

## Section A

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

For  
Examiner's  
Use

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

.....  
 .....  
 ..... [2]

- (b) The Moon may be considered to be an isolated sphere of radius  $1.74 \times 10^3$  km with its mass of  $7.35 \times 10^{22}$  kg concentrated at its centre.

- (i) A rock of mass 4.50 kg is situated on the surface of the Moon. Show that the change in gravitational potential energy of the rock in moving it from the Moon's surface to infinity is  $1.27 \times 10^7$  J.

[1]

- (ii) The escape speed of the rock is the minimum speed that the rock must be given when it is on the Moon's surface so that it can escape to infinity.  
 Use the answer in (i) to determine the escape speed. Explain your working.

speed = .....  $\text{ms}^{-1}$  [2]

- (c) The Moon in (b) is assumed to be isolated in space. The Moon does, in fact, orbit the Earth.

State and explain whether the minimum speed for the rock to reach the Earth from the surface of the Moon is different from the escape speed calculated in (b).

.....  
 .....  
 ..... [2]