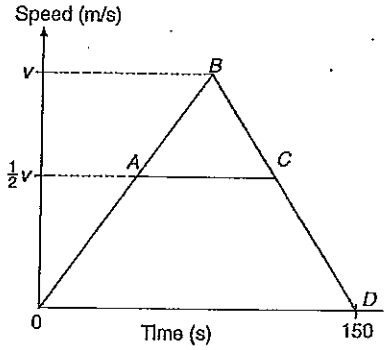
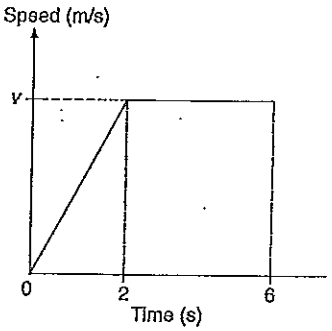
32. The diagram shows the speed-time graph of two buses which start from rest a travelled 150 seconds before stopping. Bus X travelled a total distance 1 350 metres and reached a maximum speed of v m/s. Its speed-time graph is shc by $OABCD$. Bus Y reached a maximum speed of $\frac{1}{2}v$ m/s. Its speed-time graph shown by $OACD$.
Calculate
(a) the value of v,
(b) the length of time that Bus Y was travelling at constant speed,
(c) the total distance travelled by Bus Y during the 150 seconds.

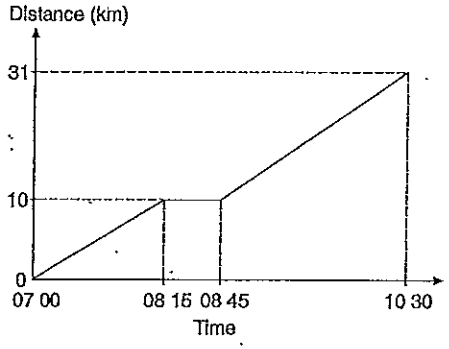


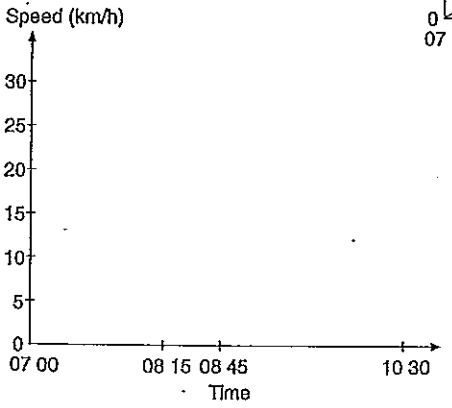
33. The diagram shows the speed-time graph of an object over a period of 6 second
(a) If the maximum speed of the object is v m/s, find the total distance travelled in terms of v.
(b) Given that the average speed during the 6 seconds is $(v - 4)$ m/s, find the value of v.
(c) After 6 seconds, the object slows down and comes to a rest after travelling a further 4 seconds. Find the deceleration during the last 4 seconds.



34. A motorist left Town A at 08 00 to travel to Town B which was 200 km away.
(a) If he maintained an average speed of 75 km/h, when will he reach Town B?
(b) If instead, he travelled at an average speed of 68 km/h for the first two hours, find the speed he needs to maintain for the remainder of the journey in order to reach Town B at the same time as in part (a).

35. The diagram shows the distance-time graph of a cyclist on a 31-km journey. He started at 07 00 and arrived at his destination at 10 30.
(a) Calculate his speed
(i) from 07 00 to 08 15,
(ii) from 08 15 to 08 45,
(iii) from 08 45 to 10 30.
(b) Calculate his average speed for the whole journey.
(c) On the axes provided, complete the speed-time graph for each of the three parts of his journey.





36. Diagram I shows the distance-time graph of a cyclist.
    (a) Find the average speed of the cylist during the first 16 seconds.
    (b) Find the
        (i) speed,
        (ii) acceleration of the cyclist during the last 10 seconds.
    (c) The speed of the cyclist increases uniformly from 2 m/s when $t = 0$ to 10 r when $t = 16$.
        Sketch the speed-time graph of the cyclist in Diagram II.

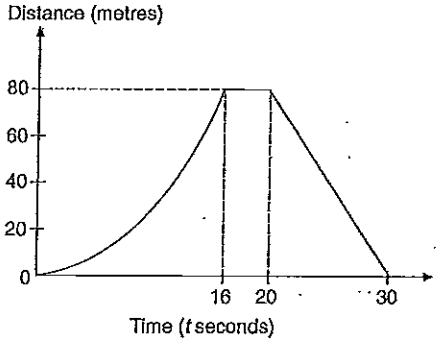


Diagram I

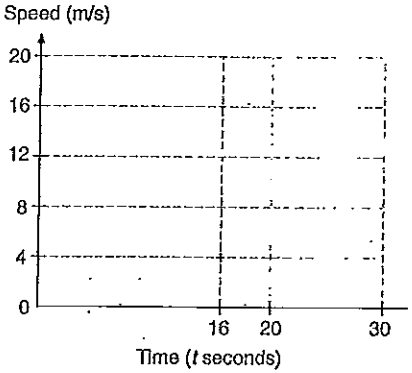


Diagram II

37. Diagram I shows the speed-time graph over a period of h seconds of a particle in motion.
    (a) Find the distance travelled by the particle in the first 40 seconds.
    (b) Find the value of h, if the particle travelled 1 500 metres in h seconds.
    (c) Find the retardation when $t = 50$.
    (d) Sketch the distance-time graph for the h seconds that the particle is in motion in Diagram II.

