

# CHAIN REACTION CONTRAPTION

"Every action has an equal and opposite reaction" Sir Isaac Newton

## EDUCATIONAL STUFF

Any age can make Chain Reaction Contraptions.

Have an adventure, learn something new and get a sense of achievement.

It involves science, the arts, lateral thinking and problem solving,

One discovers failure as part of success and it enforces the idea that practice and perseverance brings results.

Young children can start to learn simple ideas about gravity and machines.

Older children can be introduced to specific knowledge about physics, construction, design and creative problem solving.

My training is in the Arts and I would never claim to come at my making from a Scientific direction.

However I have learnt a few basics.

I find that, if related directly to the contraptions being made, some relatively complex concepts can be introduced.

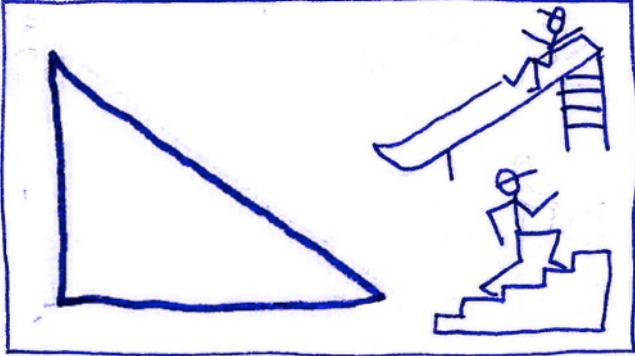
Below are some of the basic principles of Simple Machines, Forces, Motion and Energy.

If you want to get more complex, there are plenty of resources out there.

# **SIMPLE MACHINES**

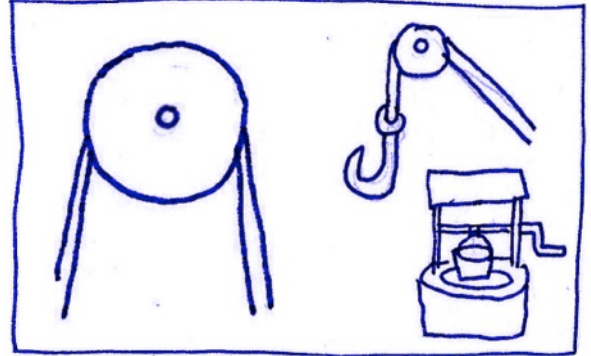
a non-mechanised device that changes the direction of a force  
do work with less force

## **INCLINED PLANE**



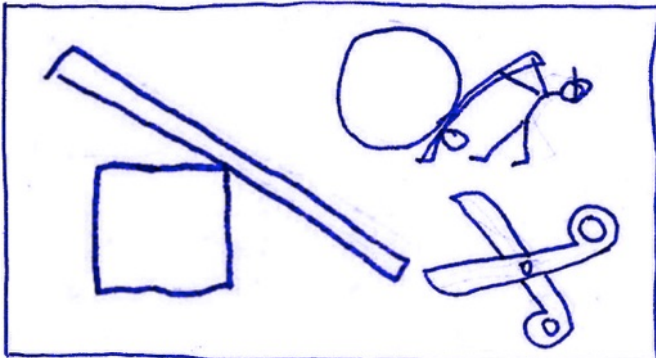
any slope or ramp that makes it  
easier to lift something

## **PULLEY**



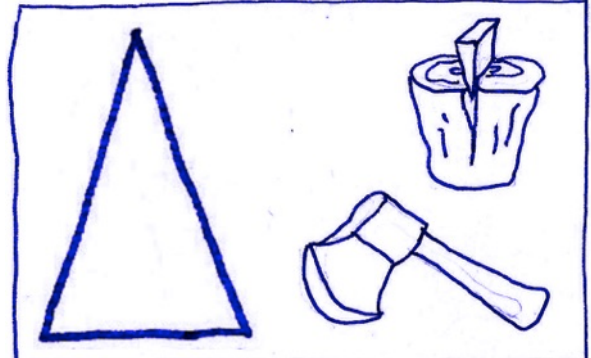
wheel(s) & a rope to raise,  
lower or move a load

## **LEVER**



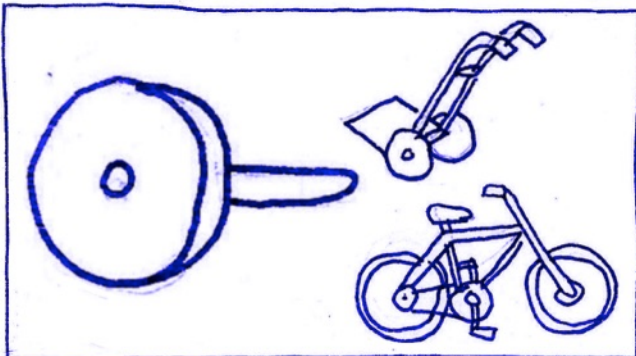
a rod balanced on a fixed point, can help  
lift a heavy weight with less effort

