

The change of speed can be calculated by finding the difference between the final speed and the initial speed of a linear moving object. From the activity, the increase in speed results in acceleration and the decrease in speed results in deceleration. Therefore, acceleration and deceleration is a rate involving speed and time.

EXAMPLE 13

A racing car accelerates from a stationary state and reaches a speed of 120 km/h in 6 seconds. Calculate the acceleration.

Solution:

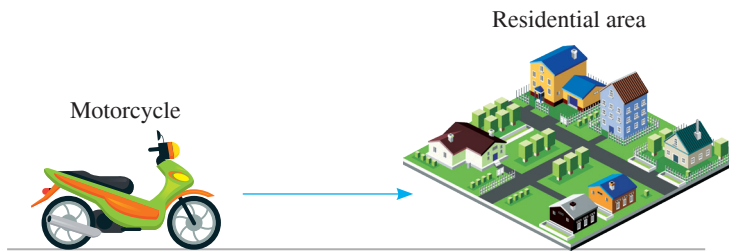
$$\begin{aligned}
 \text{Change of speed} &= 120 \text{ km/h} - 0 \text{ km/h} \\
 &= 120 \text{ km/h} \\
 \frac{120 \text{ km}}{1 \text{ h}} &= \frac{120 \text{ km}}{60 \times 60 \text{ s}} \quad \leftarrow 60 \times 1 \text{ min} \\
 &= 0.033 \text{ km/s} \\
 \text{Acceleration} &= \frac{0.033 \text{ km/s}}{6 \text{ s}} \quad \leftarrow \frac{120 \text{ km}}{1 \text{ hour}} = \frac{120 \text{ km}}{3\,600 \text{ s}} \\
 &= 0.0056 \text{ km/s per second or km/s}^2
 \end{aligned}$$

ATTENTION 

The stationary state is the fixed state of an object.

Speed = 0

EXAMPLE 14



A motorcycle moves from a stationary state and accelerates uniformly to reach a speed of 20 m/s in 5 seconds. What is the acceleration of the motorcycle?

Solution:

$$\begin{aligned}
 \text{Acceleration} &= \frac{(20 - 0) \text{ m/s}}{5 \text{ s}} \\
 &= \frac{20 \text{ m/s}}{5 \text{ s}} \\
 &= 4 \text{ m/s}^2
 \end{aligned}$$

TIPS 

Uniform acceleration means the speed increases at a similar rate.

Time (s)	Speed (m/s)
0	0
1	4
2	8
3	12
4	16
5	20

DO YOU KNOW ?

If an object moves at a uniform speed, the acceleration is zero.