3 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.

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.

(i) Show that the linear speed of the satellite in its new orbit is 6.6×10^3 m s^{-1}.

[3]

(ii) Determine the change in the potential energy of the satellite.

change in potential energy = ... J [2]

[Total: 9]