# Seventh Grade Science

| Strand | Big Idea | Concept | GLE code | GLE |
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| ME | 1 | D | a. | Describe the relationship between temperature and the movement of atmospheric gases (i.e., warm air rises due to expansion of the volume of gas, cool air sinks due to contraction of the volume of gas) |
| ME | 1 | I | a. | Explain that the amount of matter remains constant while being recycled through the water cycle |
| ME | 2 | A | a. | Recognize thermal energy as the random motion (kinetic energy) of molecules or atoms within a substance |
| ME | 2 | A | b. | Use the kinetic molecular model to explain changes in the temperature of a material |
| ME | 2 | A | c. | Recognize thermal energy is transferred as heat from warmer objects to cooler objects until both reach the same temperature (equilibrium) |
| ME | 2 | A | d. | Recognize the type of materials that transfer energy by conduction, convection, and/or radiation |
| ME | 2 | A | e | Describe how heat is transferred by conduction, convection, and radiation, and classify examples of each |
| ME | 2 | A | f | Classify common materials (e.g., wood, foam, plastic, glass, aluminum foil, soil, air, water) as conductors or insulators of thermal energy |
| ME | 2 | A | g | Predict the differences in temperature over time on different colored (black and white) objects placed under the same heat source |
| ME | 2 | A | h | Describe the interactions (i.e., repel, attract) of like and unlike charges (i.e., magnetic, static electric, electrical |

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| ME | 2 | A | i | Diagram and identify a complete electric circuit by using a source (battery), means of transfer (wires), and receiver (resistance bulbs, motors, fans) |
| ME | 2 | A | j | Observe and describe the evidence of energy transfer in a closed series circuit |
| ME | 2 | A | k | Describe the effects of resistance (number of receivers), amount of voltage (number of energy sources), and kind of transfer materials on the current being transferred through a circuit (e.g., brightness of light, speed of motor) |
| ME | 2 | A | l | Classify materials as conductors or insulators of electricity when placed within a circuit (e.g., wood, pencil lead, plastic, glass, aluminum foil, lemon juice, air, water) |
| ME | 2 | A | m | Diagram and distinguish between complete series and parallel circuits |
| ME | 2 | A | n | Identify advantages and disadvantages of series and parallel circuits |
| ME | 2 | C | a. | Identify solar radiation as the primary source of energy for weather phenomena |
| ME | 2 | F | a. | Identify the different energy transformations that occur between different systems (e.g., chemical energy in battery converted to electricity in circuit converted to light and heat from a bulb) |
| ME | 2 | F | b. | Recognize that, during an energy transformation, heat is often transferred from one object (system) to another because of a difference in temperature |
| ME | 2 | F | c. | Recognize energy is not lost but conserved as it is transferred and transformed |
| FM | 1 | A | a. | Describe the circular motion of a moving object as the result of a force acting toward the center |
| FM | 1 | A | b. | Classify different types of motion (e.g., straight line, projectile, circular, vibrational) |
| FM | 1 | A | c. | Given an object in motion, calculate its speed (distance/time) |

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| FM | 1 | A | d. | Interpret a line graph representing an object's motion in terms of distance over time (speed) using metric units |
| FM | 2 | A | a. | Identify and describe the types of forces acting on an object in motion, at rest, floating/sinking (i.e., type of force, direction, amount of force in Newtons |
| FM | 2 | A | b. | Compare the forces acting on an object by using a spring scale to measure them to the nearest Newton |
| FM | 2 | B | a. | Recognize every object exerts a gravitational force of attraction on every other object |
| FM | 2 | B | b. | Recognize an object's weight is a measure of the gravitational force of a planet/moon acting on that object |
| FM | 2 | B | c. | Compare the amount of gravitational force acting between objects (which is dependent upon their masses and the distance between them) |
| FM | 2 | D | a. | Compare the effects of balanced and unbalanced forces (including magnetic, gravity, friction, push or pull) on an object's motion |
| FM | 2 | D | b. | Explain that when forces (including magnetic, gravity, friction, push or pull) are balanced, objects are at rest or their motion remains constant |
| FM | 2 | D | c. | Explain that a change in motion is the result of an unbalanced force acting upon an object |
| FM | 2 | D | d. | Explain how the acceleration of a moving object is affected by the amount of net force applied and the mass of the object |
| FM | 2 | F | a. | Recognize examples of work being done on an object (force applied and distance moved in the direction of the applied force) with and without the use of simple machines |
| FM | 2 | F | b. | Calculate the amount of work done when a force is applied to an object over a distance W = f x d |
| FM | 2 | F | c. | Explain how simple machines affect the amount of effort force, distance through which a force is applied, and/or direction of force while doing work |

