

**SCIENCE MS COLLEGE and CAREER READINESS STANDARDS  
MADISON COUNTY SCHOOL DISTRICT  
6<sup>TH</sup> GRADE PACING GUIDE**

Note to educators: This document does not replace the standards. The pacing guide is not a stand-alone document and must be used in conjunction with the standards. The pacing guide provides clarification and helps teachers to better plan their time by showing what topics are to be taught during a nine-week period. The pacing guide does not provide the conceptual “big picture” required to fully comprehend the goal of the standard.

**SCIENCE MS COLLEGE and CAREER READINESS STANDARDS**  
**MADISON COUNTY SCHOOL DISTRICT**  
**6<sup>TH</sup> GRADE: 1<sup>ST</sup> NINE WEEKS**

**INQUIRY**

*Clarification: Inquiry skills must be taught first nine weeks but reinforced each nine weeks through activities, labs, and experiments.*

Additional Information:

- lab safety
- lab equipment
- graphing
- scientific method

**LIVING THINGS**

**L.6.1.1 Use argument supported by evidence in order to distinguish between living and non-living things, including viruses and bacteria.**

*Clarification: After teaching the characteristics and needs of living things, have students debate whether given examples are living or non-living and provide proof.*

**L.6.1.2 Obtain and communicate evidence to support the cell theory.**

Additional Information:

- Include Francesco Redi's experiment to disprove spontaneous generation.

**L.6.4.1 Compare and contrast modern classification techniques (e.g., analyzing genetic material) to the historical practices used by scientists such as Aristotle and Carolus Linnaeus.**

Additional Information:

- Emphasize how technology has led to more groups and moved organisms from group to group.

**BACTERIA**

**L.6.4.2 Use classification methods to explore the diversity of organisms in kingdoms (animals, plants, fungi, protists, bacteria). Support claims that organisms have shared structural and behavioral characteristics.**

*Clarification: Only teach the Archaeobacteria kingdom and Eubacteria kingdom at this time. Compare and contrast organisms of Eubacteria kingdom: spirilla, bacilli, and cocci. Compare and contrast organisms of Archaeobacteria kingdom: methanogens, halophiles, and thermophiles.*

Additional Information:

- Structural characteristics –ex. type (prokaryotic) and organization (unicellular) of cell
- Behavioral characteristics – ex. reproduction (asexual) and energy acquisition (autotrophs or heterotrophs)

**L.6.1.5 Provide evidence that organisms are unicellular or multicellular.**

**L.6.1.3 Develop and use models to explain how specific cellular components (cell wall, cell membrane, nucleus, chloroplast, vacuole, and mitochondria) function together to support the life of prokaryotic and eukaryotic organisms to include plants, animals, fungi, protists, and bacteria (not to include biochemical function of cells or cell part).**

*Clarification: Only teach bacteria cell parts and functions at this time.*

**L.6.4.5 Engage in scientific arguments to support claims that bacteria (Archaeobacterial and Eubacteria) and viruses can be both helpful and harmful to other organisms and the environment.**

*Clarification: Debate (as in Socratic seminar or a court case) ways bacteria and viruses can be beneficial as well as detrimental.*

## **ANIMALS**

**L.6.4.2 Use classification methods to explore the diversity of organisms in kingdoms (animals, plants, fungi, protists, bacteria). Support claims that organisms have shared structural and behavioral characteristics.**

*Clarification: Only teach the Animalia kingdom at this time. Compare and contrast organisms of Animal kingdom: vertebrates and invertebrates.*

Additional Information:

- Structural characteristics –ex. type (eukaryotic) and organization (multicellular) of cell
- Behavioral characteristics – ex. reproduction (mostly sexual) and energy acquisition (heterotrophs)

**L.6.1.5 Provide evidence that organisms are unicellular or multicellular.**

**L.6.1.3 Develop and use models to explain how specific cellular components (cell wall, cell membrane, nucleus, chloroplast, vacuole, and mitochondria) function together to support the life of prokaryotic and eukaryotic organisms to include plants, animals, fungi, protists, and bacteria (not to include biochemical function of cells or cell part).**

*Clarification: Only teach animal cell parts and functions at this time.*

**L.6.1.4 Compare and contrast different cells in order to classify them as a protist, fungus, plant, or animal.**

*Clarification: Discuss similarities and differences between an animal cell and a bacterial cell.*

**L.6.1.6 Develop and use models to show relationships among the increasing complexity of multicellular organisms (cells, tissues, organs, organ systems, organisms) and how they serve the needs of the organism.**

