March 23, Week 9

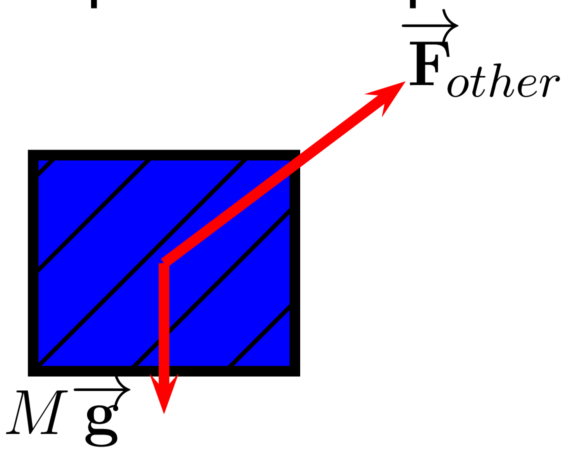
Today: Chapter 7, Elastic Energy

Homework #7:
Mastering Physics: 6 problems from chapter 7
Written Question: 7.60
Due Monday, March 26 at 11:59pm

Makeup Questions now in mailboxes. The score on them is your percentage increase.

Review

When other forces do work on an object (*e.g.* friction), while energy may not be conserved, we can still use the energy equations to predict characteristics of the motion.



$$\frac{1}{2}Mv_1^2 + Mgy_1 + W_{other} = \frac{1}{2}Mv_2^2 + Mgy_2$$

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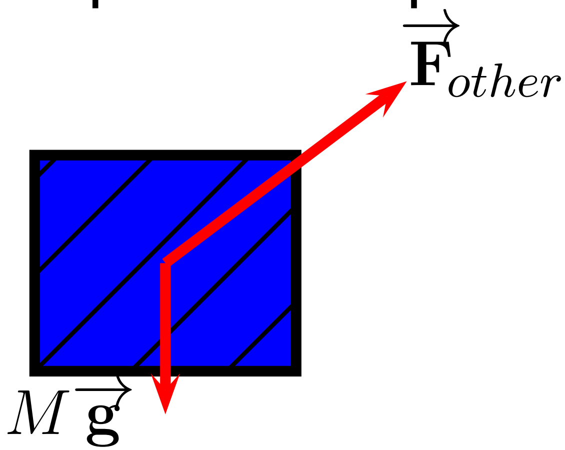

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Example: A mass slides down a $23°$, 2-m long incline. If it starts with speed $5\,m/s$ and $\mu_k = 0.6$, what is its speed at the bottom?

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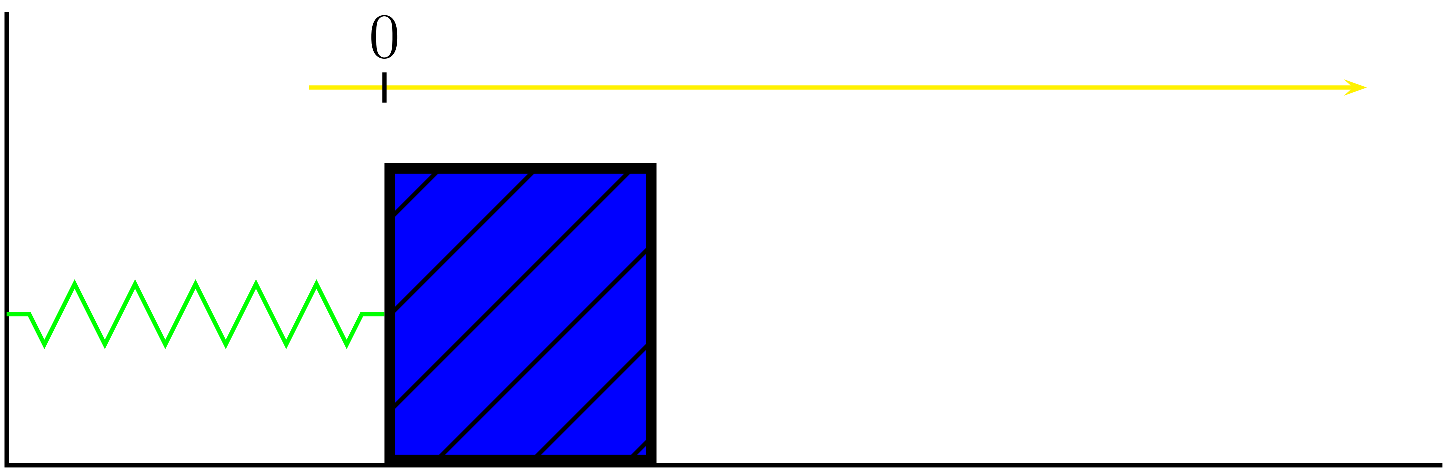

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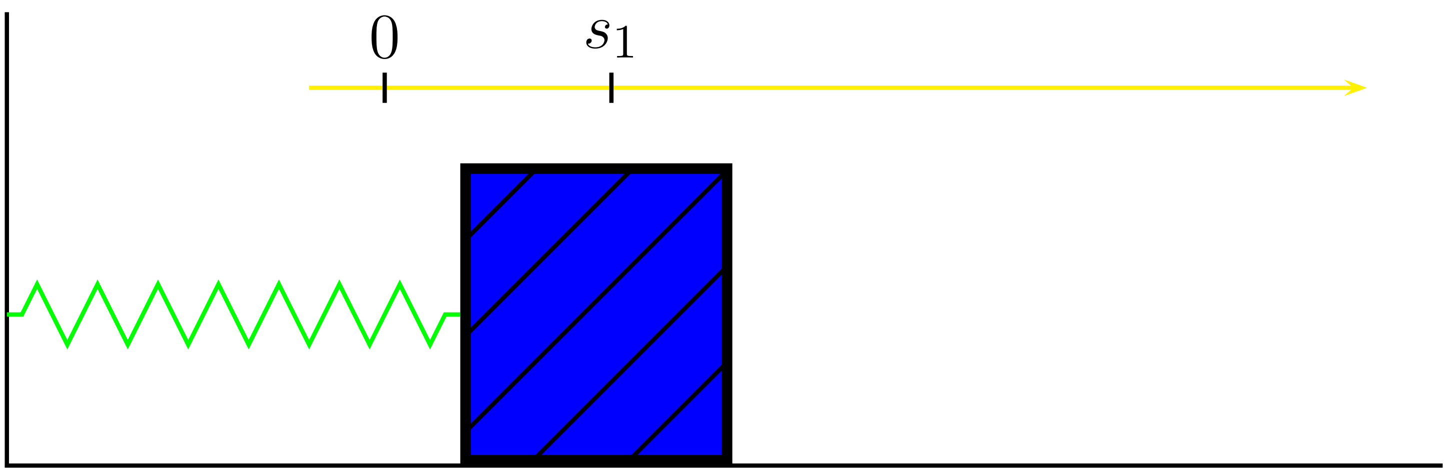

