FOCUSED REVIEW

Focused Review: Units and Measurements — Foundational

Review the highest-leverage measurement ideas, reinforce the essential skills, and confirm you're ready to move on.

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

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

use SI units and prefixes, carry units through conversions, interpret precision, and check results with estimation.

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: MEC-U01** **TOPIC: Units and Measurements** **COURSE LEVEL: Foundational introductory physics**	**BEST USED** ✓ After learning the unit ✓ Before starting homework ✓ Before a quiz or exam

Start the Unit Review Online →

Physics Sensei organizes this material as an independent learning unit rather than following an external textbook chapter sequence.

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

Key Ideas

Recall common SI units and prefixes.

What are the SI units for length, mass, and time? What factor does kilo represent?

WARM-UP 2

Common Mistakes

Use a conversion factor so units cancel.

Convert 4.50 km to meters and explain which unit must cancel.

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Distinguish precision from accuracy.

A scale repeatedly reads 52.4 g for a 50.0 g reference mass. Is it precise, accurate, both, or neither?

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

Measurement, SI Units, and Conversion Factors

A physical quantity is represented by a numerical value and a unit. SI units provide a common language. Metric prefixes represent powers of ten. A conversion factor is a ratio equal to one, so it changes the unit representation without changing the physical quantity.

$$1\ \text{km} = 10^{3}\ \text{m};\ 1\ \text{cm} = 10^{-2}\ \text{m};\ 1\ \text{ms} = 10^{-3}\ \text{s}.$$

EXAMPLE 4.50 km x (1000 m / 1 km) = 4.50×10^{3} m.

SENSEI NOTE Write the units in every step. Correct unit cancellation is one of the fastest error checks in physics.

KEY CONCEPT 2

Precision, Significant Figures, and Estimation

Measurements have finite precision. Significant figures communicate meaningful digits, while estimates help determine whether a result is plausible. Accuracy concerns closeness to an accepted value; precision concerns resolution or repeatability.

$$\text{percent uncertainty} = (\Delta x / x) \times 100\%;\ [v] = L\,T^{-1};\ [a] = L\,T^{-2}.$$

EXAMPLE Reporting a classroom length as 2.340 m can be reasonable with millimeter-scale resolution, but 2.3400000 m usually claims unjustified precision.

SENSEI NOTE Calculator digits are not automatically significant. The measurement process determines defensible precision.

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

Guided Example

Use conversion factors and cancel units explicitly.

Convert 72.0 km/h to m/s.

PRACTICE 2

Independent Check

Use percent uncertainty to compare measurement quality.

A length is measured as 25.0 ± 0.2 cm. Find the percent uncertainty.

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

Unit Conversion

Set up the factors before multiplying.

Convert 3.60 m^2 to cm^2.

CONFIDENCE CHECK 2

Precision and Reasonableness

Use the instrument and scale of the situation.

A stopwatch reads to 0.01 s. Which is better reporting for one trial: 2.7 s, 2.73 s, or 2.731946 s? Explain.

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

Units Are Part of the Calculation

Choose conversion factors so unwanted units cancel and the desired units remain.

KEY TAKEAWAY 2

Precision Must Be Earned

Report only the precision supported by the measurement and use estimation to catch unreasonable results.

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. Use each answer and explanation to check both the setup and the physical interpretation.

WARM-UP • ACTIVITY 1

Key Ideas

Length: meter (m); mass: kilogram (kg); time: second (s); kilo = 10^3.

WHY IT WORKS SI base units and metric prefixes define a consistent measurement language.

WARM-UP • ACTIVITY 2

Common Mistakes

4.50 km = 4500 m. The kilometer must cancel.

WHY IT WORKS Multiplying by 1000 m / 1 km leaves meters while preserving the same physical length.

WARM-UP • ACTIVITY 3

Quick Application

Precise but inaccurate.

WHY IT WORKS The readings are repeatable, but they are systematically displaced from the reference value.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

72.0 km/h = 20.0 m/s.

WHY IT WORKS Multiply by 1000 m/1 km and 1 h/3600 s; km and h cancel.

PRACTICE 2

Independent Check

Percent uncertainty = (0.2/25.0) × 100% = 0.8%.

WHY IT WORKS Relative uncertainty compares the absolute uncertainty with the measured value.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Unit Conversion

$3.60\ m^2 = 3.60 \times 10^4\ cm^2$.

WHY IT WORKS Because 1 m = 100 cm, squaring the conversion gives $1\ m^2 = 10^4\ cm^2$.

CONFIDENCE CHECK 2

Precision and Reasonableness

2.73 s is the best report.

WHY IT WORKS A stopwatch resolving 0.01 s supports hundredths of a second, not only tenths and not many extra calculator digits.

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.	Build confidence with additional practice problems.	Continue to the next topic or learning 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.