

- 1 (a) State one similarity and one difference between the electric field lines and the gravitational field lines around an isolated positively charged metal sphere.

similarity: .....

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difference: .....

..... [2]

- (b) (i) Define *gravitational potential* at a point.

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..... [2]

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

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..... [3]

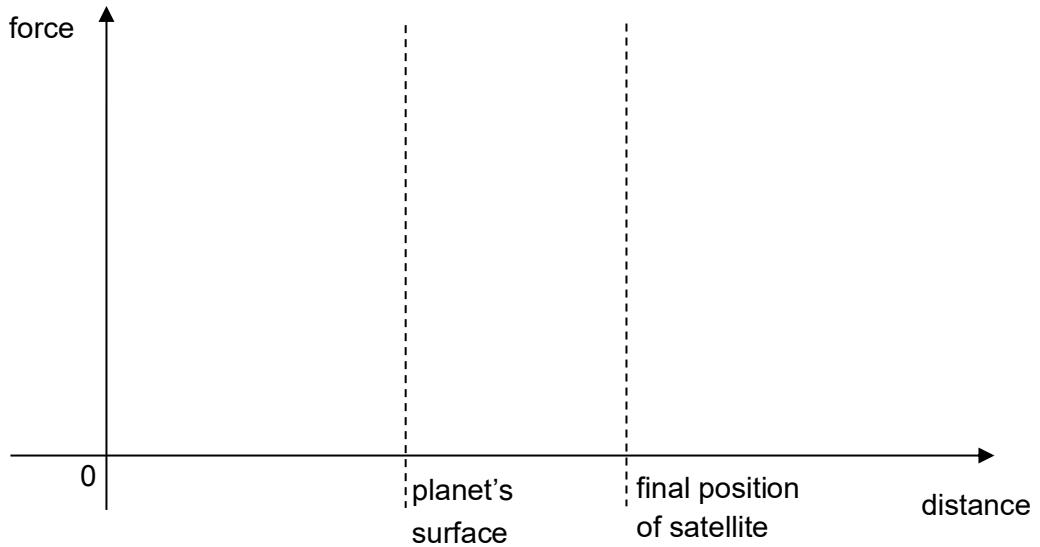
- (c) A spherical planet has mass  $6.00 \times 10^{24}$  kg and radius  $6.40 \times 10^6$  m. The planet may be assumed to be isolated in space with its mass concentrated at its centre.

A satellite of mass 340 kg is to be raised from the planet to a height of  $9.00 \times 10^5$  m above the surface of the planet.

- (i) Calculate the increase in potential energy of the satellite.

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

- (ii) On the axes of Fig. 1.1, sketch a graph to show the variation of the gravitational force on the satellite with distance between the planet and the satellite, as the satellite is raised from the planet to its final position.



**Fig. 1.1**

[2]

- (iii) State what the area under the graph in (c)(ii) represents.

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[1]

[Total: 12]

