Section A

Answer **all** the questions in the spaces provided.

1 **(a)** Define *gravitational potential* at a point.

....

....

.... [2]

(b) A stone of mass m has gravitational potential energy E_P at a point X in a gravitational field. The magnitude of the gravitational potential at X is ϕ.

State the relation between m, E_P and ϕ.

.... [1]

(c) An isolated spherical planet of radius R may be assumed to have all its mass concentrated at its centre. The gravitational potential at the surface of the planet is $-6.30 \times 10^7 \, \text{J kg}^{-1}$.

A stone of mass 1.30 kg is travelling towards the planet such that its distance from the centre of the planet changes from $6R$ to $5R$.

Calculate the change in gravitational potential energy of the stone.

change in energy = ... J [4]