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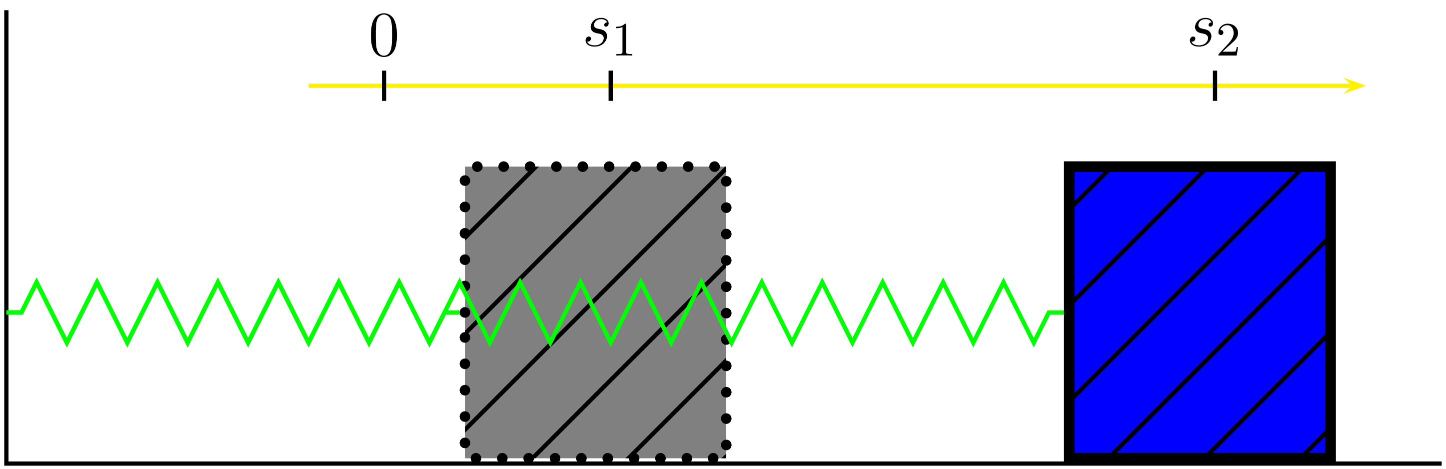

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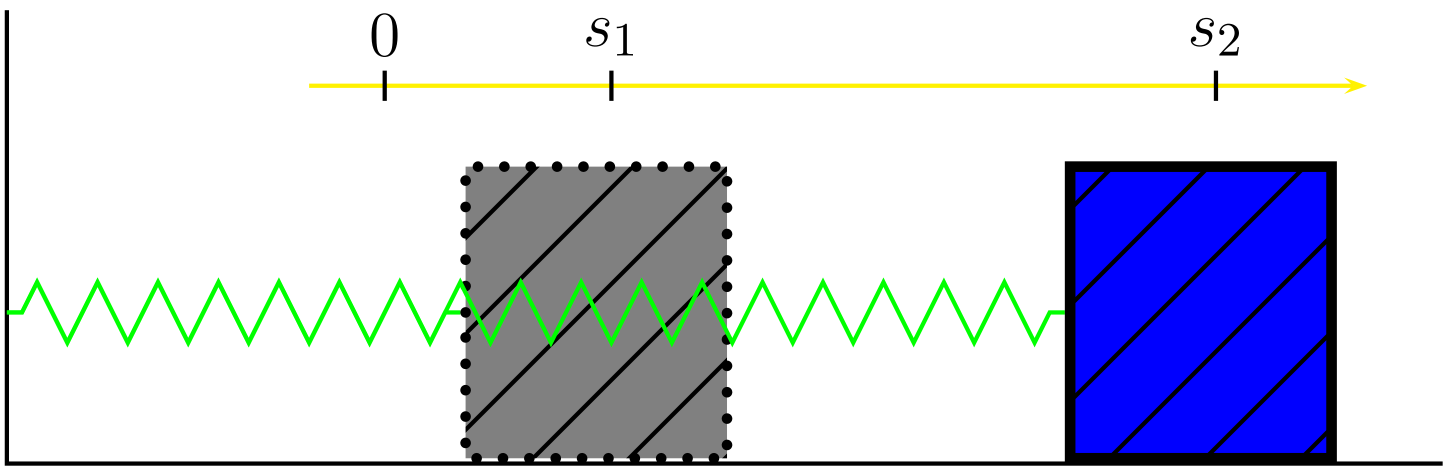

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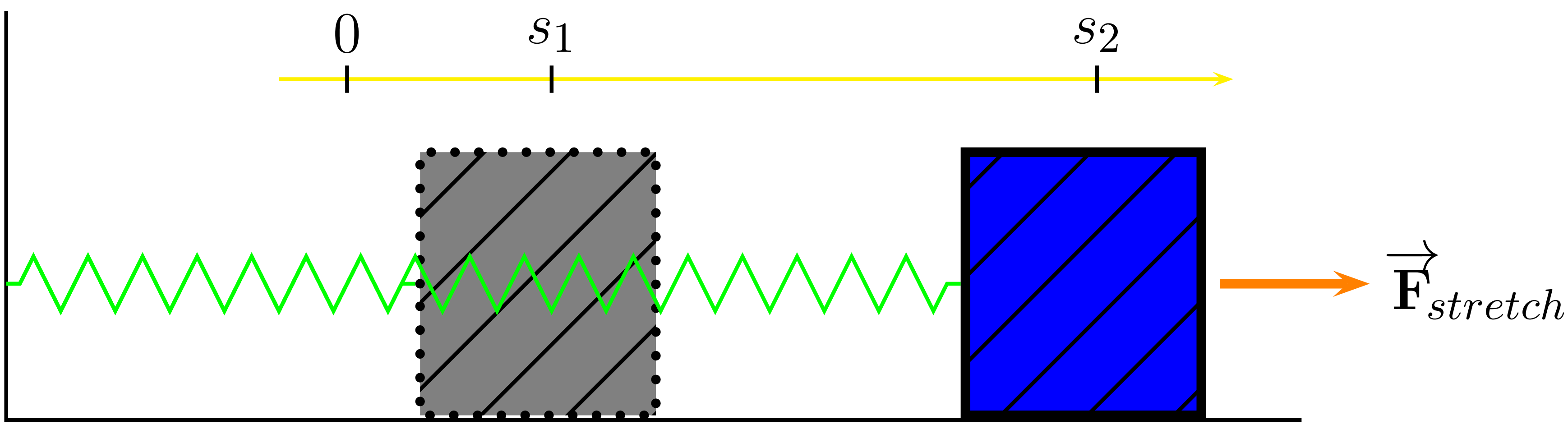

