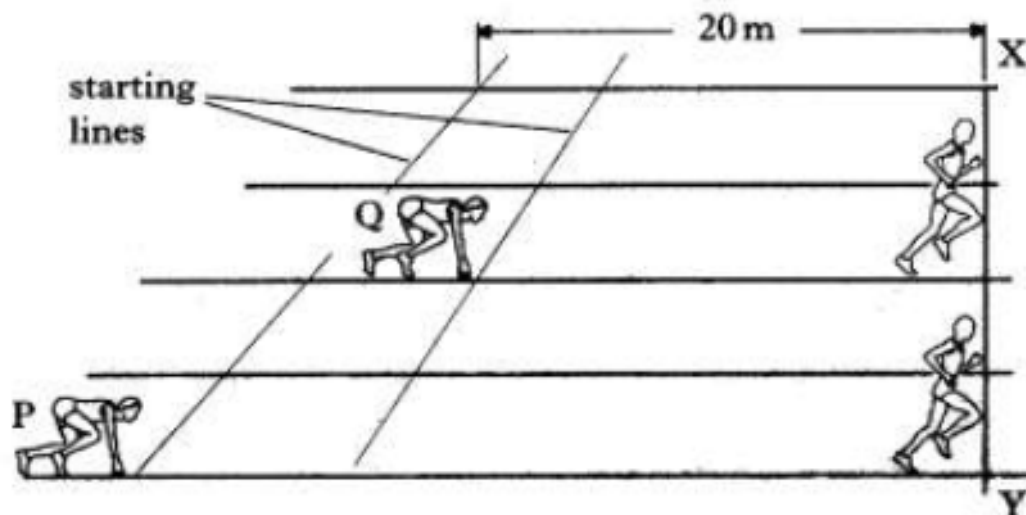


PQ 5c

Questions

In a "handicap" sprint race, sprinters P and Q both start at the same time but from different starting lines on the track. The handicapping is such that both sprinters reach line XY, as shown below, at the same.



Sprinter P has a constant acceleration of 1.6 m s^{-2} from the start line to the line XY. Sprinter Q has a constant acceleration of 1.2 m s^{-2} from the start line to line XY.

- Calculate the time taken by the sprinters to reach line XY.
- Find the speed of **each** sprinter at this line.
- What is the distance, in metres, between the starting lines for sprinters P and Q?