## **WEDGE**



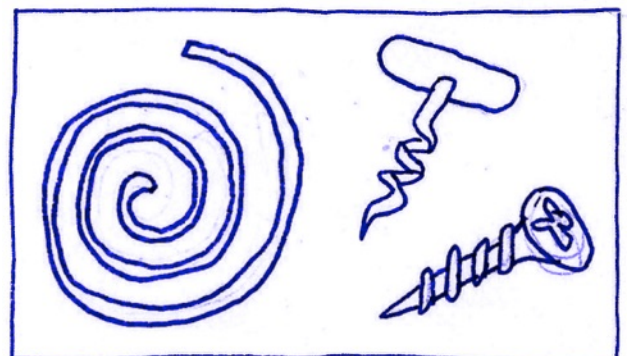
made of 2 inclined planes,  
used to push objects apart

## **WHEEL & AXLE**



used to carry loads around easily  
with less effort

## **SCREW**



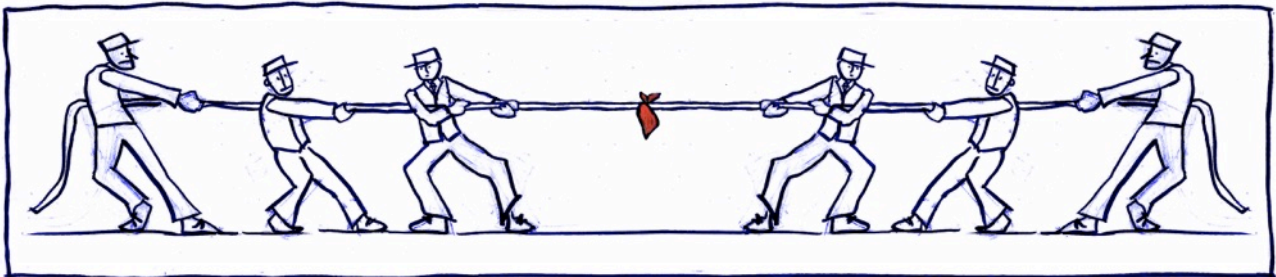
an inclined plane  
wrapped in a spiral

## BALANCED AND UNBALANCED FORCES

**Balanced Forces** are the same size but acting in opposite directions on an object.

When forces on an object are balanced:

- a stationary (still) object will remain stationary
- a moving object will keep moving in the same direction at the same speed



**Unbalanced forces** are greater in one direction than the other on an object

When forces on an object are unbalanced:

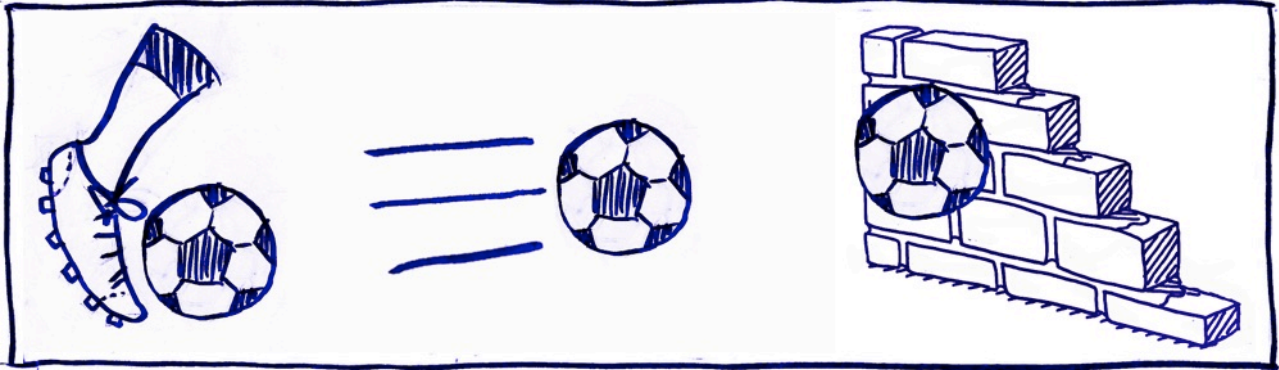
- a stationary (still) object may start to move
- a moving object will change its motion: speed up; slow down or change direction
- objects may change shape

**NET FORCE** is the difference between the 2 forces

# NEWTON'S LAWS OF MOTION

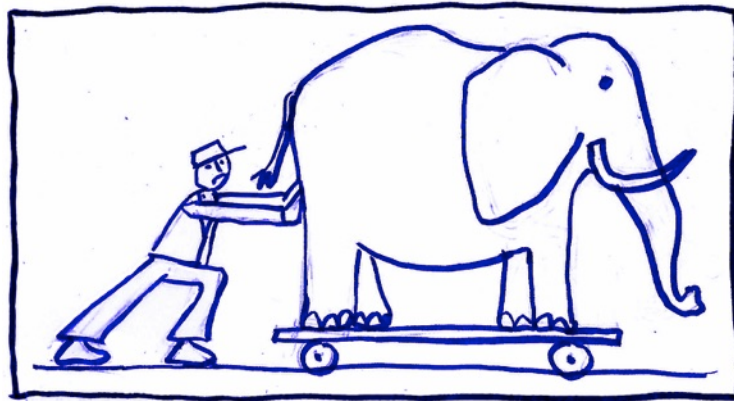
## First law

An object (football) at rest tends to stay at rest and an object in motion tends to stay in motion. Unless acted on by a greater (unbalanced) force