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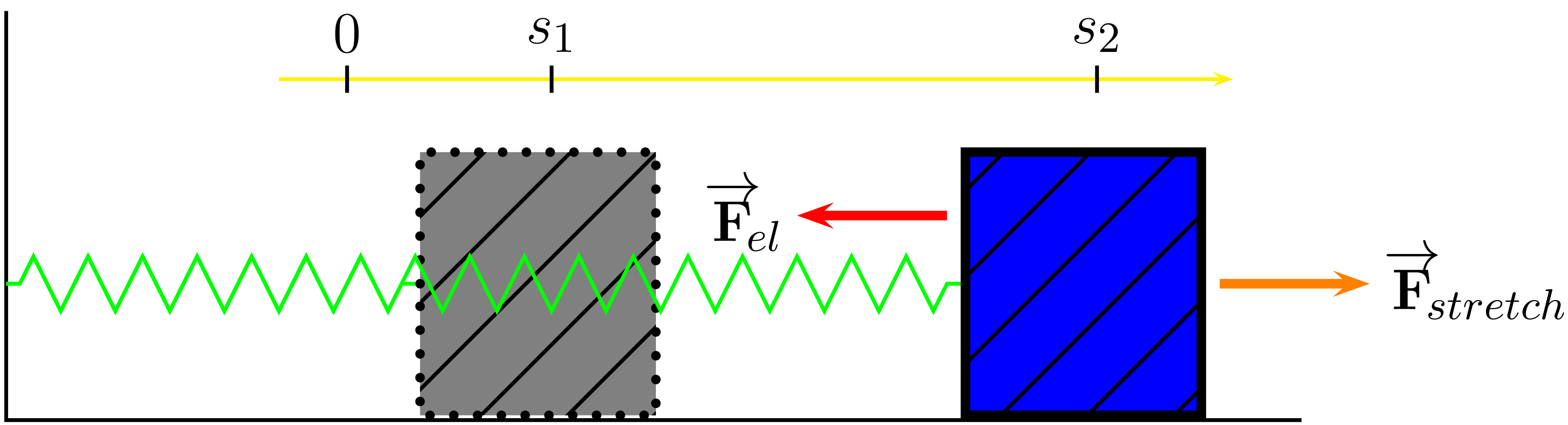

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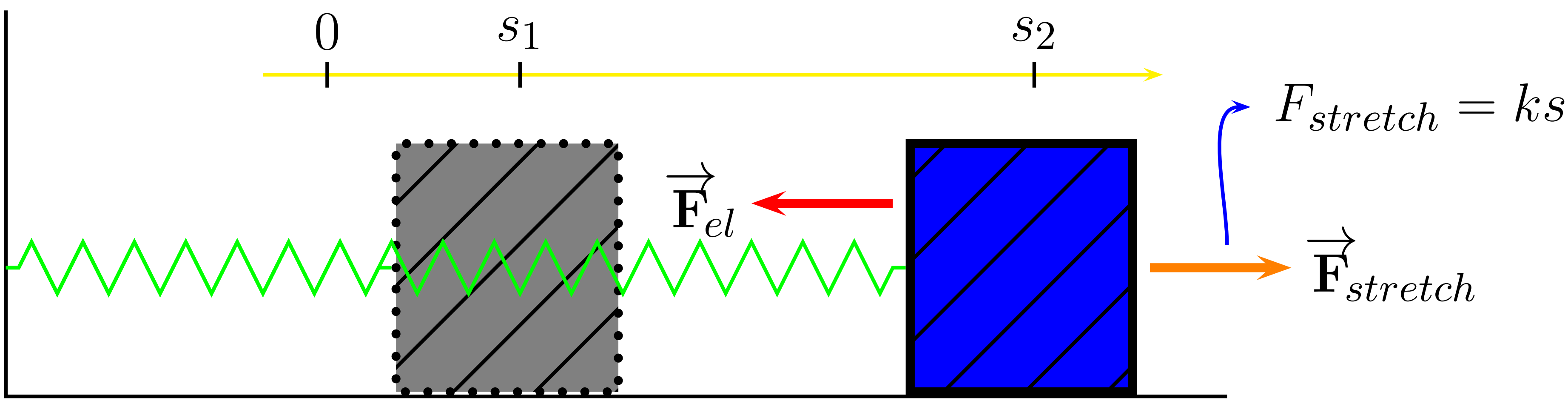

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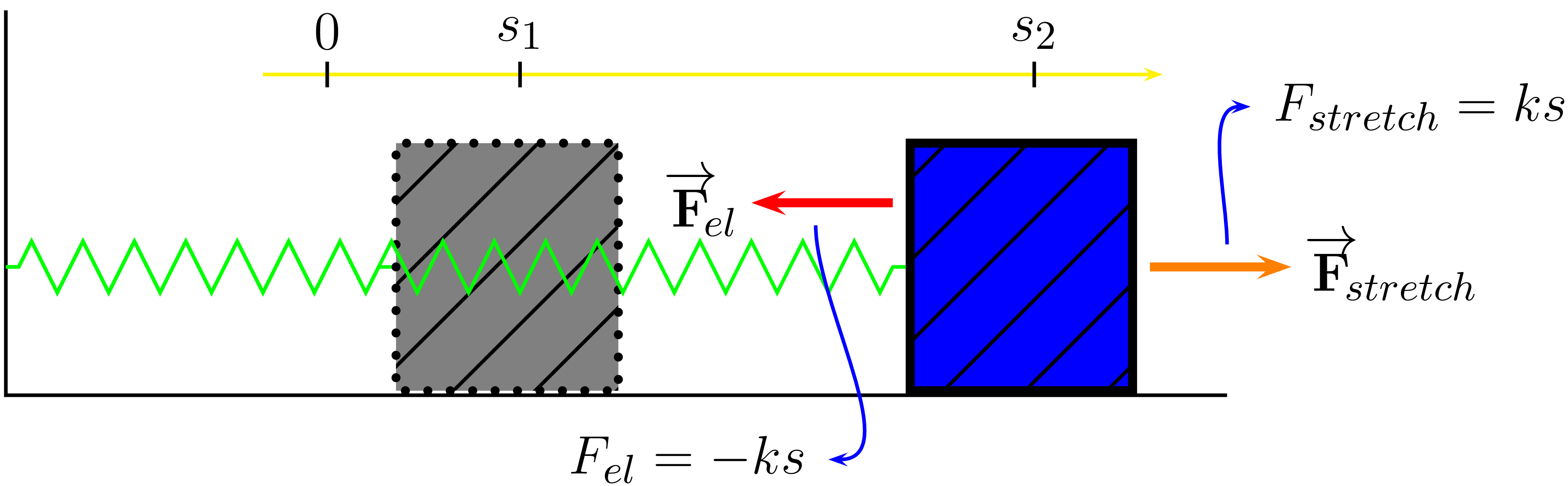

