

The Melting Lab Lockdown

Properties of Matter & Conservation of Mass: Develop a model showing that matter is made of particles too small to be seen; measure and graph to show that the total weight of matter is conserved when substances are heated, cooled, or mixed; identify materials by their properties; and investigate whether mixing substances forms new substances.

Learning target: I can measure and describe properties of matter and explain why mass stays the same when matter changes.

Success looks like: Students use the vocabulary correctly, complete the escape room, and score 80% or higher on the evidence-based exit ticket.

Materials: Student devices, the printed lesson worksheet (one per student), projector for the mini-lesson presenter.

LESSON AT A GLANCE

60 minutes

Time	Part	Teacher does	Students do
0:00-0:08	Warm-up	Project the warm-up. Circulate, then call on 2-3 students. Save question 3 for the debrief.	Answer Part 2 of the lesson worksheet; share with a partner.
0:08-0:20	Mini-lesson	Teach with the 4-step presenter. Run each quick check with the whole class.	Complete worksheet Parts 4-11 as each slide appears; answer checks with fingers.
0:20-0:48	Escape Room	Launch The Melting Lab Lockdown. Assign mission levels; circulate with the answer key.	Play solo or in pairs; record code pieces; complete any written evidence task.
0:48-0:52	Debrief	Ask 2 debrief questions and revisit warm-up question 3.	Finish worksheet Part 13 (prediction check + one thing learned).
0:52-1:00	Exit ticket	Hand out the exit ticket. Collect and sort with the mastery guide.	Answer with evidence independently.

Key vocabulary

Word	Student-friendly definition
Matter	Anything that has mass and takes up space.
Mass	The amount of matter in an object, measured in grams (g).
Volume	The amount of space something takes up, measured in mL or cm ³ .
Physical change	A change in size, shape, or state that makes no new substance.
Chemical change	A change that makes a new substance (clues: gas, color change, heat, light).

Word	Student-friendly definition
Conservation of mass	In a closed system, mass before a change equals mass after.

1. WARM-UP

0:00–0:08 · 8 min

Warm-up expectations (post these): Answer in Part 2 of the lesson worksheet (or on this sheet). Number each answer to match the question. Answer in complete sentences. For math, show your work. Work silently for 5 minutes, then share with a partner for 2 minutes. Be ready to share one answer with the class.

#	Question	Look for
1	List three properties you could use to describe a rubber ball.	Any three: color, shape, size, texture, bounciness (elasticity), mass, volume, hardness.
2	A backpack has a mass of 3 kg. You put a 1 kg book inside. What is the total mass? Explain how you know.	4 kg. Masses add: $3\text{ kg} + 1\text{ kg} = 4\text{ kg}$. Nothing was taken away.
3	Predict: If you melt a 50 g ice cube in a sealed bag, will the water weigh more, less, or the same? Why?	The same, 50 g. No matter entered or left the sealed bag; the water just changed state.

2. MINI-LESSON

0:08–0:20 · 12 min

Project the Lesson presenter from the room page. It runs the whole hour: target and agenda, warm-up with timer, hook vote, 4 teaching steps (key idea, interactive tool, turn and talk, check for understanding), I do / we do / you do, a work-time screen with a timer and expectations, debrief, and the exit ticket. Press N for teacher notes, T to pause the timer, and P to pick a student.

Hook (1 min): A 50-gram ice cube melts inside a sealed bag. What will the water weigh? Class vote: More than 50 g / Exactly 50 g / Less than 50 g

Step 1 (3 min): Matter has properties

Teach	Matter is anything with mass that takes up space. We describe it by properties we observe (color, hardness) and test (magnetism, conductivity, solubility).
Interactive tool	Visual: Liquid volume: read the bottom of the curve at eye level
Students do	List 3 properties of your pencil (color, hardness, shape, texture...).
Turn and talk	Is air matter? How could you prove it to someone who says no?
Worksheet Part 5A	Matter is anything that has MASS and takes up SPACE. We can test properties like magnetism, conductivity, and SOLUBILITY.
Check for understanding	Which property tells if a substance dissolves in water? Answer: (C) Solubility

