

FOCUSED REVIEW

Focused Review: Electric Fields — 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 Unit Review is an independent learning resource. Use it to reinforce key concepts, prepare for homework, or review before a quiz or exam.

RESOURCE: Physics Sensei Unit Review
UNIT ID: EME-U02
TOPIC: Electric Fields
COURSE LEVEL: Algebra-Based

BEST USED

- ✓ After learning the unit
- ✓ 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 two relationships used most often in electric-field problems.

State the point-charge electric-field magnitude and the field-to-force relationship.

WARM-UP 2**Common Mistakes**

Separate scalar magnitude from vector direction.

Does a negative source charge make the scalar field magnitude negative? Explain.

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Recall how fields from several source charges combine.

How do you combine electric fields produced by several source charges?

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

Point-Charge Electric Field

$$E = k|Q|/r^2; \quad E_{\text{net}} = \sum_i E_i$$

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EXAMPLE A positive source produces a field away from itself; a negative source produces a field toward itself.

SENSEI NOTE Keep magnitude and direction reasoning separate to avoid sign errors.

KEY CONCEPT 2

Vector Superposition

The net electric field is the vector sum of all source-charge contributions: $E_{\text{net}} = \sum E_i$. In two dimensions, resolve contributions into x and y components before adding.

$$E_{\text{net}} = \sum E_i$$

EXAMPLE Use symmetry first; equal opposite components may cancel before calculation.

SENSEI NOTE Fields add as vectors, not as ordinary scalar magnitudes unless the geometry is strictly one-dimensional.

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**

Calculate magnitude first, then state direction.

A $+2.0\ \mu\text{C}$ charge is $0.30\ \text{m}$ from P . Find the electric field at P .

PRACTICE 2**Independent Check**

Assign a sign to each component using one chosen axis.

At P , one field contribution is $4.0 \times 10^4\ \text{N/C}$ right and another is $1.5 \times 10^4\ \text{N/C}$ left. Find the net field.

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

Distance Scaling

Use the inverse-square relationship.

If the distance from the same point charge triples, what happens to E ?

CONFIDENCE CHECK 2

Two-Dimensional Field

Combine perpendicular components.

If $E_x = 3.0 \times 10^4 \text{ N/C}$ and $E_y = 4.0 \times 10^4 \text{ N/C}$, find the field magnitude.

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**Point-Charge Electric Field**

$$E = k|Q|/r^2; \quad E_{\text{net}} = \sum_i E_i$$

KEY TAKEAWAY 2**Vector Superposition**

The net electric field is the vector sum of all source-charge contributions: $E_{\text{net}} = \sum E_i$. In two dimensions, resolve contributions into x and y components before adding.

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

$$E$$

WHY IT WORKS Use the defining direction rule for the electric field.

WARM-UP • ACTIVITY 2

Common Mistakes

No. E is a magnitude. The sign of the source charge determines the field direction.

WHY IT WORKS Keep electric field distinct from force on a test charge.

WARM-UP • ACTIVITY 3

Quick Application

Add the individual electric-field vectors: $E_{\text{net}} = \sum E_i$.

WHY IT WORKS Apply the treatment-appropriate field relationship.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

$E = (8.99 \times 10^9)(2.0 \times 10^{-6}) / (0.30)^2 \approx 2.00 \times 10^5 \text{ N/C}$, directed away from the positive charge.

WHY IT WORKS The scalar formula gives magnitude; source-charge sign and geometry give direction.

PRACTICE 2

Independent Check

$E_{\text{net}} = 2.5 \times 10^4 \text{ N/C}$ to the right.

WHY IT WORKS The contributions oppose, so subtract their magnitudes and keep the direction of the larger field.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Distance Scaling

E becomes 1/9 as large.

WHY IT WORKS Apply the relevant electric-field relationship and direction rule.

CONFIDENCE CHECK 2

Two-Dimensional Field

5.0×10^4 N/C.

WHY IT WORKS Apply the relevant electric-field relationship and direction rule.

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.