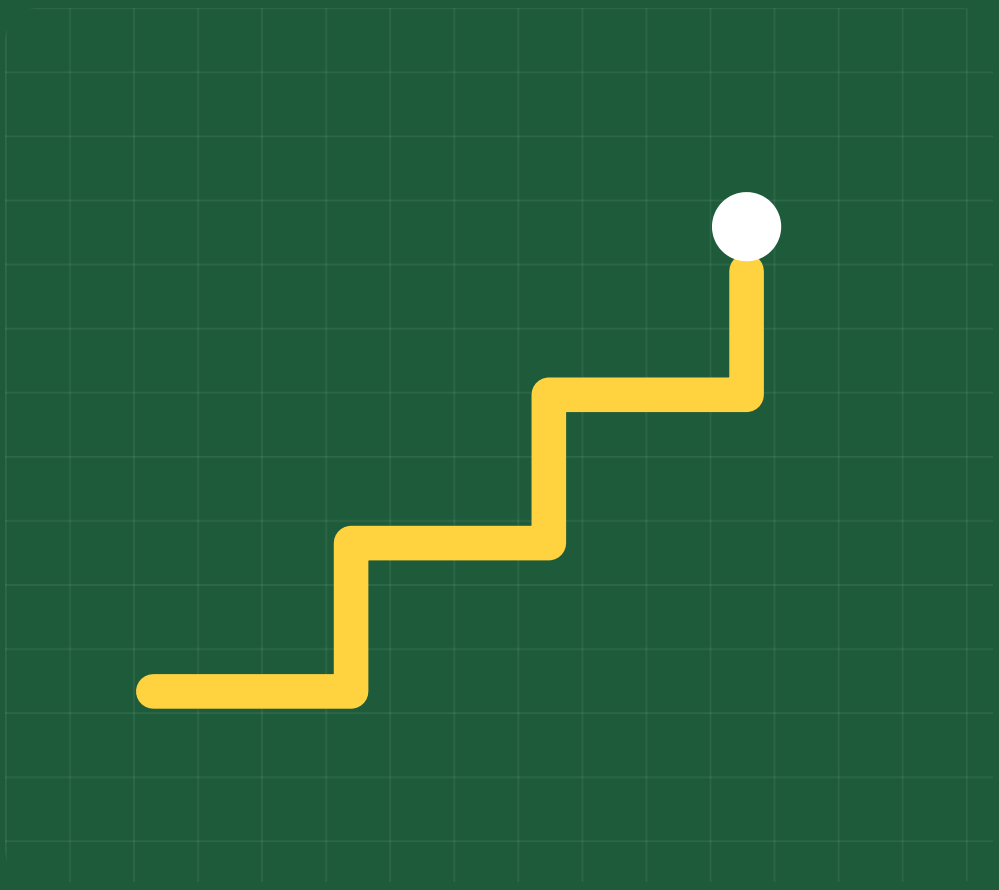
UpOnly Learning



GRADE 7

FREE SAMPLE WORKBOOK

Science Grade 7

One step at a time. · Ages 12–13 · Free sample: 1 of 8 topics

UO-SCI-7

OUR STORY

One step at a time

I'm Dr. Evan J. Hasson. I've run a specific chiropractic practice for over twelve years, and I'm a dad of three. My work is about alignment: get the structure right, and everything else works better.

At home, nothing was aligned. I was spending thousands a month on tutors, extracurriculars and programs, and when I asked about enrolling a second or third child the answer was always the same: that'll be double, that'll be triple. The charter school had a waiting list. The good public school had a waiting list. The private schools had the kind of list where it helps to know someone, or to give generously first.

And underneath all of it, the same quiet threat: if you don't pay for this, your child will fall behind. Not sold with evidence. Sold with fear.

So I did my own research, and here is what I found: none of it is secret. The standards are published. The order a child should learn in is written down and freely available. It is just scattered. Nobody had done the work of pulling it together, putting it in order and handing it over. So I did.

When every step has its place, confusion has nowhere to hide.

I built this for my own kids. I'm giving it to yours.

Dr. Evan J. Hasson, DC
Founder and dad of three

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No guaranteed results, and mistakes happen. Every student learns differently. We write and review every question and answer key carefully, and we still get things wrong. An answer key can be wrong, and a question can be worded badly or have two defensible answers. Check the answer key before you hand it over, and trust your own judgment over ours. Found a problem? **Photograph the page and email it to support@uponlylearning.com**. The picture tells us more than a description, and we fix it for every family.

