

FULL REVIEW

Full Review — Significant Figures and Measurement Uncertainty — Algebra-Based

Review the essential ideas, relationships, and problem-solving tools for Significant Figures and Measurement Uncertainty.

 TIME 45–60 minutes	 BEST FOR A complete topic review	 FINISH WITH A readiness check
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After this full review, you'll be able to...

recall the essential ideas, apply them to representative problems, and determine what to study next.

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 45–60 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 [Units and Measurements here →](#)

RESOURCE: Physics Sensei Topic Review
TOPIC ID: MEC-U01-T02
TOPIC: Significant Figures and Measurement
Uncertainty
PARENT UNIT: MEC-U01 — Units and Measurements
COURSE LEVEL: Algebra-Based College Physics

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 stages in order. Each stage builds on the previous one and prepares you for the final readiness check.

6 stages • Approximately 45–60 minutes

1 Warm-Up Check Activate prior knowledge.	2 Core Concepts Review the essential ideas.	3 Guided Practice Apply what you learned.
4 Confidence Check Confirm your understanding.	5 Summary Review the key ideas.	6 Next Step Continue your learning.

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 moment to see what you already remember. Do not worry about getting everything right. This is only a starting point.

ACTIVITY 1**Recall Activity 1**

Answer before revealing the response.

How many significant figures are in 6.020×10^3 ?

ACTIVITY 2**Recall Activity 2**

Answer before revealing the response.

A result is 18.7426 cm from a calculation, but the inputs justify only three significant figures. How should it be reported?

FR-04 • WARM-UP CHECK CONTINUED

ACTIVITY 3

Recall Activity 3

Answer before revealing the response.

A voltage is 12.0 ± 0.3 V. Estimate its percent uncertainty.

Ready to strengthen your understanding?

You've refreshed what you already know. Next, reinforce the essential concepts that will help you solve problems with confidence.

Continue to Core Concepts →

FR-05 • STAGE 2 OF 6

Core Concepts

Let's rebuild the key ideas one step at a time. Focus on understanding the relationships before worrying about solving problems.

KEY CONCEPT 1

Rounding Rules for Calculated Results

For multiplication and division, the result is usually limited by the input with the fewest significant figures. For addition and subtraction, the limiting factor is decimal place rather than a raw count of significant figures. Keep extra digits during intermediate steps and round once at the end.

Multiplication/division: final significant figures follow the least-precise factor

EXAMPLE $(3.42)(2.1) = 7.182$ on the calculator, reported as 7.2 because 2.1 has two significant figures.

SENSEI NOTE Do not round every intermediate line; repeated rounding can shift the final answer.

KEY CONCEPT 2

Absolute and Percent Uncertainty

Absolute uncertainty has the same units as the measured quantity. Percent uncertainty expresses that uncertainty relative to the size of the measurement, making it easier to compare measurements of different magnitudes.

Percent uncertainty = (absolute uncertainty / measured value) × 100%

EXAMPLE For 80.0 ± 2.0 N, the percent uncertainty is 2.5%.

SENSEI NOTE A small absolute uncertainty can still be large in percentage terms if the measured value is small.

FR-05 • CORE CONCEPTS CONTINUED

KEY CONCEPT 3

Combining Uncertainty in Simple Calculations

For simple introductory estimates, absolute uncertainties are often tracked for sums/differences and relative or percent uncertainties for products/quotients. The exact method depends on the stated uncertainty model, so identify the convention being used before calculating.

Products/quotients: compare or combine relative uncertainties

EXAMPLE If two measured factors each have a few percent uncertainty, the result cannot reasonably be reported to many more precise digits than those inputs support.

SENSEI NOTE State the propagation convention; different laboratory courses may use worst-case or independent-random rules.

Ready to apply these ideas?

You've reinforced the essential concepts. Now put them into practice by working through guided examples and building your problem-solving confidence.

Continue to Guided Practice →

FR-06 • STAGE 3 OF 6

Guided Practice

Now it's time to apply what you've reviewed. Work through each activity in order. The examples become gradually more challenging, and each prepares you for the final readiness check.

PRACTICE 1**Worked Example**

Round a Product

Calculate $(4.62\text{ m})(3.1\text{ m})$ and report the area with appropriate significant figures.

FR-06 • GUIDED PRACTICE CONTINUED

PRACTICE 2

Guided Problem

Compare Relative Precision

Measurement A is 20.0 ± 0.2 cm. Measurement B is 5.0 ± 0.2 cm. Which has better relative precision?

