

FOCUSED REVIEW

Focused Review — Two-Dimensional Kinematics with Components — 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 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: 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**

Answer before revealing the response.

A 12 m/s velocity is directed 60° above $+x$. Which component uses cosine if the angle is measured from $+x$?

WARM-UP 2**Common Mistakes**

Answer before revealing the response.

Why can a two-dimensional constant-acceleration problem be split into two one-dimensional problems?

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Answer before revealing the response.

A vector has components 6 and 8. What is its 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

Resolving a vector into components

When a vector magnitude and direction are known, choose axes and resolve the vector before using kinematic equations. If θ is measured from $+x$, the horizontal component is adjacent to θ and the vertical component is opposite. Component signs come from the actual direction.

$$\text{horizontal component} = v \cos \theta; \text{vertical component} = v \sin \theta$$

EXAMPLE A 12 m/s vector at 60° has components 6.0 m/s horizontally and 10.4 m/s vertically.

SENSEI NOTE Sketch the vector and axes first. The diagram determines the signs and which leg uses sine or cosine.

KEY CONCEPT 2

Component-by-component constant acceleration

Apply the familiar constant-acceleration relationships separately to x and y . Each axis can have a different acceleration component, but both use the same elapsed time. This is the central algebraic structure of two-dimensional kinematics.

$$\text{component displacement} = \text{initial component velocity} \times t + \frac{1}{2}(\text{component acceleration})t^2$$

EXAMPLE If the horizontal component velocity starts at 4 m/s with horizontal acceleration 2 m/s², the horizontal displacement in 3 s is 21 m.

SENSEI NOTE Never insert the total vector magnitude into a one-axis kinematic equation.

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**

Resolve the initial vector, then use the component equations.

An object starts with speed 10 m/s at 37° above $+x$. Use $\cos 37^\circ \approx 0.80$ and $\sin 37^\circ \approx 0.60$. Find its initial velocity components.

PRACTICE 2**Independent Check**

Solve both axes over the same time and report the signed components.

Initial velocity components are 5 m/s horizontally and 2 m/s vertically. Acceleration components are 1 m/s^2 horizontally and -3 m/s^2 vertically. Find the displacement components after 2 s.

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**Resolve an angled vector**

Use the angle from +x.

A 15 m/s velocity is 53° above +x. Use $\cos 53^\circ \approx 0.60$ and $\sin 53^\circ \approx 0.80$. Find the components.

CONFIDENCE CHECK 2**Recombine component velocity**

Find the magnitude from the two components.

A velocity has components 9 m/s and 12 m/s. Find its speed.

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**Resolve first**

Convert an angled vector into signed axis components before applying component kinematics.

KEY TAKEAWAY 2**One clock, separate equations**

Use separate x and y equations with the same time, then recombine the results when needed.

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

Cosine gives the horizontal component because it is adjacent to an angle measured from +x.

WHY IT WORKS The angle geometry determines adjacent and opposite components.

WARM-UP • ACTIVITY 2

Common Mistakes

Newtonian kinematics equations apply independently to perpendicular components; coupling occurs only through the shared time and final vector interpretation.

WHY IT WORKS Perpendicular component equations are scalar one-dimensional equations sharing the same physical time.

WARM-UP • ACTIVITY 3

Quick Application

The magnitude is $\sqrt{6^2+8^2}=10$.

WHY IT WORKS Use the Pythagorean relationship for perpendicular components.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

Initial components are 8.0 m/s horizontally and 6.0 m/s vertically.

WHY IT WORKS Resolve the 10 m/s vector using the supplied trigonometric values.

PRACTICE 2

Independent Check

Horizontal displacement = $5(2) + \frac{1}{2}(1)(2^2) = 12$ m; vertical displacement = $2(2) + \frac{1}{2}(-3)(2^2) = -2$ m.

WHY IT WORKS Apply the constant-acceleration displacement equation separately on each axis.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Resolve an angled vector

Components are 9.0 m/s horizontally and 12.0 m/s vertically.

WHY IT WORKS Resolve 15 m/s using the supplied trigonometric values.

CONFIDENCE CHECK 2

Recombine component velocity

Speed = $\sqrt{9^2 + 12^2} = 15$ m/s.

WHY IT WORKS The speed is the magnitude of the velocity vector.

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