*Clarification: Choose and discuss specific human tissues, organs, and systems to show how they work together.*

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**PLANTS**

**L.6.4.2 Use classification methods to explore the diversity of organisms in kingdoms (animals, plants, fungi, protists, bacteria). Support claims that organisms have shared structural and behavioral characteristics.**

*Clarification: Only teach Plantae kingdom at this time. Compare and contrast organisms of Plant kingdom: vascular and nonvascular.*

Additional Information:

- Structural characteristics –ex. type (prokaryotic) and organization (multicellular) of cell
- Behavioral characteristics – ex. reproduction (mostly sexual) and energy acquisition (autotrophs)

**L.6.1.5 Provide evidence that organisms are unicellular or multicellular.**

**L.6.1.3 Develop and use models to explain how specific cellular components (cell wall, cell membrane, nucleus, chloroplast, vacuole, and mitochondria) function together to support the life of prokaryotic and eukaryotic organisms to include plants, animals, fungi, protists, and bacteria (not to include biochemical function of cells or cell part).**

*Clarification: Only teach plant cell parts and functions at this time.*

**L.6.1.4 Compare and contrast different cells in order to classify them as a protist, fungus, plant, or animal.**

*Clarification: Discuss similarities and differences between bacterial, plant, and animal cells.*

**L.6.1.6 Develop and use models to show relationships among the increasing complexity of multicellular organisms (cells, tissues, organs, organ systems, organisms) and how they serve the needs of the organism.**

*Clarification: Discuss specific plant tissues, organs, and systems to show how they work together.*

## **FUNGI**

**L.6.4.2 Use classification methods to explore the diversity of organisms in kingdoms (animals, plants, fungi, protists, bacteria). Support claims that organisms have shared structural and behavioral characteristics.**

*Clarification: Only teach Fungi kingdom at this time. Compare and contrast organisms of Fungus kingdom: club, sac, conjugating, and imperfect.*

Additional Information:

- Structural characteristics –ex. type (prokaryotic) and organization (unicellular or multicellular) of cell
- Behavioral characteristics – ex. reproduction (sexual or asexual) and energy acquisition (heterotrophs- specifically saprotrophs)

**L.6.4.3 Analyze and interpret data from observations to describe how fungi obtain energy and respond to stimuli (e.g., bread mold, rotting plant material).**

*Clarification: Perform an experiment to show how fungi only grows on organic material. Also, perform experiments to test reactions to stimuli such as light, temperature, water, and gravity.*

**L.6.1.5 Provide evidence that organisms are unicellular or multicellular.**

**L.6.1.3 Develop and use models to explain how specific cellular components (cell wall, cell membrane, nucleus, chloroplast, vacuole, and mitochondria) function together to support the life of prokaryotic and eukaryotic organisms to include plants, animals, fungi, protists, and bacteria (not to include biochemical function of cells or cell part).**

*Clarification: Only teach fungal cell parts and functions at this time.*

**L.6.1.4 Compare and contrast different cells in order to classify them as a protist, fungus, plant, or animal.**

*Clarification: Discuss similarities and differences of bacterial, animal, plant, and fungal cells.*

## **PROTISTS**

**L.6.4.2 Use classification methods to explore the diversity of organisms in kingdoms (animals, plants, fungi, protists, bacteria). Support claims that organisms have shared structural and behavioral characteristics.**

*Clarification: Only teach Protista kingdom at this time. Compare and contrast organisms of Protist kingdom: animal-like, plant-like, and fungus-like.*

Additional Information:

- Structural characteristics –ex. type (prokaryotic) and organization (unicellular or multicellular) of cell
- Behavioral characteristics – ex. reproduction (asexual or sexual) and energy acquisition (autotrophs or heterotrophs)

**L.6.1.5 Provide evidence that organisms are unicellular or multicellular.**

**L.6.1.3 Develop and use models to explain how specific cellular components (cell wall, cell membrane, nucleus, chloroplast, vacuole, and mitochondria) function together to support the life of prokaryotic and eukaryotic organisms to include plants, animals, fungi, protists, and bacteria (not to include biochemical function of cells or cell part).**

*Clarification: Only teach protist cell parts and functions at this time.*

**L.6.1.4 Compare and contrast different cells in order to classify them as a protist, fungus, plant, or animal.**

**L.6.4.4 Conduct investigations using a microscope or multimedia source to compare the characteristics of protists (euglena, paramecium, amoeba) and the methods they use to obtain energy and move through their environment (e.g., pond water).**

Additional Information:

- This is an opportunity to allow students to use microscopes to view the movements of different microorganisms in pond water.
- Multimedia sources may be best to view energy acquisition for these microorganisms.