PRACTICE 3

Independent Problem

Report a Quotient

A distance 24.0 ± 0.2 m is divided by a time 3.00 ± 0.05 s. Estimate the speed and judge a sensible number of reported digits.

Ready to check your understanding?

You've practiced the essential skills with guidance. Now solve a few short problems on your own and confirm you're ready to move forward.

Continue to Confidence Check →

FR-07 • STAGE 4 OF 6

Confidence Check

You've rebuilt the key ideas and practiced them with guidance. Now try these short questions on your own to check your understanding before moving on.

QUICK CHECK 1

Decimal-Place Rule

Apply the addition/subtraction rule.

Report $12.43 + 1.2 + 0.056$ with appropriate decimal precision.

QUICK CHECK 2

Percent Uncertainty

Compute the relative precision.

A mass is 125.0 ± 0.5 g. What is the percent uncertainty?

FR-07 • CONFIDENCE CHECK CONTINUED

QUICK CHECK 3

Guard Digits

Choose a calculation strategy.

Should you round intermediate values after every line or retain extra digits until the final result?

HOW DID IT GO?

I answered ____ of 3 questions correctly.

Use the Solutions section to check your reasoning, then take one final look at the essential ideas.

You've checked your understanding.

Take one final look at the essential ideas before deciding what to do next.

Continue to Summary →

FR-08 • STAGE 5 OF 6

Summary

Before moving on, take one final look at the most important ideas from this review.

KEY TAKEAWAY 1**Round by the Operation**

Multiplication/division uses significant-figure limits; addition/subtraction uses decimal-place limits.

KEY TAKEAWAY 2**Use Relative Uncertainty**

Percent uncertainty compares measurement quality on a common scale and helps determine sensible reporting precision.

KEY TAKEAWAY 3**Propagation Comes Before Final Rounding**

Estimate the uncertainty or limiting precision first, then round the final value to match it.

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**Recall Activity 1**

6.020×10^3 has four significant figures.

WHY IT WORKS Scientific notation makes the intended significant digits explicit.

WARM-UP • ACTIVITY 2**Recall Activity 2**

Report 18.7 cm.

WHY IT WORKS Three significant figures retain only the digits justified by the input precision.

WARM-UP • ACTIVITY 3**Recall Activity 3**

About 2.5%.

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

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1**Worked Example**

The calculator gives 14.322 m^2 . The factor 3.1 has two significant figures, so report 14 m^2 .

WHY IT WORKS The solution applies the stated precision or uncertainty method while keeping the final report consistent with the data.

PRACTICE 2**Guided Problem**

A has 1% uncertainty; B has 4% uncertainty. Measurement A has better relative precision.

WHY IT WORKS The solution applies the stated precision or uncertainty method while keeping the final report consistent with the data.

PRACTICE 3**Independent Problem**

The speed is 8.00 m/s . The relative uncertainties are under 2%, so a report around 8.00 m/s with an uncertainty on the order of tenths is sensible; use the course-specified propagation rule for the exact uncertainty.

WHY IT WORKS The solution applies the stated precision or uncertainty method while keeping the final report consistent with the data.

SOLUTIONS • CONFIDENCE CHECK

QUICK CHECK 1

Decimal-Place Rule

The calculator gives 13.686; the least precise term is to the tenths place, so report 13.7.

WHY IT WORKS The answer follows directly from the measurement-precision or propagation principle tested by the question.

QUICK CHECK 2

Percent Uncertainty

0.4%.

WHY IT WORKS The answer follows directly from the measurement-precision or propagation principle tested by the question.

QUICK CHECK 3

Guard Digits

Retain extra digits and round the final reported result.

WHY IT WORKS The answer follows directly from the measurement-precision or propagation principle tested by the question.

READINESS GUIDE

3 correct: You're ready to continue. • 2 correct: Review the missed idea, then continue. • 0–1 correct: Revisit Core Concepts or choose more practice.

FR-09 • STAGE 6 OF 6

Next Step: Continue Learning

Great work! You've completed this review. Choose the next resource that best matches how confident you feel.

 I'm Still Unsure Review the key ideas and examples again. Review Again →	 I Need More Practice Continue with additional practice for this topic. Go to Practice →	 I'm Ready Continue to the next recommended 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