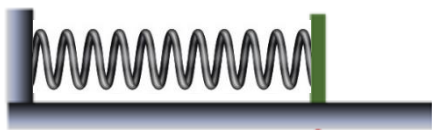


CONCEPT: Hooke's Law & Springs

- When you push/pull against a spring (F_A), spring pushes back in the _____ direction. (Action-Reaction!)

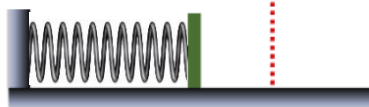
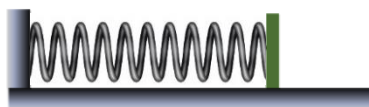


$$F_s = -F_A = \underline{\hspace{2cm}}$$

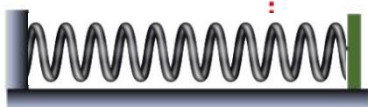
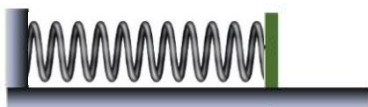
→

$$|F_s| = |F_A| = \underline{\hspace{2cm}}$$

Ex. 1: You push on a spring with a force of 120N. The spring constant k is 20. How much does it compress?



Ex. 2: How much force is required to pull a spring of length 10m out to 16m, if the spring constant k is 40N/m?



- $x = D$ _____

- Relaxed position → _____ ($x = \underline{\hspace{1cm}}$)

- NOT the spring's length → ($x = \underline{\hspace{1cm}}$)

- $k =$ spring's force constant

- Measures how _____ the spring is.

- Higher $k \rightarrow$ _____ to deform

- Ex. 1: $x =$ $k =$ $F =$

- Ex. 2: $x =$ $k =$ $F =$

- Units of k : _____

- $F_s = R$ _____ force, always opposes deformation

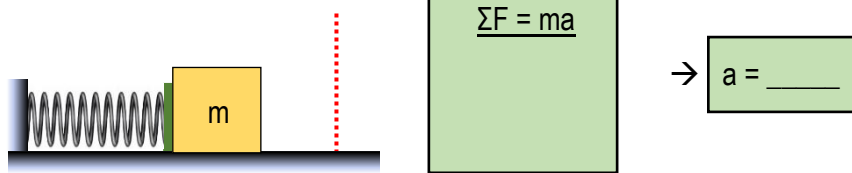
PRACTICE: A 1.0 m-long spring is laid horizontally with one of its ends fixed. When you pull on it with 50 N, it stretches to 1.2 m. **(a)** What is the spring's force constant? **(b)** How much force is needed to compress it to 0.7 m?

CONCEPT: Spring Forces

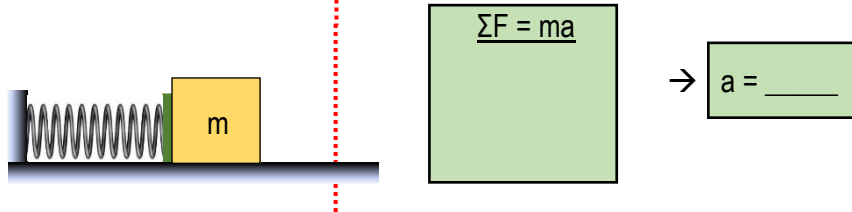
- If you attach a mass to a spring (mass-spring system) and release, the _____ force pulls it back to equilibrium.

- The “m” always refers to the mass of the _____ → (springs are always massless!)

- Compressed:



- Released:



EXAMPLE 1: A 0.60-kg block attached to a spring with force constant 15 N/m. The block is released from rest when the spring is stretched 0.2 m. At the instant the block is released, find **(a)** the force on the block and **(b)** its acceleration.

PRACTICE: You push a 3-kg mass against a spring and release it from rest. Its maximum acceleration is 10m/s^2 when pushed back 0.5m. What is the **(a)** spring constant and the **(b)** restoring force at this point?