

# SHM

## SPRINGS

- The spring constant of a spring may be defined as the force required producing an extension of one unit in the spring.  $K = F / x$ .
- Potential energy of the spring  $= \frac{1}{2}Fx = \frac{1}{2} \frac{F^2}{K} = \frac{1}{2}Kx^2$
- If a spring is cut into two pieces (of equal size), each piece will have a force constant double the original.
- When a spring of force constant  $k$  is cut into  $n$  equal parts, the spring constant of each part is  $nk$ .
- If a uniform spring of spring constant  $K$  is cut into two pieces of lengths in the ratio  $l_1 : l_2$ , then the force constants of the two springs will be  

$$K_1 = \frac{K(l_1 + l_2)}{l_1} \text{ and } K_2 = \frac{K(l_1 + l_2)}{l_2}$$
- The spring constant of a spring is inversely proportional to the number of turns.  
 $F / x$  or  $Kn = \text{constant}$  or  $K_1n_1 = K_2n_2$ .
- If two springs of force constants  $k_1$  and  $k_2$  are joined in series, the combined force constant  $k = \frac{k_1k_2}{k_1 + k_2}$ .
- If two springs of force constants  $k_1$  and  $k_2$  are joined in parallel, the combined force constant  $k = k_1 + k_2$ .
- When a body is just dropped on a spring, the maximum compression is double that of when the body rests on it in equilibrium.

