FOCUSED REVIEW

Focused Review — Drawing and Solving Free-Body Diagrams — Foundational

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

TIME	BEST FOR	FINISH WITH
15–20 minutes	Focused review	Greater confidence

After this focused review, you'll be able to…
recognize the key concepts, reinforce your problem-solving skills, and continue with greater 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 Topic Review is an independent learning resource. Use it to reinforce key concepts, prepare for homework, or review before a quiz or exam.

Related Unit Review: If you need to review the complete unit material, review Newton's Laws and Free-Body Diagrams here →

RESOURCE: Physics Sensei Topic Review TOPIC ID: MEC-U05-T02 TOPIC: Drawing and Solving Free-Body Diagrams PARENT UNIT: MEC-U05 — Newton's Laws and Free-Body Diagrams COURSE LEVEL: Foundational	BEST USED ✓ After learning the topic ✓ 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 Ideas

Answer before revealing the response.

A crate rests on a floor. List the forces acting on the crate.

WARM-UP 2

Common Mistakes

Answer before revealing the response.

A student draws weight, normal force, velocity, and acceleration arrows on an FBD. Which arrows do not belong?

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Answer before revealing the response.

For a block on an incline, which axis choice usually makes the force equations simplest?

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

Free-Body Diagrams Isolate One Object

A free-body diagram (FBD) shows only the forces acting on the chosen object. Draw the object as a dot or simple box, then draw one arrow for each external force. Label each arrow by the interaction that causes it. Do not draw velocity or acceleration as forces.

$$\Sigma F = ma$$

EXAMPLE A book resting on a table has weight downward and a normal force upward.

SENSEI NOTE Ask: What is touching or pulling on the object?

KEY CONCEPT 2

Choose Axes and Resolve Forces

Choose x and y axes that make the force components simple. On a horizontal surface, x is usually horizontal and y vertical. On an incline, choosing x parallel to the slope and y perpendicular to it often reduces the algebra.

$$F_x = F \cos \theta; \; F_y = F \sin \theta$$

EXAMPLE A pull at angle θ has horizontal component F cos θ and vertical component F sin θ.

SENSEI NOTE Resolve a force only when it is not already along an axis.

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

Draw the FBD, choose axes, and write the force equations.

A 10 kg crate is pulled right with 50 N on a level floor while kinetic friction is 20 N. Find the acceleration.

PRACTICE 2

Independent Check

Build the FBD before solving.

A 6.0 kg box is pulled by a 30 N force at 25° above horizontal. Friction is 8.0 N. Find the horizontal acceleration; assume no vertical acceleration.

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

Force Inventory

Answer from your own FBD first.

Name the forces on a hanging mass attached to a vertical string.

CONFIDENCE CHECK 2

Component Equation

Answer from your own FBD first.

A force F acts at angle θ above +x. Write its x- and y-components.

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

Isolate One Body

An FBD contains only external forces acting on the selected object.

KEY TAKEAWAY 2

Axes Control the Algebra

Choose axes first, then assign signs and resolve only the forces that need components.

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. Replace each placeholder with a concise answer and the essential explanation.

WARM-UP • ACTIVITY 1

Key Ideas

Weight downward and normal force upward.

WHY IT WORKS Only forces acting on the crate belong on its FBD.

WARM-UP • ACTIVITY 2

Common Mistakes

Velocity and acceleration arrows do not belong on an FBD.

WHY IT WORKS They describe motion, not interactions that exert force.

WARM-UP • ACTIVITY 3

Quick Application

Choose one axis parallel to the incline and one perpendicular to it.

WHY IT WORKS This aligns the normal force with an axis and simplifies the weight components.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

$\Sigma F_x = 50 - 20 = 30$ N; $a = 30/10 = 3.0$ m/s² to the right. Vertically, $N - mg = 0$.

WHY IT WORKS The FBD separates horizontal dynamics from vertical equilibrium.

PRACTICE 2

Independent Check

$F_x = 30 \cos 25° = 27.2$ N. $\Sigma F_x = 27.2 - 8.0 = 19.2$ N, so $a_x = 19.2/6.0 = 3.20$ m/s².

WHY IT WORKS Resolve the angled pull before summing components.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Force Inventory

Tension upward and weight mg downward.

WHY IT WORKS Those are the external interactions acting on the hanging mass.

CONFIDENCE CHECK 2

Component Equation

$F_x = F \cos \theta$ and $F_y = F \sin \theta$.

WHY IT WORKS The components are projections of F onto the chosen axes.

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

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 →

Online review page URL: https://physicssensei.com/focused-topic-review-drawing-and-solving-free-body-diagrams-foundational/

Video review URL: PhysicsSensei.com

PDF download URL: PhysicsSensei.com

Practice bundle URL: PhysicsSensei.com

Next recommended resource URL: PhysicsSensei.com

Another type of physics help URL: PhysicsSensei.com

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