

QUICK REVIEW

Quick Review: Newton's Laws and Free-Body Diagrams

Use free-body diagrams, vector components, Newton's laws, friction, tension, and connected-system algebra to solve college-physics force problems.

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

construct complete free-body diagrams, resolve forces into components, and solve Newton's-law problems with friction, tension, and connected objects.

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 • UNIT ALIGNMENT

Unit Alignment

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

ARCHITECTURE: Physics Sensei Independent Mechanics UNIT: MEC-U05 — Newton's Laws and Free-Body Diagrams SCOPE: Unit Review PHYSICS LEVEL: Algebra-Based	BEST USED ✓ Before force-and-friction homework ✓ When component equations are the main challenge ✓ Before a quiz on Newton's laws and FBDs
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Review Prerequisites →

Physics Sensei is an independent educational resource. This review is independently authored and organized under the approved Physics Sensei mechanics 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

Recall Activity

Translate the diagram into vector equations.

For a system accelerating horizontally with no vertical acceleration, what equations connect the force components to acceleration?

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 unit. If you remember this idea, the rest will come back much more easily.

ESSENTIAL IDEA

Use force models with their conditions

Weight is mg near Earth; an ideal rope transmits one tension; kinetic friction has magnitude $\mu_k N$ and opposes sliding; static friction adjusts up to $\mu_s N$.

$$\Sigma F_x = ma_x \quad \bullet \quad \Sigma F_y = ma_y$$

EXAMPLE Static friction is $f_s \leq \mu_s N$, not always $f_s = \mu_s N$. Equality applies only at impending slip.

SENSEI NOTE Write the inequality for static friction before assuming the limiting value.

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

Net-force calculation

Apply $\Sigma F = ma$ with signs.

An 8.0 kg box has 28 N right and 12 N left. What is its horizontal acceleration?

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**

$$\Sigma F_x = ma_x \text{ and } \Sigma F_y = 0.$$

WHY IT WORKS Newton's second law is applied component by component. Zero vertical acceleration makes the vertical force sum zero even while horizontal acceleration is nonzero.

CONFIDENCE CHECK**CONFIDENCE CHECK****Net-force calculation**

2.0 m/s² right.

WHY IT WORKS $F_{\text{net}} = 28 - 12 = 16 \text{ N}$, so $a = 16/8.0 = 2.0 \text{ m/s}^2$ right.

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 unit. 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.

PhysicsSensei.com