1   The Earth may be assumed to be an isolated uniform sphere with its mass of 6.0×10^{24} kg concentrated at its centre.

A satellite of mass 1200 kg is in a circular orbit about the Earth in the Earth's gravitational field. The period of the orbit is 94 minutes.

(a) Define *gravitational field strength*.

....

.... [1]

(b) Calculate the radius of the orbit of the satellite.

radius = ... m [3]

(c) Rockets on the satellite are fired so that the satellite enters a different circular orbit that has a period of 150 minutes. The change in the mass of the satellite may be assumed to be negligible.

(i) Show that the radius of the new orbit is 9.4×10^6 m.

[2]

(ii) State, with a reason, whether the gravitational potential energy of the satellite increases or decreases.

....

.... [1]

(iii) Determine the magnitude of the change in the gravitational potential energy of the satellite.

change in potential energy = ... J [3]