3. A train travels between two points, A and B, on a straight horizontal track.

The train usually travels at a constant speed of $50\,\text{m s}^{-1}$ for 15 minutes between the two points.

On one occasion, the train was delayed, because of signals. Figure 2 shows a sketch of the speed-time graph for the motion of the train on this occasion.

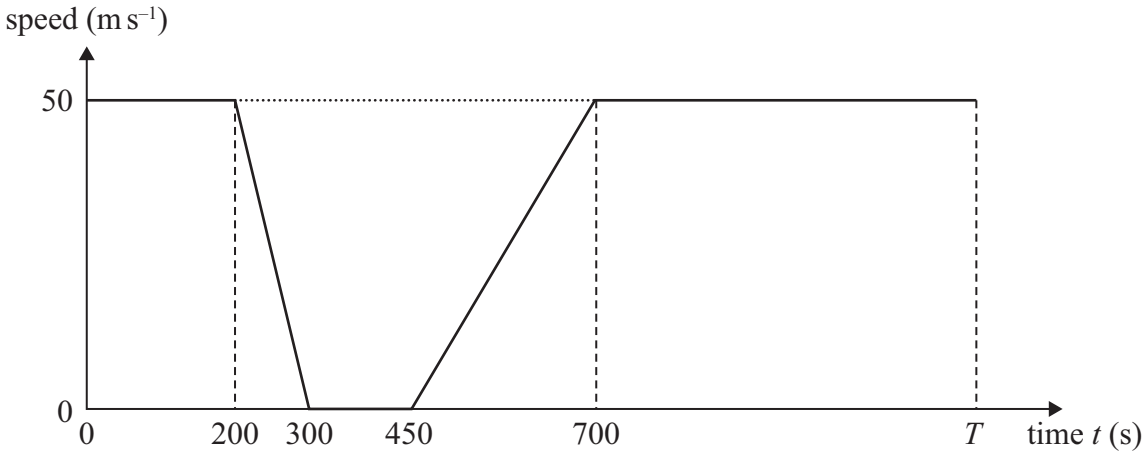


Figure 2

On this occasion, the train passes A at time $t = 0$ and passes B at time $t = T$ seconds.

(a) Find the deceleration of the train while it was slowing down.

(2)

(b) Sketch an acceleration-time graph for the motion of the train, from $t = 0$ to $t = T$ seconds, on this occasion.

(2)

(c) Find the value of T.

(4)

(d) Find the total length of time, between $t = 0$ and $t = T$ seconds, for which the speed of the train was less than $30\,\text{m s}^{-1}$ on this occasion.

(4)

(Total for Question 3 is 12 marks)