Starstruck: The Fine Art of Astrophotography
(November 8, 2014 - February 8, 2015)

Altitude: The angular distance between the direction to an object and the horizon. Altitude ranges from 0 degrees for an object on the horizon to 90 degrees for an object directly over-head

Andromeda galaxy: The closest spiral galaxy to our Milky Way. Approximately 2.5 million Light Years away in the constellation of Andromeda, the Princess.

Aperture: A device that controls the amount of light admitted through an opening. In photography and digital photography, aperture is the unit of measurement that defines the size of the opening in the lens that can be adjusted to control the amount of light reaching the film or digital sensor. The size of the aperture is measured in F-stop.

Apollo Mission: NASA led missions, which included manned and unmanned missions to bring humans to the moon during the years 1961 and 1975.

Aurora: A natural light display in the sky (from the Latin word *aurora*, "sunrise" or the Roman goddess of dawn), especially in the high latitude (Arctic and Antarctic) regions, caused by the collision of solar wind and magnetospheric charged particles with the high altitude atmosphere.

Astronomy: A natural science that studies celestial objects, space, and physics of the universe.

Astrophotography: A specialized type of photography for recording images of astronomical objects and large areas of the night sky. Modern digital cameras are helpful, but not necessary to capture images of Astronomical objects.

Atmosphere -
the envelope of gases surrounding the earth or another planet.

Azimuth - This is the direction of a celestial object, measured clockwise around the observer's horizon from north. So an object due north has an azimuth of 0°, one due east 90°, south 180° and west 270°. Azimuth and altitude are usually used together to give the direction of an object in the observer's sky.

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Black Hole- a region of space having a gravitational field so intense that no matter or radiation can escape.

Celestial Sphere - an imaginary sphere of which the observer is the center and on which all celestial objects are considered to lie.

Comet - a celestial object consisting of a nucleus of ice and dust and, when near the sun, a "tail" of gas and dust particles forms pointing away from the sun.

Constellation - a group of stars forming a recognizable pattern that is traditionally named after its apparent form or identified with a mythological figure. Modern astronomers divide the sky into eighty-eight constellations with defined boundaries.

Corona - the rarefied gaseous atmosphere of the sun and other stars. The sun's corona is normally visible only during a total solar eclipse when it is seen as an irregularly shaped pearly glow surrounding the darkened disk of the moon.

Coronal Mass Ejection (CME) - a massive burst of solar wind and magnetic fields rising above the solar corona or being released into space. Coronal mass ejections are often associated with other forms of solar activity, most notably solar flares, but a causal relationship has not been established.

Cosmology - the branch of astronomy involving the origin and evolution of the universe, from the Big Bang to today and on into the future. According to NASA, the definition of cosmology is "the scientific study of the large scale properties of the universe as a whole."

Galaxy - a system of millions or billions of stars, together with gas and dust, held together by gravitational attraction.

Interstellar Dust - can be taken to be all dust in the cosmos, as its name implies, or limited to space dust in our solar system. This dust forms stars and solar systems.

ISO – in photography refers to the sensitivity to light. This setting on your camera or film that you use, is used for specific conditions in which you choose to shoot your photos. A higher value is more sensitive to light, while a lower value is less sensitive to light.

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Light Year - a unit of astronomical distance equivalent to the distance that light travels in one year, which is nearly 6 trillion miles.

Luminosity - the total amount of energy emitted by a star, galaxy, or other astronomical object per unit time. It is related to brightness.

Milky Way – the galaxy that contains our Solar System. Its name "milky" is derived from its appearance as a dim glowing band arching across the night sky in which the naked eye cannot distinguish individual stars.

Magnitude - Astronomers define star brightness in terms of apparent magnitude (how bright the star appears from Earth) and absolute magnitude (how bright the star appears at a standard distance of 32.6 light years or 10 parsecs).

Moon: a natural satellite of a planet. There are over 150 moons discovered in our solar system.

NASA - The National Aeronautics and Space Administration is the agency of the United States government that is responsible for the nation's civilian space program and for aeronautics and aerospace research.

Nebula - a cloud of gas and dust in outer space, visible in the night sky either as an indistinct bright patch or as a dark silhouette against other luminous matter.

Observatory - a room or building housing an astronomical telescope or other scientific equipment for the study of natural phenomena.

Orion's Belt: An asterism known to easily find the constellation of Orion "the Hunter".

Planet - is a celestial body which:
is in orbit around the Sun,
has sufficient mass to create a nearly round shape
has "cleared the neighborhood" around its orbit.

Polaris - Referred to as the "North Star", the brightest star in the constellation Ursa Minor. It is currently very close to the north celestial pole, making it the current northern pole star.

