

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

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- (b) An isolated solid sphere of radius r may be assumed to have its mass M concentrated at its centre. The magnitude of the gravitational potential at the surface of the sphere is ϕ .

On Fig. 1.1, show the variation of the gravitational potential with distance d from the centre of the sphere for values of d from $d = r$ to $d = 4r$.

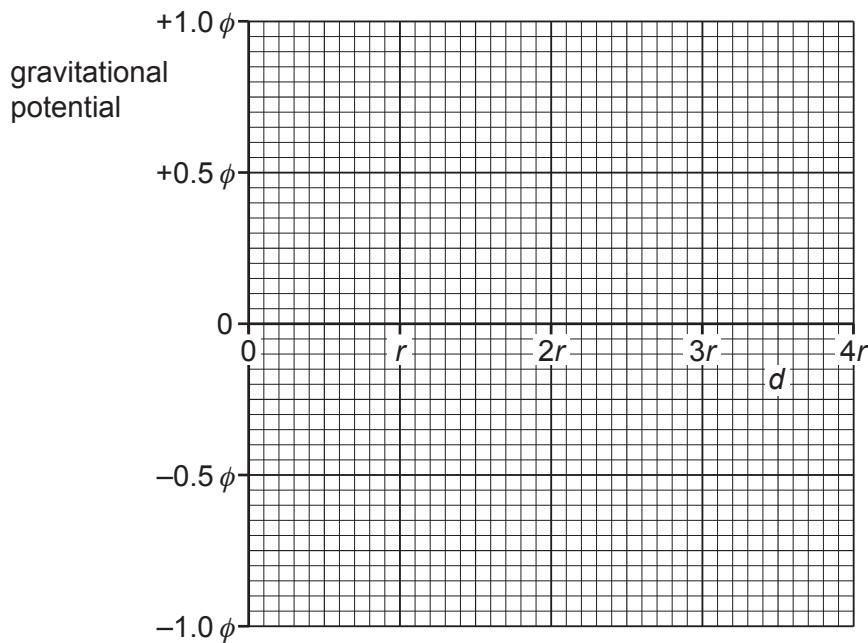


Fig. 1.1

[3]

- (c) The sphere in (b) is a planet with radius r of 6.4×10^6 m and mass M of 6.0×10^{24} kg. The planet has no atmosphere.

A rock of mass 3.4×10^3 kg moves directly towards the planet. Its distance from the centre of the planet changes from $4r$ to $3r$.

- (i) Calculate the change in gravitational potential energy of the rock.

change = J [3]

- (ii) Explain whether the rock's speed increases, decreases or stays the same.

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..... [2]