CONCEPT: ELASTIC (SPRING) POTENTIAL ENERGY

● Just like objects "STORE" energy when lifted to a height (U_g), springs store energy when compressed/stretched (_____):

Gravitational Potential Energy

$W_g = -mg\Delta y = -\Delta U_g$ | $U_g = mgy$

(Work by **Gravity** = *change* in **Grav Pot. Energy**)

Elastic Potential Energy

$W_S = -\frac{1}{2}kx^2 =$ _____ | $U_{el} =$ _____

(Work by **Spring** = *change* in **Spring Pot. Energy**)

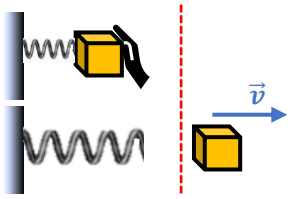
Mechanical Energy		
Kinetic	Potential	
	Elastic	Gravitational

- These 2 energies are the same *TYPE*, so we combine them in the **Conservation of Energy Equation**

$$K_i + U_i + W_{NC} = K_f + U_f$$

$U =$ _____

EXAMPLE: A 4kg block is attached to a spring on a smooth, horizontal surface. The spring constant k = 500 N/m. You push the block with a force of 100N. **(a)** Calculate the compression distance of the spring. **(b)** You release the spring and the box accelerates to the right. Calculate its launch speed.



CONSERVATION OF ENERGY

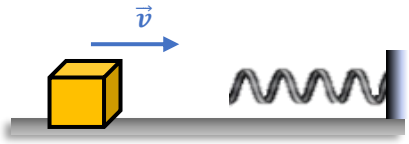
1) Draw Diagram
2) Write Cons. of Energy EQ
3) Eliminate & expand terms
4) Solve

● In spring problems where objects are STATIONARY, solve by using _____

- If objects are MOVING between two points (initial → final), solve by using _____ (because **F ≠ constant!**)

PROBLEM: A 4-kg block moving on a frictionless, horizontal surface with 20 m/s strikes a massless, horizontal spring of force constant 600 N/m. Calculate the maximum distance that the block will compress the spring by.

A) Δx = 0.365 m
B) Δx = 1.63 m
C) Δx = 2.00 m
D) Δx = 2.67 m



CONSERVATION OF ENERGY

1) Draw Diagram
2) Write Cons. of Energy EQ
3) Eliminate & expand terms
4) Solve

PRACTICE: A 4-kg block moving on a flat surface strikes a massless, horizontal spring of force constant 600 N/m with a 20 m/s. The block-surface coefficient of friction is 0.5. Calculate the maximum compression that the spring will experience.