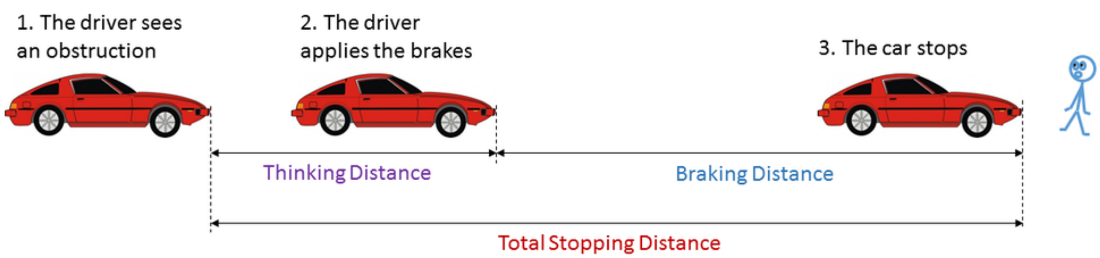
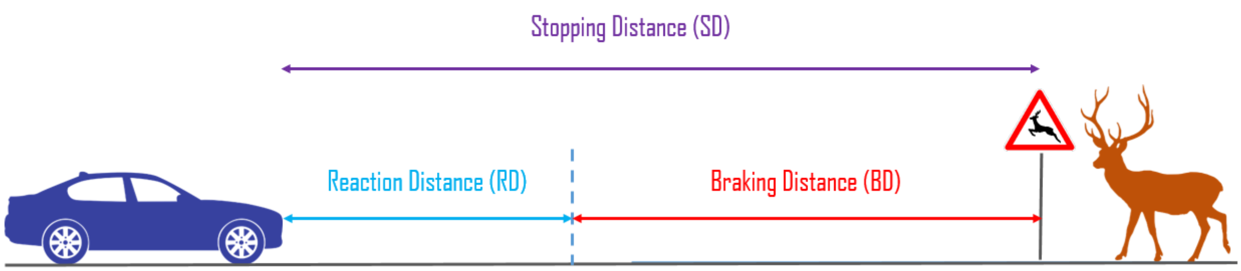
**The total stopping distance** is the ***sum*** of the ***perception-reaction distance*** and the ***braking distance***.



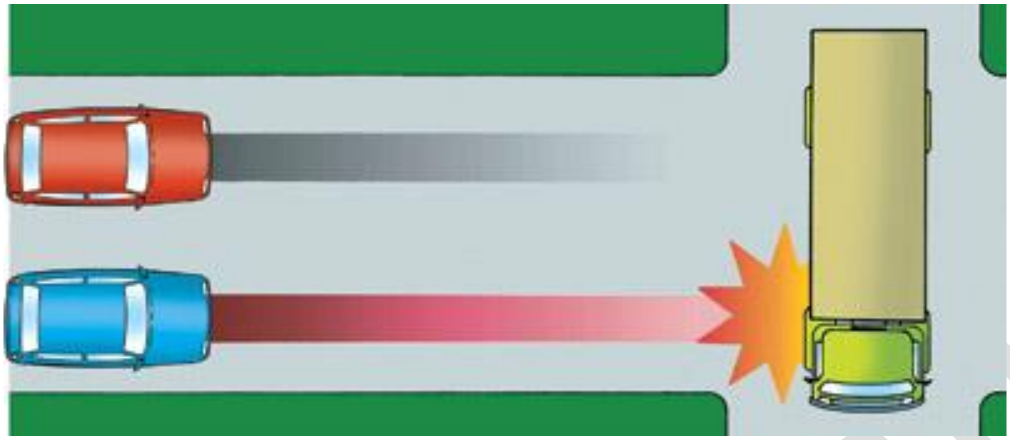



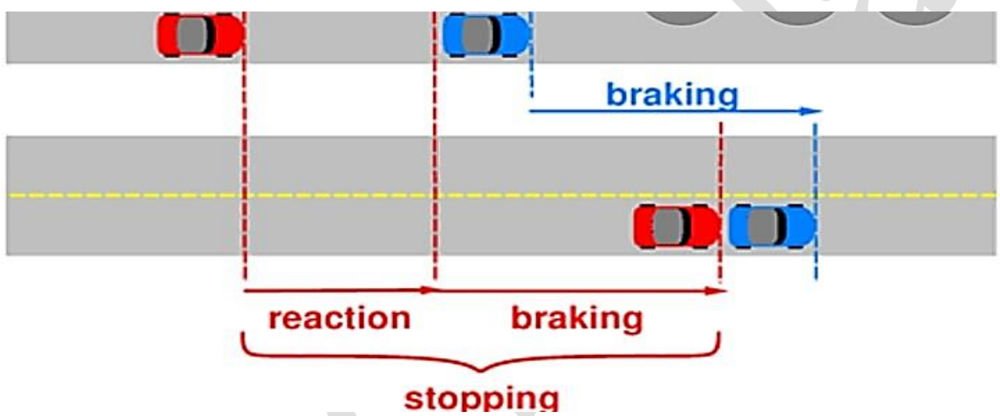

$$Stopping\ Distance = RD + BD$$

$$RD = v.tr$$

$$BD = \frac{v^2}{2\mu g}$$

| | |
|---|---|
| $v$ | Velocity (speed) of the vehicle in m/s |
| $t_r$ | Reaction time in seconds (s) |
| μ | Friction coefficient |
| $g$ | Gravity (9.81 $m/s^2$) |



