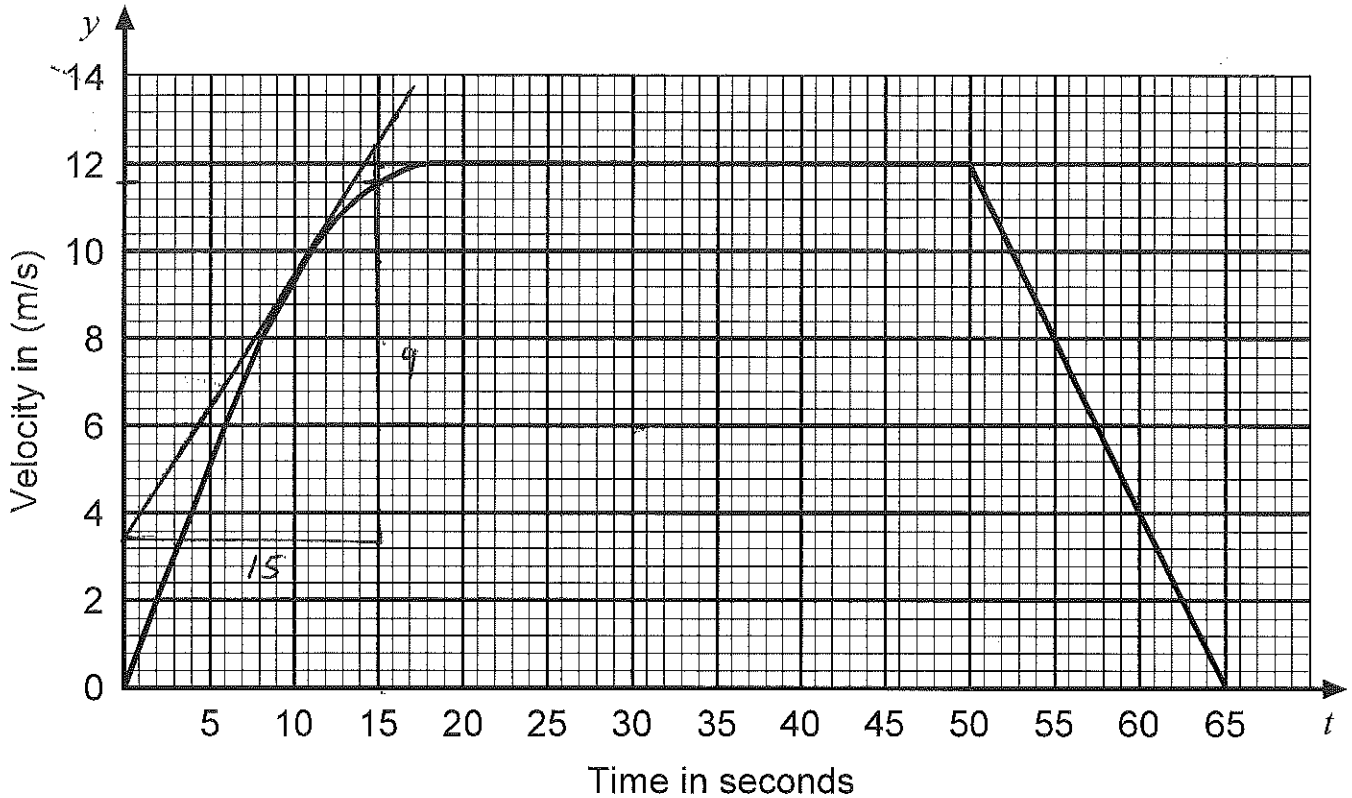


1. A car travels between two sets of traffic lights.  
The diagram represents the velocity/time graph of the car.



The car leaves the first set of traffic lights.

- (a) Use the graph to find the velocity of the car after 15 seconds.