Safety. Some activities use household items such as scissors, coins or food. An adult should supervise and skip anything unsafe for the student.

Not professional advice. This workbook does not replace an evaluation by a qualified educator or specialist. The founder is a Doctor of Chiropractic; UpOnly Learning does not provide medical or health advice.

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INTRODUCTION

How to use this workbook

Each topic follows the same steps, so your student always knows what comes next.

① **Quick Check.** 10 questions before you teach. Read them aloud for younger students. A high score means you can move faster.

② **Learn It.** Key words, step-by-step teaching with lines you can read aloud, worked examples and the mistakes to watch for.

③ **We Do It Together.** 10 questions you do side by side. The answer and the "why" are printed right after each question, so you can talk it through.

④ **You Try.** 10 questions your student does alone.

Answers with short explanations for every question are in the **Answer Key** at the end of each topic, so students can work without peeking. Go over each wrong answer together using the explanation.

This workbook is printed in full color. To save ink, choose "Black and white" or "Grayscale" in your printer settings; every page still works in black and white.

Want online checks that score themselves and track each student's progress? Visit uponlylearning.com.

GRADE 7

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Topic 1 · Signs of a chemical reaction **6**

Compare properties of substances before and after they interact to decide if a reaction occurred MS-PS1-2

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Signs of a chemical reaction

The student will compare properties of substances before and after they interact, such as density, melting point, solubility, flammability and odor, to decide whether a chemical reaction occurred.

① Quick Check

Do this before the lesson. It shows what your student already knows. Score: ____ / 10

1. What does it mean when a substance's properties after an interaction are different from before?

A The substance became a mixture **B** Nothing happened **C** The substance disappeared completely **D** A new substance probably formed

2. Is mixing red and white paint to make pink a chemical reaction?

A No, the paint melts **B** Yes, a new substance with a new color forms **C** Yes, a gas forms **D** No, the pigments are just mixed

3. Which property tells you whether a substance can burn?

A Flammability **B** Density of the sample **C** Solubility

4. What can you do to get dissolved salt back from salt water?

A Stir the water for a long time **B** Evaporate the water **C** Freeze the water

5. A substance melts at 0 degrees C. After mixing with another substance, the result melts at 80 degrees C. What does this suggest?

A It evaporated **B** It is the same substance **C** Nothing changed in the sample **D** A new substance likely formed

6. Which statement best describes the mass of the products of a reaction in a sealed container?

A Less than the mass of the reactants **B** Zero **C** Equal to the mass of the reactants **D** More than the reactants

7. Aria heats sugar in a pan and it turns brown, smells like caramel and will not turn back. What is the best conclusion?

A The sugar dissolved in the pan **B** A chemical reaction occurred **C** A physical change occurred

3. A cube of metal has a mass of 80 g and a volume of 10 mL. What is its density?

   A 8 g per mL **B** 0.125 g per mL **C** 70 g per mL **D** 800 g per mL

4. A student puts an iron nail in a sealed jar with no air. After weeks it does not rust. What does this show?

   A Rust is a mixture **B** Iron never reacts with air or water **C** Iron dissolves

   D Rusting needs oxygen from air

5. Leaves are burned and leave ash. Ash does not burn again, but leaves do. How does this show a reaction occurred?

   A Flammability changed, so a new substance formed

   B The mass of the leaves stayed the same afterward **C** Ash is warmer than the leaves

   D Leaves are green

② Learn It

MATERIALS baking soda; white vinegar; milk; a clear glass; salt; sugar; three small cups; a spoon; safety goggles or glasses (vinegar can sting eyes); paper towels

Key words

- **property**: a trait used to identify a substance, like color, density, or how it dissolves
- **physical change**: a change in form or state where the substance stays the same, like ice melting
- **chemical reaction**: a process where substances change into new substances with different properties
- **reactant**: a starting substance in a chemical reaction
- **product**: a new substance made by a chemical reaction
- **solubility**: how well a substance dissolves in another, such as in water
- **density**: how much mass is packed into a given volume

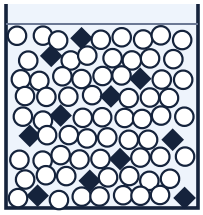
Warm-up

1. Show a torn piece of paper and a match that an adult burned earlier. Ask which one became a new substance.
2. Discuss that tearing changes shape, but burning makes ash and gases.

