

Juelfs - 7th Science Syllabus –19-20

“Show me the evidence!”

Subject to sequential adjustment

What Science is and is not

Science or Engineering

Scientific experimentation, methodology, protocols, problem solving, procedures

Tools of the trade as they apply in the classroom including but not exclusively

Measurement

General vocabulary introduction

Cause and effect

Evidence

Data collection and presentation

Benefits and consequences

Faulty interpretations

Much of the above will be incorporated into class experiences as appropriate rather than presented as freestanding material.

Note – Standards listed below apply to all topics shown within and below each of the four major units shown in bold type. They are not, for the most part, tagged to specific sections herein because, as a learned person once said, “nothing exists in isolation.”

August/September

Matter

7.PS1.1 develop and use models to illustrate the structure of atoms, including the subatomic particles with their relative positions and charge.

7.PS1.2 Compare and contrast elemental molecules and compound molecules.

7.PS1.3 Classify matter as pure substances or mixtures based on composition.

7.PS1.4 Analyze and interpret chemical reactions to determine if the total number of atoms in the reactants support the Law of Conservation of Mass.

7.PS1.5 Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.

7.PS1.6 Create and interpret models of substances whose atoms represent the states of matter with respect to temperature and pressure.

Matter and atoms

Substances and mixtures

Structure of atoms

Matter – Properties and changes

Properties of matter

Changes in matter

States of matter

Liquids, solids, gases, plasma, others (many others)

State changes

Gas behaviors

Chemical reactions and equations

Reaction processes

Types of reactions

Energy rules (Endothermic, exothermic, why, how)

October/November/December

Life Structure and Functions

7.LS1.1 Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism.

7.LS1.2 Construct an investigation to demonstrate how the cell membrane maintains homeostasis through the process of passive transport.

7.LS1.3 Evaluate evidence that cells have structural similarities and differences in organisms across kingdoms.

7.LS1.4 Diagram the hierarchical organisms from cells to organism.

7.LS1.5 Explain that the body is a system comprised of subsystems that maintain equilibrium and support life through digestion, respiration, excretion, circulation, sensation (nervous and integumentary), and locomotion (musculoskeletal).

7.LS1.6 Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.

Cell structures and functions

Basic structure of cells and life

Pieces and parts of plant animal cells

Passive and active transport of cellular material

Energy rules (photosynthesis and cellular respiration)

Organism organization

Cell cycle

Cell division

Levels of organization within organism

January/February

Exploring Life

7.LS1.7 Evaluate and communicate evidence that compare and contrasts the advantages and disadvantages of sexual and asexual reproduction.

7.LS1.8 Construct an explanation demonstrating that the function of mitosis for multicellular organisms is for growth and repair through the production of genetically identical daughter cells.

7.LS1.9 Construct a scientific explanation based on compiled evidence for the processes of photosynthesis, cellular respiration, and anaerobic respiration in the cycling of matter and flow of energy into and out of organisms.

7.LS2.1 Develop a model depict the cycling of matter, including oxygen and carbon, including the flow of energy among biotic and abiotic parts of an ecosystem.

7.LS3.1 Hypothesize that the impact of structural changes to gene (i.e., mutations) located on chromosomes may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

7.LS3.2 Distinguish between mitosis and meiosis and compare the resulting daughter cells.

7.LS3.2 Predict the probability of individual dominant and recessive alleles to be transmitted from each parent to offspring during sexual reproduction and represent the phenotypic and genotypic patterns using ratios.

7.ETS2.1 Examine a problem from the medical field pertaining a biomaterials and design a solution taking into consideration the criteria, constraints, and relevant scientific principles of the problem that may limit possible solutions.

Human body system

Transport and defensive mechanisms within blood cells

Organ systems

Reproduction and development

Reproduction of Organisms

Meiosis and sexual reproduction (mostly non-botanical))

Asexual reproduction

Plant processes and reproduction

Energy rules (photosynthesis and cellular respiration)

Responses to stimuli

Meiosis and sexual reproduction

Asexual reproduction

Animal behavior and reproduction

Types of behavior

Interactions

Animal reproduction and development

Genetics

Gregor Mendel and peas

Genetic inheritance and Punnett squares

DNA

Energy rules – matter and the environment

Biotic and abiotic factors

Cycles in nature

Energy rules in ecosystems

March/April

Earth

7.ESS3.1 Graphically represent the composition of the atmosphere as a mixture of gases and discuss the potential for atmospheric change.

7.ESS3.2 Engage in a scientific argument through graphing and translating data regarding human activity and climate.

Planet Earth

Spheres in spheres

Cyclic physical process

Nothing exists in isolation – interactions

Environmental impacts

Humans and the environment

Impacts on land, water, atmosphere

Standardized testing – form and function

May

Epilogue

*Tests, any projects completed outside the classroom, and many quizzes will be

announced in advance in the classroom and, for the most part, on “Remind.”

