# 3.6 Springs

The elastic force is a force that works to return a distorted object to its equilibrium (rest) position.

ex. spandex, rubber band, springs, tendon
hockey stick ...

Hooke's Law: The amount of restoring (elastic) force is proportional to the amount of distortion.

$\vec{F}_e = k\Delta x$

Where $\vec{F}_e$ = Elastic Force

k = spring constant (how stiff it is)

= Units are N/m

and $\Delta x$ = distortion from equilibrium (metres)

↳ a.k.a deflection

ex. A student stretches an elastic band with a spring constant fo 50.0 N/m by 15 cm. How much force are they applying?

given: $\Delta x = 15\text{ cm}$
$= 0.15\text{ m}$
$k = 50.0\text{ N/m}$

$\vec{F}_e = k\Delta x$
$= (50.0\text{ N/m})(0.15\text{ m})$
$\vec{F}_e = 7.5\text{ N}$

ex. Connor McDavid uses a composite hockey stick with a spring constant of 1350 N/m. what is the distortion of the stick if he exerts 475 N while taking a slapshot?

given: $k = 1350\ N/m$, $\vec{F}_e = 475\ N$

$$\vec{F}_e = k\Delta x$$

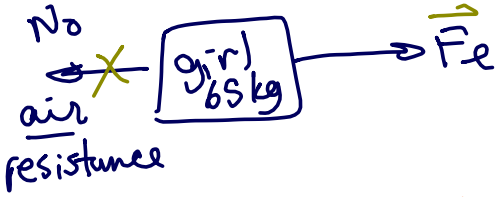
$$\frac{\vec{F}_e}{k} = \frac{k\Delta x}{k}$$

$$\Delta x = \frac{475\ N}{1350\ N/m}$$

$$= 0.352\ m$$

$$\boxed{\Delta x = 35.2\ cm}$$

ex. A 65 kg girl sits in a redneck slingshot that has a spring constant of 10.5 N/m. If the sling is stretched by 45 m, what is her initial acceleration when released?




given: $m = 65\ kg$, $\Delta x = 45\ m$, $k = 10.5\ N/m$

$$\vec{F}_e = k\Delta x$$

$$= (10.5)(45)$$

$$= 472.5\ N$$

$$\vec{F}_{net} = \frac{\vec{F}_e}{m} = \frac{m\vec{a}}{m}$$

$$\vec{a} = \frac{472.5\ N}{65\ kg}$$

$$\boxed{\vec{a} = 7.3\ m/s^2\ [\text{Forward}]}$$

practice: Photocopy #52 - 58, do 59 with a partner and hand in