

FOCUSED REVIEW

Focused Review — Acceleration and Constant-Acceleration Motion — Algebra-Based

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...

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 [Motion in One Dimension here →](#)

RESOURCE: Physics Sensei Topic Review
TOPIC ID: MEC-U03-T02
TOPIC: Acceleration and Constant-Acceleration Motion
PARENT UNIT: MEC-U03 — Motion in One Dimension
COURSE LEVEL: Algebra-Based

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**

Recall the equation before doing arithmetic.

Which constant-acceleration equation gives final velocity from v_0 , a , and t ?

WARM-UP 2**Common Mistakes**

Identify the incorrect assumption.

Why is it wrong to make acceleration positive just because an object is speeding up?

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Choose the equation that avoids an unnecessary variable.

You know v_0 , v , a , and need displacement. Which kinematic equation is most direct?

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**Velocity–Time Relationship**

For constant acceleration, velocity changes linearly with time. The slope of a velocity–time graph equals acceleration, so the sign of the slope gives the sign of a .

$$v = v_0 + at$$

EXAMPLE From $v_0 = +3 \text{ m/s}$ with $a = +4 \text{ m/s}^2$ for 2 s, $v = +11 \text{ m/s}$.

SENSEI NOTE A negative acceleration can increase speed when velocity is also negative.

KEY CONCEPT 2**Displacement under Constant Acceleration**

Displacement accumulates while velocity changes. The constant-acceleration displacement equation combines the initial velocity contribution with the additional displacement caused by acceleration.

$$\Delta x = v_0 t + \frac{1}{2}at^2$$

EXAMPLE From rest with $a = +2 \text{ m/s}^2$ for 3 s, $\Delta x = 9 \text{ m}$.

SENSEI NOTE The $\frac{1}{2}$ factor belongs to the acceleration contribution to displacement.

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**

List knowns with signs, select the equation, then substitute.

A bike has $v_0 = +6$ m/s and $a = +1.5$ m/s² for 4 s. Find v and Δx .

PRACTICE 2**Independent Check**

Solve without using time.

A car slows from +20 m/s to +8 m/s over 42 m. Find the constant 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

Position after Acceleration

Use the displacement equation.

An object starts at +2 m/s and accelerates at +3 m/s² for 2 s. What displacement occurs?

CONFIDENCE CHECK 2

Free-Fall Sign Convention

Take upward as positive.

A ball is thrown upward at +14 m/s. Using $a = -9.8 \text{ m/s}^2$, what is its velocity after 1.0 s?

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**Choose an Equation Strategically**

For constant acceleration, choose the kinematic equation containing your knowns and desired unknown while minimizing extra variables.

KEY TAKEAWAY 2**Signs Carry Direction**

Define the positive direction once. Keep the signs of displacement, velocity, and acceleration consistent with that axis.

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.

WARM-UP • ACTIVITY 1

Key Ideas

$$v = v_0 + at.$$

WHY IT WORKS This is the direct velocity–time equation for constant acceleration.

WARM-UP • ACTIVITY 2

Common Mistakes

The sign of acceleration gives its direction, not whether speed grows. Speed increases when v and a have the same sign.

WHY IT WORKS Speed depends on the magnitude of velocity; direction information is carried by signs.

WARM-UP • ACTIVITY 3

Quick Application

$$v^2 = v_0^2 + 2a\Delta x.$$

WHY IT WORKS That equation includes v_0 , v , a , and Δx but not t .

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

$$v = 6 + (1.5)(4) = +12 \text{ m/s}; \Delta x = (6)(4) + \frac{1}{2}(1.5)(4^2) = 36 \text{ m}.$$

WHY IT WORKS Both equations use the same signed acceleration and elapsed time.

PRACTICE 2

Independent Check

Use $v^2 = v_0^2 + 2a\Delta x$: $64 = 400 + 84a$, so $a = -4.0 \text{ m/s}^2$.

WHY IT WORKS The time-free kinematic equation directly connects velocity change, acceleration, and displacement.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Position after Acceleration

$$\Delta x = (2)(2) + \frac{1}{2}(3)(2^2) = 10 \text{ m.}$$

WHY IT WORKS Initial motion contributes 4 m and acceleration contributes 6 m.

CONFIDENCE CHECK 2

Free-Fall Sign Convention

$$v = 14 - 9.8(1.0) = +4.2 \text{ m/s.}$$

WHY IT WORKS The ball is still moving upward because its velocity remains positive after 1.0 s.

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