FREEHOLD BOROUGH PUBLIC SCHOOLS
Curriculum Management System

Science
Grade 8

Board Approved: June 2008

Freehold Borough Public Schools
Curriculum Management System
Grade 8 Science

Curriculum Committee

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Mission

We will inspire the creativity and imagination of all students
and empower them as knowledgeable, skillful, and confident learners who flourish
and contribute willingly in a changing world.

Core Beliefs

We believe that:

- All people have inherent worth.
- Life-long learning is basic to the survival and advancement of society.
- The primary influence on the individual's development is the family in all its forms.
- Valuing diversity is essential to individual growth and the advancement of society.
- All individuals have strengths and human potential has no known limits.
- Democracy thrives when individuals accept responsibility for their choices.
- Being trustworthy builds trust.
- Creativity and imagination are essential for society to flourish.
- A safe environment is essential for the well-being of the individual and for society to flourish.

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Philosophy

The comprehensive science program at Freehold Intermediate School is designed to spiral content throughout the curriculum. Within the alignment to state and national standards, the curriculum at each grade level contains three pillars of science: Life, Earth, and Physical Science. In each of these areas, students will encounter inquiry-based activities connected to the real world. Students will learn and apply their knowledge to analyze scientific processes and solve authentic problems. The goal of our science program is to build student knowledge for success on State assessments, as well as expose them to content that will prepare each student for the future.

Goals

The students will:

- Acquire knowledge of the three pillars of science
  - Life Science
  - Earth Science
  - Physical Science
- Think critically to use scientific processes to solve real life problems
- Understand the interrelationship between science and technology, and develop a conceptual understanding between the nature and process of technology

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New Jersey Core Curriculum Content Standards

5.1 Scientific Processes
- A. Habits of Mind
- B. Inquiry and Problem Solving
- C. Safety

5.2 Science and Society
- A. Cultural Contributions
- B. Historical Perspectives

5.3 Mathematical Applications
- A. Numerical Operations
- B. Geometry and Measurement
- C. Patterns and Algebra
- D. Data Analysis and Probability

5.4 Nature and Process of Technology
- A. Science and Technology
- B. Nature of Technology
- C. Technological Design

5.5 Life Science
- A. Matter, Energy, and Organization in Living Systems
- B. Diversity and Biological Evolution
- C. Reproduction and Heredity

5.6 Physical Science – Chemistry
- A. Structure and Properties of Matter
- B. Chemical Reactions

5.7 Physical Science – Physics
- A. Motion and Forces
- B. Energy Transformations

5.8 Earth Science
- A. Earth's Properties and Materials
- B. Atmosphere and Weather
- C. Processes that Shape the Earth
- D. How We Study the Earth

5.9 Astronomy and Space Science
- A. Earth, Moon, Sun System
- B. Solar System
- C. Stars
- D. Galaxies and Universe

5.10 Environmental Studies
- A. Natural Systems and Interactions
- B. Human Interactions and Impact

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Scope and Sequence

UNIT I

Reproduction & Heredity (5.5.8.C)

- Methods of sexual and asexual reproduction
- Cell division
- Genes and DNA
- Mendel's genetics

Evolution (5.5.8.B)

- Sources of variation in organisms
    - Vertebrate vs. Invertebrate
    - Endothermic vs. Ectothermic
- Biological Classification
- Natural selection
- Competition
- Extinction
- Evidence of evolution

UNIT II

Space Science (5.9.8.A.B.C.D)

- Big bang theory
- Sun
- Planets
    - Properties of planets
    - Planetary movement
        - Comets
        - Elliptical orbit
- Moon.
    - Phases of the moon
    - Eclipses
    - Tides
- Space travel

UNIT III

Forensic Science (5.1.A.B.C) (5.2.A.B) (5.3.A.B.C.D) (5.4.C)

- DNA, blood typing, fingerprints
- Questioning (scientific method)
- Ballistics (angle of trajectory, ballistic fingerprinting)
- Blood spatter analysis (force, motion)
- Real crime labs vs. Hollywood

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Suggested Days of Instruction	Freehold Borough Curriculum Management Grade Level/Subject Grade 8 Science	Topic (s): Reproduction & Heredity		
	Concept New Jersey Core Curriculum Content Standard/Cumulative Progress Indicator (CPI)	**Specific Learning Objectives/ Essential Questions The Students Will Be Able To:**	**Assessment/Activities**	**Instructional Tools / Materials / Technology / Resources**
	5.5.8.C How does the understanding of genetics, reproduction, development and evolution affect the quality of life?	Describe how the sorting and recombining of genetic material results in the potential for variation among offspring of humans and other species. Illustrate how a cell splits in both meiosis and mitosis. Predict variation using models such as Punnett Squares. Explain the importance of Mendel's genetic experiments with pea plants with regard to dominate vs. recessive traits and the basics of genetic engineering.	Which of the following is an example of asexual reproduction? A. Birds laying eggs. B. Dragonflies mating. C. Oak tree producing acorns. D. Microorganism splitting in half. Mother's Genes F ? Father's Genes F FF ? ff Look at the Punnett Square above. What can you conclude about the genotype of both parents?	→ Designer animal activity. → Punnett square worksheets. → Charting and graphing of class' dominate and recessive traits (e.g. tongue rolling, widow's peak, etc.). → Build DNA models.

