Newton's 2nd Law & Weight

10

1. Weight D	A. The units of weight and force.
2. Mass E	B. Newton's Second Law mathematically.
3. N A	C. The acceleration due to gravity = -9.8m/s^2.
4. F = ma B	D. The force of gravity on matter.
5. g C	E. How much matter an object contains.

Will an object accelerate faster or slower?
If its mass is increased? slower
If the force pulling on it decreases? slower
If the force pushing on it increases? faster
If its mass is decreased? faster

Why is F = ma not entirely correct?
F is only one force
It should be Fnet = ma all forces

More, less, or the same as on the Earth?
When an astronaut lands on the moon:
The astronaut's mass is: same
The astronaut's weight is: less
The astronaut's inertia is: same

Without air friction, which falls faster, heavy or light objects?
Why? same acceleration due to gravity

If there is air friction, which falls faster?
Why? heavier
Fair has a greater effect on the lighter object

How fast is the acceleration due to gravity? -9.8m/s^2

If an object falls from rest, how fast will it be going:
after 1 second? 9.8m/s after 2 seconds? 19.6m/s after 6 seconds? 58.8m/s

Using the weight equation, calculate the weight of a 45 kg rock?
g 10m/s^2, m 45kg, Fw ?
Fw = mg = 10m/s^2 · 45kg = 450N

Calculate the mass of a 10 N apple.
g 10m/s^2, m ?, Fw 10N
m = Fw/g = 10N / 10m/s^2 = 1kg

What is the mass of a 100 gram apple in kilograms? 0.1kg
1000g = 1kg

What is the weight of the above apple?
Fw ?, m 0.1kg, g 10m/s^2
Fw = m·a = 0.1kg · 10m/s^2 = 1N

What is the weight of a 250 N object?
Fw = 250N

If 100 kg person weighed 400 N on the planet Zorg, what is the acceleration due to gravity on Zorg?
Fw = 400N, m = 100kg, g = ?
g = Fw/m = 400N / 100kg = 4m/s^2

Which of Newton's Three Laws Applies: Law 1, 2, or 3?

1 Pushing a cart down the hall, when you try to turn it it tries to go straight.

2 More acceleration takes more force.

3 When you push your knuckles into a table, it hurts your knuckles.

3 A ball thrown into the ground bounces back up.

A 6 kg object experiences a 5 m/s^2 acceleration? Find the force that caused this acceleration.
F ?, m 6kg, a 5m/s^2
F = ma = 6kg · 5m/s^2 = 30N

A 3 kg rock accelerates to the left at 12 m/s^2. Find the net force that caused this.
F ?, m 3kg, a -12m/s^2
F = ma = 3kg · -12m/s^2 = -36N

A 12 kg box is pushed to the left by a 48 N force. Find its acceleration.
F -48N, m 12kg, a ?
F = ma, a = F/m = -48N / 12kg
a = -4m/s^2

30 N ← 5 kg → 25 N
A) Calculate the object's net force.
-30N + 25N = -5N
B) Calculate the object's acceleration.
Fnet = -5N, m 5kg, a ?
F = ma, a = F/m = -5N / 5kg = -1m/s^2

40 N ← 8 kg → 24 N
Calculate the object's acceleration.
Fnet = -40N + 24N = -16N
Fnet -16N, m 8kg, a ?
F = ma, a = F/m = -16N / 8kg = -2m/s^2

a = 6 m/s^2 →
4 kg
F = ? F = 30 N
Find the force pulling left.
Fnet = ma
F$_1$ + 30N = 4kg · 6m/s^2
F$_1$ + 30 = 24
F$_1$ = -6N

Fnet = F$_1$ + 30N, m 4kg, a 6m/s^2

12 N pulls to the left and 20 N pulls to the right on a 2 kg object.
Draw the problem:
12N ← 2kg → 20N

Calculate the object's acceleration.
Fnet = -12N + 20N = 8N
m = 2kg, a = ?
F = ma, a = F/m = 8N / 2kg = 4m/s^2