

velocity = ..... m s<sup>-1</sup> [2]

- 4 (a) The planet Mars has a mass of  $6.4 \times 10^{23}$  kg and a diameter of  $6.8 \times 10^3$  km. A rock, initially at rest a long distance from Mars, travels towards its surface.

Assuming that Mars is isolated in space, show that the speed of the rock as it reaches the surface of Mars is  $5.0 \times 10^3$  m s<sup>-1</sup>.

[2]

- (b) (i) Helium-4 may be assumed to be an ideal gas.

Calculate the temperature of helium-4 gas at which the r.m.s. speed of its atoms is equal to the speed of the rock in (a).

[2]

- (ii) Suggest, with a reason, whether helium-4 is found on the surface of Mars.

.....  
.....  
.....

..... [2]