetic energy. Explain why.

[2]

- (b) Cassini carries a probe that will travel to Titan, Saturn's largest moon. The 320 kg probe will enter Titan's atmosphere at 6 km/s. After plunging 100 km, parachutes will open to reduce the speed of the probe before it lands on Titan's surface.
- (i) Use the equation below to calculate in joules, the kinetic energy of the probe as it enters Titan's atmosphere. Show clearly how you work out your answer.

$$\text{kinetic energy} = \frac{1}{2}mv^2$$

[2]

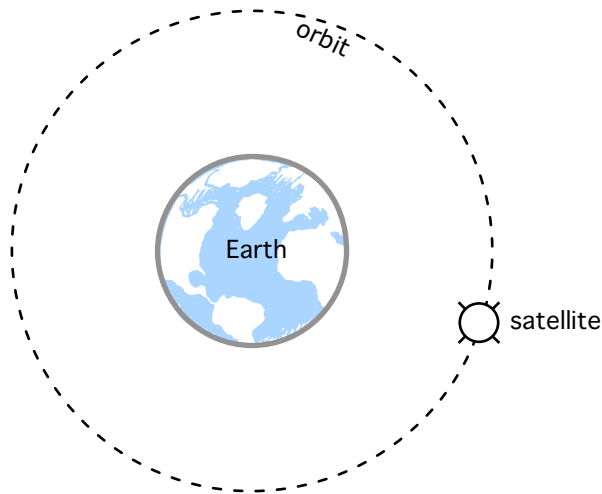
- (ii) The outside of the probe is fitted with a heat shield designed to withstand very high temperatures. Explain why.

[2]

- (iii) Why do parachutes reduce the speed of falling objects?

[2]

2 The diagram shows a satellite in orbit around the Earth.



(a) (i) Explain why the satellite stays in orbit.

[2]

(ii) The satellite is boosted to a higher orbit. What effect will this have on the time the satellite takes to complete one orbit?

[2]

(b) Communication satellites send information between places that are a long way apart on Earth.

(i) In what type of orbit are communications satellites usually placed?

[1]

(ii) Explain why they are placed in this type of orbit.

[2]

(c) Monitoring satellites are used to monitor conditions on Earth, including the weather.

(i) In what type of orbit are such satellites usually placed?

[1]

(ii) Explain why they are placed in this type of orbit.

[2]