

FOCUSED REVIEW

Focused Review: Static Equilibrium and Stability

Review the most important ideas, reinforce the essential skills, and confirm you're ready to move on.

 TIME 15–20 minutes	 BEST FOR Focused review	 FINISH WITH Greater confidence
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After this focused review, you'll be able to...

reinforce the equilibrium conditions, apply torque and stability reasoning, and solve representative algebra-based problems with confidence.

HOW TO USE THIS GUIDE

Work through the stages in order. Write directly in the spaces provided, check your work in the Solutions 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 15–20 minutes

FR-02 • COURSE ALIGNMENT

Course Alignment

This Physics Sensei Unit Review is an independent learning resource. Use it to reinforce key concepts, prepare for homework, or review before a quiz or exam.

RESOURCE: Physics Sensei Unit Review
UNIT ID: MEC-U23
TOPIC: Static Equilibrium and Stability
COURSE LEVEL: Algebra-Based

BEST USED

- ✓ After learning the unit
- ✓ Before starting homework
- ✓ Before a quiz or exam

FR-03 • YOUR REVIEW PLAN

Your Review Plan

Complete these six focused stages in order. Each stage reinforces your understanding and prepares you for a final confidence check.

6 stages • Approximately 15–20 minutes

1 Warm-Up Check Refresh key ideas.	2 Core Concepts Reinforce the essentials.	3 Guided Practice Strengthen key skills.
4 Confidence Check Confirm your understanding.	5 Summary Remember the essentials.	6 Next Step Choose your next step.

PRINTING TIP

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

FR-04 • STAGE 1 OF 6

Warm-Up Check

Before you begin, take a minute to reactivate what you already know. This quick warm-up will help you focus on the most important ideas before moving on.

WARM-UP 1**Key Equations**

Write the static-equilibrium equations for a planar rigid body.

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WARM-UP 2**Torque Direction**

A downward force acts to the right of a pivot. Is its torque clockwise or counterclockwise?

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FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

A 50 N force is perpendicular to a 0.40 m lever arm. Find the torque magnitude.

A 50 N force is perpendicular to a 0.40 m lever arm. Find the torque magnitude.

Ready to strengthen your understanding?

You've refreshed the most important ideas. Now reinforce the concepts you'll use most often.

Continue to Core Concepts →

FR-05 • STAGE 2 OF 6

Core Concepts

Let's reinforce the most important concepts you'll need to solve problems with confidence. Focus on the ideas that appear most often in homework, quizzes, and exams.

KEY CONCEPT 1

Force Equilibrium

Resolve forces into components and require the sum in each independent direction to be zero. In two dimensions, this normally gives $\Sigma F_x = 0$ and $\Sigma F_y = 0$.

$$\Sigma \mathbf{F} = 0 \quad \bullet \quad \Sigma \tau = 0 \quad \bullet \quad \tau = rF \sin \theta$$

EXAMPLE A hinge force may have both horizontal and vertical components.

SENSEI NOTE Draw the free-body diagram before writing equations.

KEY CONCEPT 2

Torque Equilibrium

Choose an origin and require $\Sigma \tau = 0$. Use $\tau = rF \sin \theta$, or use the perpendicular lever arm directly. A strategic origin can remove unknown forces from the torque equation.

$$\Sigma \mathbf{F} = 0 \quad \bullet \quad \Sigma \tau = 0 \quad \bullet \quad \tau = rF \sin \theta$$

EXAMPLE Taking torques about a hinge eliminates both hinge-force components from that equation.

SENSEI NOTE Assign one rotational direction positive and keep the sign convention consistent.

Ready to apply these ideas?

You've reinforced the essential concepts. Now strengthen your problem-solving skills by working through a few guided examples.

[Continue to Guided Practice →](#)

FR-06 • STAGE 3 OF 6

Guided Practice

Now apply the key concepts you've just reviewed. Work through these focused practice activities to reinforce your problem-solving skills before the final confidence check.

PRACTICE 1**Guided Example**

Solve the problem and show the equilibrium reasoning.

