FOCUSED REVIEW

Focused Review: Motion in One Dimension

Reinforce the most important physical meanings, signs, and graph connections for straight-line motion.

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

After this focused review, you'll be able to…

interpret the most important signs and graph relationships and decide whether your physical reasoning is ready to move forward.

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 • 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-U02 — Motion in One Dimension SCOPE: Unit Review PHYSICS LEVEL: Foundational	BEST USED ✓ Before algebra-heavy kinematics homework ✓ When graph meaning or signs feel confusing ✓ When you want to understand the physics before calculating

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 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 — page 4** Refresh key ideas.	2 **Core Concepts — page 6** Reinforce the essentials.	3 **Guided Practice — page 7** Strengthen key skills.
4 **Confidence Check — page 8** Confirm your understanding.	5 **Summary — page 10** Remember the essentials.	6 **Next Step — page 14** 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

Recall Activity 1

Separate path length from net change in position.

A student walks from x = 2 m to x = 8 m, then back to x = 5 m. What are the displacement and the total distance traveled?

WARM-UP 2

Recall Activity 2

Compare the signs of velocity and acceleration.

A car is moving to the right but slowing down. If +x points right, what are the signs of velocity and acceleration?

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Recall Activity 3

Translate graph slope into a physical statement.

What does a horizontal tangent on a position–time graph mean at that instant?

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 — page 6 →

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

Position and displacement tell where you are and how your position changed

Position is measured relative to a chosen origin. Displacement is the signed change from initial to final position. Distance is the total path length and is never negative.

$$\Sigma F_x = 0 \quad \cdot \quad \Sigma F_y = 0$$

EXAMPLE $\Delta x = x_f - x_i$. Example: moving from $x = -2$ m to $x = +4$ m gives $\Delta x = +6$ m, even if the path traveled was longer than 6 m.

SENSEI NOTE Always define the positive direction before interpreting a sign.

KEY CONCEPT 2

Velocity and acceleration describe different features of motion

Velocity tells how position changes and includes direction. Acceleration tells how velocity changes. An object speeds up when velocity and acceleration have the same sign and slows down when they have opposite signs.

$$\Sigma \tau_O = 0 \quad \cdot \quad \tau = Fd\perp$$

EXAMPLE $a_{avg} = \Delta v/\Delta t$. Example: a cart moving left has $v < 0$. If it slows while moving left, acceleration points right, so $a > 0$.

SENSEI NOTE Negative acceleration does not automatically mean slowing down. Compare the signs of velocity and acceleration.

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 — page 7 →

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

Worked Example

Read a motion story in pieces and combine the signed displacements.

A walker moves at +2 m/s for 4 s, rests for 2 s, then moves at −1 m/s for 3 s. Find the net displacement and describe the motion.

PRACTICE 2

Guided Problem

Use the turning point to distinguish zero velocity from zero acceleration.

A ball is thrown straight upward. At the highest point, what are its velocity and acceleration if +y is upward?

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 — page 8 →

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

Speeding up or slowing down?

Compare the signs of v and a.

An object has v = –6 m/s and a = +2 m/s². Is it speeding up or slowing down?

CONFIDENCE CHECK 2

Read the shape of x(t)

Use the sign of the slope and how the slope changes.

An x–t graph rises and becomes progressively steeper. What are the signs of velocity and acceleration?

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 — page 10 →

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

Signs describe direction

Define the positive axis first; then let the signs of position, velocity, and acceleration carry physical meaning.

KEY TAKEAWAY 2

Velocity and acceleration are not the same thing

Velocity describes how position changes; acceleration describes how velocity changes.

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 — page 14 →

ANSWER KEY • CHECK AFTER ATTEMPTING

Solutions and Explanations

Use these solutions to check your reasoning—not only your final answer. Compare your setup, signs, units, and interpretation with the explanations below.

WARM-UP • ACTIVITY 1

Recall Activity 1

+3 m displacement; 9 m distance.

WHY IT WORKS Displacement uses final minus initial position: 5 – 2 = +3 m. Distance adds the path lengths: 6 m + 3 m = 9 m.

WARM-UP • ACTIVITY 2

Recall Activity 2

$v > 0$ and $a < 0$.

WHY IT WORKS The car moves in +x, so velocity is positive. Because its positive velocity is decreasing, acceleration points in the opposite direction.

WARM-UP • ACTIVITY 3

Recall Activity 3

The instantaneous velocity is zero.

WHY IT WORKS Velocity is represented by the slope of the position–time graph. A horizontal tangent has zero slope.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Worked Example

Net displacement = +5 m.

WHY IT WORKS The three displacements are +8 m, 0 m, and –3 m. Their signed sum is +5 m. The walker moves in +x, pauses, then returns partway.

PRACTICE 2

Guided Problem

v = 0 for an instant; a = –g.

WHY IT WORKS The ball momentarily stops changing position upward before reversing, but gravity continues to act downward the entire time.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Speeding up or slowing down?

It is slowing down.

WHY IT WORKS Velocity and acceleration have opposite signs, so the magnitude of velocity decreases.

CONFIDENCE CHECK 2

Read the shape of x(t)

$v > 0$ and $a > 0$.

WHY IT WORKS The positive slope gives positive velocity. Because the slope becomes more positive, velocity is increasing, so acceleration is positive.

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.	Continue with additional practice for this unit.	Continue to the next recommended resource.
Review again: return to Warm-Up Check on page 4.	**Go to Practice →**	**Continue →**

RECOMMENDED LINKS

Review again: return to Warm-Up Check on page 4.

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