

FOCUSED REVIEW

Focused Review: Entropy and the Second Law — Algebra-Based

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-U11
TOPIC: Entropy and the Second Law
COURSE LEVEL: Algebra-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**

Recall the entropy-change relation for reversible heat transfer at constant absolute temperature.

Write a concise response and identify the governing entropy idea.

WARM-UP 2**Common Mistakes**

Identify the SI unit of entropy and explain why temperature must be in kelvins.

Write a concise response and identify the governing entropy idea.

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

Quick Application

For two reservoirs exchanging heat Q , write the entropy changes of the hot and cold reservoirs and predict the sign of their sum.

Write a concise response and identify the governing entropy idea.

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

Entropy change from reversible heat transfer

For reversible heat transfer at constant absolute temperature T , the entropy change is $\Delta S = Q_{\text{rev}}/T$. Use the sign of Q for the system being analyzed.

$$\Delta S = Q_{\text{rev}}/T \text{ (constant } T\text{)}$$

If 600 J enters a system reversibly at 300 K, $\Delta S = +2.00 \text{ J/K}$.

Always use kelvins and keep the heat sign consistent with the chosen system.

KEY CONCEPT 2

Second-law entropy balance

For an isolated system, $\Delta S_{\text{total}} \geq 0$. Equality describes a reversible idealization; a positive value indicates irreversibility.

$$\Delta S_{\text{total}} = -Q/T_h + Q/T_c \geq 0$$

Heat Q transferred from T_h to T_c gives $\Delta S_{\text{total}} = -Q/T_h + Q/T_c$, which is positive when $T_h > T_c$.

Do not apply $\Delta S = Q/T$ blindly when temperature changes during the process.

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**

A system absorbs 900 J reversibly from a 300 K reservoir. Calculate its entropy change.

Show your reasoning clearly and include units where applicable.

PRACTICE 2**Independent Check**

500 J of heat flows from a 400 K reservoir to a 300 K reservoir. Calculate ΔS_{hot} , ΔS_{cold} , and ΔS_{total} .

Show your reasoning clearly and include units where applicable.

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

Entropy Check

Solve or explain briefly.

A system releases 240 J reversibly at 300 K. Find ΔS_{system} .

CONFIDENCE CHECK 2

Entropy Check

Solve or explain briefly.

For $Q = 1000 \text{ J}$ transferred from 500 K to 250 K, find ΔS_{total} .

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**Use $\Delta S = Q_{\text{rev}}/T$ correctly**

For reversible heat transfer at constant absolute temperature T , the entropy change is $\Delta S = Q_{\text{rev}}/T$.

KEY TAKEAWAY 2**Check $\Delta S_{\text{total}} \geq 0$**

For an isolated system, $\Delta S_{\text{total}} \geq 0$.

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

For constant-temperature reversible heat transfer, $\Delta S = Q_{\text{rev}}/T$. Entropy is measured in J/K.

This follows from the definition of entropy and the second-law direction criterion.

WARM-UP • ACTIVITY 2

Common Mistakes

Entropy is a state function; the total entropy of an isolated system satisfies $\Delta S_{\text{total}} \geq 0$.

This follows from the definition of entropy and the second-law direction criterion.

WARM-UP • ACTIVITY 3

Quick Application

For heat Q from hot to cold: $\Delta S_{\text{hot}} = -Q/T_h$ and $\Delta S_{\text{cold}} = +Q/T_c$; their sum is positive when $T_h > T_c$.

This follows from the definition of entropy and the second-law direction criterion.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1**Guided Example**

$$\Delta S = 900 \text{ J} / 300 \text{ K} = +3.00 \text{ J/K}.$$

Check signs, absolute temperature, and whether the process is reversible or irreversible.

PRACTICE 2**Independent Check**

$\Delta S_{\text{hot}} = -500/400 = -1.25 \text{ J/K}$; $\Delta S_{\text{cold}} = +500/300 = +1.67 \text{ J/K}$; $\Delta S_{\text{total}} = +0.417 \text{ J/K}$, so the transfer is irreversible.

Check signs, absolute temperature, and whether the process is reversible or irreversible.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Entropy Check

Entropy is a state function; the total entropy of an isolated system satisfies $\Delta S_{\text{total}} \geq 0$.

Use the total-entropy criterion to justify the result.

CONFIDENCE CHECK 2

Entropy Check

For heat Q from hot to cold: $\Delta S_{\text{hot}} = -Q/T_h$ and $\Delta S_{\text{cold}} = +Q/T_c$; their sum is positive when $T_h > T_c$.

Use the total-entropy criterion to justify the result.

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