

FULL REVIEW

Full Review — Unit Conversions and Dimensional Analysis — Foundational

Review the essential ideas, relationships, and problem-solving tools for Unit Conversions and Dimensional Analysis.

 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-T01
TOPIC: Unit Conversions and Dimensional Analysis
PARENT UNIT: MEC-U01 — Units and Measurements
COURSE LEVEL: Foundational

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

State the meaning of kilo, centi, and milli. Define a conversion factor.

ACTIVITY 2

Recall Activity 2

Classify each as a unit or a dimension: meter, [L], second, [T].

FR-04 • WARM-UP CHECK CONTINUED

ACTIVITY 3

Recall Activity 3

Convert 72 km/h to m/s.

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

Conversion Factors

A conversion factor comes from an equality such as $1 \text{ km} = 1000 \text{ m}$. Either $1000 \text{ m}/1 \text{ km}$ or $1 \text{ km}/1000 \text{ m}$ equals 1. Choose the orientation that cancels the unit you do not want.

$$\text{conversion factor} = \text{equivalent quantity} / \text{equivalent quantity} = 1$$

$$1 \text{ km} = 1000 \text{ m} \Rightarrow (1000 \text{ m} / 1 \text{ km}) = 1$$

EXAMPLE $4.7 \text{ km} \times (1000 \text{ m} / \text{km}) = 4700 \text{ m}$.

SENSEI NOTE Unit cancellation is the safest way to choose the correct orientation.

KEY CONCEPT 2

Multi-Step and Compound Conversions

For compound units, convert numerator and denominator units independently. Keep every factor visible until unwanted units cancel.

$$\text{original unit} \times \text{conversion factors} \rightarrow \text{requested unit}$$

$$36 \text{ km/h} \times (1000 \text{ m/km}) \times (1 \text{ h}/3600 \text{ s}) = 10 \text{ m/s}$$

EXAMPLE $36 \text{ km/h} \times (1000 \text{ m/km}) \times (1 \text{ h}/3600 \text{ s}) = 10 \text{ m/s}$.

SENSEI NOTE Do not convert only the numerator of a compound unit.

FR-05 • CORE CONCEPTS CONTINUED

KEY CONCEPT 3

Dimensions

Dimensions identify the physical type of a quantity. Length is [L], time [T], and speed [L/T]. Equations must be dimensionally consistent term by term.

$$[\text{speed}] = [L/T]$$

$$[\text{distance}] = [\text{speed}][\text{time}] = [L/T][T] = [L]$$

EXAMPLE Distance = speed $\times$ time gives $[L/T][T] = [L]$.

SENSEI NOTE Dimensional consistency is necessary, but it does not prove an equation is completely correct.

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**

Worked example: convert 2.4 h to seconds.

$$2.4 \text{ h} \times (60 \text{ min/h}) \times (60 \text{ s/min}) = 8640 \text{ s}.$$

FR-06 • GUIDED PRACTICE CONTINUED

PRACTICE 2**Guided Problem**

Guided problem: convert 54 km/h to m/s.

Step 1: write 54 km/h. Step 2: multiply by 1000 m/km. Step 3: multiply by 1 h/3600 s. Step 4: simplify.

PRACTICE 3**Independent Problem**

Independent problem: convert 7500 mg to grams and state the dimension of the result.

Show the factor-label setup, calculate the value, and state the dimension.

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

Prefix Check

Answer and justify with units or dimensions.

How many meters are in 3.6 km?

QUICK CHECK 2

Compound Unit Check

Answer and justify with units or dimensions.

Convert 18 km/h to m/s.

FR-07 • CONFIDENCE CHECK CONTINUED

QUICK CHECK 3

Dimension Check

Answer and justify with units or dimensions.

What is the dimension of speed?

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**Conversion Factors**

Use ratios of equivalent units and orient them so unwanted units cancel.

KEY TAKEAWAY 2**Compound Units**

Convert every unit factor in the numerator and denominator.

KEY TAKEAWAY 3**Dimensions**

Use dimensions to check whether a physical expression is even possible.

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**

kilo = 10^3 , centi = 10^{-2} , milli = 10^{-3} . A conversion factor is a ratio of equivalent quantities equal to 1.

WHY IT WORKS The definitions and factors provide the basic vocabulary for the topic.

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

Units: meter, second. Dimensions: [L], [T].

WHY IT WORKS Dimensions identify the physical type of each quantity.

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

$72 \times (1000/3600) = 20 \text{ m/s}$.

WHY IT WORKS The unit or dimensional algebra produces the stated result.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1**Worked Example**

$$2.4 \text{ h} \times (60 \text{ min/h}) \times (60 \text{ s/min}) = 8640 \text{ s.}$$

WHY IT WORKS A complete setup makes every conversion or dimensional step visible.

PRACTICE 2**Guided Problem**

Step 1: write 54 km/h. Step 2: multiply by 1000 m/km. Step 3: multiply by 1 h/3600 s. Step 4: simplify.

WHY IT WORKS The checkpoints preserve consistency through the solution.

PRACTICE 3**Independent Problem**

Show the factor-label setup, calculate the value, and state the dimension.

WHY IT WORKS The independent problem uses the same approved principles without scaffolding.

SOLUTIONS • CONFIDENCE CHECK

QUICK CHECK 1

Prefix Check

3600 m.

WHY IT WORKS This follows directly from the conversion or dimensional rule used in the review.

QUICK CHECK 2

Compound Unit Check

5.0 m/s.

WHY IT WORKS The required dimensions make the expression physically meaningful.

QUICK CHECK 3

Dimension Check

[L/T].

WHY IT WORKS The dimensions of each term determine whether the expression is consistent.

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