1 A ring is moving up and down a vertical pole. The displacement, s m, of the ring above a mark on the pole is modelled by the displacement-time graph shown in Fig. 1. The three sections of the graph are straight lines.

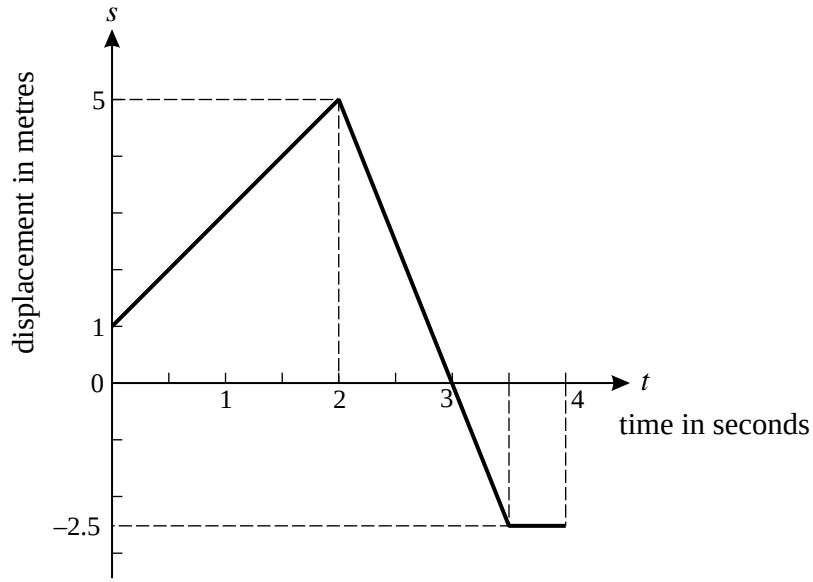

Fig. 1

(i) Calculate the velocity of the ring in the interval $0 < t < 2$ and in the interval $2 < t < 3.5$. **[2]**

(ii) Sketch a velocity-time graph for the motion of the ring during the 4 seconds. **[2]**

(iii) State the direction of motion of the ring when

(A) $t = 1$,

(B) $t = 2.75$,

(C) $t = 3.25$. **[1]**

2 Fig. 2 shows an acceleration-time graph modelling the motion of a particle.

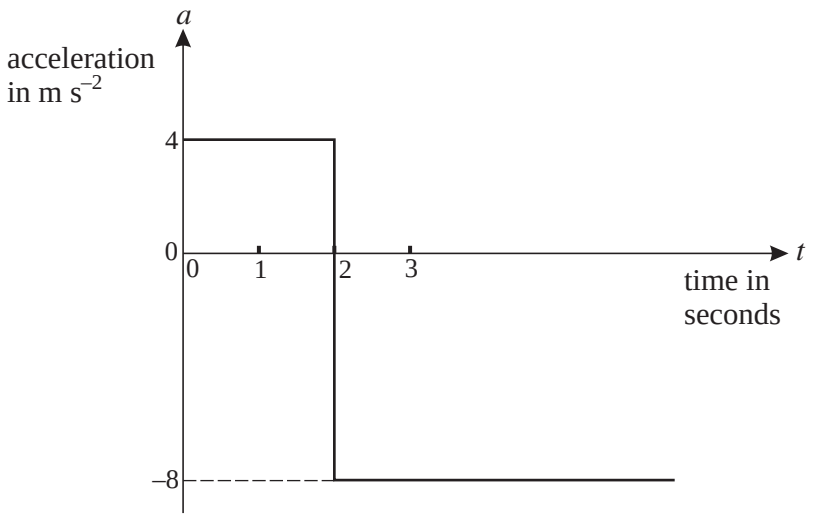

Fig. 2

At $t = 0$ the particle has a velocity of $6\,\text{m}\,\text{s}^{-1}$ in the positive direction.

(i) Find the velocity of the particle when $t = 2$. **[2]**

(ii) At what time is the particle travelling in the negative direction with a speed of $6\,\text{m}\,\text{s}^{-1}$? **[2]**

3 A cyclist starts from rest and takes 10 seconds to accelerate at a constant rate up to a speed of $15\,\text{m}\,\text{s}^{-1}$. After travelling at this speed for 20 seconds, the cyclist then decelerates to rest at a constant rate over the next 5 seconds.

(i) Sketch a velocity-time graph for the motion. [3]

(ii) Calculate the distance travelled by the cyclist. [3]

4 Fig. 1 is the velocity-time graph for the motion of a body. The velocity of the body is v m s ^{1} at time t seconds.

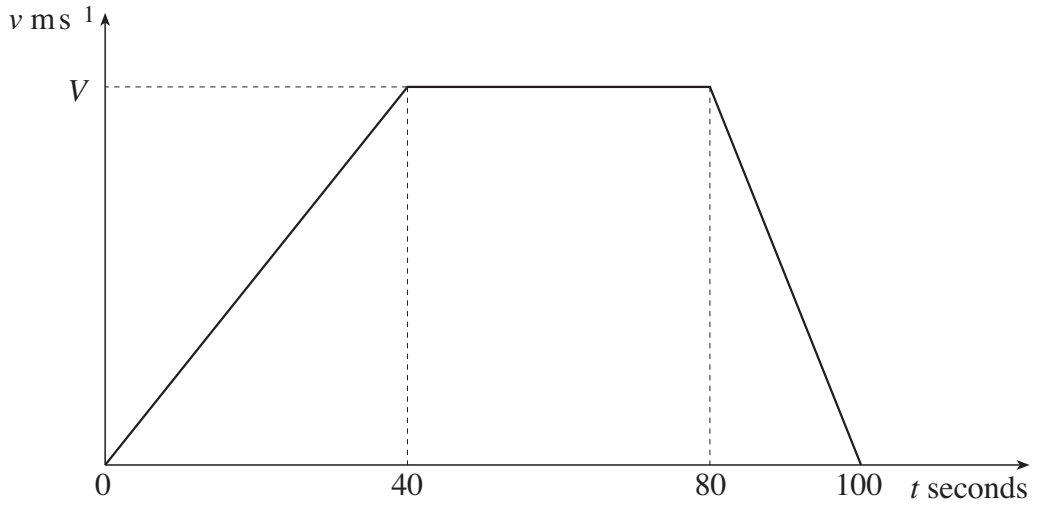

Fig. 1

The displacement of the body from $t = 0$ to $t = 100$ is 1400 m. Find the value of V. [4]