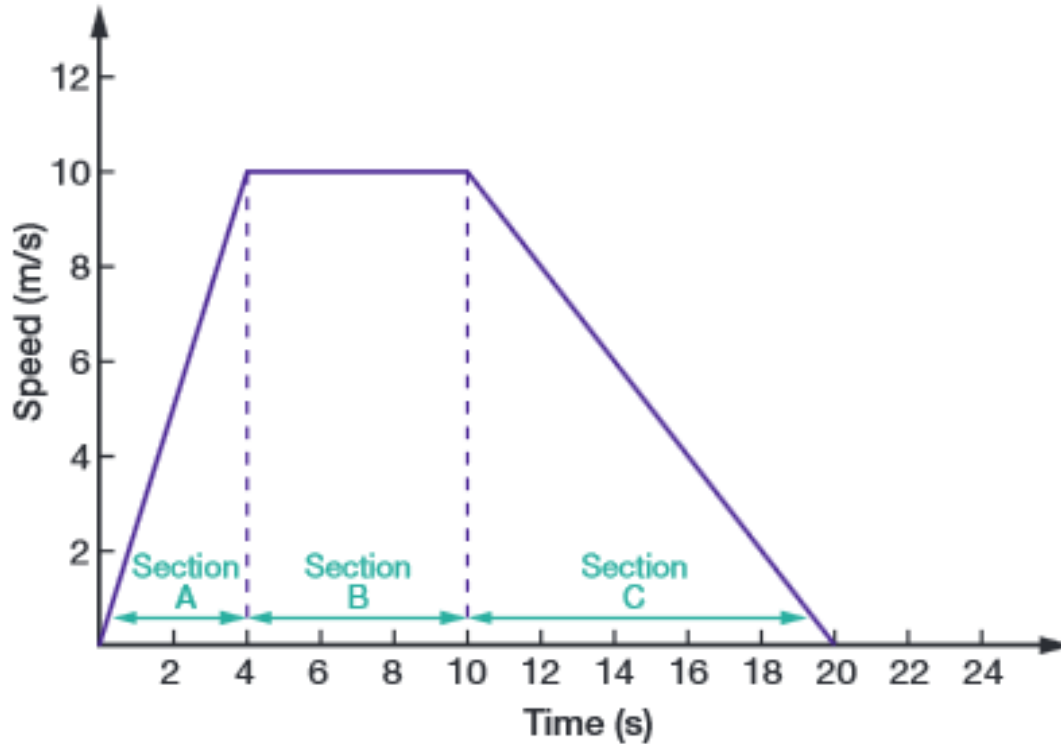
Q2

A car speeds up to 60 km/h from rest in 5 seconds. Calculate its average acceleration. (Express your answer in km/h/s.)

Q3

A train initially travelling at 30 km/h accelerates at a constant rate of 2 km/h/s for 30 seconds. Calculate its final speed.

Q4



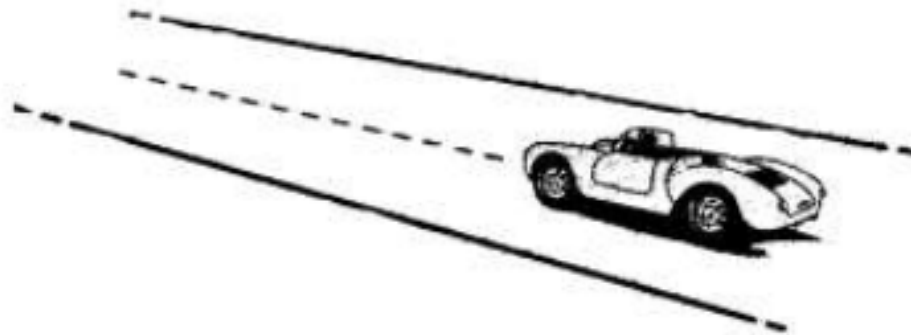
Problem

Sanjiv rides his scooter as described by Figure 8.2.6.

- Calculate his acceleration in sections A, B and C of his journey.
- Describe his motion in sections A, B and C.
- Calculate the distance Sanjiv covers in section A.

Q5

(a) A sports car is being tested along a straight track.



- (i) In the first test, the car starts from rest and has a constant acceleration of 4.0 m s^{-2} in a straight line for 7.0 s .
Calculate the distance the car travels in the 7.0 s .
- (ii) In a second test, the car again starts from rest and accelerates at 4.0 m s^{-2} over twice the distance covered in the first test.
What is the **increase** in the final speed of the car at the end of the second test compared with the final speed at the end of the first test?
- (iii) In a third test, the car reaches a speed of 40 m s^{-1} . It then decelerates at 2.5 m s^{-2} until it comes to rest.
Calculate the distance travelled by the car while it decelerates to rest.

Q6

Calculate the average speed of each of the following in the units specified in the brackets.

- a** Tim hikes 10 km in 2 hours in the bush (km/h).
- b** A frog leaps 16 m in 4 seconds (m/s).
- c** A racing car travels 3 km around a circuit in 6 minutes (km/h).

Q7

The driver of a car travelling at 80 km/h turned a bend and saw a broken-down car ahead. He took 0.75 second to react, and after he braked the car travelled a further 39.2 metres before stopping. Calculate the total distance taken for the car to stop. (Hint: Convert the speed of the car into m/s.)

Q8

Classify the following measuring errors as random or systematic.

- a** Finn always measures his height against the wall wearing his runners.
- b** Asha reads a thermometer scale from above.
- c** Shae miscounted the number of millimetres when measuring the length of an antenna.
- d** Carl times Min in a running race but his stopwatch takes 0.6 second to click off.