A 6.0 m uniform beam of weight 300 N is supported at both ends. A 600 N load is 2.0 m from the left support. Find the right support force.

PRACTICE 2**Independent Check**

Solve the problem and show the equilibrium reasoning.

For the previous beam, find the left support force.

Ready for a confidence check?

You've reinforced the essential skills through focused practice. Now confirm your understanding with two short questions.

Continue to Confidence Check →

FR-07 • STAGE 4 OF 6

Confidence Check

You've reinforced the key concepts and practiced the essential skills. Now confirm you're ready to move forward by completing these short confidence checks.

CONFIDENCE CHECK 1**Cable Tension**

Solve using torque equilibrium.

A 4.0 m horizontal uniform beam weighs 200 N and is hinged at the left end. A vertical cable at the right end holds it. Find the cable tension.

CONFIDENCE CHECK 2**Angled Force Torque**

Calculate the torque magnitude.

A 80 N force acts at 30° to a 0.50 m lever arm. Find the torque magnitude.

HOW DID IT GO?

I answered ____ of 2 questions correctly.

Use the Solutions section to check your reasoning, then take one final look at the essential ideas.

You've confirmed your understanding.

Take one final look at the essential ideas before choosing your next step.

[Continue to Summary →](#)

FR-08 • STAGE 5 OF 6

Summary

Before moving on, take one final look at the essential ideas you'll want to remember.

KEY TAKEAWAY 1**Use all equilibrium equations**

Static equilibrium requires component force balance and torque balance.

KEY TAKEAWAY 2**Choose the pivot strategically**

A good pivot choice can eliminate unknown forces and simplify the algebra.

MY ONE-SENTENCE SUMMARY

In my own words, the most important idea is:

Ready for your next step?

You've reviewed the essential ideas one last time. Now choose the resource that best matches how confident you feel.

Continue to Next Step →

ANSWER KEY • CHECK AFTER ATTEMPTING

Solutions and Explanations

Use these solutions to check your reasoning—not only your final answer. Focus on the method and the physical meaning of each result.

WARM-UP • ACTIVITY 1

Key Equations

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

WHY IT WORKS The response uses the defining conditions for force, torque, and stability.

WARM-UP • ACTIVITY 2

Torque Direction

Clockwise.

WHY IT WORKS The response uses the defining conditions for force, torque, and stability.

WARM-UP • ACTIVITY 3

Quick Application

$$\tau = rF = (0.40 \text{ m})(50 \text{ N}) = 20 \text{ N}\cdot\text{m}.$$

WHY IT WORKS Apply the relevant equilibrium or stability relationship directly.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

Take torques about the left support: $R(6.0) - 300(3.0) - 600(2.0) = 0$. Thus $R = 350$ N.

WHY IT WORKS Use force balance, torque balance, or the stability criterion appropriate to the problem.

PRACTICE 2

Independent Check

Vertical force balance gives $L + 350 - 300 - 600 = 0$, so $L = 550$ N.

WHY IT WORKS Use force balance, torque balance, or the stability criterion appropriate to the problem.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Cable Tension

$$T(4.0) - 200(2.0) = 0, \text{ so } T = 100 \text{ N.}$$

WHY IT WORKS The classification follows directly from the equilibrium and stability conditions.

CONFIDENCE CHECK 2

Angled Force Torque

$$\tau = (0.50)(80)\sin 30^\circ = 20 \text{ N}\cdot\text{m.}$$

WHY IT WORKS The classification follows directly from the equilibrium and stability conditions.

READINESS GUIDE

2 correct: You're ready to continue. • 1 correct: Review the missed idea, then continue. • 0 correct: Revisit Core Concepts or choose more practice.

FR-09 • STAGE 6 OF 6

Next Step: Continue Learning

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

? I'm Still Unsure Review the focused review again to strengthen the essential concepts. Review Again →	🎯 I Need More Practice Build confidence with additional practice problems. Go to Practice →	✓ I'm Ready Continue to the next topic or learning resource. Continue →
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RECOMMENDED LINKS

Review this topic again →

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