

FOCUSED REVIEW

Focused Review: Heat, Specific Heat, and Calorimetry

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-U03
TOPIC: Heat, Specific Heat, and Calorimetry
COURSE LEVEL: Algebra-Based College Physics

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**Equation Recall**

Complete the activity, then check your reasoning in the Solutions section.

Write the two equations that organize this unit.

WARM-UP 2**Sign Reasoning**

Complete the activity, then check your reasoning in the Solutions section.

A metal cools from 90 °C to 30 °C. What sign does its Q have?

FR-04 • WARM-UP CHECK CONTINUED

WARM-UP 3

One-Step Calculation

Complete the activity, then check your reasoning in the Solutions section.

How much heat raises 0.250 kg of water by 4.0 °C? Use $c = 4186 \text{ J}/(\text{kg}\cdot^\circ\text{C})$.

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

Sensible Heat: $Q = mc\Delta T$

When a substance remains in one phase and c is approximately constant, the heat transfer associated with a temperature change is $Q = mc(T_f - T_i)$. The sign is built into ΔT .

$$Q = mc\Delta T$$

EXAMPLE For 0.200 kg of water warmed 5.0 °C: $Q = (0.200)(4186)(5.0) \approx 4.19 \times 10^3 \text{ J}$.

SENSEI NOTE Keep mass and specific-heat units compatible before substituting.

KEY CONCEPT 2

Calorimetry: $\Sigma Q = 0$

For an insulated calorimeter with negligible heat loss, the algebraic sum of heat transfers is zero. Write one $Q = mc(T_f - T_i)$ term for each participating object and solve for the unknown.

$$\Sigma Q = 0$$

EXAMPLE Mixing 0.100 kg water at 80 °C with 0.200 kg water at 20 °C gives $T_f = 40 \text{ °C}$ when heat loss is neglected.

SENSEI NOTE Use one common final equilibrium temperature, but each object keeps its own initial temperature, mass, and c .

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**Worked Example**

Solve the problem. Show your setup before checking the solution.

A 0.300 kg aluminum sample, $c = 900 \text{ J/(kg}\cdot\text{°C)}$, warms from 20 °C to 50 °C . Find Q .

PRACTICE 2**Guided Problem**

Solve the problem. Show your setup before checking the solution.

Mix 0.100 kg water at 80 °C with 0.200 kg water at 20 °C in an insulated cup. Find T_f .

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

Solve for Heat

Answer before checking the solution.

A 0.50 kg material with $c = 800 \text{ J/(kg}\cdot\text{°C)}$ cools by 10 °C . Find Q .

CONFIDENCE CHECK 2

Solve for Temperature Change

Answer before checking the solution.

A 2.0 kg sample with $c = 500 \text{ J/(kg}\cdot\text{°C)}$ absorbs 6000 J. Find ΔT .

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**Model each object**

Use $Q = mc(T_f - T_i)$ for each object that changes temperature without a phase change.

KEY TAKEAWAY 2**Check the result**

Signs and the location of T_f between initial temperatures provide fast error checks.

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

Equation Recall

$Q = mc\Delta T$ and $\Sigma Q = 0$ for an insulated calorimetry system.

WHY IT WORKS The first models each object; the second connects the objects.

WARM-UP • ACTIVITY 2

Sign Reasoning

$\Delta T = 30 - 90 = -60\text{ }^{\circ}\text{C}$, so $Q < 0$.

WHY IT WORKS Cooling means the object releases energy.

WARM-UP • ACTIVITY 3

One-Step Calculation

$Q = (0.250)(4186)(4.0) = 4.19 \times 10^3\text{ J}$.

WHY IT WORKS Convert grams to kilograms when needed.

SOLUTIONS • GUIDED PRACTICE

PRACTICE 1**Worked Example**

$$\Delta T = 30\text{ }^{\circ}\text{C}. Q = (0.300)(900)(30) = 8100\text{ J}.$$

WHY IT WORKS Positive Q means the sample absorbed heat.

PRACTICE 2**Guided Problem**

Same c cancels: $0.100(T_f - 80) + 0.200(T_f - 20) = 0$. Thus $0.300T_f = 12.0$ and $T_f = 40\text{ }^{\circ}\text{C}$.

WHY IT WORKS Check that T_f lies between the two initial temperatures.

SOLUTIONS • CONFIDENCE CHECK

CONFIDENCE CHECK 1

Solve for Heat

$$Q = (0.50)(800)(-10) = -4000 \text{ J.}$$

WHY IT WORKS The negative sign represents heat released.

CONFIDENCE CHECK 2

Solve for Temperature Change

$$\Delta T = 6000 / [(2.0)(500)] = 6.0 \text{ }^{\circ}\text{C.}$$

WHY IT WORKS Isolate ΔT algebraically before substituting.

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