

FULL REVIEW

Full Review — Significant Figures and Measurement Uncertainty — Foundational

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: Foundational 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.

Which value communicates greater precision: 8.2 cm or 8.20 cm? Explain briefly.

ACTIVITY 2

Recall Activity 2

Answer before revealing the response.

Identify the digits that are significant in 0.03040 s.

FR-04 • WARM-UP CHECK CONTINUED

ACTIVITY 3

Recall Activity 3

Answer before revealing the response.

A ruler measurement is reported as 15.6 cm. What does the last reported digit tell you about the measurement?

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

Reading Significant Figures

Significant figures communicate which digits are supported by the measurement. Leading zeros are not significant; zeros between significant digits are; trailing zeros after a decimal point are significant. Exact counts and defined conversion factors are not limited by significant figures.

Number of significant figures = all certain digits + one estimated digit

EXAMPLE 0.03040 s has four significant figures: 3, 0, 4, and the final 0.

SENSEI NOTE First decide whether each zero is a placeholder or a measured digit.

KEY CONCEPT 2

Reporting Measurement Uncertainty

No physical measurement is infinitely precise. The reported digits and the uncertainty should agree about the measurement resolution. When comparing two measurements, consider whether their uncertainty ranges overlap before claiming they are different.

Measured value = best estimate $\pm$ uncertainty

EXAMPLE A length reported as 25.3 ± 0.1 cm represents values consistent with the measurement near 25.3 cm within about one tenth of a centimeter.

SENSEI NOTE Extra calculator digits do not create extra experimental precision.

FR-05 • CORE CONCEPTS CONTINUED

KEY CONCEPT 3

Rounding Without Inventing Precision

A calculated result should not be written with more precision than the measurements justify. Use significant-figure and decimal-place rules as practical reporting guides, but preserve extra digits during the calculation until the final step.

Final report: round the value to the same decimal place as its uncertainty

EXAMPLE If a result is 6.287 cm with an estimated uncertainty of 0.1 cm, report approximately 6.3 ± 0.1 cm.

SENSEI NOTE Rounding is a reporting decision, not a way to improve the quality of the measurement.

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**

Count and Interpret

For each value, state the number of significant figures and identify why: 0.00560 m; 7.030 s; 1200 kg with no decimal point.

FR-06 • GUIDED PRACTICE CONTINUED

PRACTICE 2**Guided Problem**

Report a Measurement

A digital balance reads 42.37 g and its resolution is 0.01 g. Write a reasonable measurement statement using the displayed resolution.

PRACTICE 3**Independent Problem**

Choose a Clear Scientific-Notation Report

Rewrite 0.0007800 m in scientific notation so the number of significant figures is unambiguous.

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**Significant or Placeholder?**

Choose the significant digits.

How many significant figures are in 0.07050?

QUICK CHECK 2**Match Precision**

Choose the better report.

Which better matches an uncertainty of ± 0.2 cm: 18.346 cm or 18.3 cm?

FR-07 • CONFIDENCE CHECK CONTINUED

QUICK CHECK 3

Uncertainty Range

Interpret a stated uncertainty.

A value is 9.8 ± 0.2 m/s. Give the approximate interval represented by this statement.

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**Digits Carry Information**

Significant figures are a compact way to show the precision justified by a measured value.

KEY TAKEAWAY 2**Uncertainty Sets the Limit**

Report a measurement only to a place value consistent with its uncertainty; calculator digits beyond that are not experimentally meaningful.

KEY TAKEAWAY 3**Scientific Notation Removes Ambiguity**

Use scientific notation when trailing zeros in an integer could make the intended significant figures unclear.

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

8.20 cm communicates greater precision because the trailing zero shows resolution to the hundredth of a centimeter.

WHY IT WORKS Trailing decimal zeros can be measured digits, not placeholders.

WARM-UP • ACTIVITY 2

Recall Activity 2

0.03040 s has four significant figures: 3, the interior 0, 4, and the trailing 0.

WHY IT WORKS Leading zeros locate the decimal point; interior and trailing decimal zeros can carry measurement information.

WARM-UP • ACTIVITY 3

Recall Activity 3

The last digit is the least precise reported digit; it indicates the measurement was resolved to about the tenths place.

WHY IT WORKS The final reported digit communicates the scale of the measurement resolution.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1**Worked Example**

0.00560 m has 3 significant figures; 7.030 s has 4; 1200 kg is ambiguous without additional notation, so scientific notation should be used to show intended precision.

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 reasonable report is 42.37 ± 0.01 g if the instrument specification supports using one display unit as the uncertainty estimate.

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**

7.800×10^{-4} m; four significant figures are explicit.

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

Significant or Placeholder?

4: 7, 0, 5, and the final 0 are significant.

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

QUICK CHECK 2

Match Precision

18.3 cm. Reporting thousandths would imply precision not supported by an uncertainty of two tenths.

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

QUICK CHECK 3

Uncertainty Range

About 9.6 to 10.0 m/s.

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