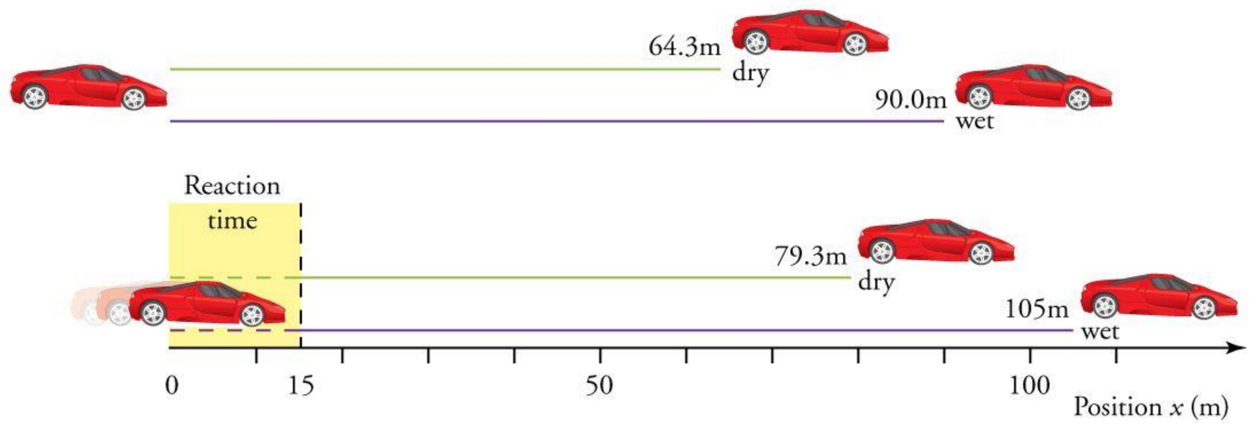


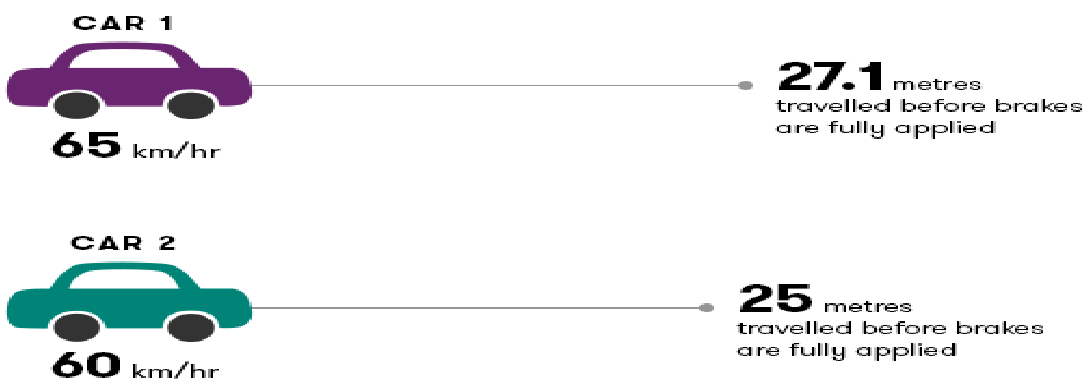

**Braking distance** refers to the distance a vehicle will travel from the point when its brakes are fully applied to when it comes to a complete stop. The braking distance is one of two principal components of the total stopping distance.

$$d = V^2/(2g(f + G))$$

Where:
d = Braking Distance (ft)
g = Acceleration due to gravity (32.2 ft/sec2)
G = Roadway grade as a percentage; for 2% use 0.02
V = Initial vehicle speed (ft/sec)
f = Coefficient of friction between the tires and the roadway

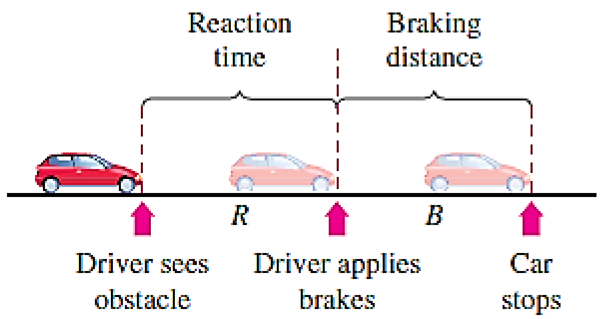
It is primarily affected by the original speed of the vehicle , ***the coefficient of friction*** between the tires and the road surface.




