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| **Week** | **Lesson Descriptions** | **Goals**  | **Lesson strategies & resources** |
| 1 | Learning Experiences 1 & 2: *Who’s Who in Astronomy** Students complete research on astronomers throughout history
* Class creation of astronomy timeline based on student research
 | - Introduce unit and build awareness that humans have been looking at the sky and creating theories for thousands of years -Introduce famous astronomers, scientists and mathematicians that studied the sky | * Use ‘Who’s Who’ as an anchor piece for later reference in the unit
* *Teacher tip*: ‘Who’s Who’ has a lot of detailed information and research for students. You can move the activity to later in the unit, or turn into a game to make it more engaging.
* Teacher tip: Start unit with KWL chart about astronomy (before doing ‘Who’s Who’)
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| 2 | Learning Experience 3: *Moon Journal Introduction** Reading: *Moon Tricks* and discussion/recording students’ questions about the moon
* Students model & observe the phases of the moon
 | - Support inquiry and observation- Students notice changes in shape and position of moon over time-Students observe and record phases of the moon using a model | * The moon journals can be challenging for students but can also be very engaging as students notice the moon for the first time.
* This can be timed so you can take students out to see the moon during the day and practice filling out the journals together before doing it independently. (It does not need to take place in week 2, but needs enough time fore students to be able to observe the moon for 28 days).
* Consult Moon Rise & Set charts to ensure students have opportunity to see the moon when it is out <http://www.timeanddate.com/moon/usa/boston>
* Consider postponing modeling of the moon globe until later in the unit, after students have had opportunity to notice apparent changes in the moon’s shape
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| 3 | Learning Experience 4: *Visible Light Sources** Read aloud & discussion

of *The Sun*Learning Experience 5: *Just Passing Through** Students experiment with

different materials to see which allow light to pass through | - Introduce the sun as the main source of light for Earth-Introduce the sun as a star-Introduce natural and artificial light sources- Introduce terms ‘transparent, translucent, opaque’-Students practice scientific inquiry (predicting, investigating, and drawing conclusions) | * Teacher tip: Materials in Just Passing through do not always match results on Teacher Answer sheet. (Light often passes through wood) You can use this as a debate point for a Science Talk (what did you notice with the wood? Why might you have different data from other groups? Is all wood translucent? Why do you think so? How could you find out?)
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| 4 | Learning Experience 6 *The Illusion of Wealth** Students experiment with mirrors, written words, pennies and protractors

Learning Experience 7 *Mirrors** Teacher demonstrates angles of reflection with bouncing a tennis ball
* Teacher demonstrates with baby powder, lasers and mirrors
* Students experiment with mirrors, penlights and protractors
 | -Introduce a protractor as a tool in science- Reinforce idea that light travels in a straight line-Reinforce idea that light can be transmitted, absorbed and/or reflected-Reinforce idea that light bounces off a mirror in the same angle as it hits- Students practice scientific inquiry (predicting, investigating, and drawing conclusions) | * These hands-on lessons can be very engaging for students and offer great opportunities for data collection and science talks.
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| 5 | Learning Experience 8 *Shadows Exploration*- Students experiment with geometric solids, flashlights and graph paper to observe shadows-Students write about how shadows are systemsLearning Experience 9 *Moon Seems to Change** Students think about what causes the moon to appear to change shape
* Read aloud: *The Moon Seems to Change*
* Students model the moon phases using moon balls on sticks and a lamp
 | -Introduce idea that shadows change when the position/angle of light source change-Introduce the idea of shadows as system-Connect the idea of shadows seen in class to the shadows on Earth-Students practice scientific inquiry (predicting, investigating, and drawing conclusions)-Students explore reasons for moon phases-Introduce the names of 8 phases of the moon | * Offer more opportunities for students to model moon phases beyond this lesson and notice changing phases as they manipulate the moon’s position (<http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Lunar_Nav.swf::Lunar+Phases+Interactive>)
* Connect the Science Talk to what students have observed during their moon journals
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| 6 | Learning Experience 10 *Lenses*-Students explore stations, investigating lenses and lightsLearning Experience 11 *Galileo and Telescopes** Teacher presents Powerpoint and Brainpop videos on Galileo
 | - Introduce different types of lenses-Introduce how lenses in combination can be used to make telescopes | * Teacher Tip: the Galileoscopes can be difficult for students to use. Consider asking for extra adult help for this activity so students can successfully use the scope.
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| 7 | Learning Experience 12 *Light is Colorful** Students complete pre-assessment about light and color
* Students watch video: Bill Nye, Light & Color & review pre-assessment answers

Learning Experience 13 *Diffraction Grating** Students experiment with diffraction grating slides (observing light bulbs and CDs)
 | - Introduce concept of visible light containing all colors-Deepen students’ understanding of visible light spectrum | * Consider omitting Learning Experience 12 & 13 (light and color is not part of Massachusetts standards for elementary grades)
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| 8 | Learning Experience 14, 16, 18* Students complete “Exploring our Celestial Neighborhood” Booklet and research
 | -Introduce Solar System (eight plants, dwarf planets, Kuiper belt and asteroid belt) | * Teacher Tip: Have students use research to create Travel Brochures for the Planets and Bodies in Earth’s Solar System
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| 9 | * Students play card games to review the planets
* Students create mnemonic devices to reinforce the names and order of the planets in Earth’s Solar System
 | Introduce Solar System (eight plants, dwarf planets, Kuiper belt and asteroid belt) |  |
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| 10 | Learning Experience 15 *Revolution Model** Read aloud: *The Gravity of the Situation*
* Students experiment with revolution models
 | - Introduce concepts of gravity-Introduce Sir Isaac Newton- Relate concepts of gravity to orbits of planets | * Consider omitting Learning Experience 15 (Earth’s gravity is not part of Massachusetts standards for elementary grades)
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| 11 | Learning Experience 17 *Earth’s Rotation, Day & Night** Students model rotation of Earth and day and night

Lesson 19 *Our Solar System** Students complete Solar System assessment
 | -Introduce concept of revolution and how it causes Day and Night on Earth- Assess what students learned from “Exploring our Celestial Neighborhood” | * Kinesthetic model of Day & Night is crucial for understanding. Consider offering students more ways to model this (<http://www.bbc.co.uk/bitesize/ks3/science/environment_earth_universe/astronomy_space/activity/>)
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