

FOCUSED REVIEW

Focused Review: Kinetic Theory of Gases — Foundational

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...

After this review, you'll be able to explain pressure microscopically, relate absolute temperature to molecular kinetic energy, and predict how rms speed changes.

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-U07
TOPIC: Kinetic Theory of Gases
COURSE LEVEL: Foundational

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**

State the microscopic meaning of pressure and temperature.

Pressure comes from molecular collisions with walls. Temperature in kelvins measures average translational kinetic energy.

WARM-UP 2**Common Mistakes**

Decide whether each statement is true or false, then correct it.

"All molecules at one temperature have the same speed." "Doubling Celsius temperature doubles molecular speed."

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

Use a proportional argument.

For the same gas, the absolute temperature rises from 200 K to 450 K. By what factor does rms speed change?

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

Pressure from Molecular Collisions

A molecule reverses part of its momentum when it hits a wall. The wall receives an impulse. Enormous numbers of impacts per second create a steady macroscopic pressure.

$$P = (1/3)(N/V)m\langle v^2 \rangle$$

EXAMPLE More molecules per volume, greater molecular mass at the same mean-square speed, or greater mean-square speed increases pressure.

SENSEI NOTE Pressure is not caused by molecules "wanting to expand"; it is the result of momentum transfer.

KEY CONCEPT 2

Temperature and Molecular Speed

For an ideal gas, absolute temperature fixes average translational kinetic energy. Molecular speeds form a distribution, so rms speed is a useful characteristic speed. Lighter molecules move faster at the same temperature.

$$v_{\text{rms}} = \sqrt{3k_B T/m}$$

EXAMPLE For the same gas, 200 K → 450 K changes rms speed by $\sqrt{450/200} = 1.50$.

SENSEI NOTE A higher rms speed does not mean every molecule moves at that speed.

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**Speed Ratio**

Use the square-root temperature dependence.

A sample is heated from 300 K to 600 K. Find the rms-speed ratio.

PRACTICE 2**Compare Two Gases**

Use the mass dependence without plugging in constants.

At the same temperature, compare the rms speeds of molecules with masses m and $4m$.

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

Pressure Change

Reason from the microscopic variables.

If N/V stays fixed and mean-square speed doubles, what happens to pressure?

CONFIDENCE CHECK 2

Mass and Speed

Compare gases at equal temperature.

Which has the larger rms speed: a lighter gas or a heavier gas? Explain in one sentence.

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**Temperature sets kinetic energy**

At a given absolute temperature, ideal-gas molecules share the same average translational kinetic energy.

KEY TAKEAWAY 2**Typical speed depends on mass**

Rms speed rises with $\sqrt{T}$ and falls with $\sqrt{m}$.

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

Pressure is momentum transfer from molecular-wall collisions; temperature tracks average translational kinetic energy.

WHY IT WORKS The microscopic model connects motion and collisions to measurable gas properties.

WARM-UP • ACTIVITY 2

Common Mistakes

Both statements are false: speeds are distributed, and molecular-speed relations use kelvins and a square-root dependence.

WHY IT WORKS A gas contains a range of molecular speeds; temperature is an energy scale, not a direct speed reading.

WARM-UP • ACTIVITY 3

Quick Application

The factor is $\sqrt{(450/200)} = 1.50$.

WHY IT WORKS For one molecular species, rms speed $\propto \sqrt{T}$.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1

Guided Example

the rms-speed ratio = $\sqrt{(600/300)} = \sqrt{2} \approx 1.41$.

WHY IT WORKS The constants and molecular mass cancel in a same-gas speed ratio.

PRACTICE 2

Independent Check

The molecule of mass m has twice the rms speed of the molecule of mass $4m$.

WHY IT WORKS At equal temperature, rms speed $\propto 1/\sqrt{m}$.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Pressure Change

Pressure doubles.

WHY IT WORKS With N/V and m fixed, P is directly proportional to mean-square speed.

CONFIDENCE CHECK 2

Mass and Speed

The lighter gas has the larger rms speed.

WHY IT WORKS Equal temperature means equal average kinetic energy; less mass therefore requires greater typical speed.

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