

Substitute Guide: Mixtures and Solutions

Grade: 5 **Subject:** Science **Time:** ~45 min core + ~15 min extension Science

Learning goal (plain language)

Students learn that a **mixture** is things put together that keep their own properties, and that a **solution** is a special mixture in which one part **dissolves** so it looks the same all the way through (like salt water). They also learn that a mixture can be **separated** using physical properties — by sifting, a magnet, filtering, or evaporating. **You do not need a science background to run this.** Everything students need is printed in their packet. There are **no lab materials and no hazards** — it is all on paper.

Standards alignment

Framework: 19 TAC Chapter 112 (Grade 5 Science, 2021 TEKS). Focus: mixtures and solutions, and separating mixtures using physical properties.

- **Provisional SE (mixtures/solutions):** identify a solution as a mixture that looks the same throughout because a part dissolves. verification_status: pending
- **Provisional SE (separating mixtures):** separate a mixture using physical properties (sift, magnet, filter, evaporate). verification_status: pending

Provisional — specific section number and SE codes are pending educator verification against the current official TAC source.

(Standards are paraphrased here, not quoted, and this packet is not claimed to be "does not claim formal alignment to the TEKS." Please confirm the section and codes against your official source.)

Setup Before class (5 min)

- Count and hand out one **student packet** per student.
- Confirm each student has a **pencil**. No calculators, computers, or lab items are needed.
- Write the date on the board and remind students to fill in the name line.
- Keep the **answer key** with you — it is a separate file and is **not** in the student packet.

Materials What's needed

- Printed student packet (about 4 pages) per student.
- Pencil per student.
- This guide and the separate answer key (teacher only).
- No technology, no calculator, no lab equipment, no safety hazards.

Timing Suggested pacing (~45–60 min)

Segment	Time	What students do
Start — Notice & Wonder	5 min	Q1–Q2 warm-up

Segment	Time	What students do
Build — Read the science	5–10 min	Read box, word bank, Figure 1; Q3
Apply — Use the data	20 min	Table 1; Q4–Q6
Explain — CER	5–10 min	Q7 claim/evidence/reasoning
Close — ACE	5 min	Articulate / Connect / Extend
Continue — early finishers optional ~15 min		Separation plan for salt + sand + iron

Script Read aloud to start

"Today's assignment is a paper science activity called *Mixtures and Solutions*. You will work by yourself with just a pencil — no computers and no lab supplies. First, do the two warm-up questions. Then read the short box and look at the picture. After that, use the chart to answer the questions. If a question is tricky, skip it and come back. Write in sentences where it asks you to explain. You may read the words out loud to yourself. Put your name, class, and date at the top now. You have about 45 minutes — raise your hand if you need a word read to you."

Support When students ask for help

- **You may read any part aloud** to a student or the whole class.
- If they are stuck, point them to the **Word Bank** and **Figure 1** — the ideas they need are right there.
- Remind them the chart (Table 1) has all the clues for Q4 and Q5.
- Do **not** give answers; prompt with "What does the chart show?" or "Can you see the parts, or does it look the same all through?"
- It is fine if a student cannot finish the optional early-finisher task.

Access Accommodations & language support

- **Read-aloud** of any passage or question is allowed for all students.
- Point students to the **sentence starters** and the **Word Bank** (definitions provided).
- Extended time is fine; the core can stop after Q7 if time runs short.
- Students may answer in short phrases if writing full sentences is a barrier, as long as the idea is clear.
- The packet is grayscale-safe — it prints and reads clearly in black and white.

Tools Allowed & not allowed

Allowed: pencil, the printed packet, quiet self-read-aloud. **Not needed / not allowed:** calculator (no math required), phones, computers, lab materials.

Collect at the end: Collect every packet, finished or not, with names on them. Stack them for the teacher. Note on a sticky how far most students got and any questions that caused confusion.

Answer key: The **answer key is a separate file** (answerkey.html) and is for the teacher only. Please do not hand it to students.

Teacher follow-up (for the returning teacher)

Watch for the common idea that "dissolving makes something disappear" — the sugar or salt is still there and can be brought back by evaporating the water. A quick next-day demo or discussion sorting real mixtures into "plain mixture / solution" and matching each to a separation tool (sift, magnet, filter, evaporate) would reinforce this well. The CER (Q7) responses show who can use a chart clue as evidence.

