Daily Question – Mechanics - Day 1

Topic: Velocity – Time graphs

Day 2 Question 1

A car moves along a straight horizontal road from a point A to a point B, where $AB = 885$ m. The car accelerates from rest at A to a speed of 15 m s^{-1} at a constant rate a m s^{-2}.

The time for which the car accelerates is $\frac{1}{3}T$ seconds. The car maintains the speed of 15 m s^{-1} for T seconds. The car then decelerates at a constant rate of 2.5 m s^{-2} stopping at B.

(a) Find the time for which the car decelerates.

(2)

(b) Sketch a speed-time graph for the motion of the car.

(2)

(c) Find the value of T.

(4)

(d) Find the value of a.

(2)

(e) Sketch an acceleration-time graph for the motion of the car.

(3)

Day 2 Question 2

` Two cars P and Q are moving in the same direction along the same straight horizontal road. Car P is moving with constant speed 25 m s^{-1}. At time $t = 0$, P overtakes Q which is moving with constant speed 20 m s^{-1}. From $t = T$ seconds, P decelerates uniformly, coming to rest at a point X which is 800 m from the point where P overtook Q. From $t = 25$ s, Q decelerates uniformly, coming to rest at the same point X at the same instant as P.

(a) Sketch, on the same axes, the speed-time graphs of the two cars for the period from $t = 0$ to the time when they both come to rest at the point X.

(4)

(b) Find the value of T.

(8)