

Instructor: _____Urquhart_____ School: _____Kalkaska High School_____

Subject: _____Astronomy_____ Grade(s): _____9-12_____

Instructional Materials: _____

Month	Topics	Activities	MCF Benchmarks, or Grade Level Content Expectations (GLCEs)
Week 1	Intro and Perspective Metric and Sig Digs	Pre Test	<p>PI.1A Generate new questions that can be investigated in the laboratory or field.</p> <p>PI.1C Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).</p> <p>PI.1D Identify patterns in data and relate them to theoretical models.</p> <p>PI.1g Based on empirical evidence, explain and critique the reasoning used to draw a scientific conclusion or explanation.</p>
Week 2	Star Charts Constellations	SC 001 Project Stellarium	<p>E5.1A Describe the position and motion of our solar system in our galaxy and the overall scale, structure, and age of the universe.</p>
Week 3	Universe Scale	Solar System Walk	<p>E5.3A Explain how the solar system formed from a nebula of dust and gas in a spiral arm of the Milky Way Galaxy about 4.6 Ga (billion years ago).</p>

Week 4	Celestial Bodies	Rocket Project	<p>E5.1A Describe the position and motion of our solar system in our galaxy and the overall scale, structure, and age of the universe.</p>
Week 5	Aerodynamics and rocket systems	Rocket Project	<p>P4.3f Calculate the impact speed (ignoring air resistance) of an object dropped from a specific height or the maximum height reached by an object (ignoring air resistance), given the initial vertical velocity.</p>
Week 6	Newton's Laws of Motion	Rocket Project	<p>P3.3A Identify the action and reaction force from examples of forces in everyday situations (e.g., book on a table, walking across the floor, pushing open a door). P3.3b Predict how the change in velocity of a small mass compares to the change in velocity of a large mass when the objects interact (e.g., collide).</p>
Week 7	<p>Measuring Earth Mass</p> <p>Newton's Law of Gravity</p>	Earth Mass Lab	<p>P3.6A Explain earth-moon interactions (orbital motion) in terms of forces. P3.6B Predict how the gravitational force between objects changes when the distance between them changes. P3.6C Explain how your weight on Earth could be different from your weight on another planet. P3.6d Calculate force, masses, or distance, given any three of these quantities, by applying the Law of Universal Gravitation, given the value of G.</p>

Week 8	Trigonometry	Rocket Height Project	P4.3f Calculate the impact speed (ignoring air resistance) of an object dropped from a specific height or the maximum height reached by an object (ignoring air resistance), given the initial vertical velocity.
Week 9	Space Technology	Space Tech Project	P4.6C Explain why there is a time delay between the time we send a radio message to astronauts on the moon and when they receive it.
Week 10	Shuttle Transit Systems (Shuttle)	Columbia Disaster	P4.6C Explain why there is a time delay between the time we send a radio message to astronauts on the moon and when they receive it.
Week 11	Optics and Telescopes	Telescope Lab	P4.9B Explain how various materials reflect, absorb, or transmit light in different ways.

Week 12	Hubble Space Telescope	Hubble's Troubles	P4.6h Explain the relationship between the frequency of an electromagnetic wave and its technological uses.
Week 13	The Apollo Program	Apollo Journal	PI.2j Apply science principles or scientific data to anticipate effects of technological design decisions.
Week 14	Light / Electromagnetism Spectroscopy	Spectrum Analysis	P4.9C Explain why the image of the Sun appears reddish at sunrise and sunset.
Week 15	Doppler Effect and Stellar Movement	Doppler Lab	E5.1A Describe the position and motion of our solar system in our galaxy and the overall scale, structure, and age of the universe. E5.1b Describe how the Big Bang theory accounts for the formation of the universe. E5.1c Explain how observations of the cosmic background radiation have helped determine the age of the universe. E5.1d Differentiate between the cosmological and Doppler red shift.

Week 16	Cosmology	Universe Scale Activity	<p>E5.1A Describe the position and motion of our solar system in our galaxy and the overall scale, structure, and age of the universe.</p> <p>E5.1b Describe how the Big Bang theory accounts for the formation of the universe.</p>
Week 17	Star's and Our Sun	Sunspot Project	<p>E5.2A Identify patterns in solar activities (sunspot cycle, solar flares, solar wind).</p> <p>E5.2B Relate events on the Sun to phenomena such as auroras, disruption of radio and satellite communications, and power disturbances.</p> <p>E5.2C Describe how nuclear fusion produces energy in the Sun.</p> <p>E5.2D Describe how nuclear fusion and other processes in stars have led to the formation of all the other chemical elements</p>
Week 18	HR Diagram and Star Classification	HR Lab	<p>E5.2e Explain how the Hertzsprung-Russell (H-R) diagram can be used to deduce other parameters (distance).</p> <p>E5.2h Compare the evolution paths of low, moderate and high mass stars using the H-R diagram.</p> <p>E5.2g Explain how the balance between fusion and gravity controls the evolution of a star (equilibrium).</p>

