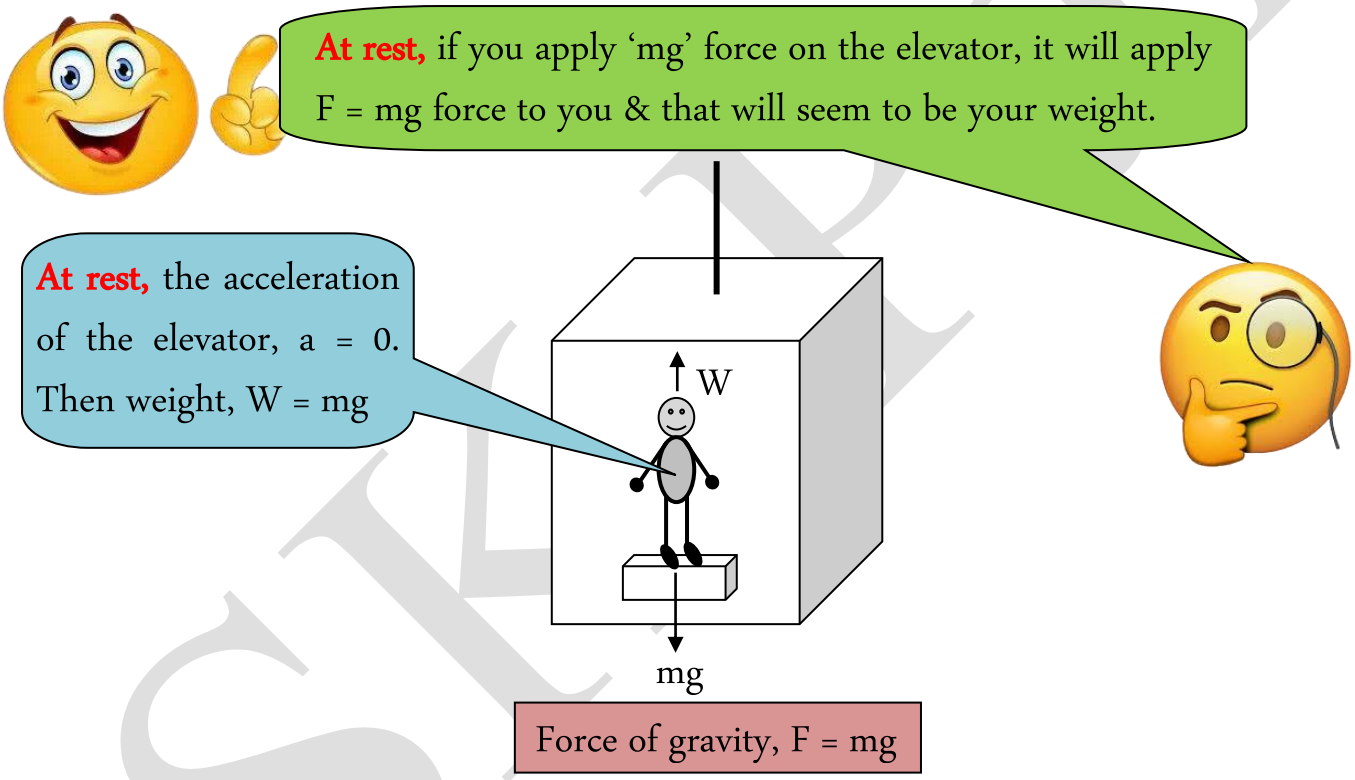
Name of the student: .....Date: 27/09/2020

Weightlessness:

Weightlessness is the absence of the sensation of weight. This is termed as Zero-G (Zero Gravity).

- ✓ Go to a place distant from any object so that the force of gravity is nearly zero. This is true weightlessness.
- ✓ If you are let fall freely, you feel no weight even though you have a weight. This apparent weightlessness is the type of weightlessness.



Q. Your mass is 60 kg. You are standing in a stationary elevator. How much force will the elevator apply to you? [g = 9.8ms^{-2}]

.....

.....

.....