Step 2 (3 min): Measure mass and volume

Teach	Mass is measured in grams on a balance. Liquid volume is measured in milliliters with a graduated cylinder. A box shape's volume is length $\times$ width $\times$ height.
Interactive tool	Visual: Volume of a box: $3 \times 2 \times 2$
Students do	Read the cylinder in the picture and write its volume in mL. Then find the box's volume: $3 \times 2 \times 2$.
Turn and talk	Why do scientists measure mass with a balance instead of just guessing by how big something looks?
Worksheet Part 6A	Mass is measured in GRAMS with a BALANCE. Liquid volume is measured in MILLILITERS with a graduated cylinder.
Check for understanding	What is the volume of the box shown in the tool? (cubic centimeters) Answer: 12

Step 3 (3 min): Physical vs. chemical change

Teach	A physical change changes size, shape, or state but makes no new substance. A chemical change makes a new substance. Clues: gas bubbles, new color, new smell, light, heat.
Interactive tool	Flip cards: Ice melting, Bread toasting, Paper cut in half, Iron rusting
Students do	Make two columns, Physical and Chemical. Sort the four flip cards.
Turn and talk	Melting ice and burning wood both change. What is the key difference between them?
Worksheet Part 7A	A PHYSICAL change makes no new substance. A CHEMICAL change makes a new substance. Clues include gas BUBBLES and a new color.
Check for understanding	Baking soda and vinegar fizz. Which kind of change is it? Answer: (D) Chemical, because a new gas forms

Step 4 (3 min): Conservation of mass

Teach	In every change, particles are rearranged, not created or destroyed. In a closed system, mass before equals mass after. If gas escapes an open cup, the scale drops, but the matter still exists.
Interactive tool	Simulation: Fizz it open, then sealed. Watch the scale.
Students do	Predict what the scale will show, open and sealed. Then watch and check.
Turn and talk	The open cup lost mass. Where did that matter go? Is it gone forever?
Worksheet Part 8A	In a CLOSED system, the mass before a change EQUALS the mass after. If a gas escapes, the scale reading goes DOWN.
Check for understanding	Sealed flask: 200 g before fizzing. What does it weigh after? Answer: (D) 200 g

I do: worked example (shown one step at a time)

1. Problem: 30 g of water + 5 g of salt are stirred together. The salt seems to disappear. What is the total mass?
2. Step 1: The salt particles did not vanish. They spread out through the water.
3. Step 2: Nothing left the cup, and nothing was added.
4. Step 3: $30\text{ g} + 5\text{ g} = 35\text{ g}$.
5. Answer: 35 g. Mass is conserved.

What to say on every slide is in the presenter script PDF.

We do: guided practice

A sealed bag holds 40 g of vinegar and 5 g of baking soda. They fizz and the bag puffs up. What does the bag weigh now?

1. Find the starting mass: $40\text{ g} + 5\text{ g} = 45\text{ g}$.
2. Is the system open or closed? The bag is sealed, so it is closed.
3. The fizzing made a new gas (a chemical change), but the gas is trapped in the bag.
4. Nothing entered or left, so the mass stays the same.

Answer: 45 g

You do: independent check (2 min)

An OPEN cup holds 150 g of water and a 10 g antacid tablet. After fizzing, the scale reads 157 g. What happened to the other 3 g? (A) The scale is broken (B) It turned into water (C) It escaped into the air as a gas (D) It was destroyed

Answer: (C) It escaped into the air as a gas. Students who miss it: 3-minute reteach at the teacher table, then start the room at the Explorer level.

Misconception: "Dissolved things disappear and have no mass." The particles are still there and still have mass.

Misconception: "Gas has no mass." Gas is matter. When it escapes an open container, the scale drops because matter left.

Misconception: "Ice weighs more than water because it is solid." Freezing changes volume a little, but mass stays the same.

3. ESCAPE ROOM: THE MELTING LAB LOCKDOWN

0:20–0:48 · 28 min

Launch: project the start screen, read the story aloud, and assign mission levels (Explorer = extra support, Agent = on level, Legend = challenge). Students can open Supports any time for read-aloud, bigger text, a word bank, and a scratch pad.

- Locks open in order, so every student moves through the same sequence. Circulate and listen for which lock is causing a traffic jam.
- Pairs work well: one student reads the clue card aloud, the other controls the device. Switch roles at every lock.
- If a group is stuck for more than 3 minutes, ask "What does the clue card say about this?" before giving the hint.