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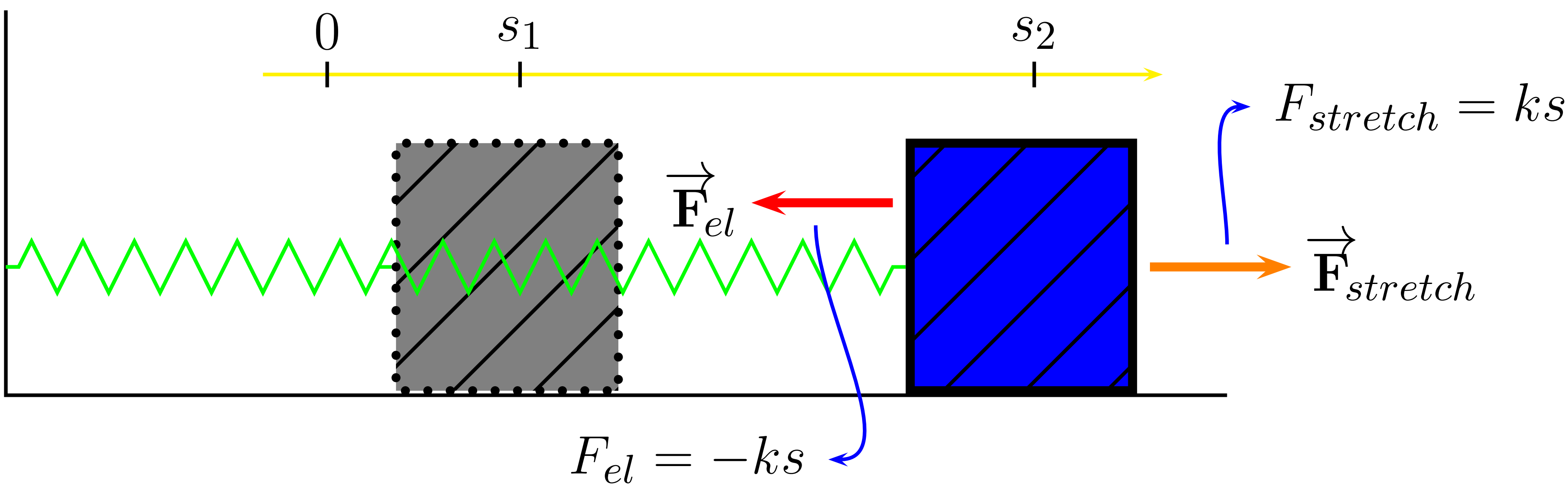

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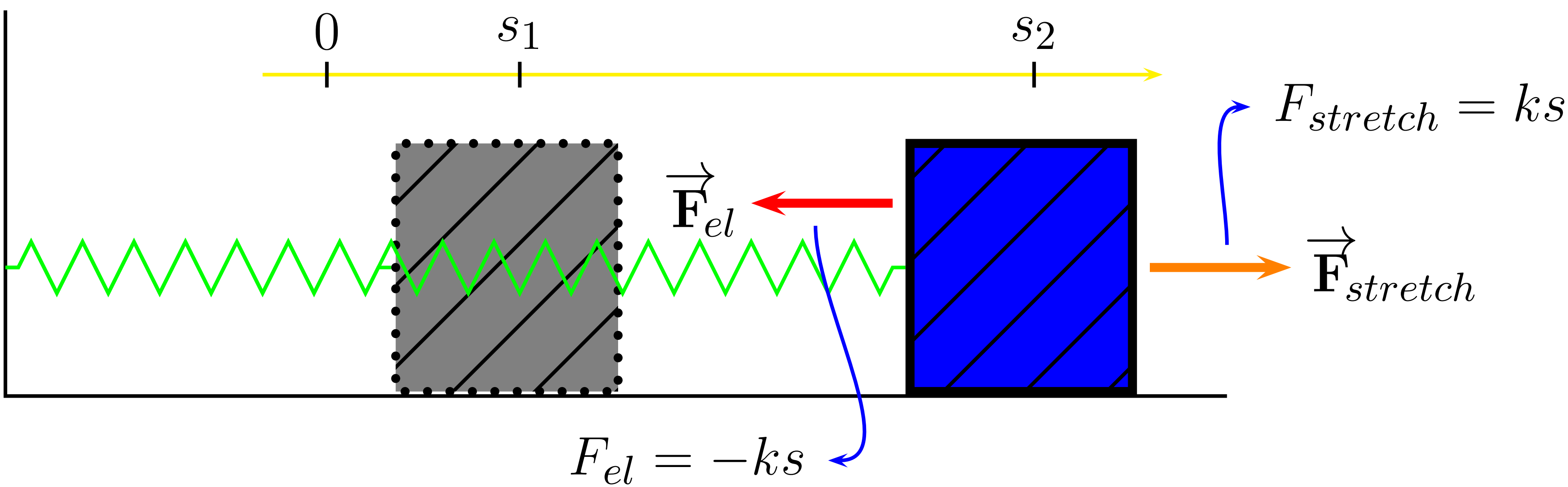

