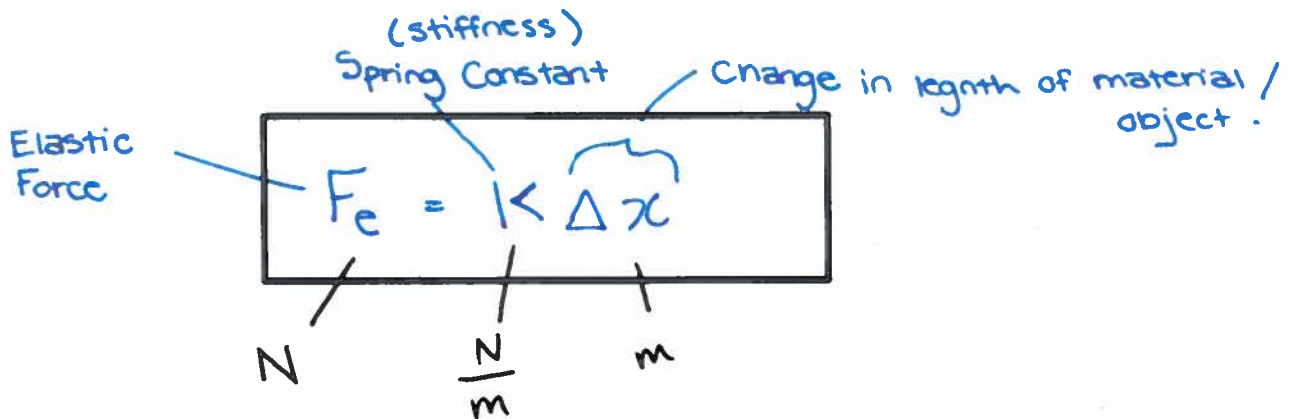**Section 5.5: Hooke's Law**

Elastic Force (F_E): The force with which a distorted object tries to get back to its original/equilibrium state.

Hooke's Law:

(stiffness)
Spring Constant — Change in legnth of material/object.

Elastic Force →

$$F_e = k \Delta x$$

N $\frac{N}{m}$ m

Example: A student stretches an elastic cord with a stiffness of 50 N/m by 15 cm. How much force is the student applying?

$$F_e = k \Delta x$$

Force the cord exerts on student

$$= (50)(0.15)$$

$$F_e = 7.5 \text{ N}$$

By Newton's 3rd law, student must exert 7.5 N on the cord.

Example: A 65 kg girl sits in a redneck slingshot. The elastic material being used has a spring constant of 31 N/m. If the sling is stretched by 22 m, what is her initial acceleration? How many g's is that? Will she survive? Did we make any assumptions?

$$\Sigma \vec{F} = m\vec{a}$$

$$F_e + F_e = (65)\vec{a}$$

$$682 + 682 = 65\vec{a}$$

$$\boxed{21 \text{ m/s}^2 = \vec{a}}$$

Fe

$$F_e = k \Delta x$$
$$= (31)(22)$$
$$= 682 \text{ N}$$

$$\frac{21}{9.8} = \boxed{2.1 \text{ g's}}$$

She should survive.