> *Some changes make brand new substances, and some don't. Today you're the detective who figures out which is which.*

Teach

1. Explain that every substance has characteristic properties. If the properties after an interaction differ from the properties before, a new substance formed.
2. List evidence that may signal a reaction: a gas forms (bubbles not from boiling), a precipitate (solid) forms, a color change, an unexpected temperature change, a new odor.
3. Explain that evidence is a clue but must be checked against properties; for example, bubbles in boiling water are not a reaction, and color change from mixing paint is not a reaction.
4. Ask: what do you think will happen? Then, wearing goggles, mix a spoon of baking soda with a little vinegar in a cup. Observe and record the bubbles. (If vinegar gets in an eye, rinse it with clean water.) Explain the gas is carbon dioxide, a new substance with different properties from either reactant.
5. Dissolve salt in water and point out it can be recovered by evaporation: a physical change, no new substance.



salt dissolved in water

○ water particle ◆ salt particle

> *Look for new properties. If what you end up with behaves differently from what you started with, a reaction happened.*

Guided practice

1. Predict what will happen when vinegar meets warm milk. An adult warms the milk. Add a few spoons of vinegar, stir, then observe and record: white clumps (curds) form. Explain: a new solid appeared. (Skip this test if anyone has a milk allergy.)
2. Dissolve sugar in water. Ask: is it a reaction? Discuss that sugar is still sugar: it can be recovered by letting the water evaporate. (Never taste substances in a science test.)
3. Make a table: interaction, observations before, observations after, reaction yes or no, evidence.

Test	Observations	Reaction?
Vinegar + milk		
Sugar + water		

> *Write down the properties before and after. Then decide like a scientist.*

Worked examples

Iron nails left outside turn reddish-brown and flaky. Is this a chemical reaction?

Property	Iron nail	Rust
Color	gray, shiny	reddish-brown
Texture	hard, smooth	brittle, flaky
Magnetic?	yes	no

Yes. Rust is a new substance (iron oxide) with different properties from iron: it is brittle, reddish and not magnetic like the iron was.

Butter melts in a hot pan. Is this a chemical reaction?
No. Melting is a physical change. When the butter cools it becomes solid again and is still butter.

Watch for these mistakes

Mistake: Any bubbles mean a chemical reaction.
Fix: Boiling water bubbles because liquid water becomes water vapor, the same substance in a different state. Bubbles are a clue only when a new gas is made.

Mistake: When something dissolves, it disappears and becomes a new substance.
Fix: Dissolved sugar or salt is still there, spread out among water particles. You can get it back by evaporating the water.

PARENT TIP Have the student wear goggles even for kitchen chemistry; it builds a safety habit they will need for later lab work.

GO FURTHER Have an adult cut an apple, then leave one slice plain and one dipped in lemon juice. Observe browning over an hour and explain what it suggests about a reaction with air.

③ We Do It Together: 10 questions

> *Do these side by side. Read each question together, let your student answer, then read the answer and the "why" right below it and talk it through.*

1. Which of these is a chemical property?

A Density **B** Color of the sample **C** Flammability

> **Answer: C** Flammability
> **Why:** Flammability describes how a substance reacts with oxygen when burning.

2. What is the evidence that baking soda and vinegar reacted?

A Bubbles of a new gas appeared **B** The cup got larger as it filled **C** The spoon melted

D The liquid got dimmer

> **Answer: A** Bubbles of a new gas appeared
> **Why:** A gas formed that was not there before.

3. What temperature does water boil at?

A 100 degrees C **B** 50 degrees C **C** 212 degrees C

> **Answer: A** 100 degrees C
> **Why:** Pure water boils at 100 degrees Celsius at sea level.

4. Which property helps tell sugar from salt?

A Solubility or melting point **B** Being solid at room temperature **C** The shape of the cup it is in

D Color, since one is white and one is not

> **Answer: A** Solubility or melting point
> **Why:** Sugar and salt differ in characteristic properties such as solubility and melting point. Never taste substances in a lab test.

5. Why does mixing blue and yellow paint to make green not count as a chemical reaction?

A The pigments become hot **B** The pigments are mixed and no new substance forms

C The pigments are melted together and then cooled **D** The pigments make a gas as they mix

> **Answer: B** The pigments are mixed and no new substance forms
> **Why:** The pigments are only mixed together.