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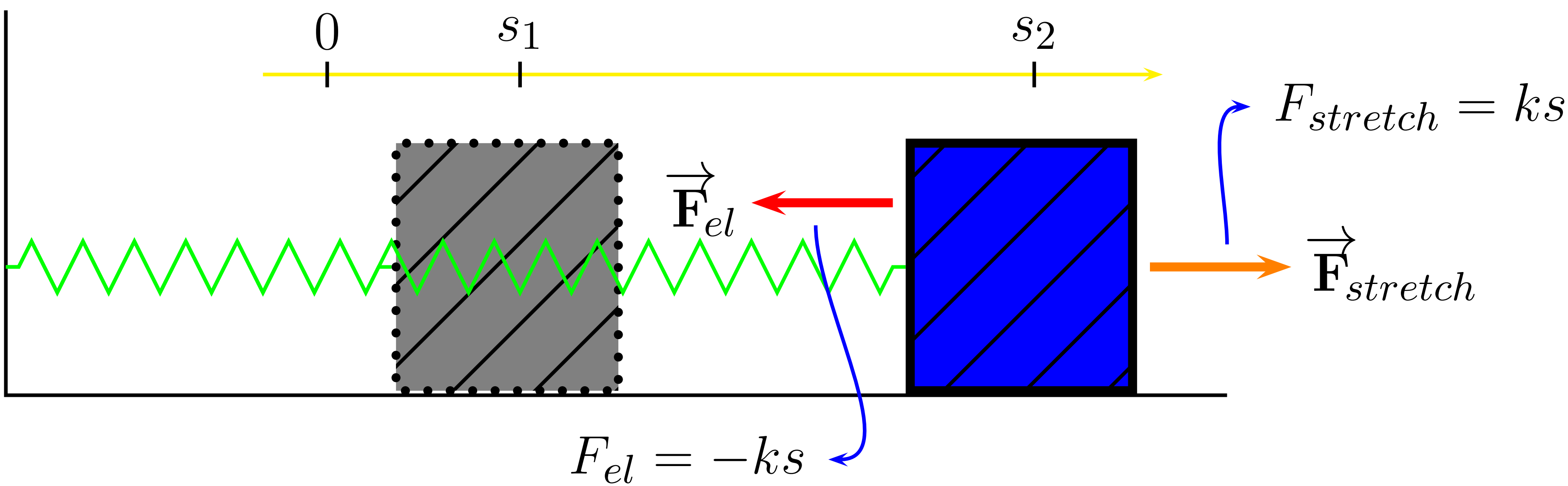

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$$\boxed{U_{el} = \frac{1}{2}ks^2}$$

Conservation of Elastic Energy

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Example: A 2-kg block is attached to a $k = 200\ N/m$ spring. If the block is given an initial 5-m/s speed from the spring's unstretched position, without friction how far does it go before stopping?

Other Forces

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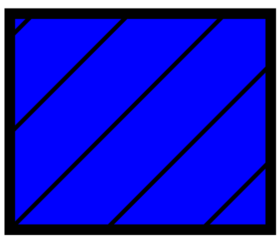

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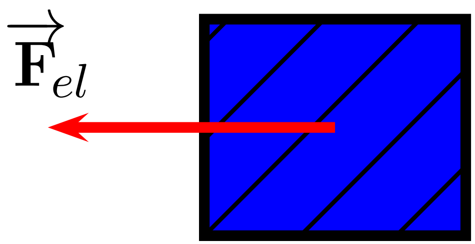

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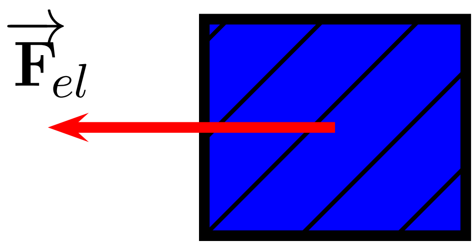

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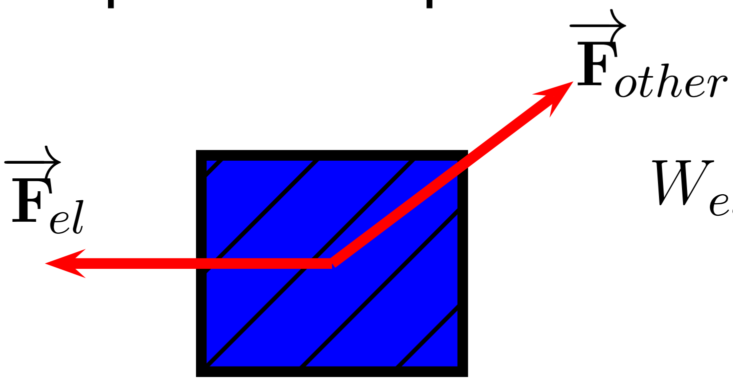

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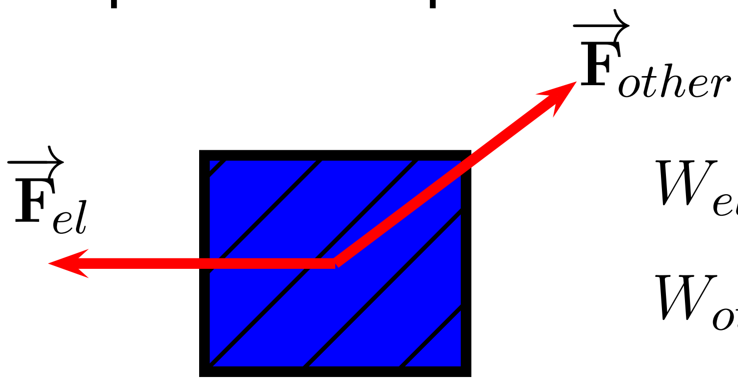

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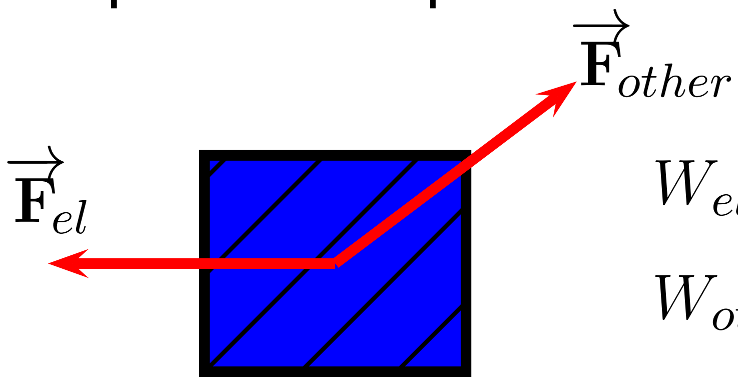

