

- 16 In 2015, the company SpaceX stated its plan to launch about 4,000 “Starlink” satellites into a low Earth orbit. These satellites would provide a low-cost internet service to people around the world.

By the start of 2020 almost 200 Starlink satellites had been launched into an orbit 550 km above the Earth’s surface.

mass of Earth = 6.0×10^{24} kg

radius of Earth = 6.4×10^6 m

- (a) Calculate the orbital time of a Starlink satellite.

(3)

Orbital time of satellite =

- (b) Explain why satellites in low Earth orbits have a smaller orbital time than satellites in higher Earth orbits.

(3)



(c) The satellites were launched into orbit using rockets able to make multiple space flights.

Calculate the minimum kinetic energy required to raise the satellite to its lower orbit height.

mass of a Starlink satellite = 227 kg.

(3)

Minimum kinetic energy =

(Total for Question 16 = 9 marks)