

- 1 (a) Define velocity.

..... [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  $4.0 \text{ ms}^{-1}$  at time  $t = 0$ . The variation with time  $t$  of the velocity  $v$  of the rock is shown in Fig. 1.1.

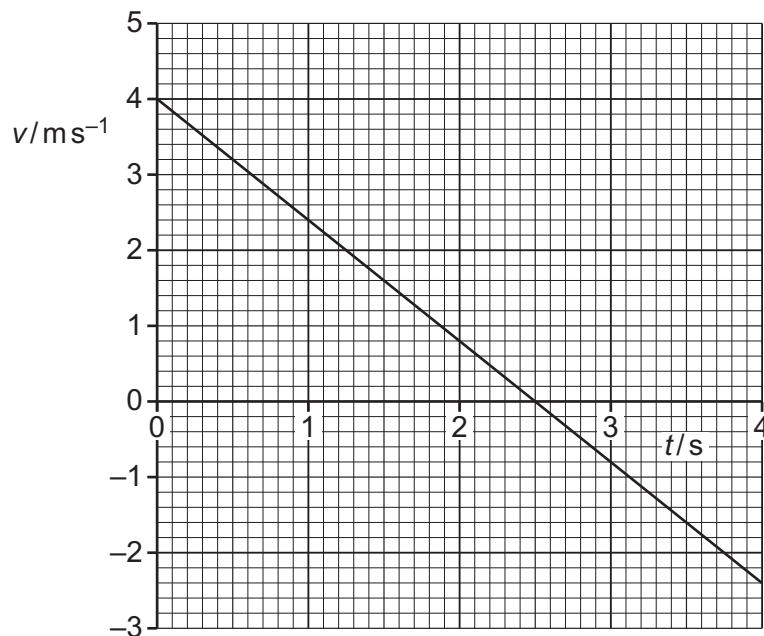


Fig. 1.1

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  $t = 4.0\text{ s}$ .

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]