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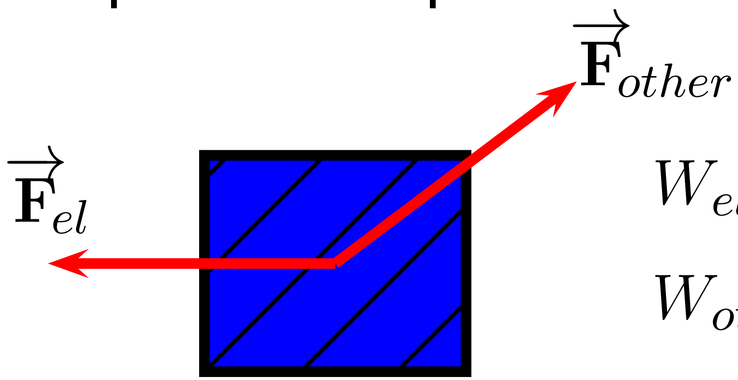

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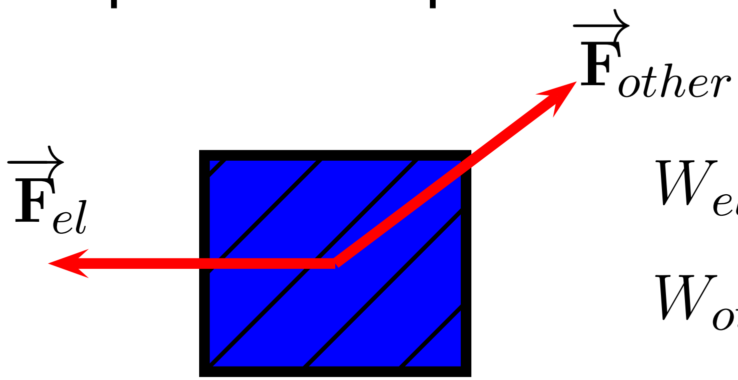

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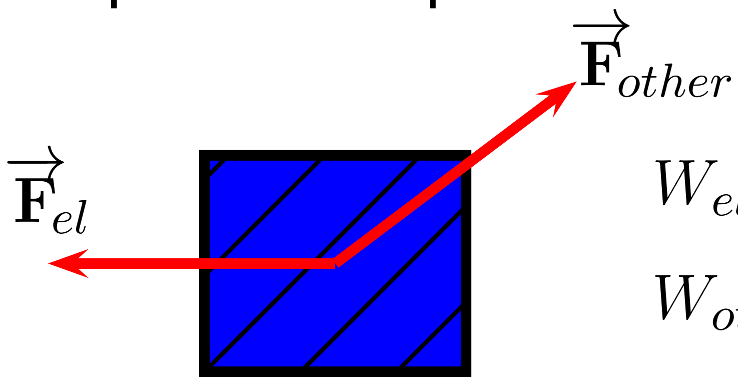

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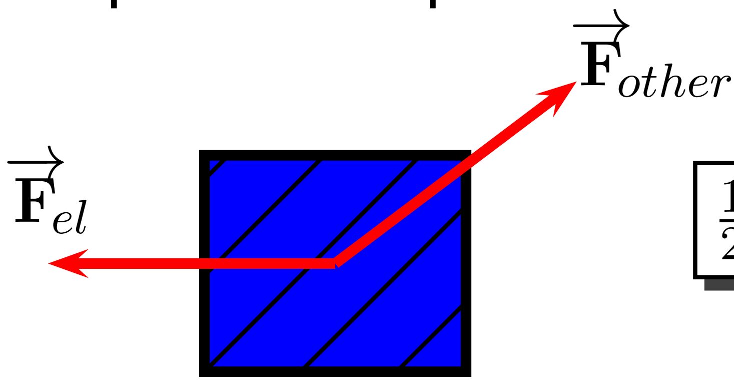

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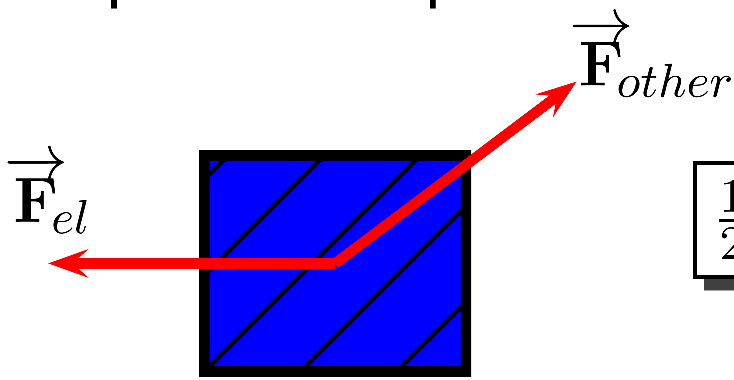

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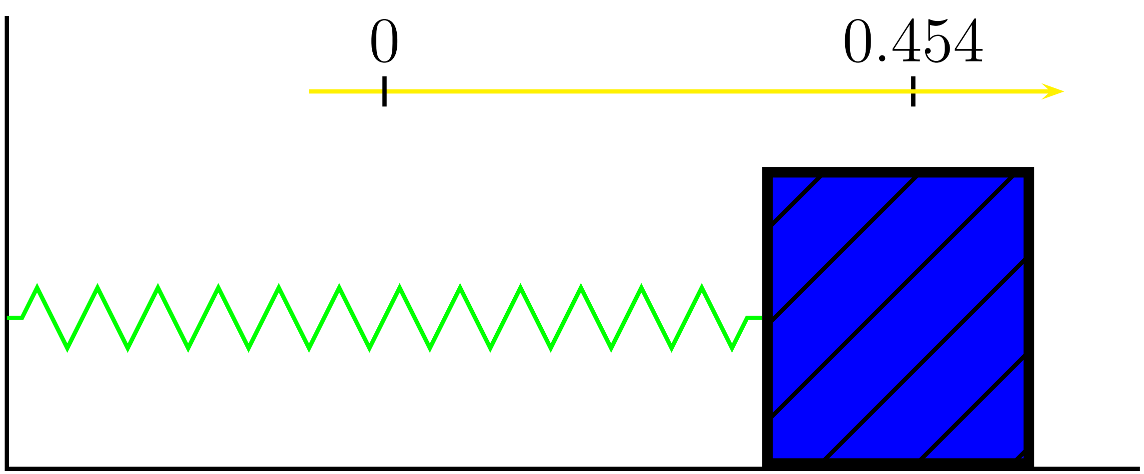
<u>Example:</u> A 2-kg block is attached to a $k = 200\,N/m$ spring. If the block is given an initial 5-m/s speed from the spring's unstretched position and $\mu_k = 0.5$, how far does it go before stopping?

