

Cellular to Multicellular 6th Grade Learning Targets

Content Statement:

Cells are the fundamental unit of life.

I can...

1. Describe the basic modern cell theory.
2. Identify and explain that all living things have **six** basic characteristics: 1 Made of cells, 2 respond to stimuli, 3 grow and develop, 4 reproduce (asexual or sexual), 5 adapt, and 6 obtain and use energy.
3. Identify and explain the parts and functions of a microscope.
4. Identify the basic organelles of a plant cell: cell wall, cell membrane, cytoplasm, vacuole, chloroplasts, mitochondria, ribosome, nucleus, chromosomes.
5. Identify the basic organelles of an animal cell.

Vocabulary:

Cell Organelle Modern Cell Theory Unicellular (Single-celled) Multicellular	Organelles: - cell wall - cell membrane - nucleus - mitochondria - chloroplast - ribosome - plasma membrane - vacuole - lysosome - plastid	
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Content Statement:

All cells come from pre-existing cells.

I can...

1. Identify and organize the phases of mitosis.
2. Understand how cells transmit genetic information from parent cell to daughter cell.
3. Order the phases of mitosis for a plant.
4. Order the phases of mitosis for an animal.
5. Compare and contrast the differences between plant and animals cell undergoing mitosis.
6. Describe how mitosis disproved the misconception of spontaneous generation.
7. Model the movement of chromosomes in mitosis.

Vocabulary:

Mitosis Parent cell Daughter cell Chromosome	Spontaneous generation	
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Content Statement:

Cells carry on specific functions that sustain life.

I can...

1. Explain the function of each of the organelles in a plant and animal cell.
 2. Explain how all of the parts work together to keep the cell alive.
 3. Explain the role of cells, tissues, organs, and organ systems in an organism
 4. Explain that cells form tissues.
 5. Explain that tissues form organs.
 6. Explain that organs form organ systems.
 7. Explain that specialized cells have different functions (such as, homeostasis, gas exchange, energy transfers, transportation of molecules, disposal of wastes, and synthesis of new molecules).
 8. Explain the relationship between cells, tissues, organs, and organ systems.
 9. Illustrate how specialized cells form tissues, organs, and organ systems.
- **Note, photosynthesis is covered in 5th grade science.

Vocabulary:

Cells Tissues Organs Organ systems	Homeostasis Gas exchange Energy transfer	Osmosis Diffusion Permeable Semi-permeable Impermeable
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Content Statement:

Living systems at all levels of organization demonstrate the complementary nature of structure and function.

I can...

1. Define multicellular.
2. Identify a variety of specialized cells, tissues, organs, and systems that perform specialized functions in multicellular organisms.
3. Identify organisms that have various forms of symmetry (i.e., radial symmetry and bilateral symmetry).
4. Recognize the difference between vertebrate and invertebrate organisms.
5. Identify the different systems in multicellular organisms (respiratory, circulatory, digestive, skeletal, muscular, etc.)
6. Describe the function of the different systems in multicellular organisms (respiratory, circulatory, digestive, skeletal, muscular etc.).
7. Describe the purpose of the different systems in multicellular organisms (respiratory, circulatory, digestive, skeletal, muscular, etc.)
8. Identify and label the parts of the body systems by dissecting multicellular organism(s).
9. Compare and contrast the functions of the body systems of vertebrates and invertebrates.
10. Define the three types of symmetry (radial, bilateral, and asymmetry).
11. Compare and contrast the complexity of body systems in the different symmetries.
12. Compare the four major types of tissues (epithelial, connective, nerve and muscles tissue).

Vocabulary:

Multicellular Symmetry Radial symmetry Bilateral symmetry Asymmetry Organ system	Tissue Epithelial tissue Connective tissue Nerve tissue Muscle tissue	
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Matter and Motion

6th Grade Learning Targets

Content Statement:

All matter is made up of small particles called atoms

I can...

1. Explain that all matter is made of atoms (atomic theory)
2. Define an element; know that all substances are made of different elements
3. Molecules are the combination of 2 or more atoms or compounds joined together chemically
4. Compounds are composed of 2 or more different elements.
5. There are ~90 naturally occurring elements
6. Each compound has its own unique, unchanging composition of type and number of elements and atoms.
7. Differentiate among atoms, elements, molecules and compounds
8. Classify examples of atoms, elements, molecules, and compounds
9. All particles (atoms and/or molecules) of a pure substance have nearly identical mass.
10. Particles of different substances usually have different masses, depending on their atomic composition.
11. Density is the ratio of mass to volume.
12. Know that while mass and volume of a material can change but the density generally remains constant.
13. Use the mass and volume of different substances to compare their relative densities.
14. Compare equal volumes of different substances and know the one that weighs more is denser.
15. Use density to identify a material.
16. Construct and mass vs. volume graphs
17. Interpret mass vs. volume graphs

Vocabulary:

Matter Atoms Element Molecules Compounds	Density Mass Volume	
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Content Statement:

Changes of state are explained by a model of matter composed of atoms and/or molecules that are in motion

I can...

1. Explain when substances undergo changes of state, neither atoms nor molecules themselves are changed in structure.
2. Define and give examples of solids, liquids, and gasses.
3. Describe the motion and spacing of particles in solids, liquids, gasses.
4. Differentiate between temperature and thermal energy
5. Describe how an object has kinetic energy due to its motion.

6. Thermal energy depends on the amount/mass of the substance whereas temperature does not depend on the amount of the substance
7. Discuss the relationship among kinetic energy, thermal energy, and temperature
8. During phase changes, matter conserved.
9. Explain the motion and energy of particles during phases change.
10. Explain the Law of Conservation of Matter.
11. Describe phase changes. (melting, evaporating, condensation, freezing)??

