

Science
Grade-Level Expectations: Grade 8

Science as Inquiry

The Abilities Necessary to Do Scientific Inquiry

1. Generate testable questions about objects, organisms, and events that can be answered through scientific investigation (SI-M-A1)
2. Identify problems, factors, and questions that must be considered in a scientific investigation (SI-M-A1)
3. Use a variety of sources to answer questions (SI-M-A1)
4. Design, predict outcomes, and conduct experiments to answer guiding questions (SI-M-A2)
5. Identify independent variables, dependent variables, and variables that should be controlled in designing an experiment (SI-M-A2)
6. Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3)
7. Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)
8. Use consistency and precision in data collection, analysis, and reporting (SI-M-A3)
9. Use computers and/or calculators to analyze and interpret quantitative data (SI-M-A3)
10. Identify the difference between description and explanation (SI-M-A4)
11. Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) (SI-M-A4)
12. Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
13. Identify patterns in data to explain natural events (SI-M-A4)
14. Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)
15. Identify and explain the limitations of models used to represent the natural world (SI-M-A5)
16. Use evidence to make inferences and predict trends (SI-M-A5)
17. Recognize that there may be more than one way to interpret a given set of data, which can result in alternative scientific explanations and predictions (SI-M-A6)
18. Identify faulty reasoning and statements that misinterpret or are not supported by the evidence (SI-M-A6)
19. Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
20. Write clear, step-by-step instructions that others can follow to carry out procedures or conduct investigations (SI-M-A7)
21. Distinguish between *observations* and *inferences* (SI-M-A7)
22. Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)
23. Use relevant safety procedures and equipment to conduct scientific investigations (SI-M-A8)
24. Provide appropriate care and utilize safe practices and ethical treatment when animals are involved in scientific field and laboratory research (SI-M-A8)

Understanding Scientific Inquiry

25. Compare and critique scientific investigations (SI-M-B1)
26. Use and describe alternate methods for investigating different types of testable questions (SI-M-B1)

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27. Recognize that science uses processes that involve a logical and empirical, but flexible, approach to problem solving (SI-M-B1)
28. Recognize that investigations generally begin with a review of the work of others (SI-M-B2)
29. Explain how technology can expand the senses and contribute to the increase and/or modification of scientific knowledge (SI-M-B3)
30. Describe why all questions cannot be answered with present technologies (SI-M-B3)
31. Recognize that there is an acceptable range of variation in collected data (SI-M-B3)
32. Explain the use of statistical methods to confirm the significance of data (e.g., mean, median, mode, range) (SI-M-B3)
33. Evaluate models, identify problems in design, and make recommendations for improvement (SI-M-B4)
34. Recognize the importance of communication among scientists about investigations in progress and the work of others (SI-M-B5)
35. Explain how skepticism about accepted scientific explanations (i.e., hypotheses and theories) leads to new understanding (SI-M-B5)
36. Explain why an experiment must be verified through multiple investigations and yield consistent results before the findings are accepted (SI-M-B5)
37. Critique and analyze their own inquiries and the inquiries of others (SI-M-B5)
38. Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6)
39. Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) (SI-M-B7)
40. Evaluate the impact of research on scientific thought, society, and the environment (SI-M-B7)

Physical Science

Properties and Changes of Properties in Matter

1. Determine that all atoms of the same element are similar to but different from atoms of other elements (PS-M-A2)
2. Recognize that elements with the same number of protons may or may not have the same charge (PS-M-A2)
3. Define ions and describe them in terms of the number of protons, electrons, and their charges (PS-M-A2)

Motions and Forces

4. Demonstrate that Earth has a magnetic field by using magnets and compasses (PS-M-B2)
5. Define gravity and describe the relationship among the force of gravity, the mass of objects, and the distance between objects (PS-M-B2)
6. Predict how the gravitational attraction between two masses will increase or decrease when changes are made in the masses or in the distance between the objects (PS-M-B2)
7. Explain the relationships among force, mass, and acceleration (PS-M-B5)

Earth and Space Science

Structure of Earth

8. Identify and describe the four density layers of Earth (ESS-M-A1)
9. Explain the historical development of the theories of plate tectonics, including continental drift and sea-floor spreading (ESS-M-A2)
10. Illustrate the movement of convection currents (ESS-M-A2)