Q9

Catarina is on yard duty collecting litter at school. She walks 300 m north, then 100 m west, finally turning to walk 300 m south. The journey takes 5 minutes.

- a** State the total distance travelled.
- b** Calculate Catarina's average speed in m/s.
- c** Construct a diagram of Catarina's journey.
- d** State her displacement.
- e** Calculate Catarina's average velocity.

Q10

A toy truck was stationary then rolls down a long ramp with a constant acceleration of 0.2 m/s^2 . Calculate its speed after:

- a** 1 second
- b** 2 seconds
- c** 3 seconds
- d** 10 seconds.

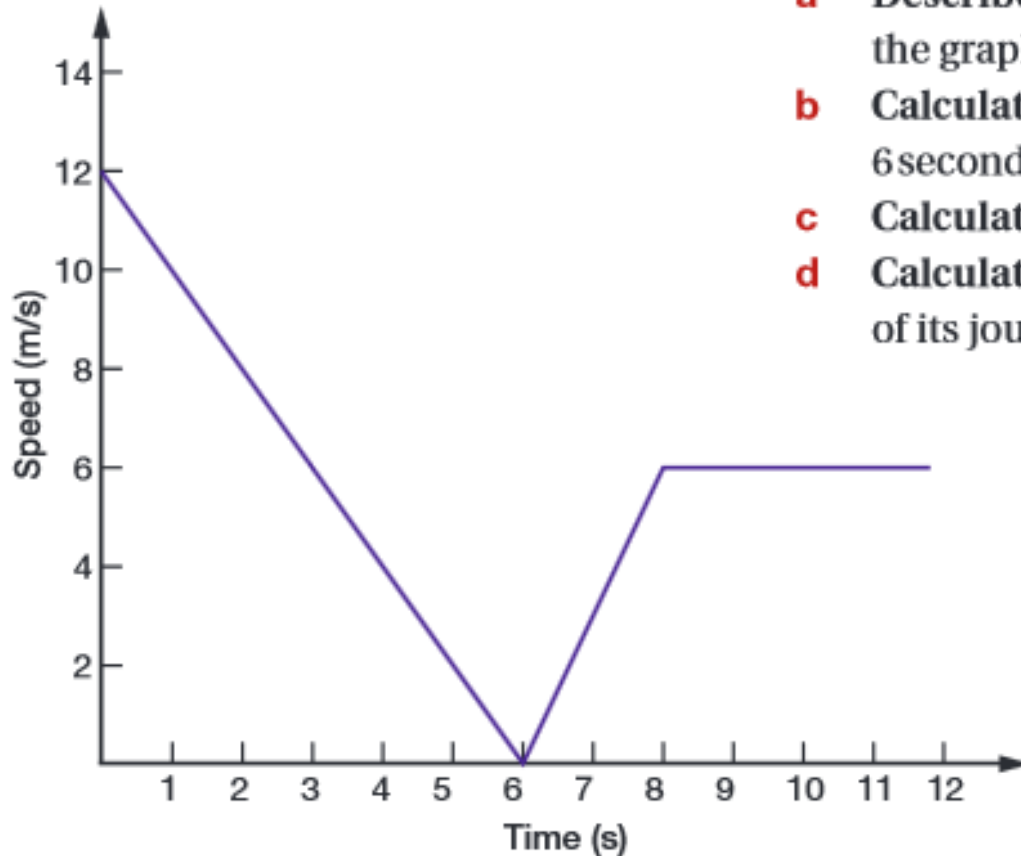
Q11

John Strapp accelerated to a speed of 1017 km/h in 5 seconds and then came to a stop in 1 second. Convert this speed into m/s and calculate his:

- a** average acceleration in reaching 1017 km/h (in m/s^2)
- b** deceleration in coming to a stop (in m/s^2).

Q12

illustrates the motion of a leaf floating in a running stream of water.



- a** Describe its motion over the 12 seconds shown on the graph.
- b** Calculate the acceleration of the leaf in the first 6 seconds.
- c** Calculate the distance it travelled in this time.
- d** Calculate its acceleration between 6 and 8 seconds of its journey.