$$
\begin{aligned}
\mathrm{KE} &= \frac{1}{2}M_1 v_1^2 \\
&= \frac{1}{2}M_1 (R_1\omega)^2 \\
&= \frac{1}{2}M_1 {R_1}^2\omega^2 \\
&= \frac{1}{2}(M_1 {R_1}^2)\omega^2
\end{aligned}
$$

$$
I = MR^2
$$

$$
\mathrm{KE} = \frac{1}{2}I_1\omega^2
$$

$$
\begin{aligned}
\mathrm{KE} &= \frac{1}{2}M_1 v_1^2 + \frac{1}{2}M_2 v_2^2 + \frac{1}{2}M_3 v_3^2 \\
&= \frac{1}{2}(M_1 {R_1}^2)\omega^2 + \frac{1}{2}(M_2 {R_2}^2)\omega^2 + \frac{1}{2}(M_3 {R_3}^2)\omega^2 \\
&= \frac{1}{2}I_1\omega^2 + \frac{1}{2}I_2\omega^2 + \frac{1}{2}I_3\omega^2 \\
&= \frac{1}{2}(I_1 + I_2 + I_3)\omega^2 \\
&= \frac{1}{2}I_{tot}\omega^2
\end{aligned}
$$

$$
\lambda(x) = 3\frac{\mathrm{kg}}{\mathrm{m}} + (3\frac{\mathrm{kg}}{\mathrm{m}})(\frac{x}{10\mathrm{m}})
$$