Clicker Quiz

If the 2-kg block attached to a $k = 200\,N/m$ spring with $\mu_k = 0.5$ slides back from its $s_2 = 0.454\,m$ position, which of the following choices is a possible stretching distance for the spring, s_3, when it stops again?



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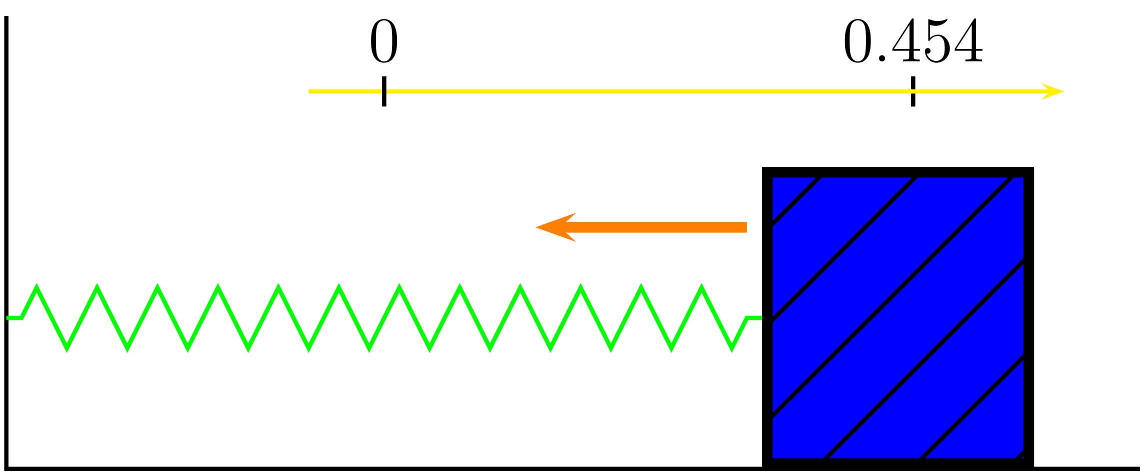

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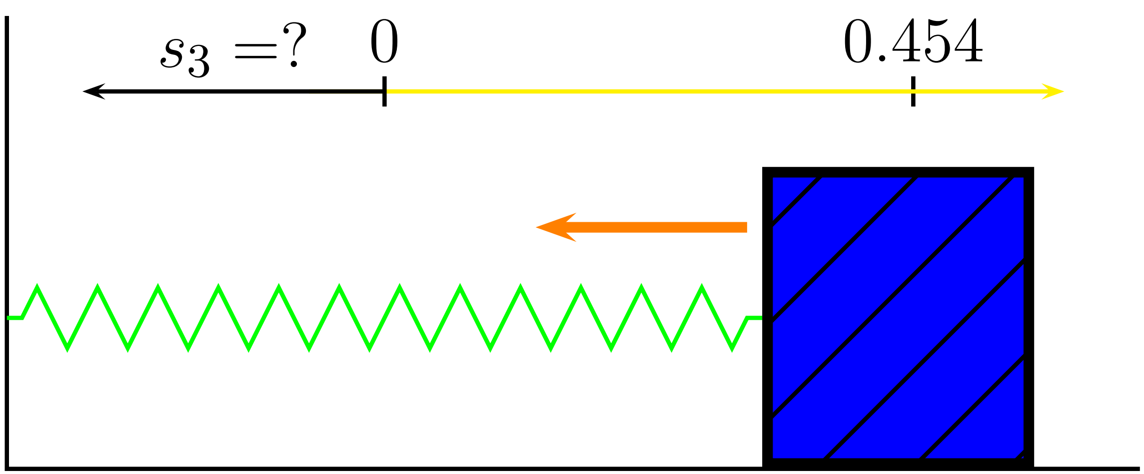

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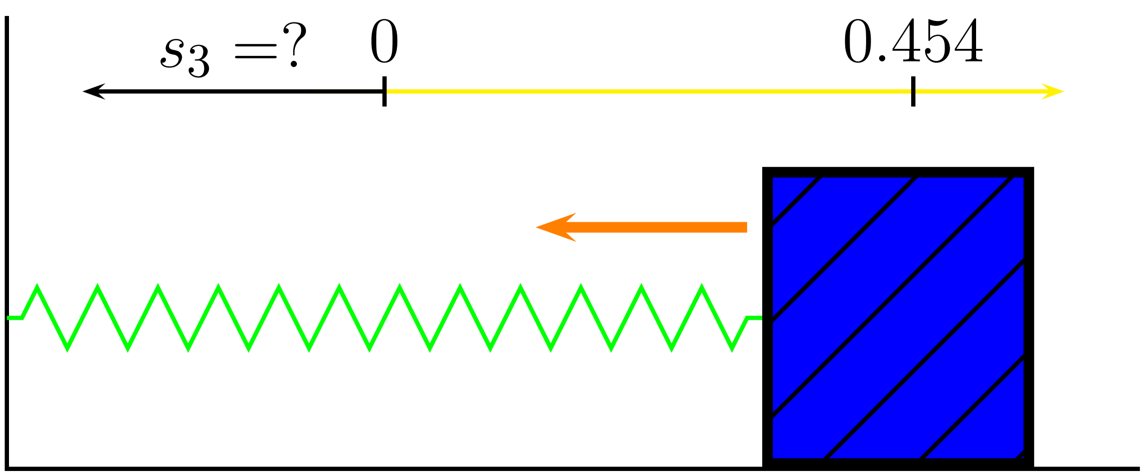

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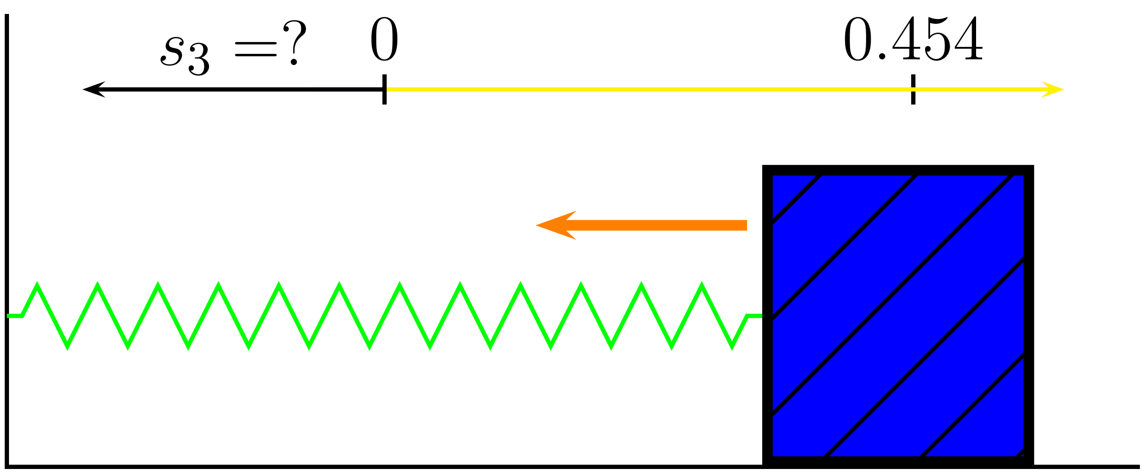

