Derek Green

Space

Pretest Questions	1. What is a quasar? 2. What is a star? 3. What is a spectrum? 4. What is a Black Hole? 5. List and explain any control structures you know in Python
Objectives	1. Learn basic astronomy facts 2. Learn simple Python control structures 3. Read and understand a database query
Catch	Ask students to write everything that they know about black holes on half a sheet of paper. Video about Black Holes
Activity	1. Discuss stars versus quasars a. View and discuss Dr. Myers' slideshow about Stars/Quasars/spectra 2. Explore SDSS navigation tool: a. Find and compare examples of quasars and stars 3. Discuss what you can learn from a spectrum 4. Use Python to graph the magnitudes of various stars and quasars
Review	1. Working in small groups students will do the SkyServer Scavenger Hunt activity and fill out and submit the given worksheet
Assessments	1. The completed Sky Server Scavenger Hunt worksheet will be assessed according to standards.
Posttest Questions (same as pretest questions)	1. What is a quasar? 2. What is a star? 3. What is a spectrum? 4. What is a Black Hole? 5. Explain how iteration works in Python
Standards	NSES Content Standards (Science) 5-8 A1. Inquiry – Abilities – Use appropriate tools and techniques to gather, analyze, and interpret data. 5-8 A2. Inquiry – Understandings – Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.

	5-8 A2. Inquiry – Understandings – Mathematics is important in all aspects of scientific inquiry. 5-8 A2. Inquiry – Understandings – Science advances through legitimate skepticism. 5-8 B3. Physical Science - Transfer of Energy – Light interacts with matter by transmission, absorption, and scattering. 5-8 G2. History and Nature of Science – Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models. 9-12 A1. Inquiry – Abilities – Communicate and defend a scientific argument. 9-12 A2. Inquiry – Understanding – Scientists rely on technology to enhance the gathering and manipulation of data. 9-12 A2. Inquiry – Understanding – Results of scientific inquiry emerge from different types of investigations and public communication among scientists. 9-12 D4. Earth and Space Science – The Origin and Evolution of the Universe – Billions of galaxies, each of which is a gravitationally bound cluster of billions of stars, now form most of the visible mass of the universe. 9-12 E2. Science and Technology – Understanding – Science often advances with the introduction of new technologies. 9-12 G1. History and Nature of Science – Science As Human Endeavor – Individuals and teams have contributed and will continue to contribute to the scientific enterprise. AAAS Project 2061 Benchmarks (Science) I A 9-12 5. Scientists in any one research group tend to see things alike, so even groups of scientists may have trouble being entirely objective about their methods and findings. For that reason, scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis. Checking each other's results and explanations helps, but that is no guarantee against bias. I B 6-8 3. No matter who does science and mathematics or invents things, or when or where they do it, the knowledge and technology that result can eventually become available to everyone in the world. I B 6-8 6. Computers have become invaluable in science because they speed up and extend people's ability to collect, store, compile, and analyze data, prepare research reports, and share data and ideas with investigators all over the world. IV A 6-8 1. The sun is a medium-sized star located near the edge of a disk-shaped galaxy of stars, part of which can be seen as a glowing band of light that spans the sky on a very clear night. The universe contains many billions of galaxies, and each galaxy contains many billions of stars. To the naked eye, even the closest of these galaxies is no more than a dim, fuzzy spot.

	IV A 6-8 4. Large numbers of chunks of rock orbit the sun. Some of those that the earth meets in its yearly orbit around the sun glow and disintegrate from friction as they plunge through the atmosphere-and sometimes impact the ground. Other chunks of rocks mixed with ice have long, off-center orbits that carry them close to the sun, where the sun's radiation (of light and particles) boils off frozen material from their surfaces and pushes it into a long, illuminated tail. IV F 6-8 1. Light from the sun is made up of a mixture of many different colors of light, even though to the eye the light looks almost white. Other things that give off or reflect light have a different mix of colors. IV F 6-8 5. Human eyes respond to only a narrow range of wavelengths of electromagnetic radiation-visible light. Differences of wavelength within that range are perceived as differences in color. XI A 6-8 1. Know why it is important in science to keep honest, clear, and accurate records. NCTM Standards (Mathematics) Standard 3 - Geometry and Spatial Sense – Analyze characteristics and properties of two- and three- dimensional geometric objects. Standard 3 - Geometry and Spatial Sense – Select and use different representational systems. Standard 4 – Measurement – Understand attributes, units, and systems of measurement. Standard 9 – Connections – Recognize, use , and learn about mathematics in contexts outside mathematics. NETS Performance Indicators (Technology) 6-8 4. Use content-specific tools, software, and simulations to support learning and research. 9-12 6. Evaluate technology-based options, including distance and distributed education, for lifelong learning. 9-12 9. Investigate and apply expert systems , intelligent agents, and simulations in real-world situations.