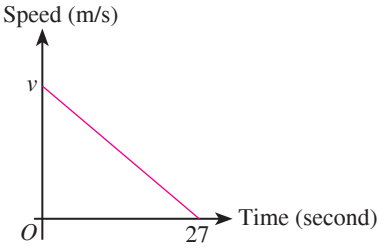
EXAMPLE 20

The diagram shows a speed-time graph for the movement of a toy lorry in 27 seconds. The deceleration of the toy lorry is 0.741 m/s^2.



(a) Calculate the speed, v, in m/second.

(b) Calculate the distance covered by the toy lorry after 2.2 seconds.

Solution:

Understanding the problem
- Acceleration = -0.741 m/s^2
- Duration = 27 seconds
- Calculate the speed, v.
- Calculate distance after 2.2 seconds

Planning the strategy

Distance = Speed × Time
Speed = Deceleration × Time

Implementing the strategy

(a) $-0.741 \text{ m/s}^2 = \dfrac{0 - v}{27 \text{ s}}$

$-0.741 \text{ m/s}^2 \times 27 \text{ s} = 0 - v$

$v = 20$ m/s

(b) Final speed = $(20 - 0.741) \times 2.2$
$= 18.4$ m/s

Distance = Average Speed × Time
$= \left(\dfrac{20 + 18.4}{2}\right) \times 2.2$
$= 42.24$ m

Conclusion

(a) Speed of toy lorry movement is 20 m/s.
(b) Distance covered by the toy lorry is 42.24 m.

SELF PRACTICE 9.2

1. State whether each of the following statements is True or False.

Situation	Acceleration	True/False
(a) The speed of a ball rolling on the floor is reduced from 12 cm/s to 2 cm/s in 4 seconds.	-2.5 cms^{-2}	
(b) A trailer accelerates from 90.5 km/h to 123 km/h in $\frac{3}{4}$ hours.	40 kmh^{-2}	
(c) A coconut fell from a tree at a speed of 7 m/s in 0.71 s.	9.86 ms^2	
(d) Puan Mages reduced the speed of her car from 80 km/h to 60 km/h in 0.5 hours	54 km/h^2	

2. Calculate the acceleration for the following situations.
   (a) A car accelerates from 60 km/h to 110 km/h in 30 minutes.
   (b) The speed of a boat decreases from 70 km/h to 40 km/h in 5 minutes.