5. A student mixes two solids and sees no change. What is the best conclusion?

A The solids evaporated **B** A reaction definitely occurred in the cup

C There is no evidence of a reaction **D** A gas formed in the mixture

> **Answer: C** There is no evidence of a reaction
> **Why:** No new substance is shown by the observations.

6. A sample has a mass of 54 g and a volume of 20 mL. What is its density?

A 74 g per mL **B** 0.37 g per mL **C** 2.7 g per mL **D** 34 g per mL

> **Answer: C** 2.7 g per mL
> **Why:** 54 divided by 20 is 2.7 g per mL.

7. A rock sinks in water. What can you conclude?

A Its density is exactly 1.0 g per mL like water **B** Its density is greater than 1.0 g per mL

C Its density is less than 1.0 g per mL

> **Answer: B** Its density is greater than 1.0 g per mL
> **Why:** Objects with greater density than water sink.

8. A student says any bubbling means a reaction. What is a counterexample?

A Baking soda and vinegar makes bubbles **B** Zinc and acid makes bubbles of hydrogen gas

C Boiling water makes bubbles of water vapor

> **Answer: C** Boiling water makes bubbles of water vapor
> **Why:** Boiling changes state only.

9. How could you show that rust is not iron?

A Test whether it is attracted to a magnet **B** Look at it **C** Weigh it on a balance and compare the mass

D Smell it

> **Answer: A** Test whether it is attracted to a magnet
> **Why:** Iron is magnetic, but rust is not.

④ You Try: 10 questions

Now your student works alone. Check answers in the Answer Key at the end of this topic. Score: ____ / 10

1. What is a reactant?

A A solid that sinks **B** A starting substance in a chemical reaction

C A new substance made when the reaction is done

2. Which of these is NOT a chemical reaction?

A Salt in water **B** Baking soda and vinegar **C** Iron rusting **D** Burning wood

3. What is rust?

A A mixture formed when iron is melted into water **B** Iron that is magnetized

C Iron that is dissolved in the water **D** A new substance formed when iron reacts with oxygen

4. A clear liquid mixed with another clear liquid makes a cloudy white solid that sinks. What is the solid called?

A A reactant **B** A product gas **C** A solute **D** A precipitate

5. What is the mass of 25 mL of a liquid with a density of 0.8 g per mL?

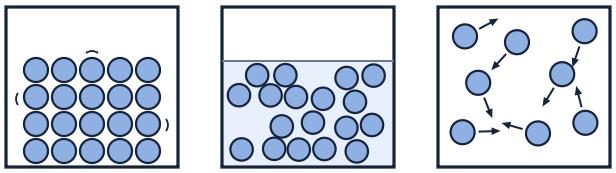
A 0.032 g **B** 20 g **C** 200 g **D** 31.25 g

6. Sofia bakes a cake. The batter was runny and the cake is spongy and brown. Which evidence shows a reaction?

A The cake is hot **B** New texture, color and smell that cannot be undone

C The cake is larger than the pan it was baked in **D** The batter is still wet

7. A student heats ice until it becomes water and then steam. The particle models show the three states. Which statement is correct?



ice (solid) liquid water steam (gas)

A It is three different substances in three states **B** It is the same substance in three states

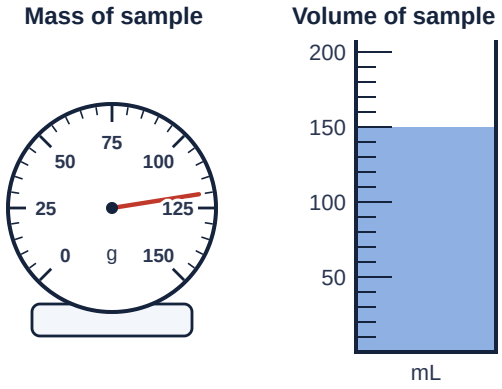
C It is a mixture **D** It is a new substance at each state

3. A student heats a white powder and it releases a gas and leaves a gray solid. How can the student decide whether a reaction occurred?

A Look only at the gas that escaped from the powder **B** Check only the color of the powder

C Compare the properties of the gray solid with the original powder

4. The scale and the measuring cup show the mass and volume of a liquid sample. What is its density, and could it be water?