Mixtures and Solutions

Grade: 5 **Subject:** Science **Time:** ~45 min + ~15 min extra **Work mode:** By yourself · pencil only Science

Start Here

This is a **paper science activity**. You will read a little, look at a picture and a chart, and answer questions with a pencil. You do **not** need a computer or any lab supplies. Work by yourself and do your best. If a question is hard, skip it and come back. You may read the words out loud to yourself.

Start Notice & Wonder 5 min

Think about foods and drinks you have seen mixed together.

1 **Trail mix** has peanuts, raisins, and pretzels all tossed together. Write **one thing you notice** and **one thing you wonder** about trail mix.

2 You stir a spoon of salt into a cup of water and keep stirring. The salt seems to **disappear**. Where do you think the salt went? Write your best idea.

Build Read the Science 5–10 min

Mixtures and solutions

A **mixture** is two or more things put together that are **not** joined into a new material. In many mixtures, like trail mix, you can still **see the different parts**.

A **solution** is a special kind of mixture. In a solution one thing **dissolves** into another and it looks **the same all the way through**. Salt water is a solution. The salt did not disappear — it broke into tiny bits too small to see, spread out in the water. You can taste it, and you can get it back.

The parts of a mixture keep their own properties, so you can **separate** them using those properties:

- **Sift** — shake through a screen to split big pieces from small ones.
- **Magnet** — pull out a part that is magnetic (like iron).
- **Filter** — pour through a coffee filter or paper to catch bits that will not fit through, while liquid passes.
- **Evaporate** — let the water dry into the air. The dissolved solid, like salt, stays behind.

Word Bank

mixture

two or more things put together that keep their own properties.

solution

a mixture that looks the same throughout because one part dissolved.

dissolve

to break into bits too small to see and spread out evenly.

property

something you can observe, like size, color, or being magnetic.
separate
to take a mixture apart into its pieces.

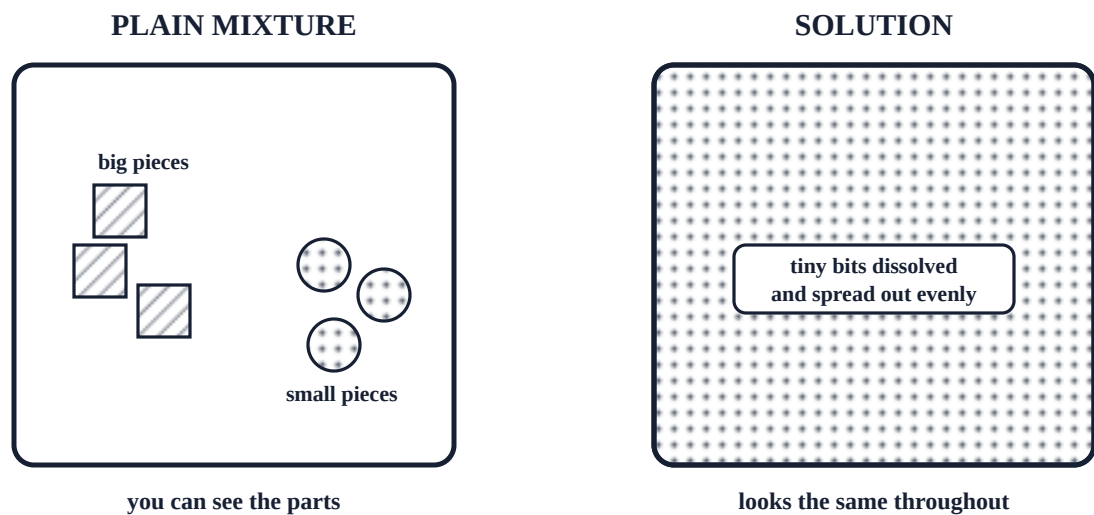


Figure 1. A particle picture. In a **plain mixture** (left) the parts stay in clumps you can see and pick apart. In a **solution** (right) the dissolved bits are spread out evenly, so it looks the same everywhere. The fills are patterns (hatching and dots), not colors, so the picture is clear in black and white.

3Look at Figure 1. In **one sentence**, tell how the solution jar looks **different** from the plain mixture jar.

Apply Use the Data 20 min

A class made some mixtures and wrote down what they observed. Read Table 1, then answer.

Table 1. Four mixtures and what the class observed (original class data).