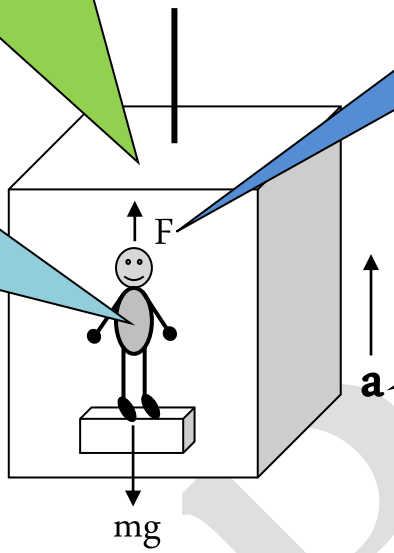
.....

At the time of getting upwards at 'a' acceleration, if you apply 'mg' force on the elevator, it will apply F = m (g + a) force to you & that will seem to be your weight.

The net force,
F + (−mg) = ma
Or, F = mg + ma
∴ F = m (g + a)

At the time of getting upwards, the acceleration of the elevator, a = a. Then weight, W = m (g + a)

Here, 'a' & 'g' are opposite to each other. If 'a' is (+), 'g' will be (−).



Q. Your mass is 60 kg. You are standing in an elevator which is accelerating upwards at 5ms^{-2}. How much force will the elevator apply to you and how much will be your weight? [g = 9.8ms^{-2}]

.....

.....

.....

.....

.....

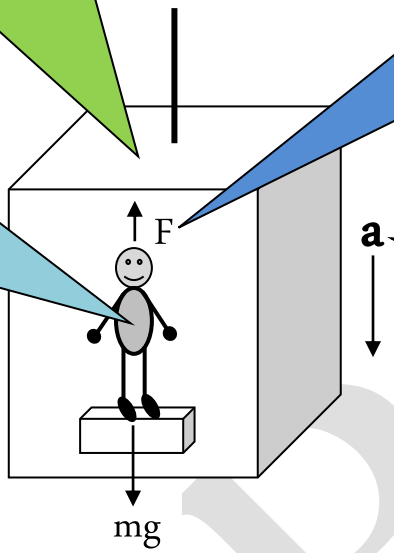
.....

.....

At the time of getting downwards at 'a' acceleration, if you apply 'mg' force on the elevator, it will apply F = m (g – a) force to you & that will seem to be your weight.

The net force,
mg + (–F) = ma
Or, mg – F = ma
Or, – F = – mg + ma
Or, – F = – m (g – a)
∴ F = m (g – a)

At the time of getting downwards, the acceleration of the elevator, a = a. Then weight, W = m (g – a)



Here, 'a' & 'g' are on the same direction. If 'g' is (+), 'a' will be (+).

Q. Your mass is 60 kg. You are standing in an elevator which is accelerating downwards at 5ms^{-2}. How much force will the elevator apply to you and how much will be your weight? [g = 9.8ms^{-2}]

.....

.....

.....

.....

.....

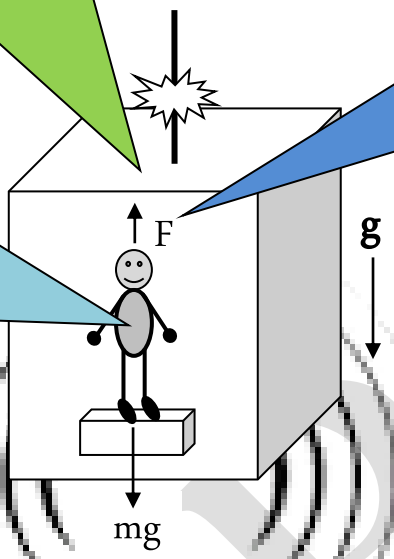
.....

.....

At the time of tearing the rope of elevator, if you apply 'mg' force on the elevator, it will apply F = m (g – g) = 0 force to you & that will seem to be your weight.

The net force,
mg + (–F) = mg
Or, mg – F = mg
Or, – F = – mg + mg
Or, – F = – m (g – g)
Or, F = m × 0
∴ F = 0

At the time of tearing the rope of elevator, the acceleration of the elevator, a = g. Then weight, W = m (g – g) = 0



Q. The mass of Johnny is 60 kg. He is standing in an elevator which is accelerating downwards at $5ms^{-2}$. Suddenly the rope of elevator got teared. Then how much force will the elevator apply to him and how much will be his weight? [$g = 9.8ms^{-2}$]

.....

.....

.....

.....

.....

.....

.....

.....