Page 21
Solution 28
Total distance=100m =0.1 km
Total time taken=15 minutes= 15/60=0.25 hour
Average speed = Total distance travelled/ Total time taken
=0.1/0.25= 0.4km/h
Solution 29
Total distance travelled =100m
Total time taken = 9.83 sec
Average speed = Total distance travelled/ Total time taken
=100/9.83 =10.172m/s
Averge speed in km/h:
10.172 x(3600/1000)=36.62 km/h
Solution 30

Speed from A to B= 30km/h

Let the distance from A to B be D.

$$\text{Time taken to travel from A to B, } T_1 = \frac{\text{Distance travelled}}{\text{Speed}}$$

$$T_1 = \frac{D}{30}$$

Speed from B to A=20 km/h

$$\text{Time taken to travel from B to A, } T_2 = \frac{\text{Distance travelled}}{\text{Speed}} = \frac{D}{20}$$

$$\text{Total time taken, } T = T_1 + T_2 = \frac{D}{30} + \frac{D}{20} = \frac{D}{12}$$

Total distance from A to B and from B to A =2D

$$\text{Average speed} = \frac{\text{Total distance travelled}}{\text{Total time taken}} = \frac{2D}{\frac{D}{12}} = 24\text{km/h}$$

Solution 31
Initial velocity= 0m/s
Final velocity=6m/s
Time=3 sec

Initial velocity= 0m/s
Final velocity=6m/s
Time=3 sec

$$\text{Acceleration} = \frac{\text{Final velocity} - \text{Initial velocity}}{\text{Time taken}}$$

$$= \frac{(6-0)}{3} = \frac{6}{3} = 2\ \text{m/sec}^2$$

Solution 32
Initial velocity, u = 600 km/h
Final velocity, v = 1100 km/h
Acceleration = 10 km/h/s = 600 km/h^2
From relation, a = (v-u)/t
t = (v-u)/a
t = (1100-600)/600 = 500/600 = 5/6 hr = 50 sec
Solution 33
Deceleration, a=-5m/s^2

Initial velocity, u=20m/s
Final velocity, v=0m/s
t=?

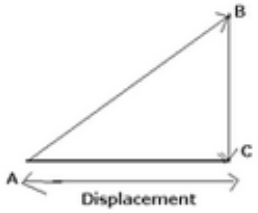
Deceleration, $a=-5m/s^2$
Initial velocity, u=20m/s
Final velocity, v=0m/s
t=?

$$a = \frac{v-u}{t}$$

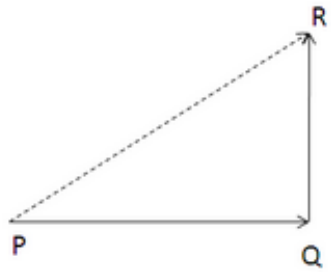
$$-5 = \frac{0-20}{t}$$

$$t = \frac{20}{5} = 4s$$

Solution 34
(a) Distance travelled is the actual length of the indirect path covered by the body whereas displacement refers to the straight line path between the initial and final positions. For e.g. In the figure given below, a body moves from point A to point B and then from point B to point C. Here, the distance travelled by the body is AB + BC and displacement is AC.



(b)



PQ=8cm
QR=6 cm
Resultant Displacement PR = $\sqrt{8^2+6^2} = \sqrt{100} = 10cm$

Solution 35
A body is said to be in motion when its position changes continuously with respect to a stationary object taken as reference point.
A body has uniform motion if it travels equal distances in equal intervals of time, no matter how small these time intervals may be. For example: a car running at a constant speed of 10m/s, will cover equal distance of 10m every second, so its motion will be uniform.
Non-uniform motion: A body has a non-uniform motion if it travels unequal distances in equal intervals of time. For example: dropping

a ball from the roof of a tall building .

Solution 36

(a) Speed of a body is the distance travelled by it per unit time. The SI unit of speed is m/s.