Students turn in: the completion code plus their copied "turn in your work" block (Canvas Text Entry).

4. DEBRIEF

0:48–0:52 · 4 min

1. Go back to the hook question. What will the melted ice cube weigh, and how do you know?
2. Which puzzle made you rethink an idea you had about matter?
3. Why do scientists seal a container when they test conservation of mass?

Close the loop: return to warm-up question 3. Answer: The same, 50 g. No matter entered or left the sealed bag; the water just changed state.

5. EXIT TICKET

0:52–1:00 · 8 min

Print the exit ticket PDF (page 2 is the key and mastery guide). Every item requires evidence: Part A asks students to justify each choice, Part B asks for an explanation, and Part C applies the standard to a new situation using Claim-Evidence-Reasoning. Sort results into Mastered, Approaching, and Beginning to plan tomorrow's groups.

LESSON RESOURCES

Resource	How it fits the lesson
Warm-up worksheet (PDF)	Optional standalone warm-up (also Part 2 of the lesson worksheet), with a key.
Mini-lesson presenter	Projectable, step-by-step interactive lesson with tools and quick checks (room page).
Lesson worksheet (PDF + key)	One printable packet students complete during the whole lesson: short fill-ins and quick checks in 13 small parts that match the presenter slides.
The Melting Lab Lockdown (.html)	The escape room for Canvas, with differentiated levels, supports, and a turn-in.
Exit ticket (PDF + key)	Evidence-based check with a rubric and a mastery sorting guide.
PhET: Density and States of Matter (extra)	Free browser simulations for mass, volume, and states of matter. https://phet.colorado.edu/
Mystery Science: Chemical Magic (extra)	Short video-led lessons on mixtures and reactions (free tier available). https://mysteryscience.com/
Crash Course Kids (extra)	Five-minute videos on matter and conservation of mass. https://www.youtube.com/@crashcoursekids
PBS LearningMedia (extra)	Search "conservation of mass grade 5" for clips and interactives. https://www.pbslearningmedia.org/

ANSWER KEY: THE MELTING LAB LOCKDOWN

Lock 1: The Balance Scale (code piece: G)

1. What is the mass of the water alone, in grams? -> 125 g
2. Which tool measures the volume of a liquid? -> Graduated cylinder
3. Sort each measurement: is it measuring mass or volume? -> Mass: 350 g, 2 kg, 900 grams | Volume: 75 mL, 1 liter,

40 cm³

4. Dr. Ortiz filled this graduated cylinder. How many milliliters of water are in it? Read the bottom of the curved surface.
-> 65 mL

Lock 2: The Property Cabinet (code piece: R)

1. Match each sample to the property it showed. -> Sample A = Magnetism; Sample B = Solubility; Sample C = Electrical conductivity; Sample D = Density (floats)

2. Sample A is most likely made of which material? -> Iron nail

3. Sample B dissolves in water. Which could it be? -> Sugar

Lock 3: The Freezer Door (code piece: A)

1. What is the mass of the ice in the sealed bottle on Day 2, in grams? -> 500 g

2. True or false: The bottle bulged because the ice has more mass than the water did. -> False

3. Sort these changes. -> Physical change: Ice melting, Tearing paper, Salt dissolving in water | Chemical change: Wood burning, A nail rusting, Baking a cake

Lock 4: The Fizzing Flask (code piece: M)

1. Why did the open flask lose 6 grams? -> A gas formed and escaped into the air

2. What does Flask 2 prove? -> In a closed system, mass is conserved

3. In a sealed bag, 40 g of baking soda is mixed with 150 g of vinegar. What will the total mass be after the fizzing stops? -> 190 g

Lock 5: The Exit Keypad (code piece: S)

1. 75 g of warm water and 25 g of sugar are stirred until the sugar disappears. What is the mass of the sugar water? -> 100 g

2. Put the steps of a fair conservation of mass test in order. -> Measure the mass of all materials and the container -> Seal the container -> Mix or heat the materials to cause a change -> Measure the mass again -> Compare the two masses

3. Dr. Ortiz wants to prove that mass is conserved when baking soda and vinegar fizz. Which container should she use? -> Tap Jar with lid

Final code: GRAMS