

QUICK REVIEW

Quick Review: Work, Energy, and Power

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

 TIME 5–10 minutes	 BEST FOR A rapid refresh	 FINISH WITH Key ideas refreshed
--	---	--

After this quick review, you'll be able to...

quickly recall the essential concepts, formulas, and problem-solving strategies needed to move forward with confidence.

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 • TOPIC ALIGNMENT

Topic Alignment

This bundle is aligned to the approved Physics Sensei topic specification below. Use it to recover the topic structure, reinforce key decisions, and confirm readiness for the next study task.

ARCHITECTURE: Physics Sensei Independent Mechanics UNIT: MEC-U06 — Work, Energy, and Power TOPIC: Unit Review — Work, Energy, and Power PROFILE: Calculus-Based	BEST USED ✓ Before calculus-based energy homework ✓ Before a quiz or exam ✓ When variable forces or potential curves are involved
--	--

Review Prerequisites →

Physics Sensei is an independent educational resource designed to complement independently authored Physics Sensei materials. Physics Sensei content is independently authored and organized under the approved topic architecture.

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

Variable-force work and energy

Recall the calculus relationships that organize the unit.

Write the one-dimensional work integral, the conservative force-potential relation, and the instantaneous power relation.

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

Work and potential are integral-derivative views of force

For a variable force, integrate the component of force along displacement. For a conservative one-dimensional force, the slope of $U(x)$ determines force through $F_x = -dU/dx$.

$$W = \int F_x dx \quad \bullet \quad F_x = -dU/dx \quad \bullet \quad P = F \cdot v$$

EXAMPLE If $F_x = 4x$ from $x = 0$ to 3.0 m, then $W = \int_0^3 4x dx = 18$ J.

SENSEI NOTE The signed area under an F_x -versus- x graph is work; the negative slope of a U -versus- x graph is force.

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

Variable-force work

Integrate force over displacement.

A one-dimensional force is $F_x = 4x$ N. Find the work done from $x = 0$ to $x = 3.0$ m.

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

Variable-force work and energy

$$W = \int F_x dx; F_x = -dU/dx; \text{ and } P = dW/dt = F \cdot v.$$

WHY IT WORKS The integral accumulates infinitesimal work, the derivative of potential gives the conservative force, and power is the instantaneous rate of doing work.

CONFIDENCE CHECK

CONFIDENCE CHECK

Variable-force work

18 J.

WHY IT WORKS $W = \int_0^3 4x \, dx = [2x^2]_0^3 = 18 \text{ J}.$

READINESS GUIDE

1 correct: You're ready to continue. • 0 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 →
--	--	--

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.

PhysicsSensei.com