Vocabulary:

Solid Liquid Gas	Thermal energy Temperature	Law of Conservation of Matter Melting Evaporating Condensation Freezing
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Content Statement:

There are two categories of energy: kinetic and potential.

I can...

1. Define potential energy.
2. Define kinetic energy.
3. Classify the different forms energy, (electrical, thermal, sound, gravitational potential) as potential, kinetic, or a combination of the two.
4. Explain the relationship between height and gravitational potential energy.
5. Explain the relationship between speed and kinetic energy.
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Vocabulary:

Kinetic energy Potential energy	Electrical energy Thermal energy Sound energy Gravitational potential energy	Speed
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Content Statement:

An object's motion can be described by its speed and the direction in which it is moving.

I can...

2. Define motion.
3. Define force.
4. Explain a reference point.
5. Explain how motion is detected using reference points.
6. Calculate the speed of an object given distance and time.

7. Describe average speed.
8. Read and interpret graphs of average speed.
9. Measure and graph position as a function of time.
10. Measure and graph speed as a function of time.
11. Analyze graphs to determine position and speed of object.

Vocabulary:

Motion Force Reference Point	Average speed	
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Rocks, Minerals, and Soil

6th Grade Learning Targets

Content Statement:

Minerals have specific, quantifiable properties.

I can...

1. Define mineral
2. Identify and classify mineral examples using properties such as color, luster, Moh's hardness scale, streak, cleavage, magnetism, fluorescence and crystal shape.
3. Describe the environments in which minerals are formed and how they are formed in those environments, including:
 - Evaporation (e.g. halite, gypsum, chalk)
 - Chemical (e.g. calcite, dolomite, kaolinite, corundum)
 - Igneous (e.g. feldspar varieties, magnetite, varieties of quartz, topaz)
 - Metamorphic (e.g. epidote, talc)

Vocabulary:

Mineral Physical properties Mohs' Hardness Scale	Luster Hardness Cleavage Streak Magnetism Fluorescence Crystal Shape	Evaporation
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Content Statement:

Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification.

I can...

1. Explain that most rocks are made up of one or more minerals.
2. Identify and classify rocks based on the basic characteristics and the distinct environments of the three main types of rocks (igneous, metamorphic, and sedimentary)
 - a. Igneous samples must include varieties of granite, rhyolite, basalt, obsidian, pumice and andesite
 - b. Metamorphic samples must include varieties of schist, gneiss, slate, marble, anthracite and phyllite
 - c. Sedimentary samples must include organic forms, such as coal, coquina, limestone, and chert, and inorganic forms, such as sandstone, shale, conglomerate and breccia
 - d. Some rock samples, such as bituminous coal, coquina and chert may not always fall neatly into one specific rock category

Vocabulary:

Igneous Metamorphic Sedimentary		
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Content Statement:

Igneous, metamorphic and sedimentary rocks form in different ways.

I can...

1. Explain that some sedimentary rocks are made of organic material (e.g. coal)
2. Explain that igneous rocks are formed from cooled magma below ground (intrusive) and lava above ground (extrusive.)
3. Explain that metamorphic rocks are formed from other rocks that have been changed by heat and pressure
4. Explain that sedimentary rocks are made of particles (sediments) that have been eroded, deposited, compacted, and cemented together
5. Apply understanding of the three types of rock to analyze the processes of the rock cycle and how it connects to Ohio
 - a. The typical pattern of coal formation is an important connection to energy in Ohio
 - b. The formation of Ohio sandstone and limestone indicating that a shallow sea once covered Ohio
 - c. Ohio's geologic history and past environmental conditions play an important role in understanding the existing bedrock in Ohio (show maps to assist with this)
6. Explain that all rocks can be broken down through the destructive processes of weathering and erosion

Vocabulary:

Intrusive Extrusive	Weathering Erosion	
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Content Statement:

Soil is unconsolidated material that contains nutrient matter and weathered rock.

I can...

1. Define soil (use the term soil, rather than dirt, they are different)
2. Analyze types of soil and how they are formed, based on their properties (texture, color, composition, permeability, porosity, and rate of formation) and their environmental conditions
3. Explain that soil forms in horizontal layers, known as horizons
4. Use soil sampling equipment to observe and investigate different soil horizons, their properties, and how those properties change
 - a. A connection must be made to environmental conditions, types of bedrock and soil properties.

Vocabulary:

Soil Inorganic Organic	Composition Permeability Porosity Horizons	
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Content Statement:

Rocks, minerals and soils have common and practical uses. **(The following learning targets should be included throughout the Minerals, Rocks, and Soil Unit or the Project-Based Learning Investigation.)**

I can...

1. Determine the uses of various minerals, rocks, and soil. Uses of the resources should include:
 - a. construction (e.g., gypsum, metals, gravel, sand, lime, clay), energy (e.g., fossil fuels, radioactive materials)
 - b. transportation (e.g., road salt, asphalt)
 - c. agriculture (e.g., lime, peat, minerals for fertilizers, pesticides),
 - d. domestic use (e.g., metals and gems for jewelry, clay for pottery or sculpting, natural dyes for clothing or paint)
 - e. technology (e.g., lithium, silica)
2. Analyze the extraction, use, storage, and disposal of minerals, rocks, and soil
3. Describe the conservation of mineral, rock, and soil, which are considered non-renewable resources

Vocabulary:

Extraction		
Conservation		