# Blackhawk School District

## CURRICULUM

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| **Course Title:** | **Science** |
| **Grade Level(s):** | **Seventh** |
| **Periods per week:** | **5** |
| **Length of Period:** | **45 minutes** |
| **Length of Course:** | **Daily** |
| **Credits:** | **1 credit** |
| **Faculty Author(s):** | **Anita Mensch, Jamie Moon, Theresa Adams, and Stewart Kirk** |
| **Date:** | **Fall 2008/ Revised October 2012** |

**MISSION STATEMENT:**
The goal of science education is to develop within students an understanding of the world around us by fostering curiosity, developing inquiry skills, and creating an excitement for learning science.

**COURSE DESCRIPTION:**
This is an introductory level science course. The course integrates concepts in Physics, Geology, Meteorology, Oceanography, and Astronomy. Concepts of environmental science are interspersed throughout each unit of study. Hands-on activities will be used to emphasize key science concepts throughout the course.

**PA Common Core Standards for Reading and Writing in Science and Technical Subjects:**
Pennsylvania Department of Education has released standards that describe what students in the science and technical subjects' classrooms should know and be able to do with the English language in reading and writing, grade 6 through 12. The standards provide the targets for instruction and student learning essentials for success in all academic areas, not just language arts classrooms. Although the standards are not a curriculum or a prescribed series of activities, Blackhawk School District has used them to develop this science curriculum.
The standards for Reading are available at:
http://static.pdesas.org/content/documents/PA_Common_Core_Standards_for_Reading_in_Science_And_Technical_Subjects_8-7-12.pdf

The standards for Writing are available at:
http://static.pdesas.org/content/documents/PA_Common_Core_Standards_for_Writing_in_Science_and_Technical_Subjects_8-7-12_rev_2.pdf

**ESSENTIAL QUESTIONS:**

Essential questions are the heart of the curriculum. Essential questions are conceptual commitments that teachers will use to guide instructional decision-making. In addition, they are kid friendly so that students can easily understand them. Essential questions are meant to be shared with students in either discussion or posting in the classroom. Essential questions provide the focus for teaching and learning.

Assessing Essential questions is key to a robust curriculum. If Essential Questions are the focal point of learning, how then do we assess students? The following are the Essential Questions for this class as well as an overview of recommended assessments to the Essential Questions. In addition, Differentiated learning opportunities are embedded as well (noted by DI).

1. How do I use the Scientific Method while making everyday decisions?
    a. Open ended question on test
2. How do I use technology in my home?
    a. Classroom discussion.
3. How do I solve word problems in Physics?
    a. DI: Individuals will solve several word problems, some students are given more clues than others, but all have enough information to answer the question.
4. Can I calculate how much time it will take to reach our vacation destination?
    a. Calculation problems on a test,
5. What forces allow me to walk, run, and stand still?
    a. DI: Students will be asked to convey information using their choice of media.
6. What are Newton's Laws of Motion, and how do they apply to me?
    a. Students will create a PowerPoint or Active Inspire presentation.
7. What are the three ways that cause an object to accelerate?
    a. Acceleration Lab
8. At what angle and how fast will I have to throw a basketball to get it in the net?
    a. Calculation problem on a chapter test.
9. In what ways does friction keep my car on the road?
    a. Friction lab question and graph.
10. How will an object move if I apply a directional force to it?
    a. Essay question on Newton test.
11. How is the momentum between two football players conserved when they collide?
    a. Collision Lab questions.
12. Why can a machine never have a greater work output than work input?
    a. Essay question on chapter test.