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| FM | 2 | F | d. | Recognize the amount of work output is never greater than the amount of work input, with or without the use of a simple machine |
| FM | 2 | F | e | Evaluate simple machine designs to determine which design requires the least amount of effort force and explain why |
| ES | 1 | C | a. | Describe the composition of the Earth's atmosphere (i.e., mixture of gases, water and minute particles) and how it circulates as air masses |
| ES | 1 | C | b. | Describe the role atmosphere (e.g., clouds, ozone) plays in precipitation, reflecting and filtering light from the Sun, and trapping heat energy emitted from the Earth's surface |
| ES | 2 | E | a. | Explain and trace the possible paths of water through the hydrosphere, geosphere, and atmosphere (i.e., the water cycle: evaporation, condensation, precipitation, surface run-off/ groundwater flow) |
| ES | 2 | E | b. | Relate the different forms water can take (i.e., snow, rain, sleet, fog, clouds, dew, humidity) as it moves through the water cycle to atmospheric conditions (i.e., temperature, pressure, wind direction and speed, humidity) at a given geographic location |
| ES | 2 | E | c. | Explain how thermal energy is transferred throughout the water cycle by the processes of convection, conduction, and radiation |
| ES | 2 | F | a. | Explain how the differences in surface temperature, due to the different heating and cooling rates of water and soil, affect the temperature and movement of the air above |
| ES | 2 | F | b. | Recognize the characteristics of air masses (i.e., high/low barometric pressure, temperature) and predict their effect on the weather in a given location |
| ES | 2 | F | c. | Identify weather conditions associated with cold fronts and warm fronts |
| ES | 2 | F | d. | Identify factors that affect weather patterns in a particular region (e.g., proximity to large bodies of water, latitude, altitude, prevailing wind currents, amount of solar radiation, location with respect to mountain ranges |
| ES | 2 | F | e | Collect and interpret weather data (e.g., cloud cover, precipitation, wind speed and direction) from weather instruments and maps to explain present day weather and to predict the next day's weather |
| ES | 2 | F | f | Recognize significant changes in temperature and barometric pressure may cause dramatic weather phenomena (i.e., severe thunderstorms, tornadoes, hurricanes) |

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| ES | 3 | A | a. | Distinguish between renewable (e.g., geothermal, hydroelectric) and nonrenewable (e.g., fossil fuel) energy sources |
| ES | 3 | A | b. | Provide examples of how the availability of fresh water for humans and other living organisms is dependent upon the water cycle |
| UN | 1 | A | a. | Classify celestial bodies in the solar system into categories: Sun, Moon, planets, and other small bodies (i.e., asteroids, comets, meteors), based on physical properties |
| UN | 1 | A | b. | Compare and contrast the size, composition, atmosphere, and surface of the planets (inner vs. outer) in our solar system and Earth's moon |
| UN | 1 | A | c. | Recognize the relative proximity of common celestial bodies (i.e., Sun, Moon, planets, smaller celestial bodies such as comets and meteors, other stars) in the sky to the Earth |
| UN | 1 | B | a. | Describe how the Earth's placement in the solar system is favorable to sustain life (i.e., distance from the Sun, temperature, atmosphere) |
| UN | 1 | B | b. | Compare and contrast the characteristics of Earth that support life with the characteristics of other planets that are considered favorable or unfavorable to life (e.g., atmospheric gases, extremely high/low temperatures |
| UN | 1 | C | a. | Recognize stars are separated from one another by vast and different distances, which causes stars to appear smaller than the Sun |
| UN | 1 | C | b. | Compare the distance light travels from the Sun to Earth to the distance light travels from other stars to Earth using light years |
| UN | 2 | A | a. | Relate the apparent east-to-west changes in the positions of the Sun, other stars, and planets in the sky over the course of a day to Earth's counterclockwise rotation about its axis |
| UN | 2 | A | b. | Describe the pattern that can be observed in the changes in number of hours of visible sunlight, and the time and location of sunrise and sunset, throughout the year |
| UN | 2 | A | c. | Recognize, in the Northern Hemisphere, the Sun appears lower in the sky during the winter and higher in the sky during the summer |
| UN | 2 | A | d. | Recognize, in winter, the Sun appears to rise in the Southeast and set in the Southwest, accounting for a relatively short day length, and, in summer, the Sun appears to rise in the Northeast and set in the Northwest, accounting for a relatively long day length |

