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

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

.....

.....

..... [2]

(ii) Use your answer in **(i)** to explain why the gravitational potential near an isolated mass is always negative.

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..... [3]

(b) A spherical planet has mass 6.00×10^{24} kg and radius 6.40×10^{6} m.
The planet may be assumed to be isolated in space with its mass concentrated at its centre.

A satellite of mass 340 kg is in a circular orbit about the planet at a height 9.00×10^{5} m above its surface.

For the satellite:

(i) show that its orbital speed is $7.4 \times 10^{3}\,\text{m s}^{-1}$

[2]

(ii) calculate its gravitational potential energy.

energy = ... J [3]

(c) Rockets on the satellite are fired for a short time. The satellite's orbit is now closer to the surface of the planet.

State and explain the change, if any, in the kinetic energy of the satellite.

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..... [2]

[Total: 12]