13. How does the shortage of non-renewable energy sources affect me?
    a. Alternative Energy PowerPoint Presentation.
14. What are several viable alternative energy sources?
    a. Open – Ended question on a chapter test?
15. What is a wave and how are waves created?
    a. Essay question on a chapter test.
16. How does a rainbow form and why do we see different colors?
    a. Open – Ended question on unit test.
17. How do different instruments produce different sounds?
    a. Student will create a PowerPoint describing different instruments.
18. What are the results of waves refracting, reflecting, and diffracting?
    a. Class discussion and demonstration of wave properties.
19. What is the importance of minerals? What does a precious gem have in common with table salt?
    a. mineral research project and mineral identification activity
20. What is the structure of the Earth? How do scientists know what is at the center of the Earth if they've never been there?
    a. classroom discussion and interactive media
21. What are the three major groups of rocks and how do we classify them? How well do you know the life of your pet rock?
    a. rock classification activity, media interactive of the rock cycle
22. What are plate tectonics, continental drift, and sea-floor spreading? Superman strength would be needed to move a tectonic plate, how are they moving?
    a. interactive media, plate boundary drawings, chapter exam
23. What causes earthquakes and how are they measured? What's the worldwide affect of an earthquake? Why did it take ten days to play game 3 of the 1989 World Series?
    a. interactive media and video, chapter exam and research on the world's largest earthquakes.
24. What processes are involved in the water cycle? Describe a day in the life of a raindrop.
    a. water cycle diagrams
25. How does water shape the land? Compare the Mississippi River to a dump truck.
    a. interactive erosion website and river formation diagrams.
26. Imagine you were a geologist, how would you explain to someone how to determine the relative and absolute ages of rock layers?
    a. of rock layer diagrams and open ended test questions
27. What would the Earth be like without an atmosphere?
    a. layers and characteristics of the atmosphere activity and chapter exam.
28. How can the weather cause a bad hair day?
    a. weather bug activities and demos

29. What causes thunder and lightning?
    a. weather bug, and interactive media.
30. How reliable is a weather man?
    a. reading a weather map activity, weather bug activities, and chapter exams.
31. What are the characteristics of the moon? Where would you weigh less the moon or Earth?
    a. moon vs. Earth concept map and open ended test question
32. How would the moon affect you if you parked your car too close the ocean's edge?
    a. moon, sun and Earth positional diagrams
33. Is the universe expanding? What has so much gravity not even light can escape it?
    a. interactive media and essay question and black hole interpreting diagrams activity

**ROBUST VOCABULARY:**

Robust vocabulary words are Tier 2 words, meaning that they are complex, powerful, and generalizable. Robust vocabulary words support language development of both lower and high level learners. In addition, robust vocabulary instruction helps prepare students for SATs, upper level high school classes, and college. "Studies showed that robust instruction was quite effective not only for learning the meanings of words but also for affecting reading comprehension." (p. 2 *Bringing Words to Life*)

Teachers are asked to commit to teaching and students USING these words throughout the entire year. Using a variety of instructional strategies, students will learn the meaning of these words in a deep and meaningful way in this content and across other content areas.

The Robust Vocabulary for this class are: **Observe, Infer, Alternative, Sequence, Analyze, Estimate, Predict, Scenario, Intrinsic, Manipulate**

| **COURSE OUTLINE and OBJECTIVES** (PA Anchors) | **PROPOSED TIME** | **RESOURCES** | **PROPOSED LABS / ACTIVITIES** | **LESSON REFLECTION (for future revisions)** |
|---|---|---|---|---|
| The following Anchors will be taught throughout the Course:<br><br>S8.A.1.1.2 Explain how certain questions can be answered through scientific inquiry and/or technological design (such as computer, calculator, scientific instruments)<br>S8.A.1.1.3 Use evidence, such as observations or experimental results, to support inferences about a relationship.<br>S8.A.1.2.3 Describe fundamental scientific or technological concepts that could solve practical problems (e.g. Newton's laws of Motion, Mendelian genetics)<br>S8.A.1.1.4 Develop descriptions, explanations, predictions, and models using evidence.<br>S8.A.2.1.2 Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.<br>S8.A.2.1.3 Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.<br>S8.A.2.1.4 Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.<br>S8.A.2.1.5 Use evidence from investigations to clearly communicate and support conclusions.<br>S8.A.2.1.6 Identify a design flaw in a simple technological system and devise possible working solutions.<br>S8.A.2.2.3 Describe ways technology (e.g. microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes. | | | | |
| **Introduction (12 days)**<br>• Measuring<br>• Metric System<br>• Scientific Method<br><br>S8.A.1.1.1 Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices.<br>S8.A.1.3.1 Use ratio to describe change (e.g. percents, parts per million, grams per cubic centimeter, mechanical advantage).<br>S8.A.2.1.1 Use evidence, observations, or a variety of scales (e.g. mass, distance, volume, temperature) to describe relationships.<br>S8.A.2.2.1 Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions. | 12 days | Balances<br><br>Rulers<br><br>Graduated<br><br>Cylinders<br><br>Consumables<br><br>Text | Mystery Box / Bag activity<br><br>Density Lab<br><br>Archimedes Volume Lab<br><br>Metric Golf Course<br><br>Card trick Activity (Magic Lab) | |

