

- 1** A train accelerates from rest at station A to a velocity of 32 m s^{-1} . It maintains this speed for 72 seconds, until it decelerates uniformly to station B. The total journey time is 112 seconds and the magnitudes of the acceleration and deceleration are equal.

Find:

- (a) the time it takes the train to accelerate from rest to 32 m s^{-1} .

(2)

- (b) sketch a velocity-time graph for the motion of the train between station A and station B.

(2)

- (c) calculate the distance between the two stations.

(3)

(Total for question 1 is 7 marks)

- 2** A train moves along a straight horizontal track between two stations, A and B. The train starts from rest and moves with acceleration of 0.6 m s^{-2} for 40 seconds. The train then moves at a constant speed before decelerating at a rate of 0.4 m s^{-2} until it reaches B.

The total distance between the two stations is 4 km.

- (a) sketch a velocity-time graph for the motion of the train between A and B.

(3)

- (b) find the total time taken by the train to travel from A to B.

(3)

(Total for question 2 is 6 marks)

- 3** A particle, moving in a straight line with speed $5U \text{ m s}^{-1}$, decelerates uniformly for 6 seconds, which reduces its speed to $2U \text{ m s}^{-1}$. It maintains this speed for a further 16 seconds before decelerating uniformly to rest in a further 2 seconds.

(a) sketch a velocity-time graph for this information.

(2)

(b) find an expression for each of the decelerations in terms of U .

(4)

(c) Given the total distance is 220 m, find the value of U .

(6)

(Total for question 3 is 12 marks)

- 4** A car starts from rest and accelerates at a constant rate to the speed of $V \text{ m s}^{-1}$ in 6 seconds. The car maintains this speed for 50 seconds before decelerating to rest. The magnitude of the deceleration is 1.5 times the magnitude of the acceleration.

(a) show the total time taken for the journey is 60 seconds.

(3)

(b) sketch a velocity-time graph for this information.

(3)

(c) Given the total distance is 1320 m, find the value of V .

(3)

(Total for question 4 is 9 marks)
