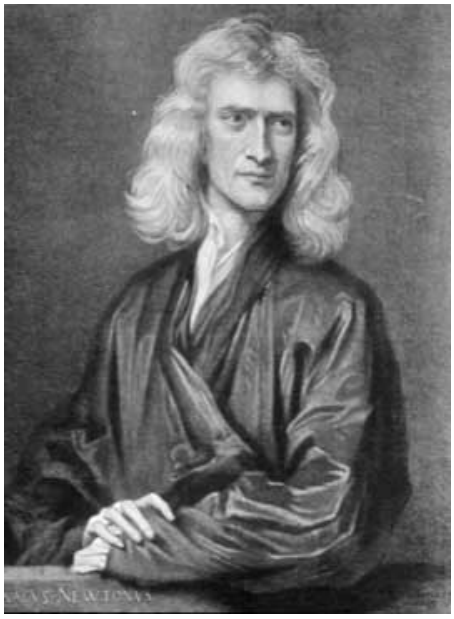
Sir Isaac Newton



1643-1727

N1: If no net force acts on an object, it continues to move at constant velocity.

Inertia: (not a force!) The property of matter which resists changes in its motion.

Mass: A measure of the inertia of an object.

If the sum of all the forces acting on an object = 0 it is said to be in equilibrium.

N2: A force acting on a system produces an acceleration which is proportional to and in the same direction as the force.

$$\boxed{F = ma}$$

Thought question:
A force of 5 N is the only force exerted on a block and the acceleration of the block is measured. When the same force is the only force exerted on a second block, the acceleration is three times as large. What can you conclude about the masses of the two blocks?

What force would be necessary to accelerate a 5 kilogram mass at 3.2 m/s^2

What force must act on a 3 kg mass which is moving at 12 m/s in order to bring it to rest in 3 s?

A box having a mass of 10 kilograms sits on the floor. If a force of 5 N is applied to it, and is the only force acting what acceleration will be produced?

Friction - a contact force which acts to oppose sliding motion between surfaces.

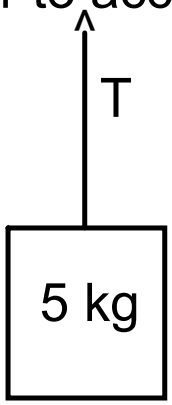
A box having a mass of 10 kilograms sits on the floor. A horizontal force of 5 N is applied to it and it accelerates horizontally at 0.2 m/s.^{2}
Find the magnitude and direction of the force of friction.

Problem Solving Steps:

1. Read the problem
2. Draw a diagram - label forces
3. Write down the equation
4. Substitute in numbers and units.

HW:
Read textbook pages 87-96
Page 101 do # 23,25

A rope is attached to a box which has a mass of 5 kilograms. What force must be applied to the rope in order to accelerate the box upward at 3 m/s ^{2}?



(Text page 113 # 70
A grocery sack can withstand a maximum of 250 N before it rips. Will the bag holding 15 kg of groceries that is lifted from the checkout counter at an acceleration of 7.0 m/s^2 hold?

(Refrain):
First the problem read,
then to the diagram proceed,
and then you write down every
formula you know.
If you keep
the numbers and the labels straight,
then you may graduate a "Physics Pro."!

Doing Physics problems can be trying, and you'll often find your answers are unfortunately wrong!
If you use the method I'm supplying, then you'll find you're getting answers right before long.

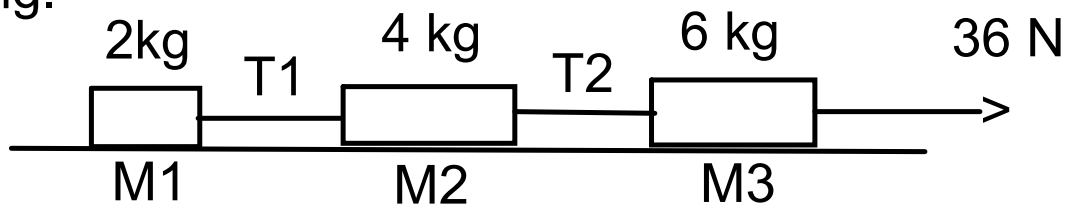
(Refrain): First the problem read, then to the diagram proceed,
and then you write down every formula you know.
If you keep the numbers and the labels straight, then you may graduate a "Physics Pro."!

Doing Physics problems without method is a little bit like beating your poor head against a wall.
But they tell me that if you don't do a lot of problems, then you're headed for a big fall. (Refrain)

When the specter of examination day is drawing close, and all your thoughts seem scrambled in your mind,
You can say with confidence "I know a way to deal with physics mysteries of every kind..."

Page 116 # 96

Three boxes are connected by strings as indicated. Fir the acceleration of each box and the tension in each string.



Page 114 # 73
A 65 kg diver jumps off a 10.0 m tower.
(A) Find the diver's speed when he hits the water.
(B) He comes to a stop 2.0 m below the water. Find the net force exerted by the water.

Homework Page 101
Numbers 64,67,75,79,84,86,88

The Concepts:
(Page 112 # 41)

A physics book is motionless on the top of a table. If you give it a hard push with your hand, it slides across the table and slowly comes to a stop. Answer each of the following questions using Newton's laws.

- A) Why does the book remain motionless before the force is applied by your hand?
- B) Why does the book begin to move when your hand pushes hard enough on it?
- C) Under what conditions would the book remain in motion at a constant speed?