Mixture	Can you see the parts?	Does it dissolve in water?	Is a part magnetic?
A. Sand + iron filings	Yes	No	Yes (iron)
B. Sugar stirred in water	No — looks the same all through	Yes	No
C. Sand + water (muddy)	Yes — bits float and settle	No	No
D. Small beads + big buttons	Yes	No	No

4Classify each mixture. Write **S** if it is a **solution** (looks the same all through, dissolved) or **P** if it is a **plain mixture you can pick apart**.

- ___ A. Sand + iron filings
- ___ B. Sugar in water
- ___ C. Sand + water
- ___ D. Beads + buttons

5Choose the best way to separate each mixture. Use the evidence in Table 1. Write **sift**, **magnet**, **filter**, or **evaporate** on the line, then tell which clue helped you choose.

5a. Mixture A (sand + iron filings): _____
Clue I used:

5b. Mixture B (sugar in water): _____

Clue I used:

5c. Mixture C (sand + water): _____

Clue I used:

5d. Mixture D (beads + buttons): _____

Clue I used:

6Observation or inference? An **observation** is something you see or measure. An **inference** is an idea you figure out. Write **O** or **I** for each.

_____ a) The sugar water looks clear all the way through.

_____ b) The sugar is still in the water even though you cannot see it.

_____ c) The iron filings jumped to the magnet.

Explain Claim–Evidence–Reasoning 5–10 min

Question 7. Pick **Mixture A** (sand + iron filings) or **Mixture B** (sugar in water). Explain how you would **separate** it. Use one clue from Table 1 as your evidence.

Sentence starters you may use: "I would separate Mixture ____ by..." · "My evidence from Table 1 is..." · "This works because..."

Claim (how you would separate it)

Evidence (a clue from Table 1)

Reasoning (why that works)

Close ACE Wrap-Up 5 min

Articulate

In your own words, what is the difference between a plain mixture and a solution?

Connect

Point to one row of Table 1 that is a solution. Write its letter and how you know.

Extend

Name one **new** mixture from home and tell how you would separate it.

Continue Early Finisher optional · ~15 min

If you finish early (no new supplies needed):

Make a separation plan. Imagine a new mixture: **salt + sand + iron filings**, all dry in one cup. On the back of this page, write the **steps in order** to get all three parts by themselves. Tell which tool you use for each step (magnet, water, filter, or evaporate) and why.

Turn in: Hand in this whole packet with your name, class, and date filled in. Make sure questions 1–7 and the ACE box are answered. The early-finisher plan is optional — turn it in too if you did it.

G05_SCI_MixturesSolutions_01 — Mixtures and Solutions Student Packet



TEACHER ANSWER KEY FOLLOWS

Do not copy the pages after this divider for students.

Answer Key: Mixtures and Solutions

Grade: 5 **Subject:** Science **For teacher use only** Science

How to use this key

Answers are grouped by section and question number. Many items are open-ended; accept any response that shows correct thinking even if the wording differs. Notes flag where more than one answer is defensible and list common misconceptions to watch for. Estimated grading time: ~4–6 min per packet.

Start Notice & Wonder grade for effort · ~1 min

1 Trail mix — notice & wonder.

Full credit for any reasonable notice + wonder. **Sample:** Notice — "you can see the peanuts, raisins, and pretzels; they are not stuck together." Wonder — "could I pick out just the raisins?" Any on-topic response is fine. Trail mix is a good example of a *plain mixture you can see and pick apart*.

2 Where did the salt go?

Accept any honest idea; this surfaces the pre-lesson thinking. **Target idea (taught in Build):** the salt did not disappear — it **dissolved** into tiny bits too small to see, spread through the water. Watch for the misconception "the salt disappeared / is gone." Note it and revisit after the reading.

Build Read the Science ~1 min

3 How the solution jar looks different (Figure 1).

The solution looks the **same all the way through** (the tiny bits are spread out evenly), while the plain mixture has **separate clumps you can see and pick apart**. Accept any sentence that captures "same throughout / spread out" vs. "you can see the parts."

Apply Use the Data ~2 min

4 Classify: Solution (S) or Plain mixture (P).

- A. Sand + iron filings — **P** (you can see the parts; nothing dissolved).
- B. Sugar in water — **S** (looks the same all through; dissolved = "Yes").
- C. Sand + water — **P** (bits float and settle; does not dissolve).
- D. Beads + buttons — **P** (dry, visible parts).

Only B is a solution. The key clue for S is the "looks the same all through" + "dissolves = Yes" columns.