*Links to many resources available on website

*All standards available at www.tn.gov/education

Juelfs - 8th Science Syllabus –19-20

“Show me the evidence!”

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What Science is and is not

Science or Engineering

Scientific experimentation, methodology, protocols, problem solving, procedures

Tools of the trade as they apply in the classroom including but not exclusively

Mathematical techniques

Measurement

Scientific Tools

General vocabulary introduction

Cause and effect

Evidence

Data collection and presentation

Benefits and consequences

Faulty interpretations

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August/September

Forces

8.PS2.1 Design and construct investigations depicting the relationship between magnetism and electricity in electromagnets, generators, and electrical motors emphasizing the factors that increase or diminish the electric current and the magnetic field strength.

8.PS2.2 Conduct an investigation to provide evidence that fields exist between objects even though the objects are not in contact.

8.PS2.3 Create an investigation of an object in motion and describe the position, force, and direction of the object.

8.PS2.4 Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

8.PS2.5 Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.

8.ETS1.1 Develop a model to generate data for ongoing testing and modification of an electromagnet, a generator, and a motor such that an optimal design can be achieved.

Describing Motion

Position applied to motion

The drt formula

Rates and acceleration including speed and velocity

The Laws of Motion

Newtonian Physics and more

Friction

Gravity and the forces of the universe

Newton's First law

Newton's Second Law

Newton's Third Law

Electricity

The language of electricity

Electrical charges and the forces thereof

Electrical current and simple circuits

Circuits – pieces and parts

Magnetism – Magnets and magnetic fields

Magnets and/to electrical currents

Electrical currents and/to magnets

October/November/December

Waves

8.PS4.1 Develop and use models to represent the basic properties of waves including frequency, amplitude, wavelength, and speed.

8.PS4.2 Compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.

8.PS4.3 Evaluate the role that waves play in different communication systems.

Waves

Types of waves

Wave properties

Wave interactions

Sound (more waves) -

Producing and detecting

Interactions

Electromagnetic “Waves”

Electromagnetic radiation

The electromagnetic spectrum (Somewhere over the rainbow)

Electromagnetic “waves” are useful

Light (electromagnetic radiation)

Color, matter

Reflection and mirrors

Refraction and lenses

Optical technology

December/January/February

Our Universe

8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies and composition of stars.

8.EES1.2 Explain the role of gravity in the formation of our sun and planets. Extend this explanation to address gravity's effect on the motion of celestial objects in our solar system and Earth's ocean tides.

8.ETS1.2 Research and communicate information to describe how data from technologies (telescopes, spectrosopes, satellites, and space probes) provide information about objects in the solar system and universe.

Our System – specifically our sun and moon

Earth's motion – relative to other bodies

Our moon and its “behavior”

Tides and Eclipses

Our Greater Solar System

Structure

Inner planets

That which never was or is no more

Dwarf planets and other cool stuff

To Infinity and Beyond

Earth's prospective

Our sun in consideration to other stars

Movement, growth and death of stars

Galaxies and the greater universe(s?)

March/April

Geology and Change

8.EES2.1 Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events.

8.ESS2.2 Evaluate data collected from seismographs to create a model of Earth's structure.

8.EES2.3 Describe the relationship between the processes and force that create igneous, sedimentary, and metamorphic rocks.

8.EES2.4 Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which create change within the lithosphere including plate movements, plate boundaries, and sea-floor spreading.

8.EES2.5 Construct a scientific experiment using data that explains the gradual process of plate tectonics accounting for A) the distribution of fossils on different continents, B) the occurrence of earthquakes, C) continental and ocean floor features (including mountains, volcanoes, faults, and trenches).

8.ESS3.1 Interpret data to explain that earth's mineral, fossil, fuel, and groundwater resources are unevenly distributed as a result of geologic processes.

Rocks and the Rock Cycle

Igneous

Sedimentary

Metamorphic

Plate Tectonics

Historical hypothesis of Continental Drift

Development of understanding and mid-oceanic ridges

As we know this today – the boundary of plates

Consequences of plate tectonics

Earthquakes and volcanoes

8.EES3.2 Collect data, map, and describe patterns in the locations of earthquakes related to tectonic plate boundaries, interaction, and hotspots

And just where might this be?

Geologic Time

8.LS4.1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.

8.LS4.2 Construct an explanation addressing similarities and difference of the anatomical structures and genetic information between extinct and extant organism using evidence of common ancestry and patterns between taxa.

8.LS4.3 Analyze evidence from geology, paleontology, and comparative anatomy to supports that scientific phenotypes within a population can increase the probabilities of survival of that species and lead to adaptation.

8.LS4.4 Develop a scientific explanation of how natural selection plays a role in determining the survival of a species in a changing environment.

8.LS4.5 Obtain, evaluate and communicate information about technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.

Geologic history and the evolution of life

Paleozoic Era

Mesozoic Era

Cenozoic Era

Today-ish

The Environment and Change

Fossil evidence of evolution

Theory of evolution and natural selection

Biological evidence of evolution

May

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