



WHAT'S THE MATTER?

BENCHMARK and TASKS

SC.A.1.2.4 The student knows that different materials are made by physically combining substances and that different objects can be made by combining different materials.

- The student physically combines different materials to create mixtures.
- The student separates a mixture by sorting, sifting, filtering, and evaporating.

KEY QUESTION

What is a mixture and how can it be separated?

BACKGROUND INFORMATION

An **element** is the simplest form of matter. All matter is made up of **atoms**. Each **element** is made of atoms of the same type. Two or more elements that have combined chemically are called a **compound**. A compound can be separated only by chemical means. Table salt is an example of a compound.

A **mixture** is a combination of two or more substances that have not combined chemically. A mixture can contain elements, compounds, or both, and in any amounts. Because the substances in a mixture are not combined chemically, they keep their unique properties and can be separated by physical means. Mixtures can be separated using processes that depend on their different properties:

Sorting: To separate by arranging according to class, kind, or size

Evaporation: To convert or change into a vapor, usually leaving only the dry, solid portion of the mixture

Sifting: To separate fine particles from coarse particles

Filtering: To separate suspended matter in a liquid or gas

A mixture can be made up of ingredients in any amount. Some mixtures are coarse (cement, trail mix, rock); some contain tiny particles (jelly, milk, ink). There are no symbols or formulas for mixtures. Mixtures may be made of **solids** only, **liquids** only, or **gases** only, or they may be made of different combinations of solids, liquids and gases.

MATERIALS

Teacher

assortment of mixtures, such
as a box of crayons, deck of cards,
trail mix, shells, rocks, etc.

Per pair of students

2 plastic cups labeled A and B
container with 6 marbles
container of popcorn kernels
container of small paper clips or iron nuggets
container of sand
1 tray
1 magnet
What's the Matter? record sheet

TEACHING TIPS

1. Ideally, the iron part of the mixture should be small enough so that it is difficult for students to remove the iron from the mixture without using a magnet. Iron filings would be perfect but they are messy, hard to get off the magnets after the activity and pose a danger to students' eyes. Iron nuggets or small steel paper clips can be used as a substitute. If using paper clips, choose the smaller type and make sure that the paper clips are attracted to a magnet. Iron nuggets can be ordered from a science supply company.
2. Although the teacher could assemble the mixtures before class, there is value in allowing students to make their own mixtures for this activity. If time allows, you might even consider requiring the students to follow a recipe such as the one below in order to practice mass measurement.

Sample Recipe for cup A

Mix together in cup A:

6 marbles

15 grams of popcorn kernels

10 grams of paper clips

ENGAGE

Display an assortment of mixtures, such as shells, crayons, or rocks. Ask:

How are these materials alike?

Can these materials be sorted and separated? How?

Which materials would be easy to separate? Hard to separate?

Tell students that all of these assortments are mixtures.

EXPLORE

1. Give each pair of students a tray with containers of marbles, popcorn kernels, and paper clips along with the cup labeled A and a magnet. Tell students to combine the marbles, popcorn kernels and paper clips to make a mixture.
2. Ask students to find a way to separate the three materials and to write a sentence about how they did it on their record sheet. After separating the mixture, have students place the marbles, popcorn, and paper clips back into their original containers and move them on the tray back to the materials table.
3. Distribute a tray with cup B along with the container of sand and the container of paper clips (or iron nuggets) to each pair of students. Make sure that students still have their magnet to use. Tell students to first combine the sand and paper clips to make a mixture and then once again separate the two materials, writing a sentence about the method used on their record sheet.
4. Have students place the sand and paper clips back into their original containers and return them and the magnet to the materials table.

EXPLAIN

What is a mixture? (A mixture consists of two or more substances, each retaining its own properties.)

How did you separate the mixtures? (by using a magnet and by sorting)

Were there any other ways to separate them?

Were there any mixtures you could not separate?

EXTEND/APPLY

1. Ask students to bring in a small sample of their favorite cereal in a baggie. Have them determine if the cereals are mixtures. Let students decide how they would separate any of the cereals that are mixtures.
2. Let students play a “Mixture or Not” game. List ten items on the board, such as the following:
trail mix fog salad
Kool-Aid salt roll of Life Savers
smoke sugar closet full of clothes
pumice

Ask students to decide if the items are mixtures or not and explain their decisions. Mixtures include trail mix, Kool Aid, smoke, fog, salad, Life Savers, closet full of clothes, and pumice. Fog is a mixture of water and air. Pumice is a mixture of rock and air. Smoke is a mixture of ash and air. Both sugar and salt are compounds. The elements making up these compounds are chemically combined and cannot be separated by ordinary means.

ASSESSMENT

1. Ask students to write their own definition of a mixture and give examples.
2. Ask students to write about how they would separate a mixture of paper clips, marbles, and rice.

WHAT'S THE MATTER?

CUP A

Explain how you separated the contents of Cup A.

CUP B

Explain how you separated the contents of Cup B.
