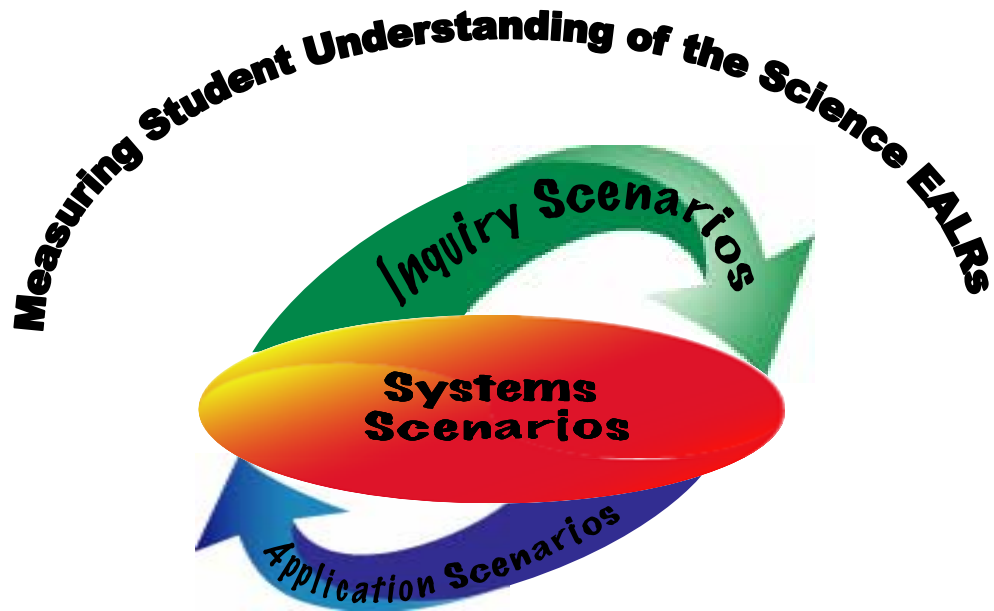


# Clean Water

## Middle School Systems Scenario



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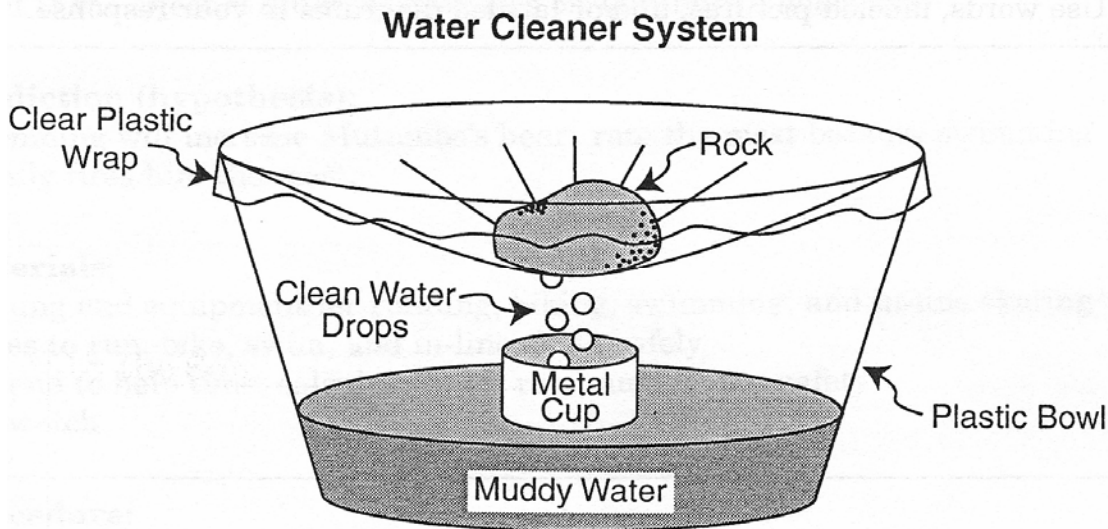
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## Clean Water

**Directions:** Use the following information to answer questions 1 through 10 on pages 2 through 9.

Darcie and Matt were hiking in the Cascade Mountains and ran out of clean water. The only water they could find was from a muddy stream. They designed and built the water cleaner system shown in the diagram below.



Darcie and Matt used their scientific understanding of the water cycle around them in the design of their water cleaner system.

Darcie and Matt made their water cleaner system from equipment found in their backpacks. They poured muddy water into the bottom of a large plastic bowl. They placed a metal cup into the middle of the muddy water in the plastic bowl. Then they stretched clear plastic wrap over the top of the plastic bowl. Finally they placed a rock on top of the plastic wrap causing the plastic wrap to sag in the middle.

Their water cleaner system functioned with the energy input from sunlight.



## Clean Water, a Middle School Powerful Classroom Assessment (PCA)

- 1** Which force caused the clean water to drop into the metal cup?
- A. Electric
  - B. Magnetic
  - C. Frictional
  - D. Gravitational
- 2** Which of the following statements explains why Darcie and Matt should be more concerned about running out of water than running out of food?
- A. The human body is able to obtain more nutrients from water than from food.
  - B. The human body is able to survive longer without food than without water.
  - C. The human body is made up of very little water.
  - D. The human body is made up of very little liquid.
- 3** If Darcie uses filter paper to filter the muddy water, which of the following parts of the muddy water will remain in the water once the water has been filtered?
- A. Sand
  - B. Leaves
  - C. Insects
  - D. Bacteria



## Clean Water, a Middle School Powerful Classroom Assessment (PCA)

4 Describe **two** human activities that could make the stream water muddy.

In your description, be sure to:

- Identify **two** different human activities that may have made the stream muddy.
- Describe how **each** activity may have made the stream muddy.

