شكراً لتحميلك هذا الملف من موقع المناهج الإماراتية

ملخص ومراجعة الدرس الثاني Force Drag and Weight الوزن وقوة السحب

تاريخ نشر الملف على موقع المناهج: 2024-02-14 08:17:40 | اسم المدرس: Marey Ahmed

التواصل الاجتماعي بحسب الصف التاسع المتقدم

روابط مواد الصف التاسع المتقدم على تلغرام

التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة فيزياء في الفصل الثاني

1	ملخص ومراجعة ثانية الدرس الأول Motion and Force القوة والحركة
2	ملخص ومراجعة الدرس الأول Motion and Force القوة والحركة
3	ملخص الوحدة الرابعة Forces القوى
4	حل مراجعة الوحدة الخامسة in Forces and Displacement

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة فيزياء في الفصل الثاني	
	بعدين في والقوى الإزاحة Two Dimension
5	مراجعة الوحدة الرابعة Dimension One in Forces القوى في بعد واحد

LESSON 2

WEIGHT AND DRAG FORCE

Gravitational force is the force exerted from the planet to the object (system) or (by how mucn the planet attract the object) and always it's direction down ward

- always object weight = gravitational force (Fg)
- gravitational force equation $Fg = m \times g$
- there is a linear proportional between gravity force and object mass
- there is a linear proportional between gravity force and gravity acceleration

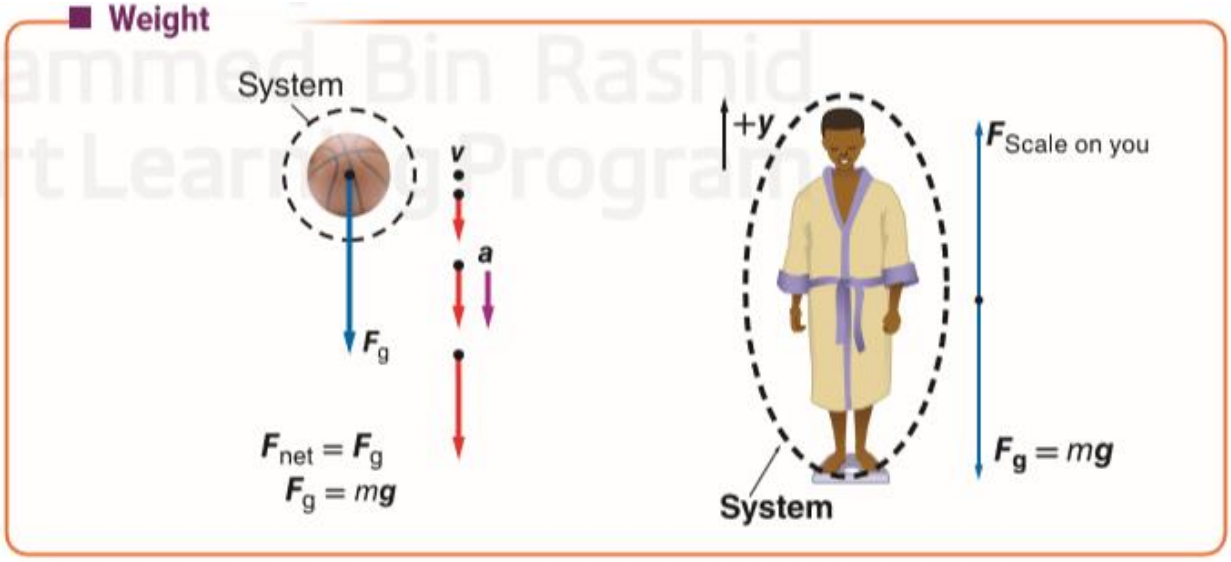


Figure 10 The gravitational force exerted by Earth's mass on an object equals the object's mass times the gravitational field, ($F_g = mg$).