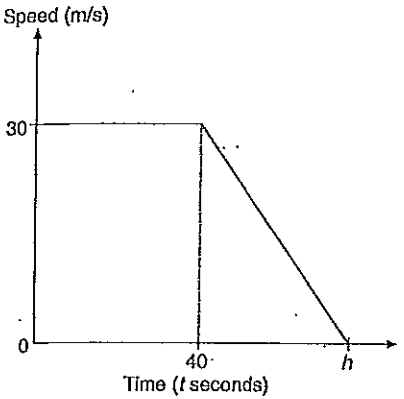


Diagram I

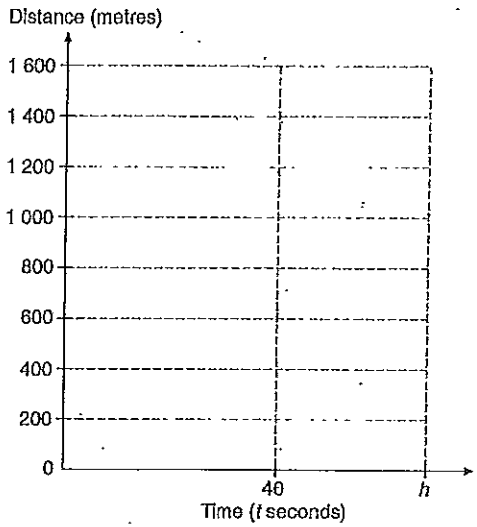


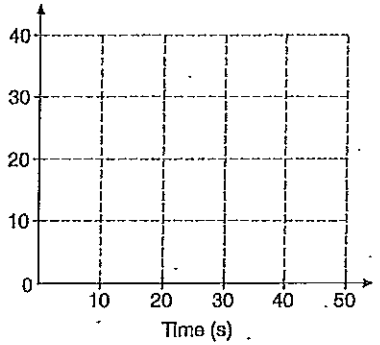
Diagram II

38. A train starts at rest and accelerates at a constant rate of 30 m/s in 10 seconds then travels at a constant speed of 30 m/s for the next 20 seconds. It finally decelerates uniformly until it comes to rest after travelling a further 20 seconds.

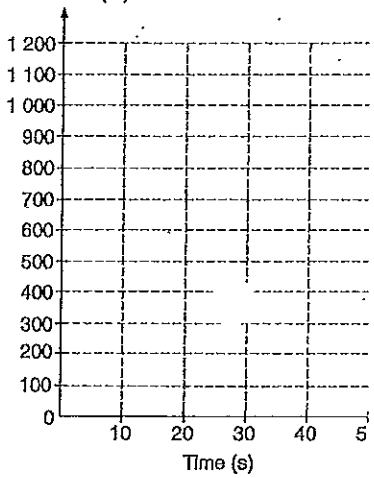
(a) Find
  (i) the acceleration,
  (ii) the deceleration,
  (iii) the total distance travelled in the 50 seconds,
  (iv) the average speed for the whole journey.

(b) On the axes provided below, draw
  (i) the speed-time graph,
  (ii) the distance-time graph,
  (iii) the accelerationt-time graph
  for the 50 seconds of the journey.

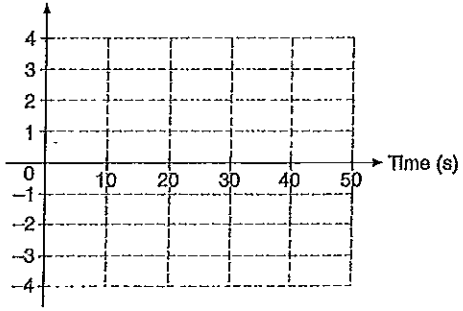
(i) Speed (m/s)



(ii) Distance (m)



(iii) Acceleration (m/s²)



39. A particle travels along a straight line PQ such that at time of t seconds, the speed v m/s in the direction of PQ is given by $v = 20 + 9t - 2t^2$.
The corresponding values of t and v are given in the table below.

t	0	1	2	3	4	5	6
v	20	27	a	29	b	15	2

(a) Calculate the values of a and b.

(b) Using a horizontal scale of 2 cm to represent 1 second and a vertical scale of 2 cm to represent 5 m/s, draw the graph of $v = 20 + 9t - 2t^2$ for $0 \le t \le 6$.