<b>One human activity:</b>
<b>Another human activity:</b>



## Clean Water, a Middle School Powerful Classroom Assessment (PCA)

- 5 Which energy transformation occurs between the Sun and the muddy water?
- A. Light energy from the Sun becomes heat energy in the muddy water.
  - B. Heat energy from the Sun becomes chemical energy in the muddy water.
  - C. Electrical energy from the Sun becomes light energy in the muddy water.
  - D. Chemical energy from the Sun becomes kinetic energy of the muddy water.
- 6 Which of the following is evidence that only a **physical** change occurs in the Water Cleaner System?
- A. The mass of the muddy water in the bowl increased.
  - B. Water molecules are present in both muddy water and clean water.
  - C. The clean water is a different temperature from the muddy water.
  - D. The drops of clean water in the metal cup are a new substance.



## Clean Water, a Middle School Powerful Classroom Assessment (PCA)

7 Darcie and Matt realized that their Water Cleaner System was not cleaning water as fast as they needed. They decided to redesign their water cleaner system to produce clean water faster than the original. They had the following four items available to use in their redesign:

- ✓ large pieces of aluminum foil
- ✓ metal pot

- ✓ large, black plastic bag
- ✓ white towel

Use one or more of the materials listed to redesign the original Water Cleaner System. You may also use any of the original materials.

Be sure to:

- Describe how you would use the material(s) to redesign the original Water Cleaner System.
- Explain how your redesign would clean water **faster** than the original Water Cleaner System.

Use words, labeled pictures, and/or labeled diagrams in your response.




## Clean Water, a Middle School Powerful Classroom Assessment (PCA)

- 8** Which of the following describes the **mass** of Darcie’s backpack as she hikes up the mountain?
- A. The mass increases because the force of gravity becomes greater.
  - B. The mass changes after Darcie reaches 5000 feet above sea level.
  - C. The mass is the same at all locations on the mountain.
  - D. The mass decreases because there is less air pressure.
- 9** Darcie and Matt used their Water Cleaner System on another trip to the mountains. They found that the clean water was produced much more slowly than on their first trip. What is a reason the water cleaner might work more slowly?
- A. The amount of sunlight was less due to clouds.
  - B. The mass of the second rock was greater.
  - C. The force of gravity had decreased.
  - D. The air pressure had increased.



## Clean Water, a Middle School Powerful Classroom Assessment (PCA)

**10** Darcie and Matt used their scientific understanding of the water cycle around them in the design of their Water Cleaner System. Four processes that are part of the water cycle are listed below:

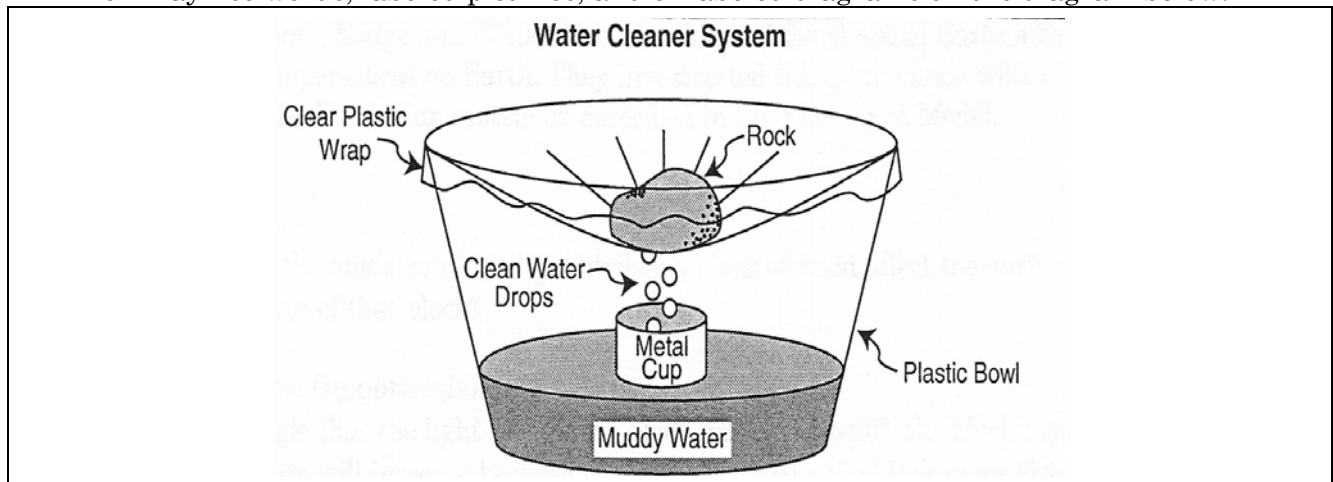
1. Condensation
2. Evaporation
3. Precipitation
4. Collection

Explain how Darcie and Matt used each of these four water cycle processes in the design of their Water Cleaner System.

In your explanation, be sure to:

- Identify a specific location in the Water Cleaner System that models **each** of the four water cycle processes listed above.
- Describe how **each** of the four water cycle processes is used in the design of their Water Cleaner System.
- Describe how each process occurs in the environment around Darcie and Matt.

You may use words, labeled pictures, and/or labeled diagrams on the diagram below.



**How does the design use condensation?**

**How does condensation happen in the environment?**





**Clean Water, a Middle School Powerful Classroom Assessment (PCA)**

<b>How does the design use evaporation?</b>
<b>How does evaporation happen in the environment?</b>
<b>How does the design use precipitation?</b>
<b>How does precipitation happen in the environment?</b>
<b>How does the design use collection?</b>
<b>How does collection happen in the environment?</b>