Q1) if the object mass = 4kg find the ratio between the object weight in the earth and the object weight in the moon (g_{moon} =1.62m/s^2/ g_{earth}= 9.81 m/s^2)

Mr / Ahmed Marey

Comparison of Mass and Weight

Sr. no.	Mass	Weight
01	Mass is a property of matter. The mass of an object is the same everywhere.	Weight depends on the effect of gravity. Weight varies according to location.
02	Mass can never be zero.	Weight can be zero if no gravity acts upon an object, as in space.
03	Mass does not change according to location.	Weight increases or decreases with higher or lower gravity.
04	Mass is a scalar quantity. It has magnitude.	Weight is a vector quantity. It has magnitude and is directed toward the center of the Earth or other gravity well.
05	Mass may be measured using an ordinary balance.	Weight is measured using a spring balance.
06	Mass usually is measured in grams and kilograms.	Weight often is measured in newtons, a unit of force.
07	Unit : Kilogram (Kg)	W= mg Unit : newton (N)

Elevator Motion

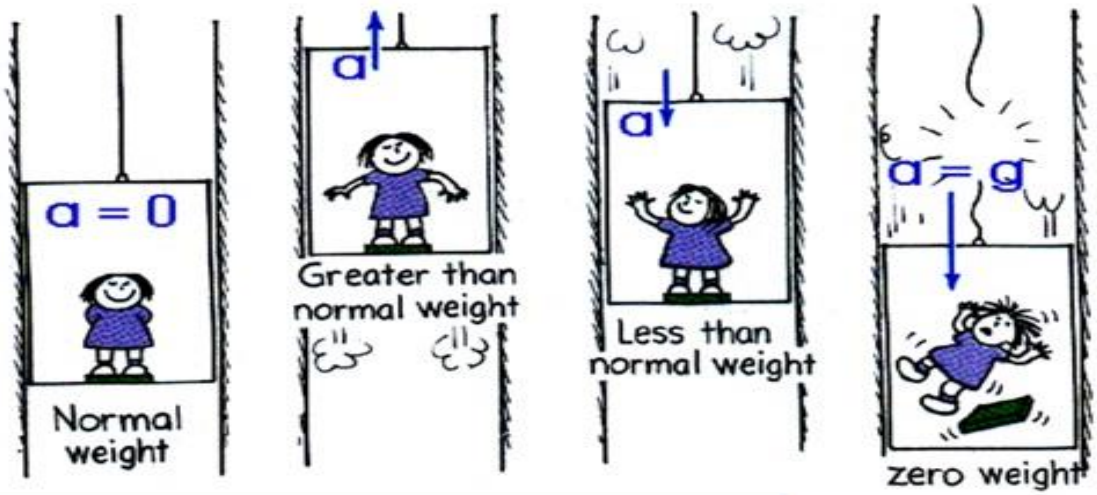
When the person stands on the scale which it inside the elevator there are two forces effect on the person

1- **gravity force downward F_g not change when the elevator move (real weight for the person) $F_g = m \times g$**

2- **normal force from scale to the person (scale reading F_S) and it will change as the elevator moving**

Apparent weight equation $F_{apperent} = F_S = m\,(g - \vec{a}\,)$

A pictorial summary of apparent weight:



Does Your Apparent Weight Change?

- If you accelerate in a vertical direction, your weight will appear different
  - Accelerating up, apparent weight increases
  - Accelerating down, apparent weight decreases
- Why? Picture an Elevator...
  - N = mg if the elevator is at rest or moving at constant velocity
  - N = mg + ma if the elevator has an upward acceleration
  - N = mg - ma if the elevator has a downward acceleration

1- compare between the apparent weight (F_S) and real weight (F_g) if the elevator at rest

$$at\ rest \qquad a = 0 \qquad F_S = m(g - 0) \quad so$$
$$F_s = mg \quad so \quad F_s = F_g$$

2- compare between the apparent weight (F_S) and real weight (F_g) if the elevator move with constant speed up ward or down ward

$$constant\ speed \qquad a = 0 \qquad F_S = m(g - 0) \quad so$$
$$F_s = mg \quad so \quad F_s = F_g$$

