

# Chapter 2: Constant Acceleration

*Mr Faruk*

Teacher of Mathematics  
BSc/MSc/PGCE Mathematics

✉ [ciegcsolutions@gmail.com](mailto:ciegcsolutions@gmail.com)





Organised by Mr Omar Faruk



6.

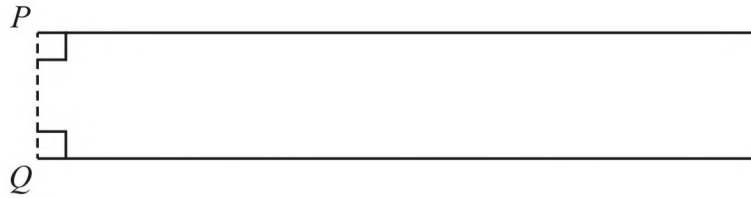


Figure 2

Two cars,  $A$  and  $B$ , move on parallel straight horizontal tracks. Initially  $A$  and  $B$  are both at rest with  $A$  at the point  $P$  and  $B$  at the point  $Q$ , as shown in Figure 2. At time  $t = 0$  seconds,  $A$  starts to move with constant acceleration  $a \text{ m s}^{-2}$  for 3.5 s, reaching a speed of  $14 \text{ m s}^{-1}$ . Car  $A$  then moves with constant speed  $14 \text{ m s}^{-1}$ .

- (a) Find the value of  $a$ . (2)

Car  $B$  also starts to move at time  $t = 0$  seconds, in the same direction as car  $A$ . Car  $B$  moves with a constant acceleration of  $3 \text{ m s}^{-2}$ . At time  $t = T$  seconds,  $B$  overtakes  $A$ . At this instant  $A$  is moving with constant speed.

- (b) On a diagram, sketch, on the same axes, a speed-time graph for the motion of  $A$  for the interval  $0 \leq t \leq T$  and a speed-time graph for the motion of  $B$  for the interval  $0 \leq t \leq T$ . (3)

- (c) Find the value of  $T$ . (8)

- (d) Find the distance of car  $B$  from the point  $Q$  when  $B$  overtakes  $A$ . (1)

- (e) On a new diagram, sketch, on the same axes, an acceleration-time graph for the motion of  $A$  for the interval  $0 \leq t \leq T$  and an acceleration-time graph for the motion of  $B$  for the interval  $0 \leq t \leq T$ . (3)

---

---

---

---

---

---

---

---

---

---

Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk

1. A train travels along a straight horizontal track between two stations  $A$  and  $B$ .

The train starts from rest at station  $A$  and accelerates uniformly for  $T$  seconds until it reaches a speed of  $20\text{ m s}^{-1}$

The train then travels at a constant speed of  $20\text{ m s}^{-1}$  for 3 minutes before decelerating uniformly until it comes to rest at station  $B$ .

The magnitude of the acceleration of the train is twice the magnitude of the deceleration.

(a) On the axes below, sketch a speed–time graph to illustrate the motion of the train as it moves from station  $A$  to station  $B$ .



**If you need to redraw your graph, use the axes on page 3**

(3)

Stations  $A$  and  $B$  are 4.8 km apart.

(b) Find the value of  $T$

(5)

(c) Find the acceleration of the train during the first  $T$  seconds of its motion.

(2)

---

---

---

---

---

---

---

---





Organised by Mr Omar Faruk

5.

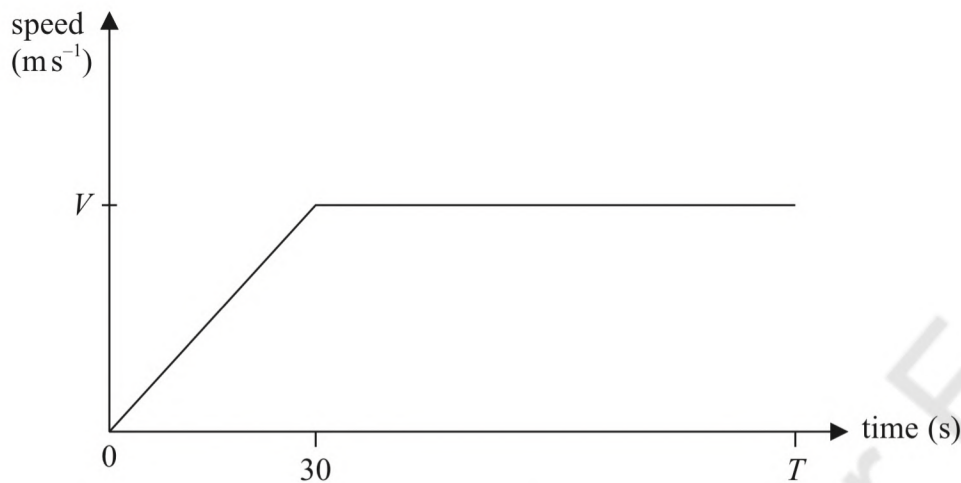


Figure 2

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  $V \text{ m s}^{-1}$

The car then travels at a constant speed of  $V \text{ m s}^{-1}$  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  $t = 10 \text{ s}$  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  $V \text{ m s}^{-1}$  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  $\frac{4V}{3} \text{ m s}^{-1}$  (2)

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

- (d) Find the value of  $T$  (5)

Organised by Mr Omar Faruk





Organised by Mr Omar Faruk



Organised by Mr Omar Faruk



Organised by Mr Omar Faruk













