SUCCESS ACADEMY EDUCATION INSTITUTE

Separating Mixtures

Name: _____

Teacher: _____

Class: _____

Physical Science
Unit 1
Lab Notebook

Lesson 1:
Dirty Water

Directions: Perform iron, copper, and lead tests on tap water. Record the results from your water test in the space below.

	Tap Water Level	EPA Limit	Notes
Iron			
Copper			
Lead			

Additional Notes:

Lesson 2:
The Global State of Water

Directions: Fill in the blanks to the questions below as a class.

1. Every day, pounds of sewage and industrial and agricultural waste are discharged into the world's water.

   _____

2. Unsafe water causes deaths each year.

   _____

3. Most people who die from unsafe water are years old.

   _____

Record notes on the videos.

Lesson 2

Analysis Questions:

How has human activity impacted the environment?

Should cleaning up polluted water on Earth be a priority for scientists? Explain and justify your response.

Lesson 3:
Removing Solid Particles

Directions: Design and implement a procedure for removing sand and rocks from a water sample. Use the space to plan your investigative procedure and then describe it in the lines below.

Investigative Procedure:

Lesson 4:
Removing Dissolved Particles

Directions: Design and implement a procedure to separate salt from the water in which it is dissolved. Use the space to plan your investigative procedure and then describe it in the lines below.

Investigative Procedure:

Lesson 5:
Removing Other Liquids

Directions: Design and implement a procedure to separate oil from water. Use the space to plan your investigative procedure and then describe it in the lines below.

Investigative Procedure:

Lesson 6:
Physical Properties

Directions: Create a list of physical properties of water in the lines below.

Investigation Scenario:

An accident at a plant that produces flavored coffee resulted in some of the ingredients and oil used to operate the factory's machines being dumped into a nearby reservoir! Unfortunately, that reservoir houses the town's supply of drinking water. Help the company clean the water so the townspeople can use it again.

Design and implement a procedure to separate oil from water. Use the space below to plan your investigative procedure and then describe it in the lines below.

Lesson 6

Investigative Procedure:

Lesson 7:
Solubility

Directions: Follow the procedure below to test the solubility of the four solutes.

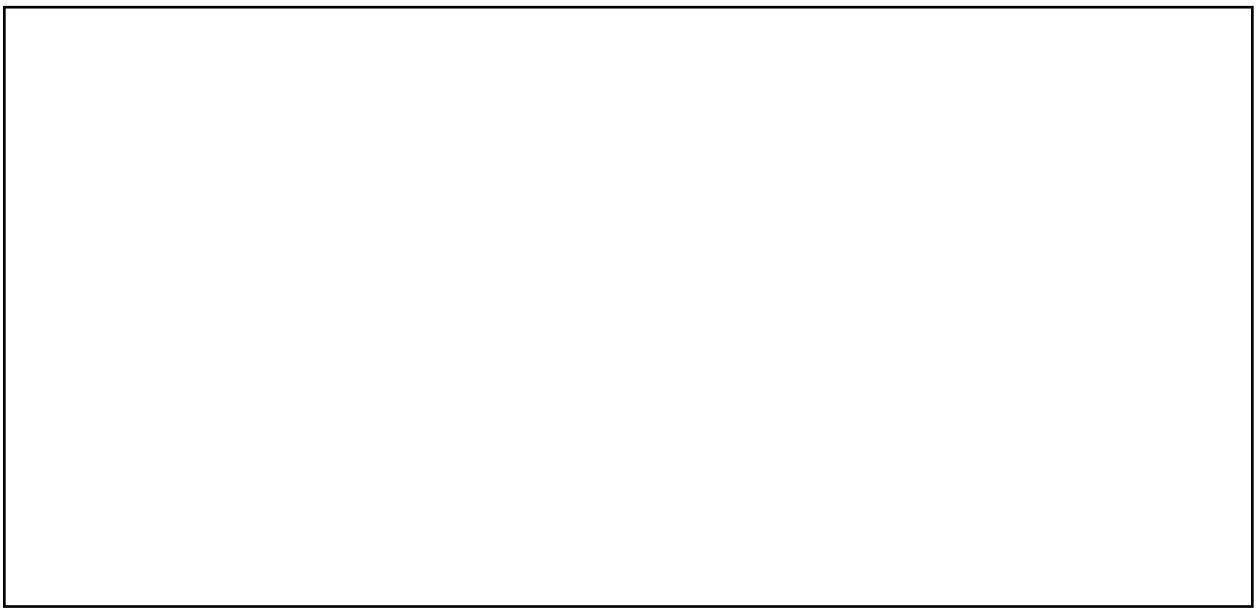
1. Set up your solubility tests to resemble the grid below.
2. Place a small scoop of your solute into each container in its row.
3. Starting with the sample in the top left of the grid, add solvent to your container until it is half full.
4. Place the lid on the container and gently slosh the container in order to stir the mixture.
5. Observe and record the appearance of the solution. Record whether the solute is soluble.
6. Repeat steps 3–5, adding water to all samples in column 1.
7. Repeat steps 3–5, adding oil to all samples in column 2.
8. Repeat steps 3–5, adding ethanol to all samples in column 3.
9. When the experiment is complete, dump all mixtures into a dump bucket as directed by your teacher.

