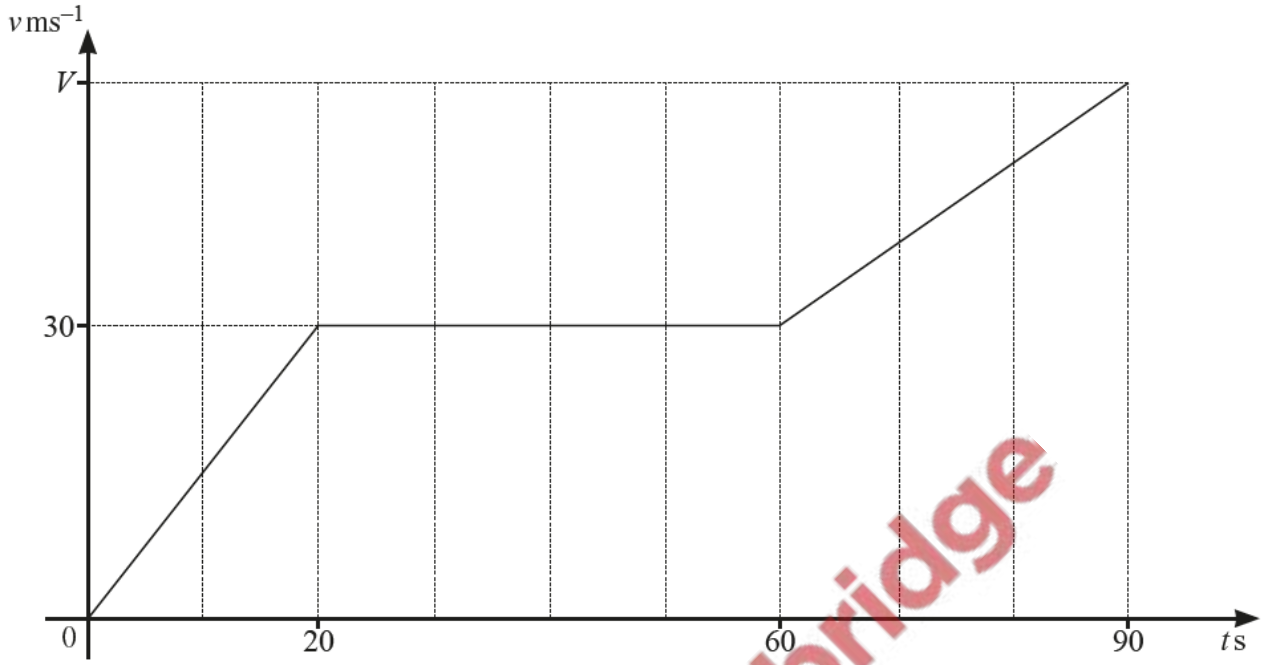
1. Nov/2020/Paper_12/No.12

(a)



The diagram shows the velocity–time graph of a particle P that travels 2775 m in 90 s, reaching a final velocity of V ms^{-1}.

(i) Find the value of V. [3]

(ii) Write down the acceleration of P when $t = 40$. [1]

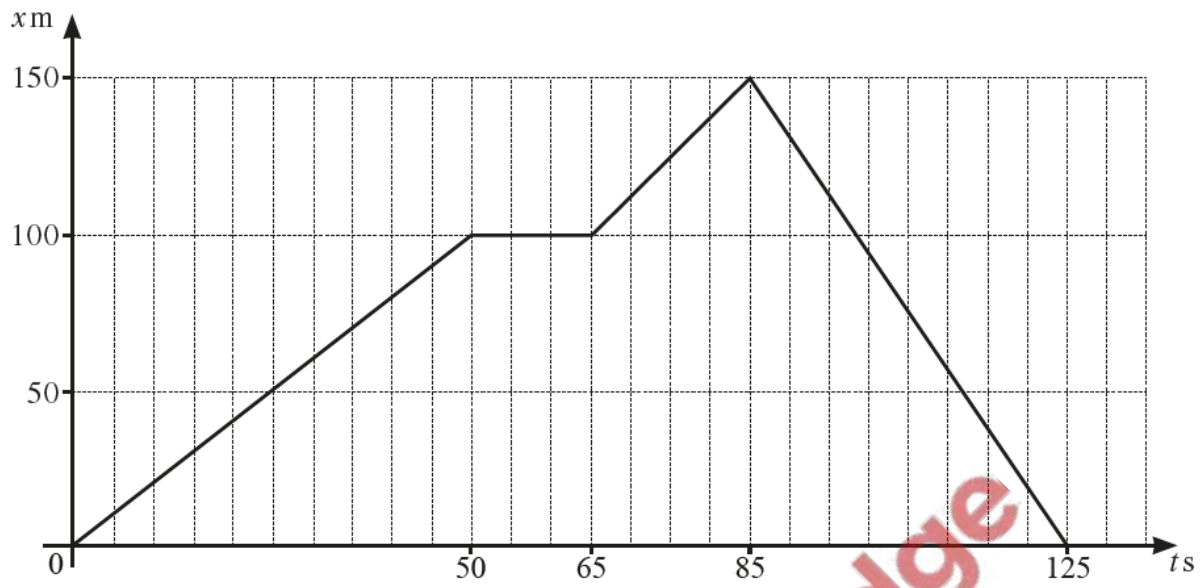
(b) The acceleration, a ms^{-2}, of a particle Q travelling in a straight line, is given by $a = 6\cos 2t$ at time t s. When $t = 0$ the particle is at point O and is travelling with a velocity of 10 ms^{-1}.