..... 11.6 m/s (1)

- (b) Calculate an estimate for the acceleration of the car, in  $m/s^2$ , after 10 seconds.

$$\frac{9}{15} = \frac{3}{5} = 0.6 m/s^2$$

..... (2)

2. A toy car is placed on the floor of a sports hall.

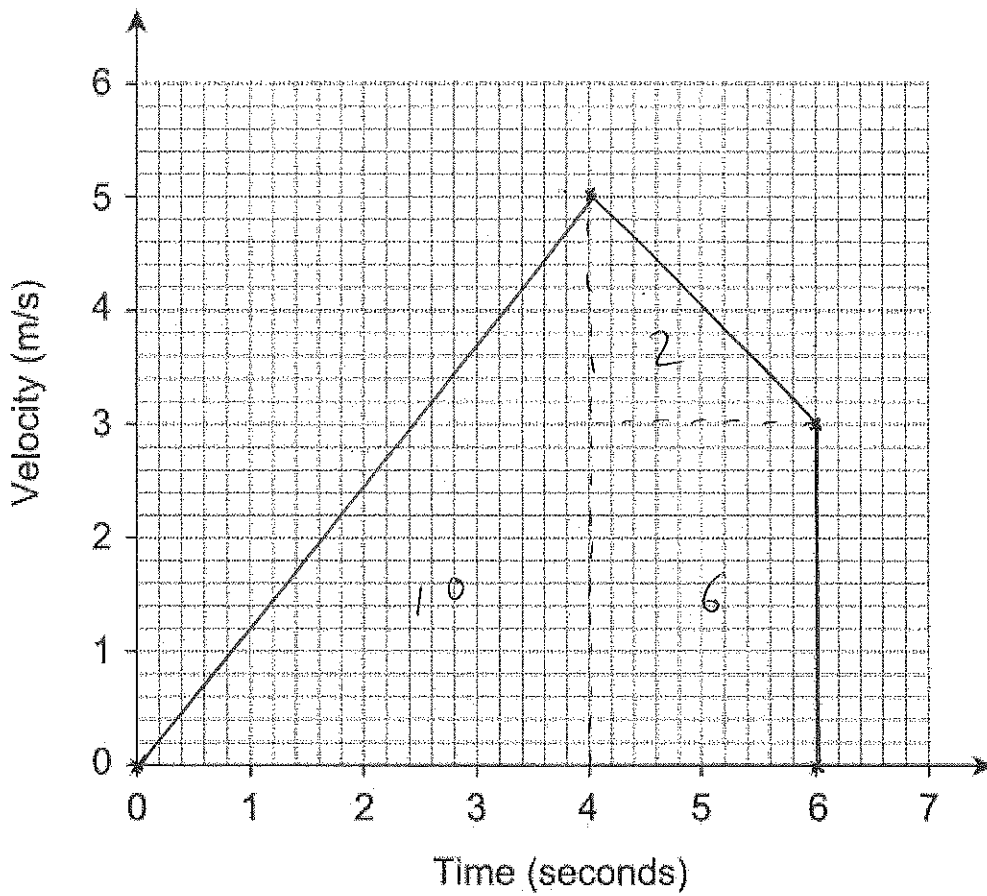
It moves in a straight line starting from rest.

It travels with constant acceleration for 4 seconds reaching a velocity of 5m/s.

It then slows down with constant deceleration of 1m/s<sup>2</sup> for 2 seconds.

It then hits a wall and stops.