A 1.25 g per mL, so it is water **B** 0.8 g per mL, not water **C** 1.0 g per mL, water

D 1.25 g per mL, not water

5. A student says that because a new color appears, a reaction occurred. What is a better statement?

A Color change is meaningless **B** A color change is a clue that must be checked with other properties

C Color change is proof of a reaction **D** Color change is a state change

Signs of a chemical reaction: Answers and explanations

① Quick Check

1. What does it mean when a substance's properties after an interaction are different from before?
   D A new substance probably formed
   Different properties suggest a chemical reaction.

2. Is mixing red and white paint to make pink a chemical reaction?
   D No, the pigments are just mixed
   The pigments are only mixed together. No new substance with new properties forms.

3. Which property tells you whether a substance can burn?
   A Flammability
   Flammability is a property that describes whether a substance burns.

4. What can you do to get dissolved salt back from salt water?
   B Evaporate the water
   The water leaves as vapor and the salt is left behind.

5. A substance melts at 0 degrees C. After mixing with another substance, the result melts at 80 degrees C. What does this suggest?
   D A new substance likely formed
   Melting point is a characteristic property, so a change suggests a new substance.

6. Which statement best describes the mass of the products of a reaction in a sealed container?
   C Equal to the mass of the reactants
   Mass is conserved in a closed system.

7. Aria heats sugar in a pan and it turns brown, smells like caramel and will not turn back. What is the best conclusion?
   B A chemical reaction occurred
   The new color, smell and irreversibility show new substances.

8. A cube of metal has a mass of 80 g and a volume of 10 mL. What is its density?
   A 8 g per mL
   80 divided by 10 is 8 g per mL.

9. A student puts an iron nail in a sealed jar with no air. After weeks it does not rust. What does this show?
   D Rusting needs oxygen from air
   Without oxygen, the reactants for rust are missing.

10. Leaves are burned and leave ash. Ash does not burn again, but leaves do. How does this show a reaction occurred?
    A Flammability changed, so a new substance formed
    A different characteristic property means a new substance formed.

④ You Try

1. What is a reactant?
   B A starting substance in a chemical reaction
   Reactants are what you start with before the reaction.

2. Which of these is NOT a chemical reaction?
   A Salt in water
   Salt dissolves and can be recovered.

3. What is rust?
   D A new substance formed when iron reacts with oxygen
   Rust is iron oxide, with properties different from iron.

4. A clear liquid mixed with another clear liquid makes a cloudy white solid that sinks. What is the solid called?
   D A precipitate
   A precipitate is a solid that forms in a liquid reaction.

5. What is the mass of 25 mL of a liquid with a density of 0.8 g per mL?
   B 20 g
   Mass is density times volume: 0.8 times 25 is 20 g.

6. Sofia bakes a cake. The batter was runny and the cake is spongy and brown. Which evidence shows a reaction?
   B New texture, color and smell that cannot be undone
   Different properties that cannot be undone point to new substances.

7. A student heats ice until it becomes water and then steam. The particle models show the three states. Which statement is correct?
   B It is the same substance in three states
   Water changes state, but remains H_2O.

8. A student heats a white powder and it releases a gas and leaves a gray solid. How can the student decide whether a reaction occurred?
   C Compare the properties of the gray solid with the original powder
   Comparing characteristic properties shows whether a new substance formed.

9. The scale and the measuring cup show the mass and volume of a liquid sample. What is its density, and could it be water?
   B 0.8 g per mL, not water
   120 divided by 150 is 0.8 g per mL.

10. A student says that because a new color appears, a reaction occurred. What is a better statement?
    B A color change is a clue that must be checked with other properties
    Color alone does not prove a new substance formed.

THE FULL WORKBOOK

Keep going with the full Science workbook

You just tried one topic. The full Grade 7 workbook has every topic below, each with a Quick Check, a lesson, We Do It Together, up to 90 You Try questions, Show What You Know and a full answer key.

1. Signs of a chemical reaction MS-PS1-2
2. Conservation of mass MS-PS1-5
3. Heat, mass and temperature change MS-PS3-4
4. Photosynthesis MS-LS1-6
5. Cellular respiration and using food MS-LS1-7
6. Food webs: matter and energy in ecosystems MS-LS2-3
7. The rock cycle MS-ESS2-1
8. Resources and population size MS-LS2-1

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One step at a time.

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