

MOTION AND FORCE

Objects that change the position with respect to their surroundings are considered to be in motion, while those that do not change position are considered to be stationary.

The object taken to determine the state of motion or the state of rest of a body is called the reference object.

Distance is the length of path travelled by an object. The SI unit of distance is metre.

Speed is the distance travelled by an object in unit time. The SI unit of speed is m/s.

$$1 \text{ km/h} = \frac{5}{18} \text{ m/s}$$

Child	Distance	Time	Speed
A	400 m	180 s	2.23
B	400 m	120 s	3.34
C	400 m	400 s	1

Uniform Speed, Non-uniform Speed

If an object travels equal distance in equal intervals of time, it is in uniform speed.

If an object travels equal distance in not equal intervals of time, it is in non uniform speed.

Eg for niform speed---clock dial,movement of earth

eg for non uniform speed---Birds flying, humans walking, a ball rolling

Contact Force, Non-contact Force

The force experienced when objects come into contact with each other is called contact force. The force effected when there is no contact with the object is called non-contact force.

Frictional Force

When a surface moves or tries to move over another surface, a parallel force is produced between them against their relative motion. This is frictional force.

Situation	Force	Through Contact / Non-Contact
Mango falling downward	Earth's Gravitational Force	non-contact
Leaves swaying in the wind	wind force	non contact
hammer used to push the nail	muscular force	contact
wind is flowing	wind force	non contact
a man swimming	muscular force	contact

the advantages of friction.

- Helps to hold objects firmly.
- Helps us in walking.
- Helps vehicles to move without slipping.

Disadvantages of friction

- Surfaces in contact wears out.
- Obstructs smooth movement of machine parts.

Ways to reduce friction

friction is reduced when oil is applied.

Graphite is used as a lubricant.

ball bearings are used.

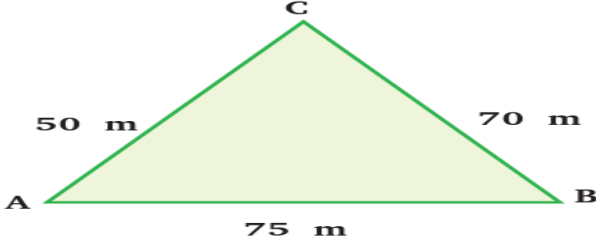
method of reducing friction by changing the shape is called streamlining.



Let's assess

1)

A car starts from A and reaches B, which is 75 m away. The uniform speed of the car is 25 m/s. Another car with a uniform speed of 30 m/s starts from A and reaches B through C. Which car will reach fthe destination first?



Car 1 (Straight from A to B)

- Distance = 75 m
- Speed = 25 m/s

Time = Distance / Speed
Time=75/25=3seconds

Car 2 (Goes via C: A → C → B)

- **Distance AC** = 50 m
- **Distance CB** = 70 m
- **Total Distance** = 50 + 70 = 120 m

Speed = 30 m/s **Time** = **Distance** / **Speed**

Time=120/30=4seconds

- Car 1 takes **3 seconds**
- Car 2 takes **4 seconds**

Car 1 will reach the destination first.

2) A bus starts from C and reaches D in 7 s. If the uniform speed of the bus is 50 m/s, find the distance from C to D.

Distance=Speed×Time

- Speed = 50 m/s
- Time = 7 s

metersDistance=50×7=350meters.

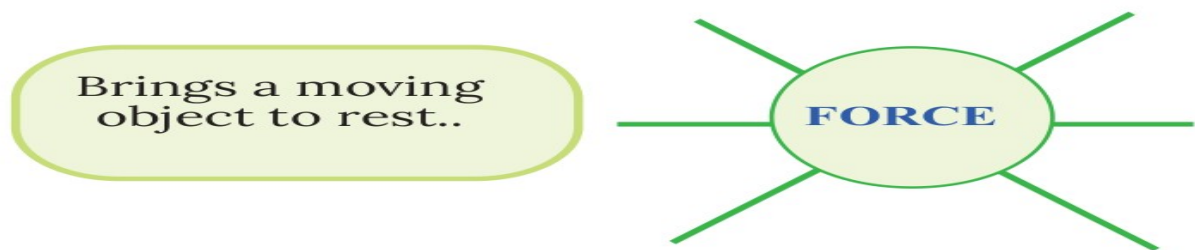
3)How long will it take to hear thunder from 12000 m away? (The speed of sound is 340 m/s).

Distance = 12,000 m

- Speed of sound = 340 m/s

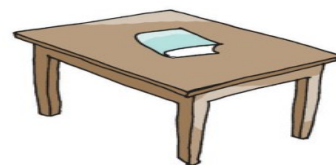
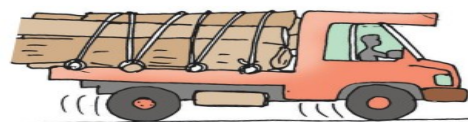
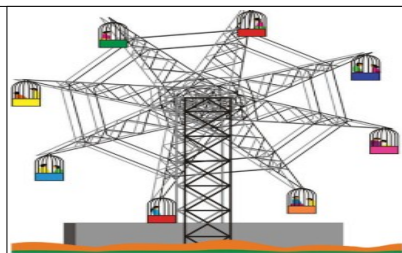
Time=12000/340≈35.29seconds.

4. Complete the puzzle given below.



Makes a stationary object move

- **Changes the direction of a moving object**
- **Changes the speed of an object**
- **Changes the shape of an object**



Context	The reference object	State of motion	State of rest
Child on a moving giant wheel	child sitting near by		✓
	A Person standing on the ground	✓	
Person riding a horse	The Horse		✓
	The Ground	✓	
Twig in the beak of a flying bird	The Bird		✓
	A Person standing on the ground	✓	
Earth in the solar system	The Sun	✓	
	The Moon		✓
Log of wood in a moving lorry	The Lorry		✓
	The trees on either side	✓	
A book on a table	The Table		✓
	The Sun	✓	