5.

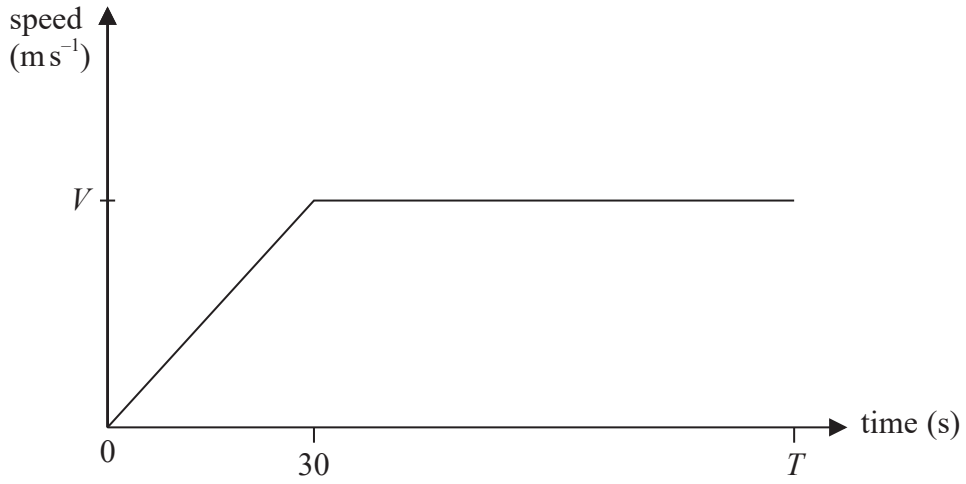

Figure 2

The speed-time graph in Figure 2 illustrates the motion of a car travelling along a straight horizontal road.
At time $t = 0$, the car starts from rest and accelerates uniformly for 30 s until it reaches a speed of V m s^{-1}
The car then travels at a constant speed of V m s^{-1} until time $t = T$ seconds.

(a) Show that the distance travelled by the car between $t = 0$ and $t = T$ seconds is $V(T - 15)$ metres.

(2)

A motorbike also travels along the same road.

- The motorbike starts from rest at time $\boldsymbol{t = 10}$ **s** and accelerates uniformly for 40 s
- The acceleration of the motorbike is the **same** as the acceleration of the car
- The motorbike then travels at a constant speed for a further 10 s before decelerating uniformly until it reaches a speed of V m s^{-1} at time T seconds

(b) On Figure 2, sketch a speed-time graph for the motion of the motorbike.

[*If you need to redraw your sketch, there is a copy of Figure 2 on page 15.*]

(2)

(c) Show that the constant speed of the motorbike is $\frac{4V}{3}$ m s^{-1}

(2)

At time $t = T$ seconds, the distance travelled by each vehicle is the same.

(d) Find the value of T

(5)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 5 continued

Question 5 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 5 continued

Only use this copy of Figure 2 if you need to redraw your sketch.

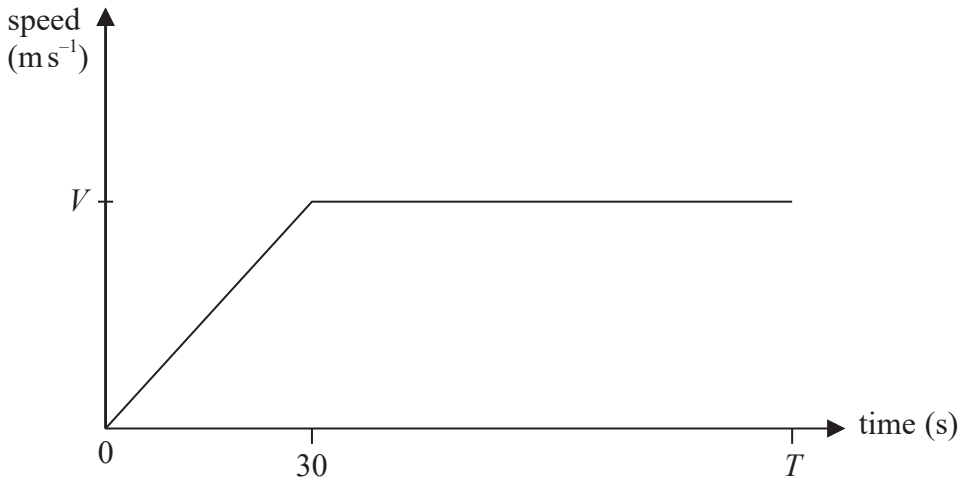

Figure 2

(Total for Question 5 is 11 marks)