

17 Salyut 1 was the first Earth-orbiting space station. It was built by the Soviet Union and launched into a low Earth orbit fifty years ago.

(a) Salyut 1 orbited at an average height above the surface of the Earth of 211 km.

mass of Salyut 1 = 18 400 kg

mass of Earth = 5.98×10^{24} kg

radius of Earth = 6.37×10^6 m

(i) A textbook claims that for astronauts in Salyut 1, there would be a sunrise 16 times every day.

Assess the validity of this claim.

1 day = 8.64×10^4 s

(4)



(ii) Salyut 1 made almost three thousand orbits before falling back to Earth.

Calculate the change in gravitational potential energy of Salyut 1 as it fell back to Earth.

(3)

.....

.....

.....

.....

.....

.....

Change in gravitational potential energy =

(b) Salyut 1 burned up over the Pacific Ocean as it re-entered the Earth's atmosphere.

Explain why Salyut 1 burned up.

(2)

.....

.....

.....

.....

(Total for Question 17 = 9 marks)