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| UN | 2 | A | e | Recognize the Sun is never directly overhead when observed from North America |
| UN | 2 | B | a. | Observe the change in time and location of Moon rise, Moon set, and the Moon's appearance relative to time of day and month over several months, and note the pattern in this change |
| UN | 2 | B | b. | Recognize the Moon rises later each day due to its revolution around the Earth in a counterclockwise direction |
| UN | 2 | B | c. | Recognize the Moon is in the sky for roughly 12 hours in a 24-hour period (i.e., if the Moon rises at about 6 P.M., it will set at about 6 A.M.) |
| UN | 2 | B | d. | Recognize that one half of the Moon is always facing the Sun and, therefore, one half of the Moon is always lit |
| UN | 2 | B | e | Relate the apparent change in the Moon's position in the sky as it appears to move east-to-west over the course of a day to Earth's counterclockwise rotation about its axis |
| UN | 2 | B | f | Describe how the appearance of the Moon that can be seen from Earth changes approximately every 28 days in an observable pattern (moon phases |
| UN | 2 | C | a. | Illustrate and explain a day as the time it takes a planet to make a full rotation about its axis |
| UN | 2 | C | b. | Diagram the path (orbital ellipse) the Earth travels as it revolves around the Sun |
| UN | 2 | C | c. | Illustrate and explain a year as the time it takes a planet to revolve around the Sun |
| UN | 2 | C | d. | Explain the relationships between a planet's length of year (period of revolution) and its position in the solar system |
| UN | 2 | C | e | Recognize the phases of the moon are due to the relative positions of the Moon with respect to the Earth and Sun |
| UN | 2 | C | f | Relate the axial tilt and orbital position of the Earth as it revolves around the Sun to the intensity of sunlight falling on different parts of the Earth during different seasons |

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| UN | 2 | D | a. | Describe how the Earth's gravity pulls any object on or near the Earth toward it (including natural and artificial satellites) |
| UN | 2 | D | b. | Describe how the planets' gravitational pull keeps satellites and moons in orbit around them |
| UN | 2 | D | c. | Describe how the Sun's gravitational pull holds the Earth and other planets in their orbits |
| IN | 1 | A | a. | Formulate testable questions and hypotheses |
| IN | 1 | A | b. | Recognize the importance of the independent variable, dependent variables, control of constants, and multiple trials to the design of a valid experiment |
| IN | 1 | A | c. | Design and conduct a valid experiment |
| IN | 1 | A | d. | Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment |
| IN | 1 | A | e | Recognize that different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects organisms, or events; some involve collecting specimens; some involve experiments; some involve making observations in nature; some involve |
| IN | 1 | A | f | Acknowledge there is no fixed procedure called "the scientific method", but some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and imagination in developing hypotheses and other explanations |
| IN | 1 | B | a. | Make qualitative observations using the five senses |
| IN | 1 | B | b. | Determine the appropriate tools and techniques to collect data |
| IN | 1 | B | c. | Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders, stopwatches |
| IN | 1 | B | d. | Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second |

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| IN | 1 | B | e | Compare amounts/measurements |
| IN | 1 | B | g | Judge whether measurements and computation of quantities are reasonable |
| IN | 1 | B | g | Calculate the range and average/mean of a set of data |
| IN | 1 | C | a. | Use quantitative and qualitative data as support for reasonable explanations (conclusions) |
| IN | 1 | C | b. | Use data as support for observed patterns and relationships, and to make predictions to be tested |
| IN | 1 | C | c. | Recognize the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions) |
| IN | 1 | C | d. | Evaluate the reasonableness of an explanation (conclusion |
| IN | 1 | C | e | Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories |
| IN | 1 | D | a. | Communicate the procedures and results of investigations and explanations through: oral presentations, drawings and maps, data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, |
| ST | 1 | A | a. | Explain how technological improvements, such as those developed for use in space exploration, the military, or medicine, have led to the invention of new products that may improve lives here on Earth (e.g., new materials, freeze-dried foods, infrared goggles, Velcro, satellite imagery, robotics, |
| ST | 1 | B | a. | Identify the link between technological developments and the scientific discoveries made possible through their development (e.g., Hubble telescope and stellar evolution, composition and structure of the universe; the electron microscope and cell organelles; sonar and the composition of the |
| ST | 1 | C | a. | Describe how technological solutions to problems (e.g., storm water runoff, fiber optics, windmills, efficient car design, electronic trains without conductors, sonar, robotics, Hubble telescope) can have both benefits and drawbacks (e.g., design constraints, unintended consequences, risks) |
| ST | 2 | A | a. | Describe how the contributions of scientists and inventors, representing different cultures, races, and gender, have contributed to science, technology and human activity (e.g., George Washington Carver, Thomas Edison, Thomas Jefferson, Isaac Newton, Marie Curie, Galileo, |

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| ST | 2 | B | a. | Recognize the difficulty science innovators experience as they attempt to break through accepted ideas (hypotheses, laws, theories) of their time to reach conclusions that may lead to changes in those ideas and serve to advance scientific understanding (e.g., Darwin, Copernicus, Newton |
| ST | 2 | B | b. | Recognize explanations have changed over time as a result of new evidence |
| ST | 3 | B | a. | Describe ways in which science and society influence one another (e.g., scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment; societal challenges often inspire questions for scientific |
| ST | 3 | B | b. | Identify and evaluate the physical, social, economic, and/or environmental problems that may be overcome using science and technology (e.g., the need for alternative fuels, human travel in space, AIDS) |