(b) (i) Average speed of a body is the total distance travelled divided by the total time taken to cover this distance.

(ii) Uniform speed refers to the constant speed of a moving body. A body has a uniform speed if it travels equal distance in equal intervals of time, no matter how small these time intervals may be.

(a) Speed of a body is the distance travelled by it per unit time. The SI unit of speed is m/s.
(b) (i) Average speed of a body is the total distance travelled divided by the total time taken to cover this distance.

$$\text{Average speed} = \frac{\text{total distance travelled}}{\text{total time taken}}$$

(ii) Uniform speed refers to the constant speed of a moving body. A body has a uniform speed if it travels equal distance in equal intervals of time, no matter how small these time intervals may be.

Solution 37

(a) Velocity of a body is the distance travelled by it per unit time in a given direction. SI unit of velocity is m/s.

(b) (i) Speed is a scalar quantity whereas velocity is a vector quantity.

(ii) Speed of a body is distance travelled by it per unit time whereas velocity of a body is the distance travelled by it per unit time in a given direction.

(iii) Speed is always positive whereas velocity can be both positive as well as negative.

(c) Speed = 54km/h = 54 x (1000/3600) = 15m/s

Solution 38

(a) Acceleration of a body is defined as the rate of change of its velocity with time. SI unit of acceleration is m/s^2.

(b) A body has uniform acceleration if it travels in a straight line and its velocity increases by equal amounts in equal intervals of time. For example: Motion of a freely falling body.

Solution 39

$$\text{Total distance} = 200\ \text{km}$$

$$\text{Average speed} = 70\ \text{km/h}$$

$$\text{Total time taken} = \frac{\text{Total distance}}{\text{Average speed}} = \frac{200}{70} = \frac{20}{7}\text{h}$$

For first part of the journey,

$$\text{Distance} = 100\ \text{km}$$

$$\text{Speed} = 50\ \text{km/h}$$

$$\text{Time taken, } t_1 = \frac{100}{50} = 2\text{h}$$

For second part of the journey,

$$\text{Distance} = 100\ \text{km}$$

$$\text{Speed} = x\ \text{km/h}$$

$$\text{Time taken, } t_2 = \frac{100}{x}\text{h}$$

$$t_1 + t_2 = \frac{20}{7}$$

$$2 + \frac{100}{x} = \frac{20}{7}$$

$$\frac{100}{x} = \frac{6}{7}$$

$$700 = 6x$$

$$\Rightarrow x = 116.6\ \text{km/h}$$

Solution 40

(i) In the first part, train travels at a speed of 30 km/h for a distance of 15 km.

$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

$t_1 = \frac{15}{30} = \frac{1}{2}\text{h}$

(ii) In the second part, train travels at a speed of 50 km/h for a distance of 75 km.

$t_2 = \frac{75}{50} = \frac{3}{2}\text{h}$

(iii) In the third part, train travels at a speed of 20 km/h for a distance of 10 km.

$t_3 = \frac{10}{20} = \frac{1}{2}\text{h}$

Total distance covered= 15+75+10=100 km

Total time taken= $\frac{1}{2} + \frac{3}{2} + \frac{1}{2} = \frac{5}{2}\text{h}$

Average speed= $\frac{\text{Total distance covered}}{\text{Total time taken}} = \frac{100}{5/2} = 40\text{km/h}$

Solution 41

(a) Average speed, $v_{av} = \frac{\text{Total distance travelled}}{\text{Total time taken}} = \frac{150}{5} = 30\,\text{m/s}$

(b) Time=1s

Distance = $v_{av} \times \text{time} = 30 \times 1 = 30\,\text{m/s}$

(c) Time=6s

Distance = $v_{av} \times \text{time} = 30 \times 6 = 180\,\text{m/s}$

(d) Distance=240m

$\text{Time} = \frac{\text{Distance}}{v_{av}} = \frac{240}{30} = 8\text{s}$

********** END **********