MAGNETS MOTION and MEASUREMENT
INTRODUCTION to PART 2
MEASUREING WORK DONE BY MAGNETS

The energy from magnets (expressed as magnetic force), is considered as conservative in that is follows the law of conservation of energy "it cannot do work".

A basic set of observations which may lead one to the conclusion, that magnets interacting can do no work, is as follows.

The work done as the motion of two magnets toward one another due to their mutual attraction, is equal to the work done as the motion of returning those two magnets to their original positions, against that mutual attraction. The work output is equal to the work input. The work is canceled out. Or we say, the net work done sums to zero, or that there is no net gain in work done.

The similar conclusion that "gravity is conservative" is reached, when one considers that the same amount of work is done in lifting an object 1 meter **AGAINST GRAVITY**, as is done when that same object is pulled down, 1 meter **BY GRAVITY**. This is why two objects of equal weight, balance with one another, when placed upon the two sides of a balance type of weight scales.

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In order to get "a net gain in work done" by two magnets attracted together, the magnets must be separated **without doing,** just as much work as was done during the motion which was due to their attraction. Finding a method of doing such, is one definition of the "bottom line" in experiments done as an exploration of over unity by means of magnet interactions. The same would apply to magnets in repulsion.

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Force times displacement equals work.

Mechanical work is done when a force acts upon an object and that object is displaced some amount of distance. That force is defined by the magnitude of that objects resistance to displacement (how difficult is it to push or pull that object). Please note that, the measure of that force applied to cause the object's motion, is equal to the measure of the objects opposition to being moved by that force.

When the force is measured as newtons and the distance is measured in meters, the product of their multiplication is stated as either joules of work or joules of energy.

When an object is moved some amount of distance, **in a straight line**, that distance is called the displacement.

One meter of displacement against one newton of force is equal to one joule of work done.

A mass of 102 grams, exerts approximately 1 newton of force (down) in earth's standard gravity (as weight). If we lift that 102 gram mass 1 meter, we do approximately 1 joule of work upon it, as that lifting. Force times displacement equals work. 1 newton times 1 meter equals 1 joule of work.

MEASUREING WORK DONE BY MAGNETS
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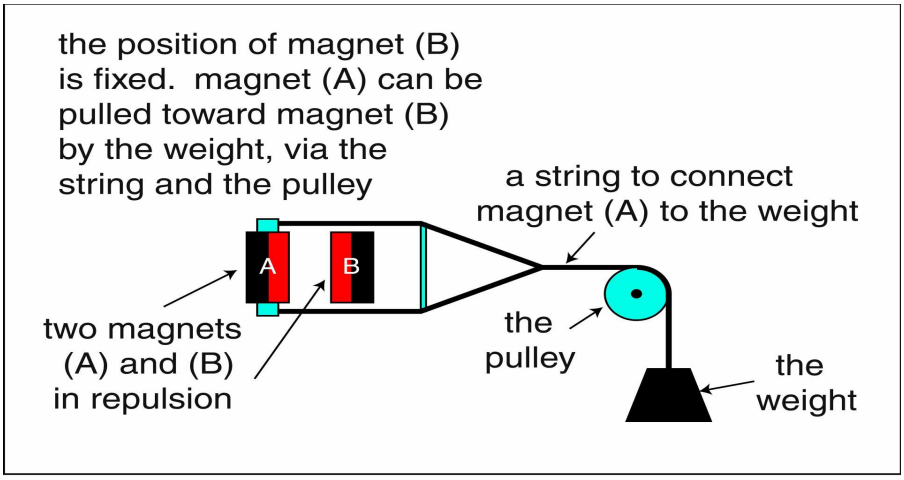

In the drawing above, as magnet (A) approaches magnet (B) the force (weight) needed, in order to cause further approach, increases. This is because magnets (A) and (B) are in repulsion and magnetic force is greater at nearer distances. Many average force times distance calculations must be done, in small increments, in order to calculate the amount of work done in bringing the two magnets together (from some specific distance to some other specific distance).