(i) Find the velocity of Q at time t. [3]

(ii) Find the displacement of Q from O at time t. [3]

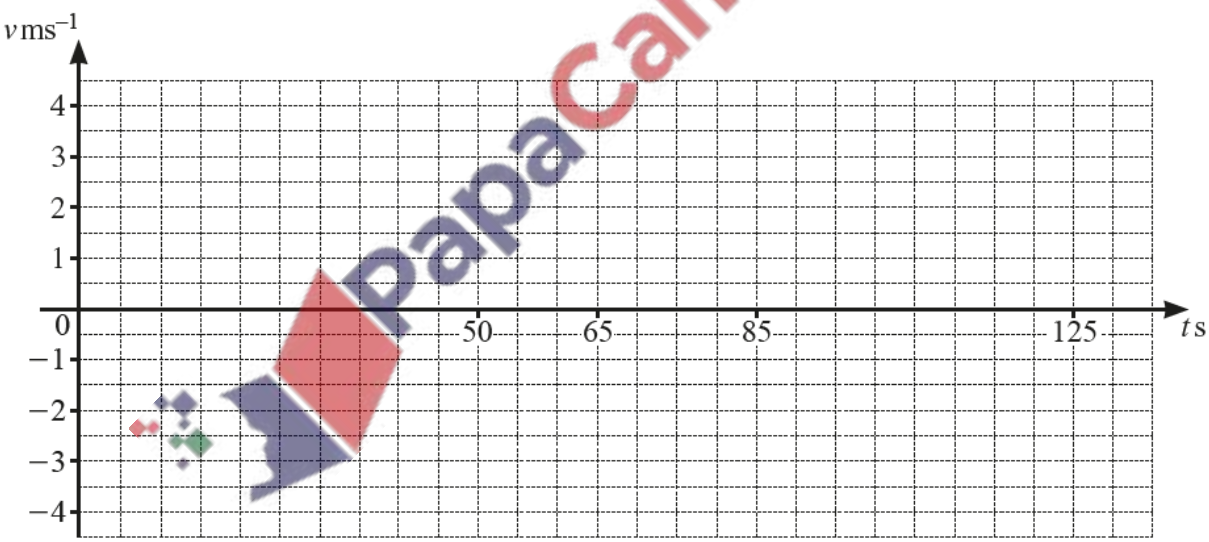
2. Nov/2020/Paper_13/No.4

(a)



The diagram shows the x–t graph for a runner, where displacement, x, is measured in metres and time, t, is measured in seconds.

(i) On the axes below, draw the v–t graph for the runner. [3]

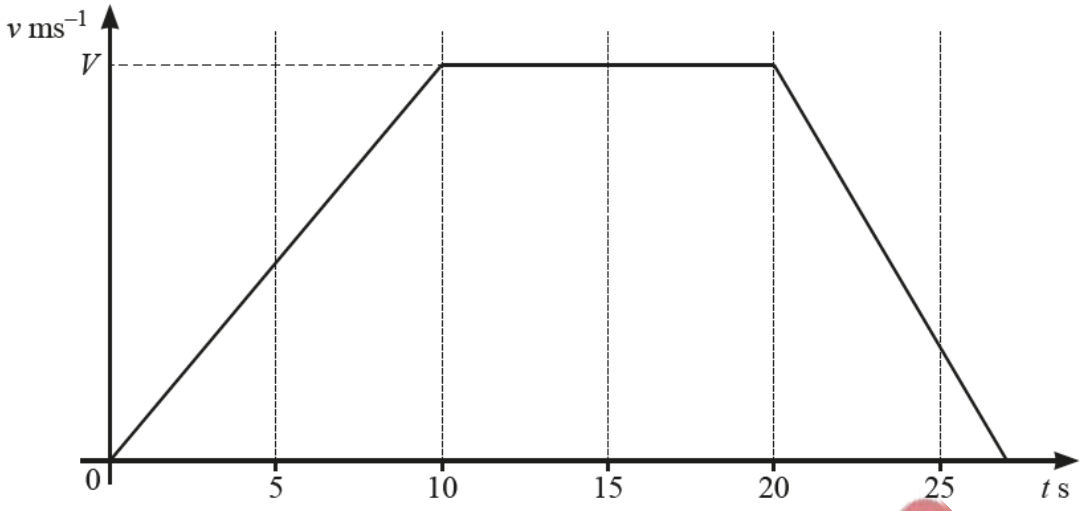


(ii) Find the total distance covered by the runner in 125 s. [1]

(b) The displacement, x m, of a particle from a fixed point at time t s is given by $x = 6\cos\left(3t + \frac{\pi}{3}\right)$. Find the acceleration of the particle when $t = \frac{2\pi}{3}$. [3]

3. June/2020/Paper_12/No.9b

(b)



The diagram shows the velocity–time graph for a particle Q travelling in a straight line with velocity v ms^{-1} at time t s. The particle accelerates at 3.5 ms^{-2} for the first 10 s of its motion and then travels at constant velocity, V ms^{-1}, for 10 s. The particle then decelerates at a constant rate and comes to rest. The distance travelled during the interval $20 \leqslant t \leqslant 25$ is 112.5 m.

(i) Find the value of V. [1]

(ii) Find the velocity of Q when $t = 25$. [3]

(iii) Find the value of t when Q comes to rest. [3]

4. June/2020/Paper_21/No.9

A particle travels in a straight line. As it passes through a fixed point O, the particle is travelling at a velocity of $3\,\text{ms}^{-1}$. The particle continues at this velocity for 60 seconds then decelerates at a constant rate for 15 seconds to a velocity of $1.6\,\text{ms}^{-1}$. The particle then decelerates again at a constant rate for 5 seconds to reach point A, where it stops.

(a) Sketch the velocity-time graph for this journey on the axes below. [3]

(b) Find the distance between O and A. [3]

(c) Find the deceleration in the last 5 seconds. [1]