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**ECOLOGY**

**L.6.3.1 Use scientific reasoning to explain differences between biotic and abiotic factors that demonstrate what living organisms need to survive.**

**L.6.3.2 Develop and use models to describe the levels of organization within ecosystems (species, populations, communities, ecosystems, and biomes).**

Additional Information:

- Review biomes as these were taught in 5<sup>th</sup> grade.

**L.6.3.3 Analyze cause and effect relationships to explore how changes in the physical environment (limiting factors, natural disasters) can lead to population changes within an ecosystem.**

**L.6.3.5 Develop and use food chains, webs, and pyramids to analyze how energy is transferred through an ecosystem from producers (autotrophs) to consumers (heterotrophs, including humans) to decomposers.**

**L.6.3.4 Investigate organism interactions in a competitive or mutually beneficial relationship (predation, competition, cooperation, or symbiotic relationships).**

**FORCES**

**P.6.6.2 Use mathematical computation and diagrams to calculate the sum of forces acting on various objects.**

**P.6.6.3 Investigate and communicate ways to manipulate applied/frictional forces to improve movement of objects on various surfaces (e.g., athletic shoes, wheels on cars).**

*Clarification: Experiment to show ways to increase or decrease friction and share results in graphic, verbal, or written form.*

**P.6.6.6 Investigate forces (gravity, friction, drag, lift, thrust) acting on objects (e.g., airplane, bicycle helmets). Use data to explain the differences between the forces in various environments.**

Additional Information:

- Examples of environments could include water, air, and rough/smooth solid surfaces.

**P.6.6.4 Compare and contrast magnetic, electric, frictional, and gravitational forces.**

## **MOTION/ENERGY**

**P.6.6.5 Conduct investigations to predict and explain the motion of an object according to its position, direction, speed, and acceleration.**

**P.6.6.7 Determine the relationships between the concepts of potential, kinetic, and thermal energy.**

*Clarification: Relate potential, kinetic, and thermal energies to the motion of objects.*



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**NEWTON'S LAWS**

**P.6.6.1 Use an engineering design process to create or improve safety devices (e.g., seat belts, car seats, helmets) by applying Newton's Laws of motion. Use an engineering design process to define the problem, design, construct, evaluate, and improve the safety device.\***

*Clarification: This is not an experiment following the steps of the scientific method. The end result should include a prototype.*

Additional Information:

- Newton's Laws were taught in fifth grade but will need to be reviewed.

**SUN/MOON/EARTH RELATIONSHIPS**

**E.6.8.5 Construct explanations for how gravity affects the motion of objects in the solar system and tides on Earth.**

**E.6.8.6 Design models representing motions within the Sun-Earth-Moon system to explain phenomena observed from the Earth's surface (positions of celestial bodies, day and year, moon phases, solar and lunar eclipses, and tides).**

Additional Information:

- Because these models have to demonstrate motion and position, they should be working models. These could include but not be limited to students acting as the celestial bodies.

**E.6.8.7 Analyze and interpret data from the surface features of the Sun (e.g., photosphere, corona, sunspots, prominences, and solar flares) to predict how these features may affect Earth.**

*Clarification: Provide data that the students must examine and then explain the effects on Earth. Features are not limited to what is listed in parenthesis and could also include solar storms and solar winds.*

## **ASTRONOMY**

**E.6.8.1 Obtain, evaluate, and summarize past and present theories and evidence to explain the formation and composition of the universe.**

Additional Information:

- Examples of some theories to research could include the Big Bang Theory, Creationism Theory, Plasma Theory, Steady State Theory, etc.

**E.6.8.2 Use graphical displays or models to explain the hierarchical structure (stars, galaxies, galactic clusters) of the universe.**

**E.6.8.4 Obtain and evaluate information to model and compare the characteristics and movements of objects in the solar system (including planets, moons, asteroids, comets, and meteor).**

*Clarification: This is not an individual study of each planet but a comparative study of the celestial objects.*

**E.6.8.3 Evaluate modern techniques used to explore our solar system's position in the universe.**

Additional Information:

- Examples could include but are not limited to optical telescopes (refracting and reflecting like Hubble), radio telescopes, rockets, rovers, satellites, space probes, space shuttle, and space station.