

FOCUSED REVIEW

Focused Review: Ideal Gas Law

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: THM-U06
TOPIC: Ideal Gas Law
COURSE LEVEL: Calculus-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**

Identify the ideal-gas variables and their meanings.

Identify P , V , n , T , and R ; distinguish state variables from process constraints; recognize $PV = nRT$ as an equation of state.

WARM-UP 2**Common Mistakes**

Why is $dP/P = -dV/V$ not a general ideal-gas relation?

It follows only for fixed n and an isothermal process.

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Apply the ideal-gas relationship.

For fixed n , differentiate $PV = nRT$.

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**Ideal Gas Law and State Variables**

The ideal gas law is an equation of state connecting equilibrium variables P , V , n , and T . It constrains states but does not specify the process between them.

$$PV = nRT$$

EXAMPLE Given any three state variables at equilibrium, the fourth follows from the equation of state.

SENSEI NOTE An equation of state describes states, not the path.

KEY CONCEPT 2**Units and Absolute Temperature**

Temperature must be absolute and the units of R must be compatible with P and V . In SI, $\text{Pa}\cdot\text{m}^3$ is a joule.

$$R = 8.314 \text{ J}/(\text{mol}\cdot\text{K}) = 8.314 \text{ Pa}\cdot\text{m}^3/(\text{mol}\cdot\text{K})$$

EXAMPLE With P in Pa and V in m^3 , both PV and nRT have units of energy.

SENSEI NOTE Use dimensional consistency as a check.

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**

Work through a representative ideal-gas problem.

For fixed n and an isothermal change, $P dV + V dP = 0$. Dividing by PV gives $dP/P = -dV/V$.

PRACTICE 2**Independent Check**

Solve this ideal-gas problem independently.

For fixed n and constant volume, relate dP/P to dT/T .

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

Ideal-Gas Check

Show the governing relationship and reasoning.

What thermodynamic role does $PV = nRT$ play?

CONFIDENCE CHECK 2

Ideal-Gas Check

Show the governing relationship and reasoning.

For fixed n , what is the differential form of $PV = nRT$?

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**Ideal Gas Law and State Variables**

The ideal gas law is an equation of state connecting equilibrium variables P , V , n , and T . It constrains states but does not specify the process between them.

KEY TAKEAWAY 2**Units and Absolute Temperature**

Temperature must be absolute and the units of R must be compatible with P and V . In SI, $\text{Pa}\cdot\text{m}^3$ is a joule.

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

Identify P , V , n , T , and R ; distinguish state variables from process constraints; recognize $PV = nRT$ as an equation of state.

WHY IT WORKS Use the ideal-gas law together with the stated constraints and consistent units.

WARM-UP • ACTIVITY 2

Common Mistakes

It follows only for fixed n and an isothermal process.

WHY IT WORKS Use the ideal-gas law together with the stated constraints and consistent units.

WARM-UP • ACTIVITY 3

Quick Application

$P dV + V dP = nR dT$.

WHY IT WORKS Use the ideal-gas law together with the stated constraints and consistent units.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

For fixed n and an isothermal change, $P dV + V dP = 0$. Dividing by PV gives $dP/P = -dV/V$.

WHY IT WORKS Use the ideal-gas law together with the stated constraints and consistent units.

PRACTICE 2

Independent Check

With $dV = 0$, $dP/P = dT/T$.

WHY IT WORKS Use the ideal-gas law together with the stated constraints and consistent units.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Ideal-Gas Check

It is the ideal-gas equation of state.

WHY IT WORKS Use the ideal-gas law together with the stated constraints and consistent units.

CONFIDENCE CHECK 2

Ideal-Gas Check

$P dV + V dP = nR dT$.

WHY IT WORKS Use the ideal-gas law together with the stated constraints and consistent units.

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.

PhysicsSensei.com