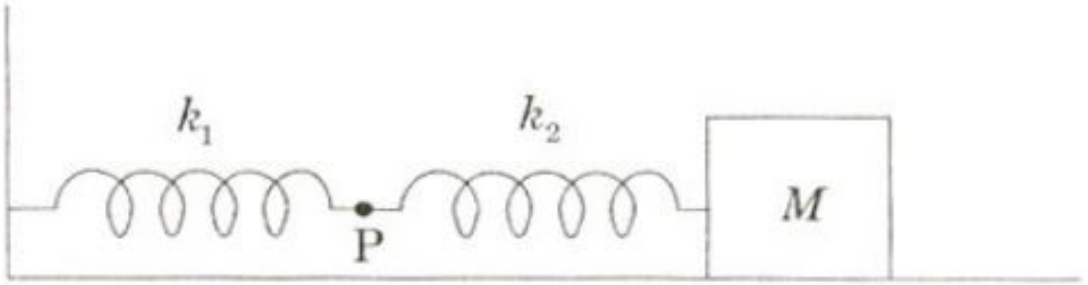
39. The mass M shown in the figure oscillates in simple harmonic motion with amplitude A. The amplitude of the point P is



(A) $\frac{k_1 A}{k_2}$ (B) $\frac{k_2 A}{k_1}$ (C) $\frac{k_1 A}{k_1 + k_2}$ (D) $\frac{k_2 A}{k_1 + k_2}$

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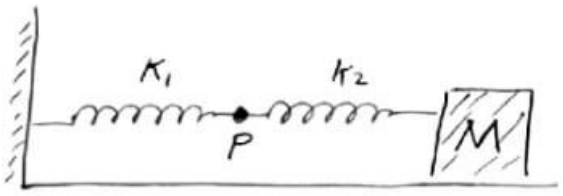
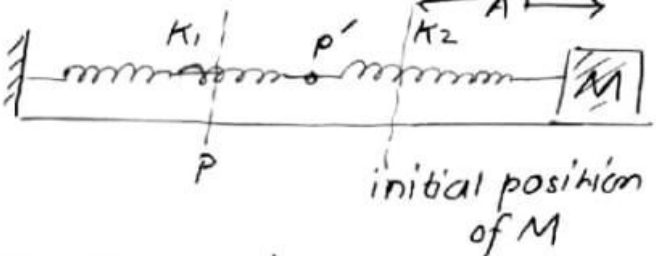


WE NEED TO FIND THE AMPLITUDE OF POINT 'P'.

Amplitude of P would mean the maximum displacement of point P.

Maximum displacement of P would occur when mass 'M' would be at its extreme position.



* Now both the springs would stretch to compensate for this amplitude 'A'. i.e $\boxed{\text{Stretch}_1 + \text{Stretch}_2 = A}$

Let's suppose K_1 is stretched by x_1 & K_2 is stretched by x_2.

Now since springs are in series, so both will have same force.

$$\text{So, } \quad K_1 x_1 = K_2 x_2 \quad \& \quad x_1 + x_2 = A \quad \text{—(1)}$$

$$x_1 = \frac{K_2}{K_1} x_2$$

PUTTING IN —(1)

$$\frac{K_2}{K_1} x_2 + x_2 = A \Rightarrow x_2 = \frac{K_1 A}{K_1 + K_2} \quad \text{and} \quad x_1 = \frac{K_2 A}{K_1 + K_2}$$

So, now Amplitude of P would be the distance to which the first spring extends. which is

$$\boxed{x_1 = \frac{K_2 A}{K_1 + K_2}} \Rightarrow \underline{\text{OPTION (d)}}$$