

Sorting Solid Clues

Use observable properties to plan and explain solid-mixture separation.

SC.5.P.8.3 "Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each observable property that helps separate the solids, then number the three sorting actions in the order they occur.

A Tray of Mixed Solids

- ① During a materials lab, Ms. Ortiz poured a dry mixture onto a tray. It held steel washers, red plastic cubes, round yellow peas, and large curved pasta pieces. The parts stayed unchanged, so the tray held a mixture, not a new substance. The class could separate the solids by observing properties that were easy to see or test.
- ② First, students put a bar magnet inside a thin plastic bag and held it just above the mixture. The steel washers moved toward the magnet and stuck to the bag because they were attracted to the magnet. The plastic cubes, peas, and pasta did not move. Students lifted the bag over a cup, then pulled the magnet out of the bag so the washers dropped into the cup. Magnetic attraction separated one kind of solid without changing the other parts.
- ③ Next, students picked out the red plastic cubes by color. They then poured the remaining peas and pasta onto a screen with holes larger than peas but smaller than the pasta pieces. Peas passed through, while pasta stayed on top because of particle size. The peas were round and the pasta was curved, so shape could also help sort any pieces left behind.

2 ANSWER WITH EVIDENCE Use the passage

1 Which solid did the magnet separate? What observation showed that it was magnetic?

2 Why did the peas pass through the screen while the pasta pieces stayed on top?

3 What observable property did students use to separate the plastic cubes?

4 How could shape help students tell the peas and pasta apart after using the screen?

3 YOUR TURN Your own words

Design a dry mixture with three different solid parts. Complete the table with an observable property and a separation method for each. Then actually separate a teacher-provided mixture: four steel paper clips, four red plastic counters and four blue plastic counters mixed on a tray. Put a classroom magnet inside a thin bag, use it to lift the steel clips over a cup, and remove the magnet from the bag to release them. Pick out red counters by color into a second cup; place blue counters in a third. On extra paper record actual Before / After counts for each part and write two sentences explaining which properties allowed separation and what you observed. Account for all pieces without changing them; do not eat or put pieces or magnets near your mouth.

SOLID PART	OBSERVABLE PROPERTY	SEPARATION METHOD

PART 1 • READ AND MARK

Underline each observable property that helps separate the solids, then number the three sorting actions in the order they occur. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which solid did the magnet separate? What observation showed that it was magnetic?	The steel washers. They moved toward the magnet, while the other solids did not move.
2	Why did the peas pass through the screen while the pasta pieces stayed on top?	The screen holes were larger than the peas but smaller than the pasta pieces, so the peas were small enough to pass through.
3	What observable property did students use to separate the plastic cubes?	Color. The cubes were red.
4	How could shape help students tell the peas and pasta apart after using the screen?	The peas were round, and the pasta pieces were curved.

PART 3 • YOUR TURN (SAMPLE ANSWER)

SOLID PART	OBSERVABLE PROPERTY	SEPARATION METHOD
Iron nails	Magnetic attraction	Use a magnet to pull out the nails.
White beans	White color	Pick out the white beans by hand.
Blue buttons	Blue color	Pick out the blue buttons by hand.

Accept any reasonable dry solid mixture and methods based on observable properties, such as particle size, shape, color, or magnetic attraction. The property and method must match, and the method must separate the named solid without changing it. Teacher supplies smooth steel clips, clearly colored plastic counters, bar magnet, bag, tray and three cups; pretests clip attraction and lack of counter attraction. Avoid sharp nails, tiny powerful magnets or food/allergens in the performed task. Read/support steps and check every learner participates or directs an accessible demonstration. Require actual before/after counts and a magnetic-attraction/color explanation; expected four clips and four counters of each color remain unchanged in separate cups. If counts differ, locate missing pieces or repeat, never invent recovery. The original table can propose other safe mixtures, but does not replace execution. AACT Sandbox describes actual magnetic separation followed by hand sorting and before/after observations: <https://teachchemistry.org/classroom-resources/sandbox>.