5 Best way to separate + the clue used.

5a. Mixture A (sand + iron filings) → magnet. Clue: "a part is magnetic (iron)." Pull the iron out with a magnet; sand is left. *Defensible alternate:* sifting could work if the grain sizes differ, but the magnetic clue is the strongest and cleanest choice — magnet is the intended answer.

5b. Mixture B (sugar in water) → evaporate. Clue: "dissolves = Yes / looks the same all through." Let the water evaporate and the sugar stays behind. A filter would **not** work because dissolved sugar passes right through the paper.

5c. Mixture C (sand + water) → filter. Clue: "does not dissolve; bits float and settle." Pour through a filter to catch the sand; water passes through. *Defensible alternate:* letting it settle and pouring off (decanting) is reasonable; accept with sound reasoning, but filter is the intended answer.

5d. Mixture D (beads + buttons) → sift. Clue: "small beads vs. big buttons" (a size difference). A screen lets small beads fall through and holds back big buttons.

6 Observation (O) vs. Inference (I).

a) **O** — you can see it (looks clear all through).

b) **I** — a reasoned idea; you cannot see the sugar, so you conclude it is still there.

c) **O** — you can see the filings jump to the magnet.

Observation = seen or measured directly; inference = an idea you figure out from evidence.

Explain CER (Q7) ~1–2 min

7 Explain how to separate Mixture A or B.

Model answer — Mixture A. Claim: I would separate the sand and iron filings with a **magnet**. Evidence: Table 1 shows a part of Mixture A is **magnetic (iron)**. Reasoning: A magnet pulls magnetic iron but not sand, so the iron sticks to the magnet and the sand is left behind.

Model answer — Mixture B. Claim: I would separate the sugar from the water by letting the water **evaporate**. Evidence: Table 1 shows Mixture B **dissolves** and looks the same all through. Reasoning: Dissolved sugar cannot be caught by a filter, but when the water dries into the air the sugar is left behind.

Grade for a correct method matched to a real clue from Table 1, not for wording. Either mixture earns full credit if the tool fits the evidence.

CER scoring rubric (3 points)

Score	Claim	Evidence	Reasoning
3	Names a correct way to separate the chosen mixture.	Uses a real, matching clue from Table 1.	Clearly tells why that tool works on that property.
2	Names a mostly-correct method.	Clue is close but vague or not from the table.	Some correct why, but incomplete.
1	Method is vague or does not fit.	Little or off-topic evidence.	Little or unclear reasoning.
0	No/incorrect method.	No evidence.	No reasoning.

Close ACE ~1 min

ACE Articulate / Connect / Extend.

Articulate: accept any accurate plain-language difference (e.g., "in a plain mixture you can see the parts; in a solution one part dissolves so it looks the same all through").

Connect: the only solution in Table 1 is **B (sugar in water)**; students should cite "dissolves = Yes" or "looks the same all through."

Extend: any real home mixture with a sensible separation (e.g., cereal + milk → strain/filter; pasta + water → strain; a salad → pick apart; salt water → evaporate). More than one answer is defensible.

Watch Common misconceptions

- **"Dissolving means disappearing."** The dissolved solid is still there — it broke into bits too small to see and spread out. You can still taste it and weigh it.
- **"You can't get the salt (or sugar) back."** You can — let the water evaporate and the dissolved solid stays behind. Dissolving is not permanent.
- **"All mixtures are solutions."** Only mixtures that dissolve and look the same throughout are solutions. Trail mix, sand + iron, and beads + buttons are plain mixtures, not solutions.
- **"Filtering removes dissolved things."** A filter only catches bits too big to pass; dissolved sugar/salt goes right through. Use evaporation instead (Q5b).
- **Observation vs. inference (Q6).** Students often mark a figured-out idea (like "the sugar is still there") as something they saw. If you cannot see it directly, it is usually an inference.

Teacher follow-up based on likely errors

If many students miss Q4B or Q5b, do a quick review of "dissolve = spread out, not gone" and show that evaporation brings a dissolved solid back. If Q5 mixes up filter and evaporate, re-anchor with "a filter catches what is too big; dissolved bits are too small." If Q6 shows observation/inference confusion, sort a few statements aloud into "seen" vs. "figured out." The "dissolving = disappearing" idea is the highest-value one to revisit next class.

G05_SCI_MixturesSolutions_01 — Mixtures and Solutions Teacher Answer Key