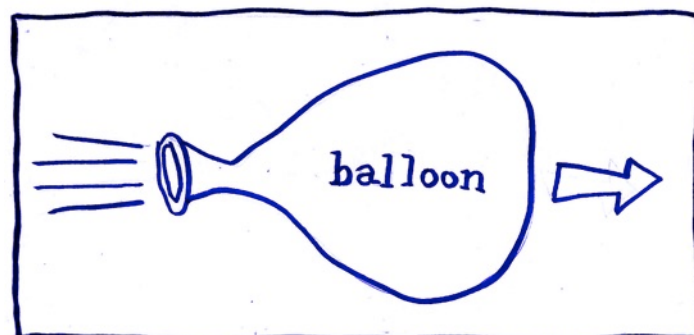
## Second Law

The acceleration of an object (elephant) depends on the net force acting upon an object and the mass of the object



## Third Law

For every action (force) there is an equal and opposite reaction (force)

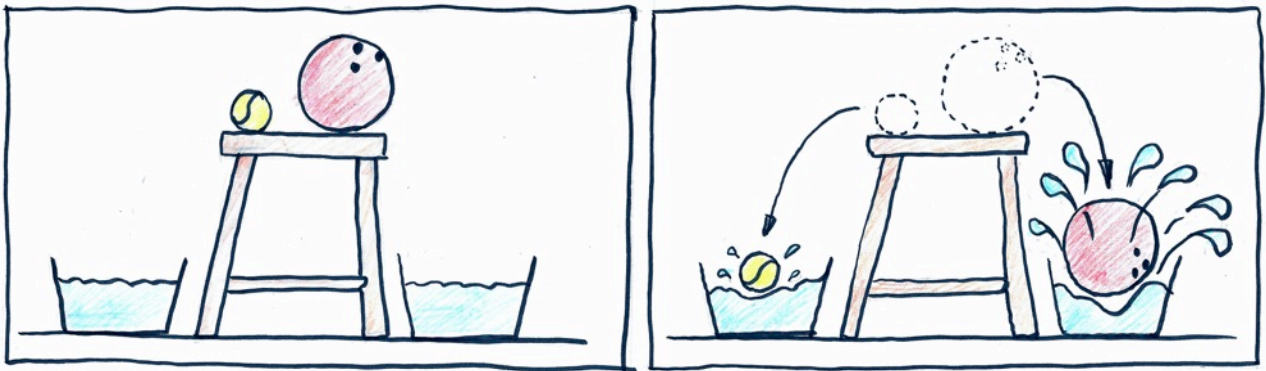


# ENERGY

## Potential Energy

The stored energy an object has because of its position or state.

A bicycle on top of a hill, a book held over your head, and a stretched or compressed spring all have potential energy



1. Both balls had **potential energy** as they rested on the stool
2. By moving and falling off the stool, potential energy changed to **kinetic energy**

Q. Which of the balls had more kinetic energy?

A. The bigger heavier ball

## Kinetic Energy

The energy an object has due to its motion.

As long as an object is moving at the same velocity it will maintain the same kinetic energy.

# REFLECTION

look back, think about what's been learnt  
Doing a drawing and writing a report can be useful.

## Some Questions & Prompts

WHAT WAS YOUR RESEARCH & INSPIRATION FOR YOUR MACHINE ?

WHERE DID YOU GET YOUR ITEMS?

HOW AND WHY DID YOU CHOOSE THEM?

WHAT ARE THE 6 SIMPLE ELEMENTS OF A MACHINE ?

WHICH ELEMENTS DID YOU USE IN YOUR CONTRAPTION?

GIVE EXAMPLES OF THE LAWS OF MOTION, FORCES AND ENERGY IN  
RELATION TO YOUR CONTRAPTION

WHICH DIRECTION DID YOU BUILD THE MACHINE? WHY?

HOW DID YOU SUPPORT THE STRUCTURE AND HOLD STUFF TOGETHER?

WHICH WAS YOUR FAVOURITE SECTION OF THE MACHINE? WHY?

WHAT WORKED WELL?

WHICH SECTION DIDN'T YOU LIKE SO MUCH OR DIDN'T WORK SO WELL?  
WHY?

IF YOU WERE MAKING IT AGAIN WHAT WOULD YOU DO TO CHANGE IT ?

WHAT WAS YOUR FAVOURITE THING ABOUT THE WHOLE PROJECT?

MAKE A DRAWING OF YOUR MACHINE AND LABEL AND DESCRIBE EACH  
ACTION