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Shutter Speed: In photography and digital photography the shutter speed is the unit of measurement that determines how long shutter remains open as the picture is taken. The slower the shutter speed, the longer the exposure time. The shutter speed and aperture together control the total amount of light reaching the sensor. Shutter speeds are expressed in seconds or fractions of a second. For example 2, 1, 1/4, 1/8, 1/15, 1/30, 1/125, 1/1000, 1/2000, 1/4000. Each speed increment determines the amount of light entering the camera.

Solar Flare: a brief eruption of intense high-energy radiation from the sun's surface, associated with sunspots and causing electromagnetic disturbances on the earth, as with radio frequency communications and power line transmissions.

Solar System: the term that refers to our eight planets, millions of asteroids and comets which all revolve around our star, the Sun.

Spectroscopy: the branch of science concerned with the investigation and measurement of light produced when matter interacts with or emits electromagnetic radiation.

Stellar Evolution: the process of every star to age and go through drastic changes along a large amount of time. The life of stars can vary from millions of years to billions of years.

Star trail: A continuous line that a star moves in a photograph. Captured using extended shutter speed of varying lengths. This motion shows us the stars are moving due to the earth's rotation

Supernova: The explosion of a star which at times can outshine entire galaxies, as the explosion pushes out most of the star's mass outwards.

Sun: the star which the earth and 7 other planets in our solar system orbit around.

Time-lapse Photography: a technique in photography in which the frequency of images occurs much slower than real time. When the images are played back the motion seems sped up to the viewer.

Wavelength: the distance between successive crests of a wave, especially points in a sound wave or electromagnetic wave.

Resources for Elementary students:

NASA for kids: https://solarsystem.nasa.gov/kids/

NASA Kids Club: https://www.nasa.gov/kidsclub/index.html

Sea and Sky: http://www.seasky.org/sky.html

The sky tonight – Sky and Telescope:
https://www.skyandtelescope.com/observing/sky-at-a-glance/

How old are you on other Planets?: http://www.exploratorium.edu/ronh/age/index.html

Children's literature

Driscoll, Michael, and Meredith Hamilton. *A Child's Introduction to the Night Sky: The Story of the Stars, Planets, and Constellations, and How You Can Find Them in the Sky*. New York: Black Dog & Leventhal :, 2004. Print.

Rey, H. A., and Fritz Eichenberg. *The Stars, a New Way to See Them.* Enl. World-wide ed. Boston: Houghton Mifflin, 1962. Print.

Mitton, Jacqueline, and Christina Balit. *Kingdom of the Sun: A Book of the Planets*. Mascot, NSW: Koala, 2001. Print.

Dickinson, Terence, and John Bianchi. *Exploring the Night Sky: The Equinox Astronomy Guide for Beginners*. Camden East, Ont.: Camden House, 1987. Print.

Mitton, Jacqueline, and Christina Balit. *Zoo in the Sky: A Book of Animal Constellations*. Washington, D.C.: National Geographic Society, 1998. Print.

Crelin, Bob, and Amie Ziner. *There Once Was a Sky Full of Stars*. Cambridge, Mass.: Sky Pub., 2003. Print.

Halpern, Paul, and Lynette Cook. *Faraway Worlds: Planets beyond Our Solar System*. Water-town, MA: Charlesbridge Pub., 2004. Print.

Resource List:

Video preview of Starstruck exhibition: https://vimeo.com/90675184

Astronomy Picture of the Day: https://apod.nasa.gov/apod/astropix.html

Spaceweather: http://spaceweather.com/

International Dark Sky Association: https://www.darksky.org/

Hubble Space Telescope: https://hubblesite.org/

Sky and Telescope: https://www.skyandtelescope.com/

Solar System link: https://solarsystem.nasa.gov/planets/overview/

Galaxy Zoo: https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/

Science @ NASA: https://science.nasa.gov/

Moon Zoo: https://www.moonzoo.org/

Recommended books and literature

Dickenson, Terrance. *NightWatch: A Practical Guide to Viewing the Universe*. 4th ed. Firefly, 2006. Print.

Sinnott, Roger W. *Sky & Telescope's Pocket Sky Atlas*. Cambridge, MA: Sky Pub., 2006. Print.

Hawking, Stephen. *A Brief History of Time: From the Big Bang to Black Holes*. Toronto: Ban-tam, 1988. Print.

Sagan, Carl. *Pale Blue Dot: A Vision of the Human Future in Space*. New York: Random House, 1994. Print.

Greene, B. *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*. New York: W.W. Norton, 1999. Print.

Bryson, Bill. *A Short History of Nearly Everything*. New York: Broadway, 2003. Print.

Tyson, Neil DeGrasse. *Death by Black Hole: And Other Cosmic Quandaries*. New York: W.W. Norton, 2007. Print.

Plait, Philip C. *Death from the Skies!: These Are the Ways the World Will End*--. New York: Vi-king Penguin, 2008. Print.