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| | | | "Making Inferences" Activity (picture activity)<br><br>Metric Conversions Activity | |
| **Physics Unit (60 days)**<br>• Motion<br>• Force and Motion<br>• Fluids<br>• Work, Power and Machines<br>• Energy<br>• Waves<br><br>S8.A.1.2.3 Describe fundamental scientific or technological concepts that could solve practical problems (e.g. Newton's laws of Motion, Mendelian genetics)<br>S8.A.3.1.3 Distinguish among system inputs, system processes, system outputs, and feedback (e.g. physical, ecological, biological, informational).<br>S8.A.3.3.2 Describe repeating structure patterns in nature (e.g. veins in a leaf, tree rings, crystals, water waves) or periodic patterns (e.g. daily, monthly, annually).<br>S8.C.1.1.2 Use characteristic physical or chemical properties to distinguish one substance from another (e.g. density, thermal expansion/contraction, freezing/melting points, streak test).<br>S8.C.2.1.1 Distinguish among forms of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e. renewable and nonrenewable energy).<br>S8.C.2.1.2 Explain how energy is transferred from one place to another through convection, conduction, or radiation.<br>S8.C.2.1.3 Describe how one form of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.<br>S8.C.2.2.1 Describe the Sun as the major sources of energy that impacts the environment.<br>S8.C.3.1.1 Describe forces acting on objects (e.g. friction, gravity, balanced versus unbalanced).<br>S8.C.3.1.2 Distinguish between kinetic and potential energy.<br>S8.C.3.1.3 Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g. simple machines, hydraulic systems). | 60 days | Text<br><br>Graph Paper<br><br>Stop Watches<br><br>Consumables<br><br>Wood Boxes<br><br>Carts<br><br>Surface Boards<br><br>Neon Bulbs<br><br>Slinkies<br><br>Computer with Internet<br><br>Tuning Forks<br><br>Spring Scales<br><br>Balances | Acceleration Lab<br><br>Newton Cars or Balloon Cars<br><br>Sliding Friction Lab<br><br>Inclined Plane Lab<br><br>Simple Machine Packet<br><br>Archimedes Lab<br><br>Speed of Sound Lab<br><br>Decimeter Activity with Ring Tones<br><br>Spectroscopy Lab | |

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| S8.1.3.1 Use ratio to describe change (e.g. percents, parts per million, grams per cubic centimeter, mechanical advantage).<br>S8.A.2.1.1 Use evidence, observations, or a variety of scales (e.g. mass, distance, volume, temperature) to describe relationships.<br>S8.A.2.2.1 Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions. | | | Slinky Lab<br><br>Salt Lab to Demonstrate Waves | |
| **Geology Unit (45 days)**<br>• Earth's Structure<br>• Mineral and Rocks<br>• Plate Tectonics<br>• Shaping Earth's Surface (Fresh and Salt Water, Weathering)<br><br>S8.D.1.3.3 Distinguish among different water systems (e.g. wetland systems, ocean systems, river systems, watersheds) and describe relationships to each other as well as to landforms.<br>S8.A.1.3.2 Use evidence, observations, or explanations to make inferences about change in systems over time (e.g. carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.<br>S8.A.1.3.3 Examine systems changing over time, identifying the possible variables causing change, and drawing inferences about how these variables affect this change.<br>S8.A.1.3.4 Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems.<br>S8.A.3.1.1 Describe a system (e.g. watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.<br>S8.A.3.2.1 Describe how scientists use models to explore relationships in natural systems (e.g. ecosystem, river system, the solar system).<br>S8.C.2.2.2 Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.<br>S8.C.2.2.3 Describe the waste (kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.<br>S8.D.1.1.1 Explain the rock cycle as changes in the solid earth and rock types (igneous-granite, basalt, obsidian, pumice; sedimentary-limestone, sandstone, shale, coal; and metamorphic-slate, quartzite, marble, gneiss).<br>S8.D.1.1.2 Describe natural processes that change Earth's surface (e.g. landslides, volcanic eruptions, earthquakes, mountain building, new land being formed, weathering, erosion, sedimentation, soil formation). | 45 days | Rock Samples<br><br>Mineral Samples<br><br>Compasses<br><br>Paper Rolls<br><br>Fossil Samples<br><br>Quadrangles<br><br>Stereogram<br><br>Ore-Samples<br><br>Streak Plates<br><br>Glass Plates<br><br>Hand Lenses<br><br>Text<br><br>PA Environmental Text | Stereoscope Lab<br><br>Mineral Lab<br><br>Rock Lab<br><br>Epicenter Triangulation Lab<br><br>Geologic Lab<br><br>Fossil Lab<br><br>Topography Lab<br><br>Ore Lab-Mining Unit<br><br>Chocolate Chip Cookie Mining Activity<br><br>Geology of PA mini-unit of study | |