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			If F is the symbol for curly fur and f is the symbol for straight fur, what is the probability that any of their offspring will have curly hair?	

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Suggested Days of Instruction	Freehold Borough Curriculum Management Grade Level/Subject Grade 8 Science	Topic (s): Evolution		
	Concept New Jersey Core Curriculum Content Standard/Cumulative Progress Indicator (CPI)	**Specific Learning Objectives/ Essential Questions The Students Will Be Able To:**	**Assessment/Activities**	**Instructional Tools / Materials / Technology / Resources**
	5.5.8.B How are organisms of the same kind different from each other?	Compare and contrast kinds of organisms using their internal and external characteristics. Distinguish between the characteristics of vertebrates and invertebrates as well as endothermic and ectothermic organisms.	Tick Scorpion Shrimp Blue crab Using the organisms above, answer the following question. You are the curator of a new exhibit at the New Jersey Museum of Science. You have determined that each of the specimens above belong to the same group in a scientific classification system. Give three convincing arguments to support the idea that these organisms are closely related and should therefore be displayed together. Be sure to include structures and physical characteristics of the organisms in your argument.	→ Classification/matching activity using vertebrate animal cards. → Which bean is mine activity? → Incorporate "Trout in the Classroom" lessons.
	5.5.8.B How do environmental conditions effect how an organism evolves?	Discuss how changing environmental conditions can result in the evolution or extinction of a species. Explain how heredity is the mechanism by which organisms evolve or become extinct.	A species of bird becomes overpopulated on an island on which they have survived by eating berries from trees. Some of the birds move to a nearby island that does not have as many berry trees, but has a large number of small crabs to eat. Explain how the birds that moved may evolve and adapt to their new situation.	→ Evolution of a specific species project.

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	5.5.8.B **How does the concept of natural selection factor into the survival of a species?**	Recognize that individual organisms with certain traits are more likely to survive and have offspring. Explain the concept of natural selection.	A female bullfrog lays thousands of eggs. Most of the eggs hatch into tadpoles. The tadpoles compete for limited resources within their own ecosystem. A few of these tadpoles become adult bullfrogs. What characteristics might contribute to a tadpole's survival?	→ Incorporate "Trout in the Classroom" lessons/activities (e.g. survival rates for the 200+ trout eggs that are delivered to the classroom as part of the program).

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Suggested Days of Instruction	Freehold Borough Curriculum Management Grade Level/Subject Grade 8 Science	Topic (s): Astronomy and Space Science		
	Concept New Jersey Core Curriculum Content Standard/Cumulative Progress Indicator (CPI)	**Specific Learning Objectives/ Essential Questions The Students Will Be Able To:**	**Assessment/Activities**	**Instructional Tools / Materials / Technology / Resources**
	5.9.8.A -What predictable, observable patterns occur as a result of the interaction between the Earth, Moon, and Sun? -What causes these patterns?	Investigate Earth, Moon, and Sun as a system and explain how the motion of these bodies results in the phases of the moon and eclipses. Explain how the regular and predictable motions of the Earth and Moon produce tides. Compare and contrast a solar eclipse and a lunar eclipse. Explain how the tilt, rotation and orbital pattern of the Earth relative to the Sun produce seasons and weather patterns.	What, if any, impact would there be on tides if the Moon's orbit were 700,000 km in diameter rather than 384,400 km? Explain Which of the following is an important factor in exploring why seasons occur on Earth? A. Earth rotates on its axis B. Sun rotates on its axis C. Earth's axis is tilted D. Sun's axis is tilted	→ Make a model of Earth's orbit →Activity: Why does Earth bulge at the Equator? →Power Point Presentation: Scientists/ Astronomers/ Astronauts →Create a model of a lunar and solar eclipse →Activity: Telling time by the light of the Moon http://school.discoveryeducation.com/lessonplans/programs/lightofthemoon/ →Activity: Food for spaceflight http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Food_For_Spaceflight_Activity.html →Activity: Moon Phases (worksheet included) http://sciencespot.net/Pages/classastro.html#anchor-moon