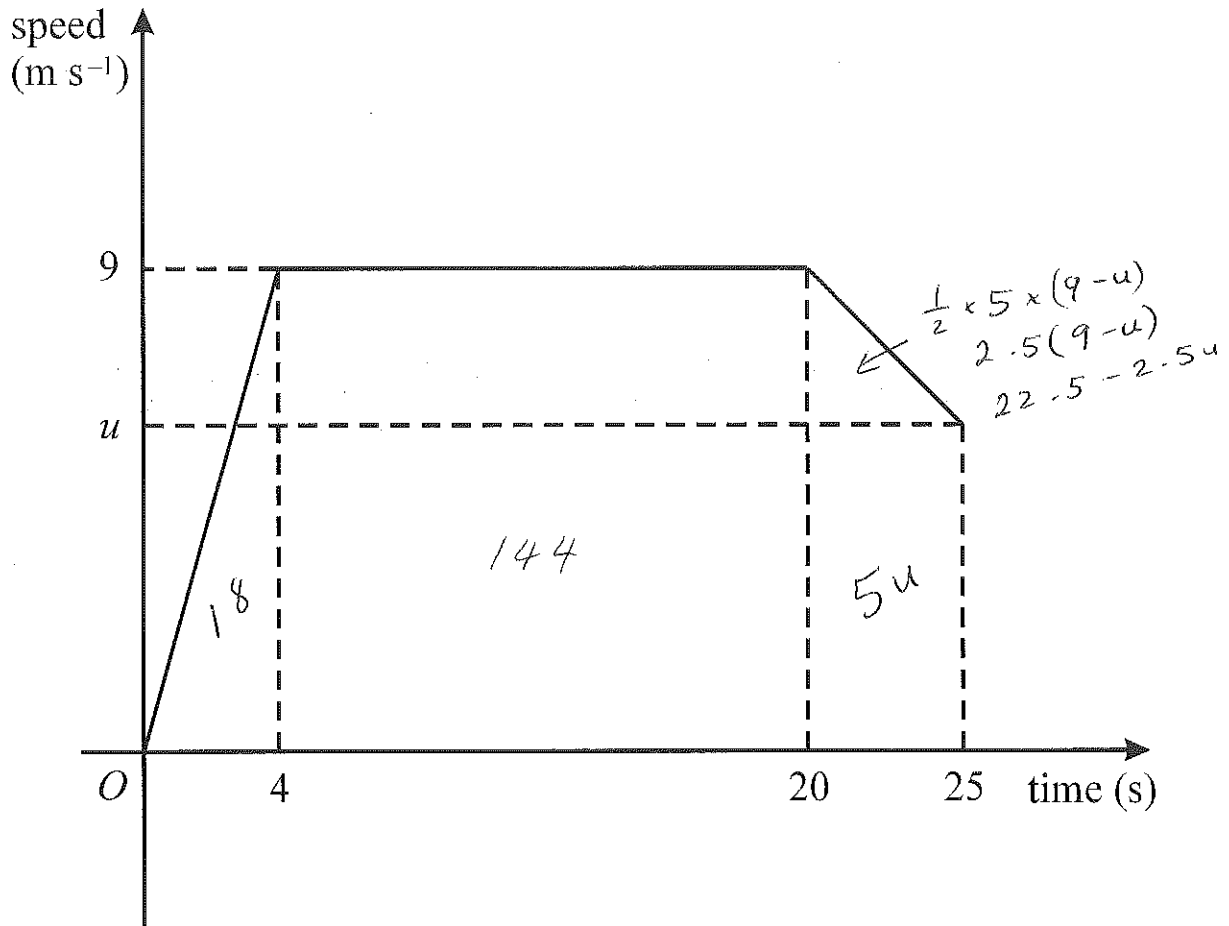
a) Draw a velocity-time graph for the toy car. (3)



b) Work out the total distance travelled by the toy car.

..... 18 m (3)

3. A sprinter runs a race of 200 m.  
 Her total time for running the race is 25 s.  
 Below is a sketch of the speed-time graph for the motion of the sprinter.



Calculate:

- a) The acceleration in the first 4 seconds of the race

$$\frac{9}{4} \dots\dots\dots 2.25 \text{ m/s}^2 \quad (2)$$

- b) The distance covered by the sprinter in the first 20 seconds of the race

c) The value of  $u$  ..... 162 m (2)

