

QUICK REVIEW

Quick Review: Springs and Elastic Potential Energy

Refresh the most important ideas, formulas, and problem-solving strategies for Springs and Elastic Potential Energy in just a few minutes.

 TIME 5–10 minutes	 BEST FOR A rapid refresh	 FINISH WITH Key ideas refreshed
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After this quick review, you'll be able to...

derive spring work and elastic potential energy from $F(x)$, recover force from $U(x)$, and apply conservation of mechanical energy to ideal spring systems.

HOW TO USE THIS GUIDE

Work through the four stages in order. Write directly in the spaces provided, check your work in the Quick Answers section, and finish by choosing the next resource that matches your confidence.

Choose how you want to review: work through this guide, follow the online review, or watch the video review.

[Start the Review Online →](#)

[Watch the Video Review →](#)

YOU WILL NEED

Pencil or pen • Calculator if needed • Approximately 5–10 minutes

FR-02 • COURSE ALIGNMENT

Course Alignment

Use this independent Physics Sensei Unit Review to reinforce key concepts, prepare for homework, or review before a quiz or exam.

RESOURCE: Physics Sensei Unit Review UNIT: MEC-U18 TOPIC: Springs and Elastic Potential Energy COURSE LEVEL: College introductory physics • Calculus-Based	BEST USED ✓ After learning the topic ✓ Before starting homework ✓ Before a quiz or exam
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Explore Physics Sensei Reviews →

Physics Sensei is an independent educational resource. This Unit Review uses Physics Sensei-owned organization, examples, explanations, and practice.

FR-03 • YOUR REVIEW PLAN

Your Review Plan

Complete these four stages to quickly refresh the essential ideas and confirm you're ready to continue.

4 stages • Approximately 5–10 minutes

1 Quick Recall — page 4 Refresh what you already know.	2 Essential Idea — page 5 Review the most important concept.
3 Confidence Check — page 6 Confirm you're ready to move on.	4 Next Step — page 8 Continue your learning.

PRINTING TIP

For student copies, print double-sided and keep the Quick Answers section after the student activities so learners attempt each activity before checking their work.

FR-04 • STAGE 1 OF 4

Quick Recall

Let's quickly refresh what you already know. This short recall activity will bring the most important ideas back to mind before you review them.

QUICK RECALL**Recall Activity**

Complete these three spring statements from memory before checking the answers.

1) State the ideal spring force function. 2) What integral gives spring work? 3) How is force recovered from a potential-energy function?

Ready to refresh the essentials?

Great! Now review the most important idea you'll want to remember.

Continue to Essential Idea — page 5 →

FR-05 • STAGE 2 OF 4

Essential Idea

Take one last look at the most important concept from this topic. If you remember this idea, the rest will come back much more easily.

ESSENTIAL IDEA

Position-Dependent Spring Force

The ideal spring force is $F(x) = -kx$. Because force varies with position, work is an integral. The F - x graph is linear with slope $-k$.

$$F_s(x) = -kx; W_s = \int F_s(x) dx; U_s = (1/2)kx^2; F_x = -dU/dx.$$

EXAMPLE For $k = 300 \text{ N/m}$ from $x = 0.12 \text{ m}$ to 0.04 m , integrating gives $W_s = 1.92 \text{ J}$.

SENSEI NOTE Endpoint force times displacement is not the general spring-work formula.

Ready to check your memory?

You've refreshed the essential idea. Now see how much you remember before moving on.

Continue to Confidence Check — page 6 →

FR-06 • STAGE 3 OF 4

Confidence Check

You've refreshed the essential idea. Now answer this quick confidence check to confirm you're ready to move on.

CONFIDENCE CHECK

Five-Minute Readiness Check

Answer without notes.

At a point where $dU/dx > 0$, what is the sign of F_x ?

Ready for your next step?

Great work! You've refreshed the essential idea. Now choose the resource that best matches what you'd like to do next.

Continue to Next Step — page 8 →

QUICK ANSWERS • CHECK AFTER ATTEMPTING

Quick Answers and Explanations

Use these concise answers to check your recall and confidence—not only your final response.

QUICK RECALL

Recall Activity

1) $F(x) = -kx$; 2) $W = \int F(x) dx$; 3) $F_x = -dU/dx$.

WHY IT WORKS The calculus chain is force as a function of position, work from its integral, and force from the negative gradient of potential energy.

CONFIDENCE CHECK

CONFIDENCE CHECK

Five-Minute Readiness Check

Negative.

WHY IT WORKS $F_x = -dU/dx$.

READINESS GUIDE

3 correct: You're ready to continue. • 2 correct: Review the missed idea. • 0–1 correct: Revisit the Essential Idea or choose more practice.

FR-07 • STAGE 4 OF 4

Next Step: Continue Learning

Great work! You've completed this quick review. Choose the next resource that best matches how confident you feel.

? I'm Still Unsure Review the essential idea again. Review again: return to Essential Idea on page 5.	🕒 I Need More Practice Continue with additional practice for this topic. Go to Practice →	✓ I'm Ready Continue to the next recommended resource. Continue →
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RECOMMENDED LINKS

Review again: return to Essential Idea on page 5.

Find additional practice →

Choose another type of physics help →

Continue reviewing with these companion resources.

Start the Review Online →

Watch the Video Review →

PHYSICS HELP THAT MAKES SENSE

A Physics Sensei review never ends at the last question. It always guides you toward the next useful step.

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