The sum of many measurements and calculations, in which the force (weight) has been increased by some small amount, and the measure of the displacement of magnet (A) toward magnet (B) (caused by that increased weight), gives an approximation of the the work done in bringing the magnets together.
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Please note, the sum of, the force of the previous force, and the present force, are used to arrive at an **average.** This average is multiplied by the current small displacement measurement, which the present small increase in force has caused.

The previous force applied, plus, the present force applied divided by 2, is equal to the average force during the present displacement increment. This averaged force multiplied by the present displacement increment, gives an approximation of the work done during that displacement increment.

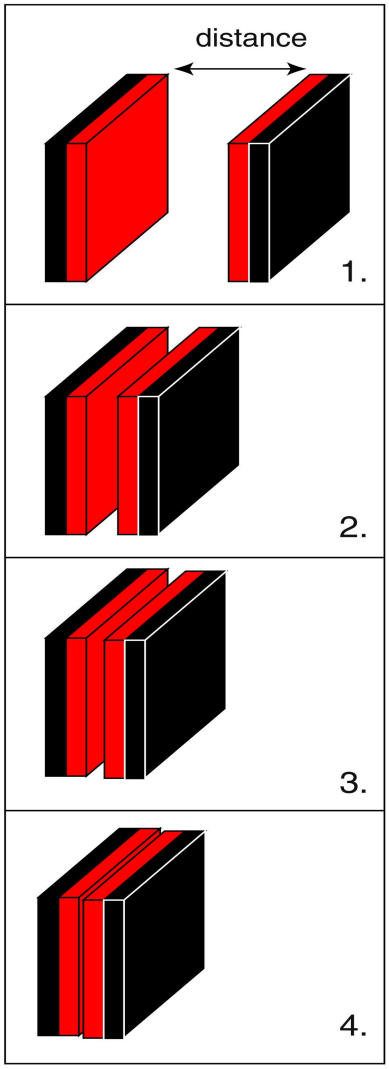
The sum of these many, averaged force times displacement calculations, gives us an approximation of the total work done **UPON THE MAGNETS** as (A) is pulled toward (B).

These measurements and calculations also represent, the amount of work that could be done **BY THE MAGNETS**, if the repelling action of those magnets, were incrementally causing the lifting of those weights, in decreased increments of weight, while at increments of increasing distances between the magnets. The work in would be equal to the work out. With sufficient precision during the measuring process, these approximations can be, for all practical purposes, equal the actual work done as either, by or upon the magnets. These measurements and calculations, would confirm that **under these conditions**, magnet interactions are in fact, conservative.

MEASUREING WORK DONE BY MAGNETS

The drawing below shows the process (in 3 iterations), of calculating the work done in bringing two magnets together against their mutual repulsion. Three intervals of measurements is too few in number to accurately represent the work done. The increments of weight increase should be smaller. Using smaller increments is equivalent to a higher precision in the process.

If the millimeters are converted into meters and the grams into newtons, the work done in positions 2, 3, and 4 can be stated as joules of work or joules of energy. Totaling the work done in positions 2, 3, and 4 gives a crude estimation of the work done in forcing the magnets together against repulsion. Please note that a force gauge which is calibrated to read directly in newtons of force might be used in place of weight objects.



Position 1... distance 1... force 1

distance 1 = 25 mm
force 1 = 0 grams

Position 2... distance 2... force 2

distance 2 = 5 mm
force 2 = 50 grams
0 g + 50 g = 50 g
50 / 2 = 25 g = average force
25 mm - 5 mm = 20 mm displacement
25 g x 20 mm = work done

Position 3... distance 3... force 3

distance = 2 mm
force 3 = 75 grams
50 g + 75 g = 125 g
125 / 2 = 62.5 g = average force
5 mm - 2 mm = 3 mm displacement
62.5 g x 3 mm = work done

Position 4... distance 4... force 4

distance = 1 mm
force 4 = 150 grams
150 g + 75 g = 225 g
225 / 2 = 112.5 g = average force
3 mm - 1 mm = 2 mm displacement
112.5 g x 2 mm = work done