Experimental Setup:

	Add Water ↓	Add Oil ↓	Add Ethanol ↓
	Cup 1	**Cup 5**	**Cup 9**
	Cup 2	**Cup 6**	**Cup 10**
	Cup 3	**Cup 7**	**Cup 11**
	Cup 4	**Cup 8**	**Cup 12**

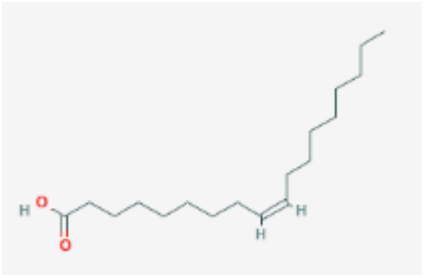
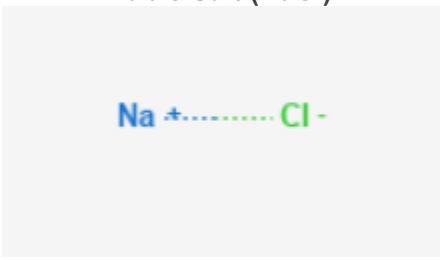
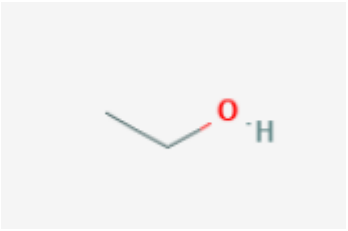
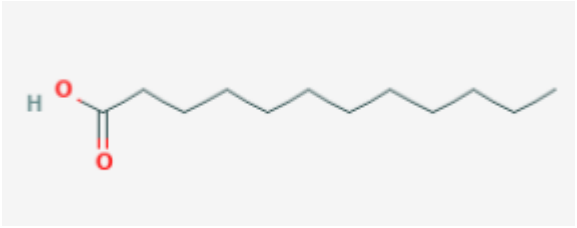
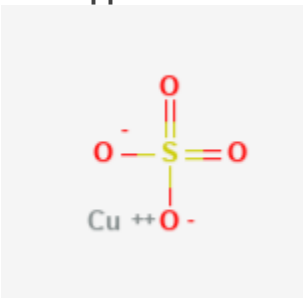
Lesson 7

Data: Record your data in the space below.



Lesson 7

Compare your data with the structure of each solute/solvent to determine a pattern.

Water Image Credit: 2D Structure of CID 962 (water), via PubChem	Cornstarch Image Credit: 2D Structure of CID 24836924 (cornstarch,) via PubChem
Oil  Image Credit: *2D Structure of CID 445639 (*oleic *acid,) via PubChem*	**Table Salt (NaCl)**  Image Credit: *2D Structure of CID 5234 (sodium chloride), via PubChem*
Ethanol  Image Credit: *2D Structure of CID 702 (ethanol), via PubChem*	**Lauric Acid**  Image Credit: *2D Structure of CID 3893 (lauric acid), via PubChem*
	Copper Sulfate  *Image Credit: 2D Structure of CID 24462 (copper sulfate), via PubChem*

Lesson 8:
Changing Solubility

Directions: Design and implement a procedure to test the effects of various factors on solubility. Use the space below to plan your investigative procedure and then describe it in the lines below.

Investigative Procedure:

Lesson 9:
Graphing Solubility

Directions: Reference the tables below to construct a solubility graph and then answer the questions that follow.

