Springs

1. 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.

2. Potential energy of the spring $= \frac{1}{2}Fx = \frac{1}{2}\frac{F^2}{K} = \frac{1}{2}Kx^2$.

3. If a spring is cut into two pieces (of equal size), each piece will have a force constant double the original.

4. When a spring of force constant k is cut into n equal parts, the spring constant of each part is nk.

5. 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

   $K_1 = \frac{K(l_1 + l_2)}{l_1}$ and $K_2 = \frac{K(l_1 + l_2)}{l_2}$.

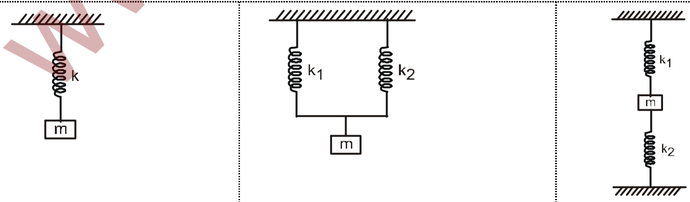
6. The spring constant of a spring is inversely proportional to the number of turns.

   F / x or Kn = constant or $K_1n_1 = K_2n_2$.

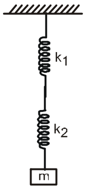
7. If two springs of force constants k_1 and k_2 are joined in series, the combined force constant $k = \frac{k_1k_2}{k_1 + k_2}$.

8. If two springs of force constants k_1 and k_2 are joined in parallel, the combined force constant $k = k_1 + k_2$.

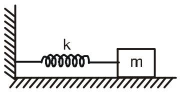
9. When a body is just dropped on a spring, the maximum compression is double that of when the body rests on it in equilibrium.



$T = 2\pi\sqrt{\frac{m}{k}}$ $T = 2\pi\sqrt{\frac{m}{k_1 + k_2}}$ $T = 2\pi\sqrt{\frac{m}{k_1 + k_2}}$



$$T = 2\pi\sqrt{\frac{m(k_1 + k_2)}{k_1k_2}}$$



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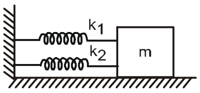
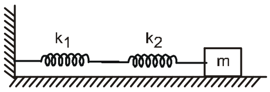


$$T = 2\pi\sqrt{\frac{m}{k_1 + k_2}}$$



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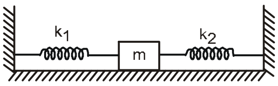

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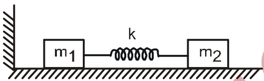

$$T = 2\pi\sqrt{\frac{m_1m_2}{k(m_1 + m_2)}}$$