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11. Illustrate the movements of lithospheric plates as stated in the plate tectonics theory (ESS-M-A2)
12. Identify the edges of plate boundaries as likely areas of earthquakes and volcanic action (ESS-M-A3)
13. Describe the processes responsible for earthquakes and volcanoes and identify the effects of these processes (e.g., faulting, folding) (ESS-M-A3)
14. Distinguish between chemical and mechanical (physical) weathering and identify the role of weathering agents (e.g., wind, water, ice, gravity) (ESS-M-A4)
15. Illustrate the role of organic processes in soil formation (ESS-M-A4)
16. Compare the physical characteristics of rock and mineral specimens to observe that a rock is a mixture of minerals (ESS-M-A5)
17. Describe the properties of minerals (e.g., color, luster, hardness, streak) (ESS-M-A5)
18. Describe how sedimentary, igneous, and metamorphic rocks form and change in the rock cycle (ESS-M-A6)
19. Determine the results of constructive and destructive forces upon landform development with the aid of geologic maps of Louisiana (ESS-M-A7)
20. Describe how humans' actions and natural processes have modified coastal regions in Louisiana and other locations (ESS-M-A8)
21. Read and interpret topographic maps (ESS-M-A9)
22. Compare ocean floor topography to continental topography by using topographic maps (ESS-M-A9)
23. Explain the processes of evaporation, condensation, precipitation, infiltration, transpiration, and sublimation as they relate to the water cycle (ESS-M-A10)
24. Investigate and explain how given factors affect the rate of water movement in the water cycle (e.g., climate, type of rock, ground cover) (ESS-M-A10)
25. Explain and give examples of how climatic conditions on Earth are affected by the proximity of water (ESS-M-A11)
26. Describe and illustrate the layers of Earth's atmosphere (ESS-M-A11)
27. Identify different air masses, jet streams, global wind patterns, and other atmospheric phenomena and describe how they relate to weather events, such as El Niño and La Niña (ESS-M-A12)
28. Use historical data to plot the movement of hurricanes and explain events or conditions that affected their paths (ESS-M-A12)
29. Make predictions about future weather conditions based on collected weather data (ESS-M-A12)

Earth History

30. Interpret a geologic timeline (ESS-M-B1)
31. Compare fossils from different geologic eras and areas of Earth to show that life changes over time (ESS-M-B1)
32. Interpret a timeline starting with the birth of the solar system to the present day (ESS-M-B2)
33. Use historical data to draw conclusions about the age of Earth (e.g., half-life, rock strata) (ESS-M-B2)
34. Apply geological principles to determine the relative ages of rock layers (e.g., original horizontality, superposition, cross-cutting relationships) (ESS-M-B3)
35. Describe how processes seen today are similar to those in the past (e.g., weathering, erosion, lithospheric plate movement) (ESS-M-B3)

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Earth in the Solar System

36. Describe the life cycle of a star and predict the next likely stage of the Sun (ESS-M-C1)
37. Use a Hertzsprung-Russell diagram and other data to compare the approximate mass, size, luminosity, temperature, structure, and composition of the Sun to other stars (ESS-M-C1)
38. Use data to compare the planets in terms of orbit, size, composition, density, rotation, revolution, and atmosphere (ESS-M-C2)
39. Relate Newton's laws of gravity to the motions of celestial bodies and objects on Earth (ESS-M-C3)
40. Identify and illustrate the relative positions of Earth, the Moon, and the Sun during eclipses and phases of the Moon (ESS-M-C4)
41. Describe the effects of the Moon on tides (ESS-M-C4)
42. Interpret a scale model of the solar system (ESS-M-C5)
43. Identify the processes involved in the creation of land and sea breezes (ESS-M-C6)
44. Describe how unequal heating of Earth's surface affects movement of air masses and water in the atmosphere and hydrosphere (ESS-M-C6)
45. Explain how seasonal changes are caused by the tilt of Earth as it rotates on its axis and revolves around the Sun (ESS-M-C7)
46. Illustrate and explain how the angle at which sunlight strikes Earth produces changes in the seasons and length of daylight (ESS-M-C7)
47. Compare the relative distances from Earth to the Sun on the first day of summer and the first day of winter (ESS-M-C7)
48. Communicate ways that information from space exploration and technological research have advanced understanding about Earth, the solar system, and the universe (ESS-M-C8)
49. Identify practical applications of technological advances resulting from space exploration and scientific and technological research (ESS-M-C8)

Science and the Environment

50. Illustrate possible point and non-point source contributions to pollution and natural or human-induced pathways of a pollutant in an ecosystem (SE-M-A3)
51. Analyze the consequences of human activities on global Earth systems (SE-M-A4)
52. Describe the relationship between plant type and soil compatibility (SE-M-A9)
53. Distinguish among several examples of erosion (e.g., stream bank, topsoil, coastal) and describe common preventive measures (SE-M-A10)