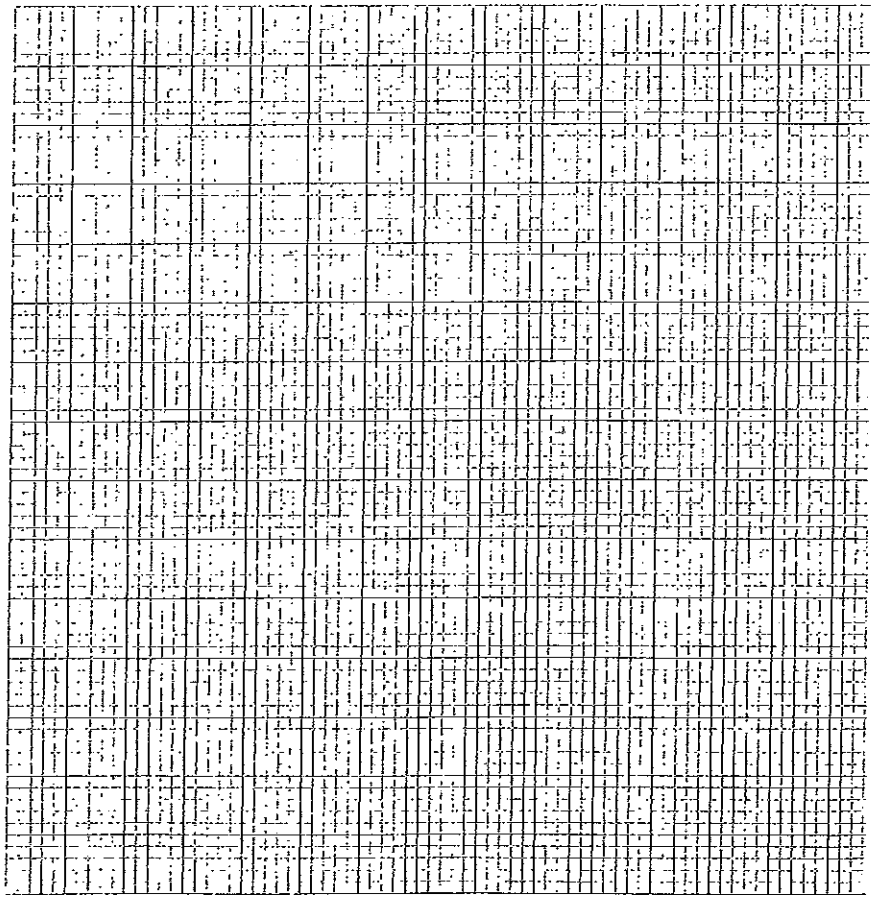
(c) Use your graph to find the
  (i) values of t when the speed is 26 m/s,
  (ii) value of t when the acceleration is zero,
  (iii) acceleration when $t = 1$,
  (iv) deceleration when $t = 5$.

(d) Find the distance travelled by the particle in the first 2 seconds of its motion.

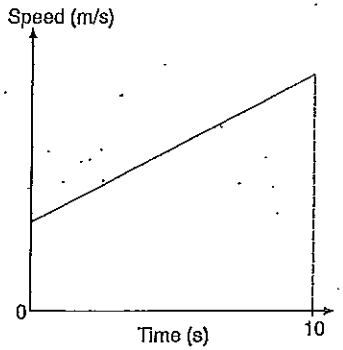
40. An object moves along a straight line XY such that after t seconds, the speed v r in the direction of XY is given by $v = 2t^2 - 10t + 15$.
The corresponding values of t and v are given in the table below.

t	0	1	2	3	4	5	6
v	15	7	a	3	7	15	b

(a) Calculate the values of a and b.
(b) Taking 2 cm to represent 1 second on the horizontal axis and 2 cm to repres 5 m/s on the vertical axis, draw the graph of $v = 2t^2 - 10t + 15$ for $0 \le t \le 6$.
(c) Use your graph to find
  (i) the values of t when the speed is 9 m/s,
  (ii) the value of t when the acceleration is zero,
  (iii) the gradient of the curve at $t = 1$ and $t = 5$.
  Explain what these gradients represent.



41. The diagram shows the speed-time graph of an object which accelerated uniformly for 10 seconds. Given that the speed v m/s at the time t seconds from the start was given by $v = 6 + 5t$, calculate
(a) its acceleration during the first 10 seconds,
(b) its average speed for the first 4 seconds,
(c) its average speed during the fourth second.



42. The diagram shows the speed-time graphs of a bus and a lorry. The bus, starting from rest, accelerates uniformly for 10 seconds until its reaches a speed of 8 m/s. It then continues to travel at this constant speed.
(a) Find the acceleration of the bus during the first 10 seconds.
(b) Find the distance travelled by the bus during the 26 seconds.
(c) The lorry starts from the same place as the bus but 12 seconds later and accelerates uniformly until it overtakes the bus. Given that overtaking occurs when the bus has been travelling for 26 seconds, calculate the speed of the lorry at that instant.