



Altamonte Springs SCIENCE INCUBATOR

Name: _____

Date: _____

Mighty Microbes

Middle School Earth Science | Spring Module 2 | Regional Water Reclamation Facility

NGSSS Big Idea: Big Idea 1—The Practice of Science

Benchmark Code & Description:

SC.6.N.1.1, SC.7.N.1.1, SC.8.N.1.1—Define a problem from your curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.6.N.1.3—Explain the differences between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.

SC.6.N.1.5—Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.

NGSSS Big Idea: Big Idea 2—The Characteristics of Scientific Knowledge

Benchmark Code & Description:

SC.6.N.2.3—Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests and goals.



LEARNING GOAL/OBJECTIVE

To learn about microorganisms used in wastewater treatment, how reclaimed water is created and how microscopes aid the process.



PREREQUISITES

Review:

- Vocabulary List
- Applicable Textbook Sections



VOCABULARY

See vocabulary sheet.



HANDS-ON ACTIVITY

Task(s):

Students will use educational cards and microscopes to identify microorganisms.

Provided Materials:

- Clipboard/Pencil
- Digital Microscopes
- Mighty Microbe Cards

Career Options: Engineer (BS Degree), Operator (High School Diploma and Certification), Mechanic (Certification), Electrician (Certification)

Lesson Steps:

1. Provide mighty microbe cards showing microorganisms used in wastewater treatment.
2. City staff to provide brief presentation on wastewater, reclaimed water and microorganisms.
3. Present living sample of microorganisms.
4. Students will use other microscopes to identify more microorganisms.



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Regional Water Reclamation Facility Earth Science Vocabulary List

Activated Sludge—small clumps of organisms that grow in wastewater. It's called "activated" because the particles are alive with microorganisms.

Aeration—combining air with a liquid.

Aerobic—to need oxygen.

Aerobic Digestion—the process of stabilizing sludge.

Anaerobic—not needing oxygen.

Biosolids—solids that have been treated enough to become fertilizer.

Clarifier—a tank that lets the solids settle to the bottom.

Disinfection—the process of killing or disabling pathogenic organisms.

Effluent—treated wastewater ("reclaimed water") leaving the plant.

Influent—wastewater flowing into the wastewater treatment facility.

Microbe/Microorganism—microscopic organisms that can be either single-cell or multi-cell.

MLSS (Mixed Liquor Suspended Solids)—the mixture of solids and water in the aeration tank.

Nutrients—elements necessary for organisms to live and grow (including carbon, nitrogen, phosphorus).

Preliminary Treatment—the first treatment process that removes larger particles and heavier grit particles (sand, gravel, metal or glass).

Reclaimed Water—treated wastewater that can be used for a beneficial purpose.

Sand Filters—filtration through sand.

SCADA (Supervisory Control and Data Acquisition)—computer system that monitors pumps, motors and plant processes.

Secondary treatment—the third process in the treatment plant that includes the aeration tanks and secondary clarifiers. The wastewater is treated by microorganisms in the aeration tank then are removed (settle to the bottom) in the clarifier.

Wastewater—water that has been used for purposes such as bathing, cooking, washing clothes, toilets, etc.

Water Reclamation—the physical, chemical and biological process of removing contaminants from wastewater to produce a reusable water source.