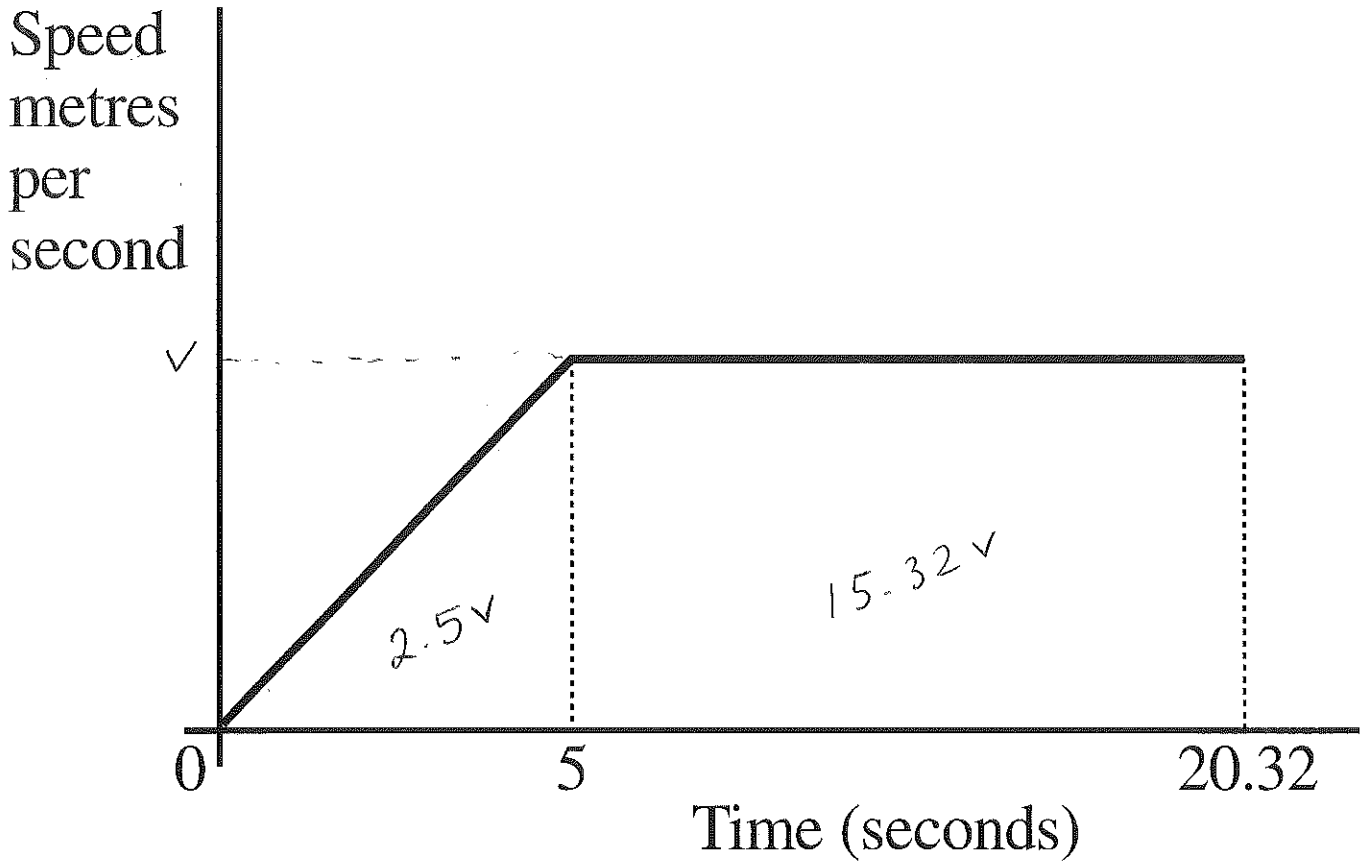
$$22.5 - 2.5u + 5u = 38$$

$$2.5u + 22.5 = 38$$

$$2.5u = 15.5$$

$$u = \frac{15.5}{2.5} \dots\dots\dots 6.2 \text{ m/s} \quad (3)$$

5. A sprinter runs a race of 200 m.  
 His total time for running the race is 20.32s.  
 Below is a sketch of the speed-time graph for the motion of the sprinter.



