

- 1 (a) Define velocity.

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..... [1]

- (b) A rock of mass 7.5 kg is projected vertically upwards from the surface of a planet. The rock leaves the surface of the planet with a speed of 4.0 ms^{-1} at time $t = 0$. The variation with time t of the velocity v of the rock is shown in Fig. 1.1.

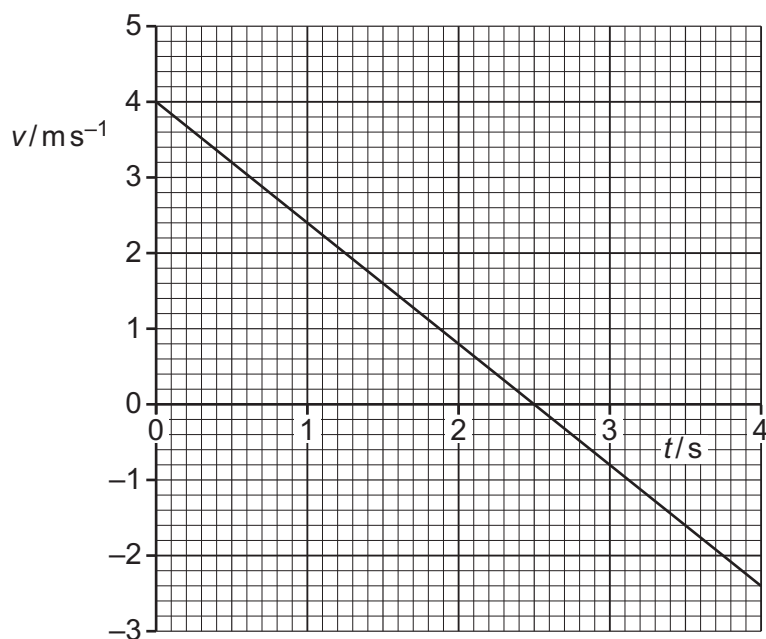


Fig. 1.1

Assume that the planet does not have an atmosphere and that the viscous force acting on the rock is always zero.

- (i) Determine the height of the rock above the surface of the planet at time $t = 4.0 \text{ s}$.

height = m [3]

(ii) Determine the change in the momentum of the rock from time $t = 0$ to time $t = 4.0$ s.

change in momentum = N s [2]

(iii) Determine the weight W of the rock on this planet.

$W =$ N [2]

(c) In practice, the planet in (b) does have an atmosphere that causes a viscous force to act on the moving rock.

State and explain the variation, if any, in the resultant force acting on the rock as it moves vertically upwards.

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..... [2]

[Total: 10]