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| S8.D.1.1.3 Identify soil types (i.e. humus, topsoil, subsoil, loam, loess, and parent material) and their characteristics (i.e. particle size, porosity, and permeability) found in different biomes and in Pennsylvania, and explain how they formed.<br>S8.D.1.1.4 Explain how fossils provide evidence about plants and animals that once lived throughout Pennsylvania's history (e.g. fossils provide evidence of different environments).<br>S8 D.1.2.2 Describe potential impacts of human-made process (e.g. manufacturing, agriculture, transportation, mining) on Earth's resources, both nonliving (i.e. air, water, or earth materials) and living (plants and animals).<br>S8.D.1.3.2 Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics (I.e. composition, density, and electrical conductivity) and their use as natural resources.<br>S8.B.3.2.1 Use evidence to explain factors that affect changes in populations (e.g. deforestation, disease, land use, natural disaster, invasive species).<br>S8.B.3.2.2 Use evidence to explain how diversity affects the ecological integrity of natural systems.<br>S8.1.2.2 Identify environmental issues and explain their potential long-term health effects (e.g. pollution, pest controls, vaccinations). | | | | |
| **Meteorology Unit (20-25 days)**<br>• Atmosphere<br>• Weather Patterns and Climate<br><br>S8.A.3.2.3 Given a model showing simple cause-and-effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g. photosynthesis, water cycle, diffusion, infiltration).<br>S8.A.3.3.1 Identify and describe patterns as repeated processes or recurring elements in human-made systems (e.g. trusses, hub-and-spoke system in communications and transportation systems, feedback controls in regulated systems).<br>S8.B.3.2.3 Describe the responses of organisms to environmental changes (e.g. changes in climate, hibernation, migration, coloration) and how those changes affect survival.<br>S8.B.3.3.1 Explain how human activities may affect local, regional, and global environments.<br>S8.D.2.1.1 Explain the impact of water systems on the local weather or the climate of a region (e.g. lake effect snow, land/ocean breezes).<br>S8.D.2.1.2 Identify how global patterns of atmospheric movement influence regional weather and climate.<br>S8.D.2.1.3 Identify how cloud types, wind directions, and barometric pressure changes are associated with weather patterns in different regions of the country. | 20-25 days | Weather Maps<br><br>Psychomotor<br><br>Aquarium<br><br>Barometer<br><br>Weather Bug Station | Weather Mapping<br><br>Hurricane Tracking Activity<br><br>Humidity Lab<br><br>Water Cycle Demo<br><br>Cloud Activity Global<br><br>Warming Activity | |

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| S8.1.2.2 Identify environmental issues and explain their potential long-term health effects (e.g. pollution, pest controls, vaccinations).<br>S8.A.2.2.1 Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.<br>S8.2.2.3 Describe the waste (kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment. | | | | |
| **Astronomy Unit (20-25 days)**<br>• Solar Systems and Universe<br><br>S8.A.3.1.2 Explain the concept of order in a system [e.g. (first to last: manufacturing steps, trophic levels); (simple to complex: cell, tissue, organ, organ system)].<br>S8.A.3.2.1 Describe how scientists use models to explore relationships in natural systems (e.g. ecosystem, river system, the solar system).<br>S8.C.2.2.1 Describe the Sun as the major sources of energy that impacts the environment.<br>S8.C.3.1.1 Describe forces acting on objects (e.g. friction, gravity, balanced versus unbalanced).<br>S8.D.3.1.1 Describe patterns of earth's movements (i.e. rotation and revolution) in relation to the moon and sun (I.e. phases, eclipses, and tides)<br>S8.D.3.1.2 Describe the role of gravity as the force that governs the movement of the solar system and universe.<br>S8.D.3.1.3 Compare and contrast characteristics of celestial bodies found in the solar system (e.g. moons, asteroids, comets, meteors, inner and outer planets). | 20-25 days | Graph Paper<br><br>Colored Pencils<br>White Foam Balls<br><br>Apollo 13 Movie | H-R Diagram Activity<br><br>Solar System Model Activity<br><br>Moon Phases activity<br><br>Virtual Field Trip (International Space Station)<br><br>Possible Field Trip to Planetarium at Carnegie Science Center | |