Science Grade-Level Expectations: Grade 5 Color Coded

Science as Inquiry

The Abilities 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)
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. Measure a variety of objects in metric system units (PS-M-A1)
2. Compare the physical properties of large and small quantities of the same type of matter (PS-M-A1)
3. Describe the structure of atoms and the electrical charge of protons, neutrons, and electrons (PS-M-A2)
4. Identify the physical and chemical properties of various substances and group substances according to their observable and measurable properties (e.g., conduction, magnetism, light transmission) (PS-M-A3)
5. Describe the properties and behavior of water in its solid, liquid, and gaseous phases (states) (PS-M-A5)
6. Describe new substances formed from common chemical reactions (e.g., burning paper produces ash) (PS-M-A6)

Motions and Forces

7. Compare, calculate, and graph the average speeds of objects in motion using both metric system and U.S. system units (PS-M-B1)
8. Explain that gravity accelerates all falling objects at the same rate in the absence of air resistance (PS-M-B3)
9. Demonstrate a change in speed or direction of an object's motion with the use of unbalanced forces (PS-M-B5)

Transformations of Energy

10. Compare potential and kinetic energy and give examples of each (PS-M-C1)
11. Classify energy resources as *renewable*, *non-renewable*, or *inexhaustible* (PS-M-C1)

12. Identify the Sun as Earth's primary energy source and give examples (e.g., photosynthesis, water cycle) to support that conclusion (PS-M-C3)
13. Investigate how changes in the position of a light source and an object alter the size and shape of the shadow (PS-M-C4)
14. Identify other types of energy produced through the use of electricity (e.g., heat, light, mechanical) (PS-M-C6)

Life Science
Structure and Function in Living Systems
15. Identify the cell as the basic unit of living things (LS-M-A1)
16. Observe, identify, and describe the basic components of cells and their functions (e.g., cell wall, cell membrane, cytoplasm, nucleus) (LS-M-A1)
17. Compare plant and animal cells and label cell components (LS-M-A2)
18. Describe the metamorphosis of an amphibian (e.g., frog) (LS-M-A3)
19. Describe the processes of photosynthesis and respiration in green plants (LS-M-A4)
20. Describe the levels of structural organization in living things (e.g., cells, tissues, organs, organ systems) (LS-M-A5)
21. Identify diseases caused by germs and how they can be transmitted from person to person (LS-M-A7)

Populations and Ecosystems
22. Develop and use a simple dichotomous key to classify common plants and animals (LS-M-C1)
23. Construct food chains that could be found in ponds, marshes, oceans, forests, or meadows (LS-M-C2)
24. Describe the roles of producers, consumers, and decomposers in a food chain (LS-M-C2)
25. Compare food chains and food webs (LS-M-C2)
26. Identify and describe ecosystems of local importance (LS-M-C3)
27. Compare common traits of organisms within major ecosystems (LS-M-C3)
28. Explain and give examples of predator/prey relationships (LS-M-C4)

Adaptations of Organisms
29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1)

Earth and Space Science
Structure of the Earth
30. Identify organic and inorganic matter in soil samples with the aid of a hand lens or microscope (ESS-M-A4)
31. Identify common rocks and minerals and explain their uses and economic significance (ESS-M-A5)
32. Demonstrate the results of constructive and destructive forces using models or illustrations (ESS-M-A7)
33. Identify the processes that prevent or cause erosion (ESS-M-A7)
34. Identify the components of the hydrosphere (ESS-M-A11)
35. Identify the atmosphere as a mixture of gases, water vapor, and particulate matter (ESS-M-A11)
36. Identify, describe, and compare climate zones (e.g., polar, temperate, tropical) (ESS-M-A11)

37. Identify typical weather map symbols and the type of weather they represent (ESS-M-A12)

Earth History

38. Estimate the range of time over which natural events occur (e.g., lightning in seconds, mountain formation over millions of years) (ESS-M-B3)

Earth in the Solar System

39. Identify the physical characteristics of the Sun (ESS-M-C1)
40. Describe the significance of Polaris as the North Star (ESS-M-C1)
41. Explain why the Moon, Sun, and stars appear to move from east to west across the sky (ESS-M-C1)
42. Differentiate among moons, asteroids, comets, meteoroids, meteors, and meteorites (ESS-M-C2)
43. Describe the characteristics of the inner and outer planets (ESS-M-C2)
44. Explain rotation and revolution by using models or illustrations (ESS-M-C4)
45. Identify Earth's position in the solar system (ESS-M-C5)
46. Identify and explain the interaction of the processes of the water cycle (ESS-M-C6) (ESS-M-A10)
47. Identify and explain advances in technology that have enabled the exploration of space (ESS-M-C8)

Science and the Environment

48. Determine the ability of an ecosystem to support a population (carrying capacity) by identifying the resources needed by that population (SE-M-A2)
49. Identify and give examples of pollutants found in water, air, and soil (SE-M-A3)
50. Describe the consequences of several types of human activities on local ecosystems (e.g., polluting streams, regulating hunting, introducing nonnative species) (SE-M-A4)
51. Describe naturally occurring cycles and identify where they are found (e.g., carbon, nitrogen, water, oxygen) (SE-M-A7)

Science as Inquiry – 22% of iLEAP (GLE #s: 1 – 40)
Physical Science – 20% of iLEAP (GLE #s: 1 – 14)
Life Science – 20% of iLEAP (GLE #s: 15 – 29)
Earth and Space Science – 22% of iLEAP (GLE #s: 30 – 47)
Science and the Environment – 16% of iLEAP (GLE #s: 48 – 51)