3- compare between the apparent weight (F_S) and real weight (F_g) if the elevator move upward with speeding up

$$up\ ward\ v+$$
$$speeding\ up\ a+$$
$$F_S = m(g + \vec{a}) = m(g + a)$$
$$F_s > F_g$$

4- compare between the apparent weight (F_S) and real weight (F_g) if the elevator move upward with slowing down

$$up\ ward\ v+$$
$$slowing\ down\ a-$$
$$F_S = m(g + \vec{a}) = m(g - a)$$
$$F_s < F_g$$

5- compare between the apparent weight (F_S) and real weight (F_g) if the elevator move down ward with speeding up

$$down\ ward\ v-$$
$$speeding\ up\ a-$$
$$F_S = m(g + \vec{a}) = m(g - a)$$
$$F_s < F_g$$

6- compare between the apparent weight (F_S) and real weight (F_g) if the elevator move down ward with slowing down

$$down\ ward\ v-$$
$$slowing\ down\ a+$$
$$F_S = m(g + \vec{a}) = m(g + a)$$
$$F_s > F_g$$

7- What will happen for the apparent weight if the elevator's cable breaks (elevator in free falling a= -g)

$$F_S = m\,(g + \vec{a}\,) = m\,(g - g) = 0$$

$F_s = 0$ (Weightless) (no weight)

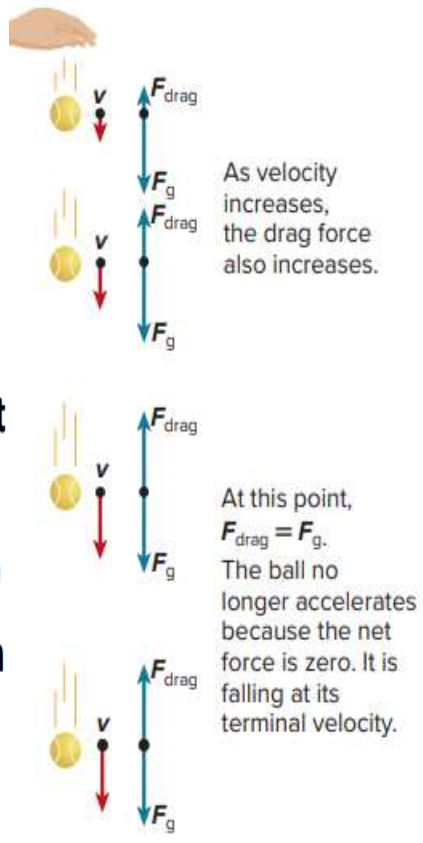
Drag force

Drag force is the force exerted from the fluid (liquid or gas) to the object moving in the fluid and always the drag force is opposite direction to the object motion

- When velocity for the object increases the drag force will increase (direct proportional)
- When the surface area of the object increases the drag force will increase, too
- Air resistance is an example of drag force because always air resistance opposes to the object motion

Terminal velocity

- The drag force in this example is the air resistance
- When the person goes down his weight (Fg)does not change
- When the person goes down the velocity increases so the drag force increases, too
- When the person goes down Fnet decreases because drag force increases Fnet = F_d- Fg
- In one point in the air(fluid) ,drag force equals person weight(Fg) and Fnet = 0 $F_d = F_g$,the person will complete his motion with the final velocity which reach it in this point(terminal velocity)



20. On Earth, a scale shows that you weigh 585 N.

a. What is your mass?

b. What would the scale read on the Moon ($g = 1.60$ N/kg)?

21. CHALLENGE Use the results from Example Problem 3 to answer questions about a scale in an elevator on Earth. What force would be exerted by the scale on a person in the following situations?

a. The elevator moves upward at constant speed.

b. It slows at 2.0 m/s^2 while moving downward.

c. It speeds up at 2.0 m/s^2 while moving downward.

d. It moves downward at constant speed.

e. In what direction is the net force as the elevator slows to a stop as it is moving down?