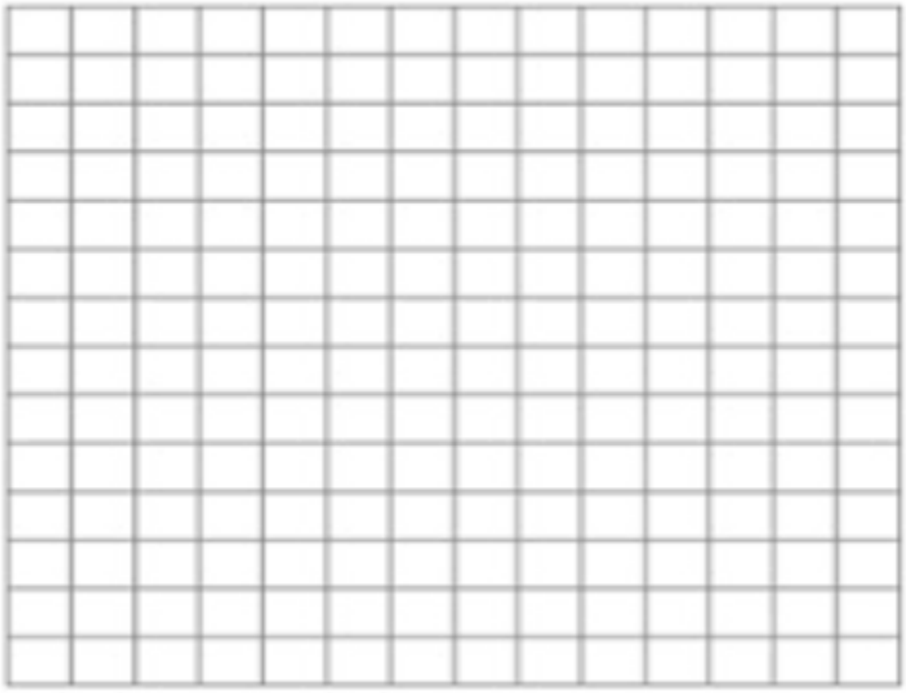
Solubility of Sodium Chloride at Different Temperatures

Temperature (oC)	Solubility (g of solute/100 mL of H2O)
0	35.7
10	35.8
20	35.9
30	36.0
40	36.4
60	37.1
80	38.0
90	38.5
100	39.2

Solubility of Copper Sulfate at Different Temperatures

Temperature (oC)	Solubility (g of solute/100 mL of H2O)
0	23.0
10	27.5
20	32.0
30	38.0
40	44.5
60	62.0
80	84.0
100	114.0

Lesson 9



Analysis Questions:

How does the temperature of the solvent affect the solubility of the solute?

Which compound is more affected by the change in temperature? Explain.

Lesson 10:
Panning for Gold

Directions: Design and implement a procedure to pan for gold in pay dirt using the materials provided. Use the space to plan your investigative procedure and then describe it in the lines below.

Investigative Procedure:

Lesson 10

Exit Ticket: What properties of gold allowed you to isolate it? Explain. [3]

Lesson 11:
Fizz, Fizz, Pop!

Directions: Follow the procedure below.

1. Pour an inch of hot water into a clear plastic cup.

2. Pour seltzer into a second clear plastic cup and place it inside the hot water cup.

3. Pour an inch of cold tap water into a new clear plastic cup.

4. Pour seltzer into a second clear plastic cup and place it inside the cold water cup.

5. Observe the two mixtures.

Record your observations in the space below.

Lesson 11

Analysis Question:

How does the temperature of the water affect the solubility of the gas?

Additional Notes:

Lesson 12:
The Dirty Water Design Challenge: Introduction and Planning, Day One

Directions: Record your observations and any notes from research you conduct below.

Lesson 12, Day One

Plan your procedure for isolating each ingredient in the space below.

Lesson 12:
The Dirty Water Design Challenge: Introduction and Planning, Day Two

Directions: List the materials needed for your project in the table below.

Lesson 12, Day Two

Sketch your design in the space below.

List your extra materials (not those already provided) for your prototype in the table below.

Material	Cost/Other Notes

Lesson 13:
The Dirty Water Design Challenge: Implementation and Reflection, Day One

Directions: Build, test, and modify your device. Record any modifications made and why below.

Lesson 13:
The Dirty Water Design Challenge: Implementation and Reflection, Day Two

Directions: Continue to test and modify your device. Record any final modifications made and reflections below.

Discuss with your lab group to answer the unit Essential Question: *How can scientists make poisonous water safe to drink?*