Calculate:

- a) The maximum speed of the sprinter during the race

$$17.82v = 200$$

$$v = \frac{200}{17.82}$$

$$v = 11.22 \text{ m/s (2dp)}$$

..... (4)

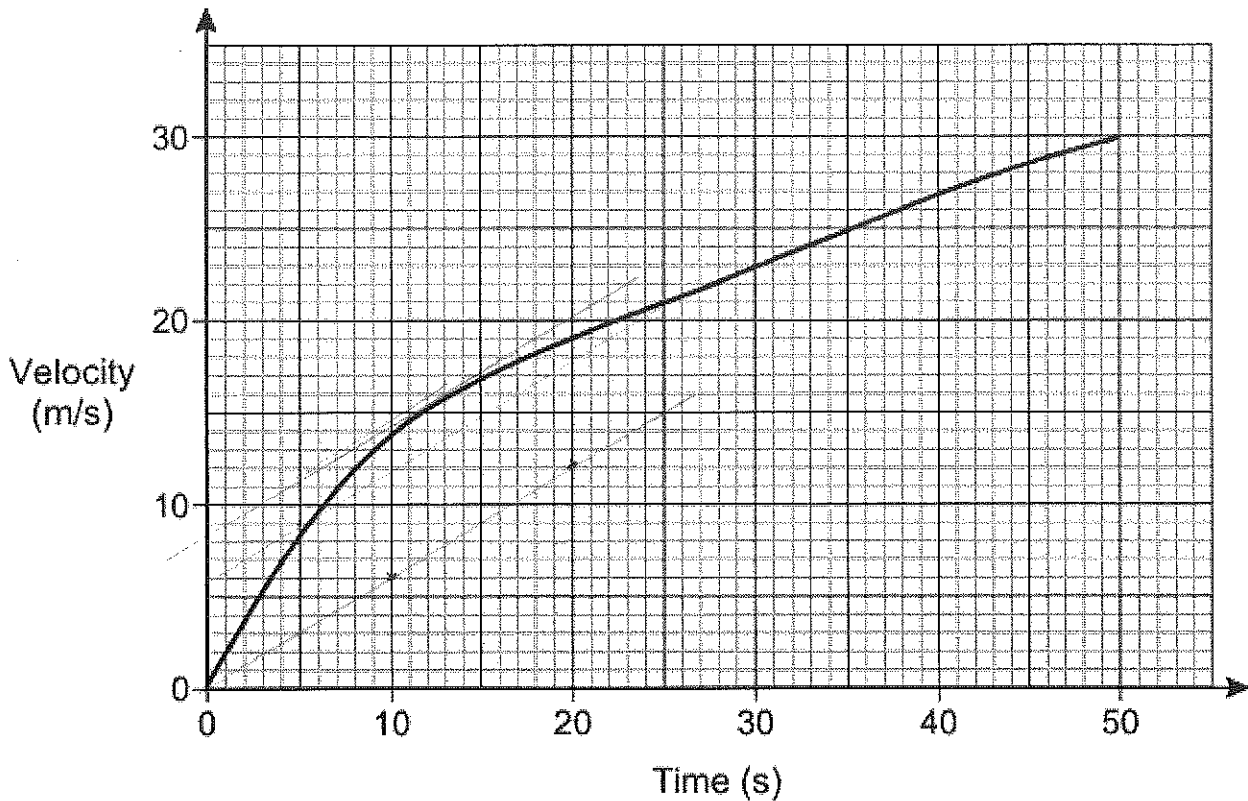
- b) The distance covered by the sprinter in the first 5 seconds of the race

$$2.5 \times 11.22$$

$$28.06 \text{ m (2)}$$

(2dp)

6. Here is the velocity-time graph of a car for 50 seconds.



Work out the average acceleration during the 50 seconds.  
Give the units of your answer.

$$\frac{30}{50} = 0.6 \text{ m/s}^2$$

..... (2)

Estimate the time during the 50 seconds when  
the instantaneous acceleration = the average acceleration  
You must show your working on the graph.