April 24, 2018

1) answers pg 137 #1-4/Force of Gravity WS

2) Common Forces

- Force of Friction

pg 137 #1-4

1. The weight of a 2.3 kg bowling ball on Earth.

$m = 2.3\,kg$
$g = 9.81\,m/s^2$
$F_g = ?$

$F_g = mg$
$= (2.3)(9.81)$
$F_g = 23\,N$

2. You have a weight of 652.58 N [down] while standing on a spring scale on Earth near the equator

a) Calculate mass

$F_g = 652.58\,N\,[down]$
$g = 9.7805\,m/s^2$
$m = ?$

$F_g = mg$
$\frac{652.58}{9.7805} = \frac{m(9.7805)}{9.7805}$
$67\,kg = m$

b) Determine your weight on Earth near the North Pole.

$m = 67\,kg$
$g = 9.8322\,m/s^2$
$F_g = ?$

$F_g = mg$
$= (67)(9.8322)$
$= 659\,N$

c) Determine your weight on ISS Why would this value be impossible to verify experimentally?

$m = 67\,kg$
$g = 9.0795$
$F_g = ?$

$F_g = mg$
$= (67)(9.0795)$
$= 608\,N$

pg 137 # 1-4

3. LRV has a mass of 209 kg regardless of where it is, but its weight is much less on the surface of the Moon than on Earth. Calculate the LRV's weight on Earth and on the moon.

$m = 209\,kg$
$g_{earth} = 9.81\ m/s^2$
$F_g =$

$F_g = mg$
$= (209)(9.81)$
$= 2050\ N$

$m = 209\,kg$
$g_{moon} = 1.64\ m/s^2$
$F_g = ?$

$F_g = mg$
$= (209)(1.64)$
$= 343\ N$

4. A 1.00 kg mass is used to determine the acceleration due to gravity of a city-sized asteroid. Calculate the acceleration due to gravity if the mass has a weight of 3.25×10^{-2} N [down]

$F_g = mg$

$$\frac{3.25 \times 10^{-2}}{1.00\,kg} = \frac{1.00\,kg\ g}{1.00\,kg}$$

$3.25 \times 10^{-2}\ m/s^2$

1 An object's mass and weight are both a measure of the force of gravity.

True

False

2 There is not a force of gravity from the Earth on board the ISS.

True

False

3 The farther you are from the Earth the weaker the force of gravity.

True

False

4 In which quantitiy is the distance between masses accounted for?

A F_g

B m

C g

5 In the absence of air and at the same location on the surface of the Earth _____

A all objects fall at the same rate.

B heavier objects fall faster than lighter objects.

C pointy objects fall faster than flat objects.

6 At the North Pole, what is the weight of an 82 kg object?

A 82 N

B 806 N

C 8.34 N

7 What mass, located at the equator, would have a weight of 1450 N.

A 14 182 kg

B 148 kg

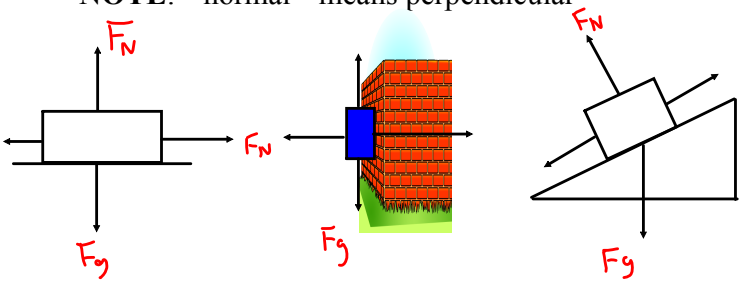
C 0.00675 kg

Common Forces

F_a : an ***applied*** force
- a push or pull you exert on an object

F_N : the ***normal*** force
- a force that acts perpendicular to the surface on which an object rests

NOTE: "normal" means perpendicular

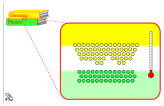


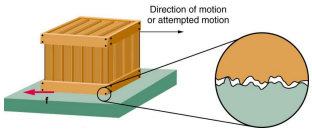
F_T : ***tension***
- the force that acts along a rope, wire, string, etc.

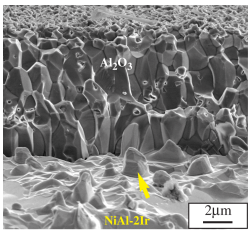
F_e : *elastic*
- the force that an elastic pulls with (dependant on distance stretched or compressed).

The Force of Friction

1. What is friction?
2. What causes it?







It is very important to have a detailed understanding of friction as all motion is affected by some type of friction (surface, fluid, air, etc).

Reading: Friction

MHR: Pg. 137 - 145 Follow Up Questions:

1. In detail and with physics terminology, what is friction the result of?
2. Does the force of friction have a dependance on surface area? Provide an explanation.
3. Summarize 3 situations where we will not apply the basic theory of surface friction.
4. Suppose I have two smooth (to the touch) pieces of iron, how come they do not fuse when I bring them together?

Attachments

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