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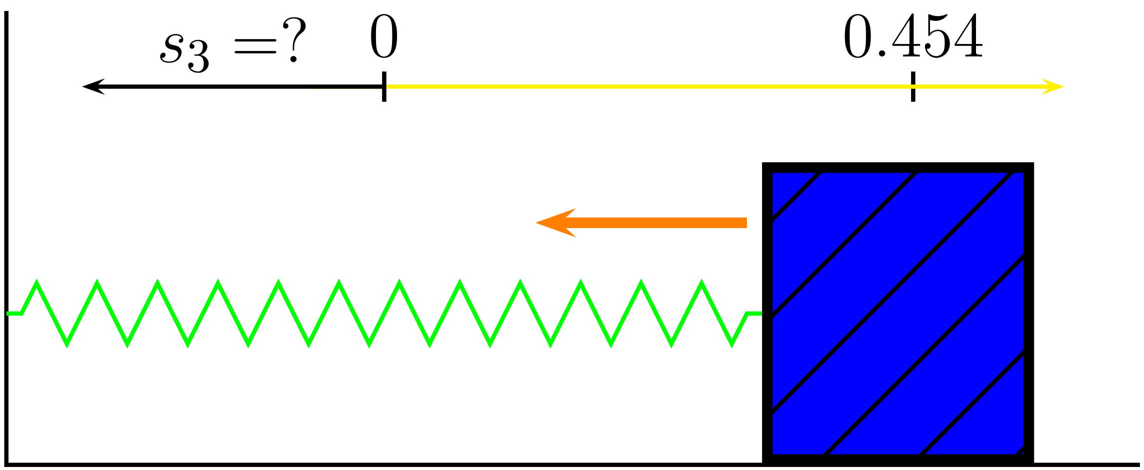

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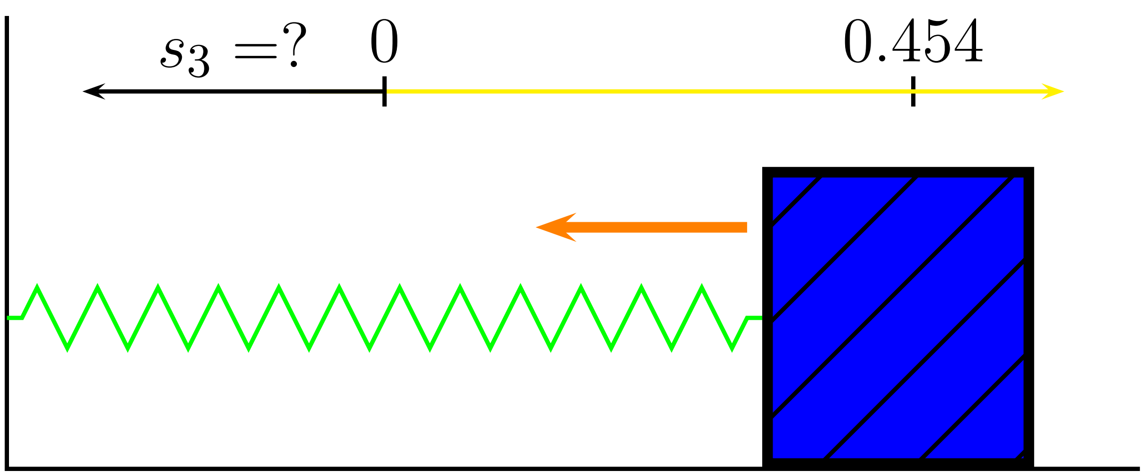

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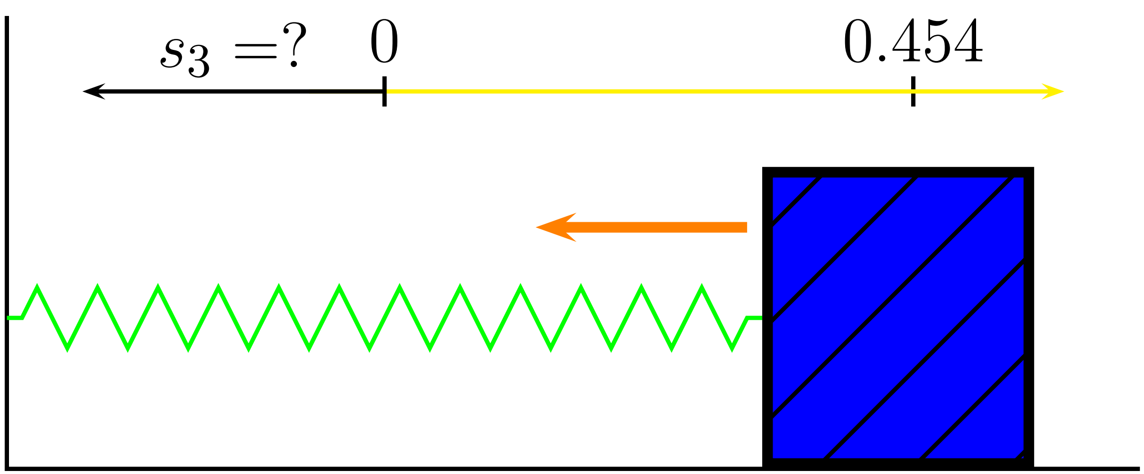

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$W_{total} \rightarrow \Delta K$

$W_g \rightarrow -\Delta U_g$

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$$\boxed{\tfrac{1}{2}Mv_1^2 + Mgy_1 + \tfrac{1}{2}ks_1^2 + W_{other} = \tfrac{1}{2}Mv_2^2 + Mgy_2 + \tfrac{1}{2}ks_2^2}$$