**reaction distance**: Due to the delay in human reaction, however, there is always a time *lag* between seeing a hazard and braking the car. This time interval is known as *reaction time*, which is vary widely for different persons. During the reaction time the car travels a distance known as ***reaction distance***.

reaction distance refers to the other component of the total stopping distance, reaction distance is the product of the speed and the perception-reaction time of the driver/rider.




$$\text{reaction distance} = \text{speed} \times \text{reaction time}$$

1- If Speed in **(Km/h)** then:

$$\boldsymbol{d = 0.278\ S.t}$$

$d$ = reaction distance, m
$t$ = reaction time, s
$S$ = initial speed of vehicle, km/h

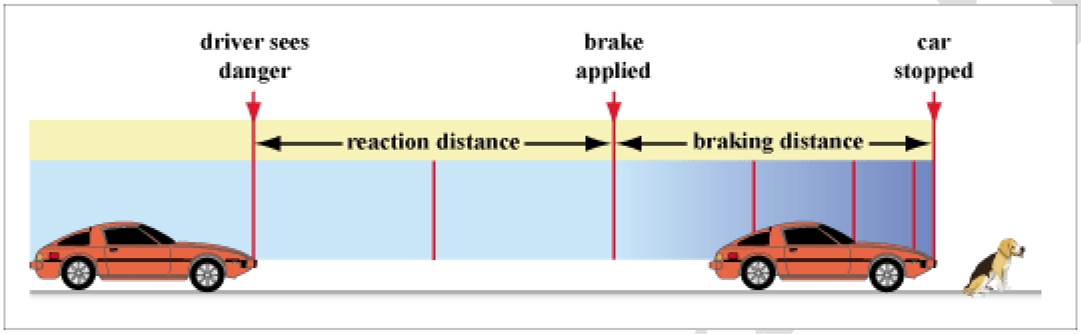
2- If speed in **(m/h)** then:

$$\boldsymbol{d = 1.47\ S.t}$$

*d = reaction distance, ft*
*t= reaction time, s*
*S= speed of vehicle, m/h*

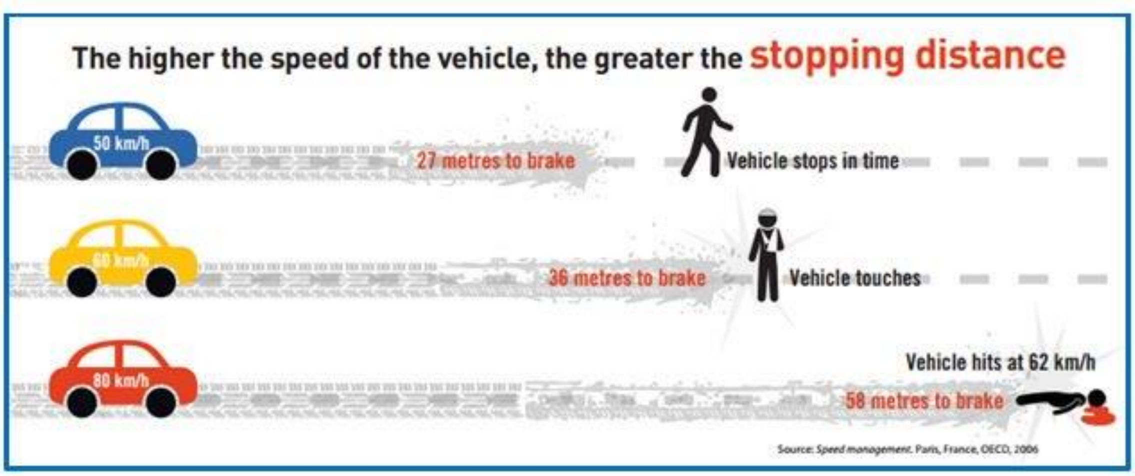
After the reaction time, the brake is applied and the car decelerates. It takes another distance, which is known as the ***braking distance***, for the car to stop completely. The total distance that the car has travelled after the driver seeing the hazard is known as the stopping distance. It is equal to

$$\text{stopping distance} = \text{reaction distance} + \text{braking distance}$$




**Stopping Distance**

We should make the stopping distance as small as possible to prevent accidents. Both the reaction distance and the braking distance depend on the initial speed of the car. The higher the speed of the car, the longer distance it has to travel before coming to rest.



Speeding is often a major cause of traffic accidents because the driver cannot stop the car in time in an emergency. The braking distance also depends on the friction between the tires and road. It would increase greatly if the road is wet, or tires of poor quality are used. We can estimate the braking distance of a car if its deceleration is known.