

FOCUSED REVIEW

Focused Review — Two-Dimensional Kinematics with Components — Foundational

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 Two Dimensions here →](#)

RESOURCE: Physics Sensei Topic Review
TOPIC ID: MEC-U04-T01
TOPIC: Two-Dimensional Kinematics with Components
PARENT UNIT: MEC-U04 — Motion in Two Dimensions
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 displacement is $\langle 4, 3 \rangle$ m. What do the two numbers tell you physically?

WARM-UP 2**Common Mistakes**

Answer before revealing the response.

A student says a 3 m horizontal displacement and a 4 m vertical displacement should be added to get 7 m. What is wrong with that reasoning?

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Answer before revealing the response.

An object has a constant velocity component of 2 m/s horizontally and 1 m/s vertically. What component displacement does it make in 3 s?

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

Representing two-dimensional motion with components

Use an ordered pair to keep the horizontal and vertical information separate. Position, displacement, velocity, and acceleration can each be described by two perpendicular components. A component can be positive, negative, or zero depending on the chosen axis directions.

$$\Delta \mathbf{r} = \langle \Delta x, \Delta y \rangle$$

EXAMPLE A displacement of 4 m east and 3 m north is $\langle 4, 3 \rangle$ m.

SENSEI NOTE Keep the signs with the components. A negative component means the vector points partly opposite the positive axis.

KEY CONCEPT 2

Independent component motion

Once axes are chosen, analyze the horizontal and vertical changes separately over the same time interval. A change along one axis does not automatically change the component along the other axis. After solving the components, interpret them together as one motion.

$$\text{average velocity} = \langle \Delta x / \Delta t, \Delta y / \Delta t \rangle$$

EXAMPLE If an object changes position by $\langle 6, -2 \rangle$ m in 2 s, its average velocity is $\langle 3, -1 \rangle$ m/s.

SENSEI NOTE Use the same elapsed time for both components of the same motion.

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**

Use the given component velocities to find the component displacement.

A cart moves with constant horizontal velocity 3 m/s and vertical velocity 2 m/s for 4 s. Find Δx and Δy .

PRACTICE 2**Independent Check**

Work independently, then check the signs.

A drone moves 6 m east, then 2 m west, while also moving 5 m north. Find its net displacement components.

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

Signs and directions

Write a signed ordered pair.

Using east as $+x$ and north as $+y$, write 7 m west and 4 m north as an ordered pair.

CONFIDENCE CHECK 2

Same time interval

Use the same 3 s interval on both axes.

For component velocities $\langle 5, -2 \rangle$ m/s over 3 s, find the displacement 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**Keep components separate**

Two perpendicular components describe one vector quantity. Their signs carry direction information.

KEY TAKEAWAY 2**Solve axes separately, interpret together**

Use the same time interval on both axes, solve each component, then combine the physical meaning.

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. Compare your approach with the concise reasoning below.

WARM-UP • ACTIVITY 1

Key Ideas

The first number is the horizontal component and the second is the vertical component.

WHY IT WORKS The ordered pair assigns one value to each perpendicular axis.

WARM-UP • ACTIVITY 2

Common Mistakes

Perpendicular components cannot be added as ordinary scalar distances; they describe different directions.

WHY IT WORKS Adding $3 + 4$ ignores the right-angle geometry and direction of the components.

WARM-UP • ACTIVITY 3

Quick Application

$\Delta x = 6 \text{ m}$ and $\Delta y = 3 \text{ m}$.

WHY IT WORKS Multiply each constant component velocity by the same 3 s interval.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1**Guided Example**

$\Delta x = 12$ m and $\Delta y = 8$ m.

WHY IT WORKS Each component evolves independently for 4 s.

PRACTICE 2**Independent Check**

Net horizontal change = 4 m east; vertical change = 5 m north, so $\langle 4, 5 \rangle$ m.

WHY IT WORKS Horizontal motions combine with signs; the northward component remains separate.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Signs and directions

$\langle -7, 4 \rangle$ m.

WHY IT WORKS West is negative x and north is positive y.

CONFIDENCE CHECK 2

Same time interval

$\Delta x = 15$ m and $\Delta y = -6$ m.

WHY IT WORKS Apply the same 3 s interval to both signed velocity components.

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