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	5.9.8.B **-How are planets and other objects in the solar system similar and different to Earth?** **-What implication does this have for the existence and sustaining of life?**	Describe the physical characteristics of the planets and other objects within the Solar System and compare Earth to the rest of the planets. Compare and contrast solar systems, galaxies, and the universe	The dwarf planet Pluto takes much longer to revolve around the Sun that other planets do. This is because Pluto A. is farther form the Sun than other planets B. is smaller than other planets C. has fewer satellites than other planets D. has a very slow rotation as compared to other planets Since the invention of the telescope and other technologies, scientists have been able to learn more about space. • Identify four types of objects in space that scientists have discovered, other than the Sun, moons, or planets • Describe each object identified	→ Make a Solar System Simulator http://www.exploratorium.edu/ronh/solar_system/index.html →Activity: The size and distance of the planets http://cse.ssl.berkeley.edu/AtHomeAstronomy/activity_10.html →Activity: Planetary Weather http://school.discoveryeducation.com/lessonplans/programs/planetaryweather/
	5.9.8.C **What characteristics does our Sun share with other stars?**	Relate the temperature of a star to its color Explain how measurements of parallax are used to measure a star's distance from Earth Contrast absolute magnitude and apparent magnitude Explain how stars come into being Describe the stages of a star's life cycle Predicts what will happen for the rest of the Sun's life cycle	• Plot the location of stars in an Hertzsprung-Russell (HR) diagram and compare and contrast the characteristics of the Sun with other stars when given a data table • Compare and contrast the characteristics of the Sun to the other stars using a HR diagram	→ Make a model of the sun's interior →Activity: How can you use the sun to tell time? →Activity: How are star observations affected by location? →Activity: Colors of Stars http://stardate.org/teachers/plans/plan.php?lp_id=20 →Activity: Savage Sun http://school.discoveryeducation.com/lessonplans/programs/savagesun/ →Activity: Make a star wheel http://www.astronomyinyourhands.com/activities/makestarwheel.html

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			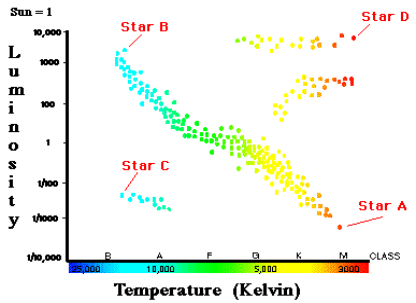 Use the Hertsprung-Russell (HR) to answer the following question Betelgeuse is a red supergiant star located approximately 427 light-years from the Earth. It is the second brightest star in the night sky. • Which of the identified stars on the HR Diagram is most likely Betelgeuse? • Based on its position on the HR Diagram, describe at least three ways that Betelgeuse is different than the Sun.	
	5.9.8.D **Is there order to the Universe?**	Know that the Universe consists of many billions of galaxies, each including billions of stars Describe the four types of galaxies Explain what a constellation is and how if differs from a galaxy or a star cluster Explain how scientist know the universe is expanding Predict how the constellations will look in the distant future	• Distinguish between the size of a solar system, a star and a galaxy • Describe the relative distance between a star in a galaxy and between neighboring galaxies in terms of light years Which distance is most likely described in light years? A. distance to the Moon B. distance to a galaxy C. distance to Australia D. distance to an Earth satellite	→ Activity: Galaxy Mapping http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/newton/GlxyMpng.html

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	Concept New Jersey Core Curriculum Content Standard/Cumulative Progress Indicator (CPI)	**Specific Learning Objectives/ Essential Questions The Students Will Be Able To:**	**Assessment/Activities**	**Instructional Tools / Materials / Technology / Resources**
	5.1.A.B.C 5.2.A.B 5.3.A.B.C.D 5.4.C (The forensic science program also extends into some social studies NJCCCS areas by covering the judicial system)	Distinguish between the different blood types. Use the uniqueness of DNA and fingerprints as tools to show the differences between every sexually reproduced organism. Demonstrate how the Scientific Method can be employed as a process to solve problems; including how to evaluate the strength of evidence, data, claims, arguments, investigations, and experimental findings. Explain how the science of ballistics can be used to solve crimes. Describe and illustrate how forces and motion (gravity, mass, distance, etc.) are utilized in solving crimes; specifically how they factor into blood spatter analysis.	1) Students must complete a series of chapter assessments from Prentice Hall's "Forensic Science: A Companion Book for Your Middle School Science Program" book. Questions from this source include: How does hemoglobin make it possible to detect traces of blood? Do a child and a parent have the same nuclear DNA? Explain your answer. Which Sixth Amendment right is part of the Miranda warning? 2) Students must complete a series of hands-on activities, some of which include blood spatter analysis, fingerprinting, blood typing, evidence collection, and questioning. 3) Students also are assessed on all of the elements of the program by being presented with at least two staged "crimes" that must be solved using	→ Presentations/demonstrations by guests from law enforcement. → Processing a crime scene activity. → Compare and contrast essay on forensic science vs. Hollywood CSI.

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		Compare and contrast real forensic cases vs. Hollywood's portrayal of CSI.	the processes and techniques learned throughout the unit.	