Law of Conservation of Energy:

STARTING ENERGY + WORK(IN/OUT) = FINAL ENERGY

$KE + GPE + EPE + W_{NC} = KE' + GPE' + EPE'$

$\frac{1}{2}mv_0^2 + mgh_0 + \frac{1}{2}kx_0^2 + W_{NC} = \frac{1}{2}mv^2 + mgh + \frac{1}{2}kx^2$

"Crazy long energy equation"

CLEE

We'll use this to solve problems that have lots of energy transfers. There may also be more than one of a certain type of object (like a spring) - so we might need to keep track of two or more very similar terms.

Here are some useful web resources ... there are lots more on YouTube.

https://www.youtube.com/watch?v=lIPWyY__N2A

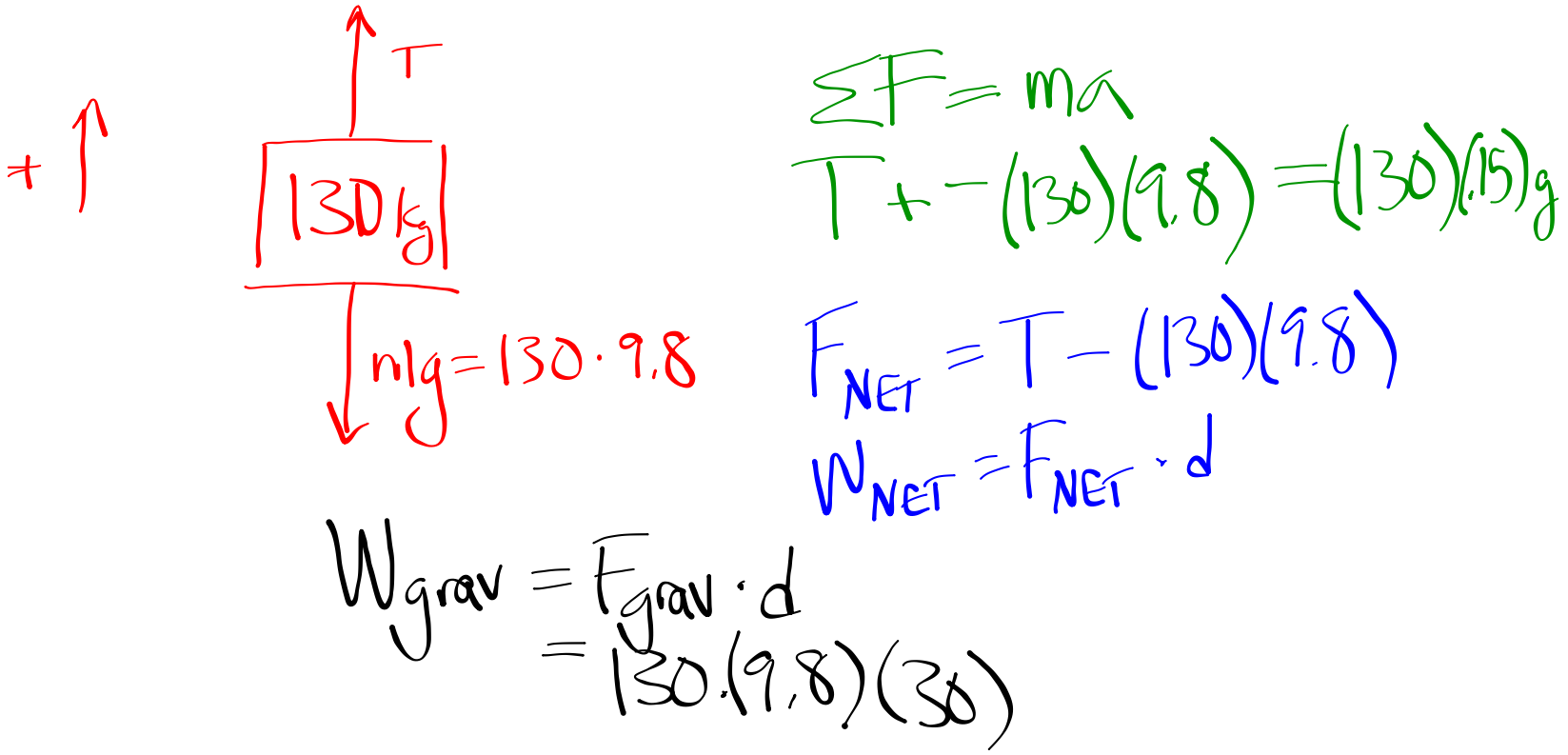
https://www.khanacademy.org/science/physics/work-and-energy/work-and-energy-tutorial/v/conservation-of-energy

https://www.khanacademy.org/science/physics/work-and-energy/work-and-energy-tutorial/v/work-energy-problem-with-friction

https://www.youtube.com/watch?v=Y7WFnqkjg-g

22. A 130-kg load is lifted 30 m vertically by a single cable with an acceleration a = 0.15 g (one "g" is 9.8 m/s^2)
Determine

a) the tension in the cable
b) the net work done on the load
c) the work done by the cable on the load.
d) the work done by gravity on the load.
e) the final speed of the load assuming it started from rest.



2. A 550-N crate rests on the floor. How much work is required to move it at constant speed
   a) 2.0 m along the floor against a friction force of 150 N?
   b) 2.0 m vertically?

$\Delta KE, \Delta GPE, \Delta EPE = 0$

$W_{NC} = 0$

$W_F + W_{Fr} = 0$

23. An elevator cable breaks when a 750-kg elevator is 25 m above a huge spring ($k=4.0\times10^4$ N/m) at the bottom of the shaft. Calculate

a) the work done by gravity on the elevator before it hits the spring.
b) the speed of the elevator just before striking the spring.
c) the amount the spring compresses (Hint: remember that work is done by both the spring and gravity in this part).