

Science
Grade-Level Expectations: Biology
(Recommended for Grade 10)

Science as Inquiry

The Abilities Necessary to Do Scientific Inquiry

1. Write a testable question or hypothesis when given a topic (SI-H-A1)
2. Describe how investigations can be observation, description, literature survey, classification, or experimentation (SI-H-A2)
3. Plan and record step-by-step procedures for a valid investigation, select equipment and materials, and identify variables and controls (SI-H-A2)
4. Conduct an investigation that includes multiple trials and record, organize, and display data appropriately (SI-H-A2)
5. Utilize mathematics, organizational tools, and graphing skills to solve problems (SI-H-A3)
6. Use technology when appropriate to enhance laboratory investigations and presentations of findings (SI-H-A3)
7. Choose appropriate models to explain scientific knowledge or experimental results (e.g., objects, mathematical relationships, plans, schemes, examples, role-playing, computer simulations) (SI-H-A4)
8. Give an example of how new scientific data can cause an existing scientific explanation to be supported, revised, or rejected (SI-H-A5)
9. Write and defend a conclusion based on logical analysis of experimental data (SI-H-A6) (SI-H-A2)
10. Given a description of an experiment, identify appropriate safety measures (SI-H-A7)

Understanding Scientific Inquiry

11. Evaluate selected theories based on supporting scientific evidence (SI-H-B1)
12. Cite evidence that scientific investigations are conducted for many different reasons (SI-H-B2)
13. Identify scientific evidence that has caused modifications in previously accepted theories (SI-H-B2)
14. Cite examples of scientific advances and emerging technologies and how they affect society (e.g., MRI, DNA in forensics) (SI-H-B3)
15. Analyze the conclusion from an investigation by using data to determine its validity (SI-H-B4)
16. Use the following rules of evidence to examine experimental results:
 - (a) Can an expert's technique or theory be tested, has it been tested, or is it simply a subjective, conclusive approach that cannot be reasonably assessed for reliability?
 - (b) Has the technique or theory been subjected to peer review and publication?
 - (c) What is the known or potential rate of error of the technique or theory when applied?
 - (d) Were standards and controls applied and maintained?
 - (e) Has the technique or theory been generally accepted in the scientific community? (SI-H-B5) (SI-H-B1) (SI-H-B4)

Life Science

The Cell

1. Compare prokaryotic and eukaryotic cells (LS-H-A1)
2. Identify and describe structural and functional differences among organelles (LS-H-A1)
3. Investigate and describe the role of enzymes in the function of a cell (LS-H-A1)
4. Compare active and passive cellular transport (LS-H-A2)

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5. Analyze the movement of water across a cell membrane in hypotonic, isotonic, and hypertonic solutions (LS-H-A2)
6. Analyze a diagram of a developing zygote to determine when cell differentiation occurs (LS-H-A3)

The Molecular Basis of Heredity

7. Identify the basic structure and function of nucleic acids (e.g., DNA, RNA) (LS-H-B1)
8. Describe the relationships among DNA, genes, chromosomes, and proteins (LS-H-B1)
9. Compare mitosis and meiosis (LS-H-B2)
10. Analyze pedigrees to identify patterns of inheritance for common genetic disorders (LS-H-B3)
11. Calculate the probability of genotypes and phenotypes of offspring given the parental genotypes (LS-H-B3)
12. Describe the processes used in modern biotechnology related to genetic engineering (LS-H-B4) (LS-H-B1)
13. Identify possible positive and negative effects of advances in biotechnology (LS-H-B4) (LS-H-B1)

Biological Evolution

14. Analyze evidence on biological evolution, utilizing descriptions of existing investigations, computer models, and fossil records (LS-H-C1)
15. Compare the embryological development of animals in different phyla (LS-H-C1) (LS-H-A3)
16. Explain how DNA evidence and fossil records support Darwin's theory of evolution (LS-H-C2)
17. Explain how factors affect gene frequency in a population over time (LS-H-C3)
18. Classify organisms from different kingdoms at several taxonomic levels, using a dichotomous key (LS-H-C4)
19. Compare characteristics of the major kingdoms (LS-H-C5)
20. Analyze differences in life cycles of selected organisms in each of the kingdoms (LS-H-C6)
21. Compare the structures, functions, and cycles of viruses to those of cells (LS-H-C7)
22. Describe the role of viruses in causing diseases and conditions (e.g., AIDS, common colds, smallpox, influenza, warts) (LS-H-C7) (LS-H-G2)

Interdependence of Organisms

23. Illustrate the flow of carbon, nitrogen, and water through an ecosystem (LS-H-D1) (SE-H-A6)
24. Analyze food webs by predicting the impact of the loss or gain of an organism (LS-H-D2)
25. Evaluate the efficiency of the flow of energy and matter through a food chain/pyramid (LS-H-D2)
26. Analyze the dynamics of a population with and without limiting factors (LS-H-D3)
27. Analyze positive and negative effects of human actions on ecosystems (LS-H-D4) (SE-H-A7)

Matter, Energy, and Organization of Living Systems

28. Explain why ecosystems require a continuous input of energy from the Sun (LS-H-E1)

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29. Use balanced equations to analyze the relationship between photosynthesis and cellular respiration (LS-H-E1)
30. Explain the role of adenosine triphosphate (ATP) in a cell (LS-H-E2)
31. Compare the levels of organization in the biosphere (LS-H-E3)

Systems and the Behavior of Organisms

32. Analyze the interrelationships of organs in major systems (LS-H-F1) (LS-H-E3)
33. Compare structure to function of organs in a variety of organisms (LS-H-F1)
34. Explain how body systems maintain homeostasis (LS-H-F2)
35. Explain how selected organisms respond to a variety of stimuli (LS-H-F3)
36. Explain how behavior affects the survival of species (LS-H-F4)

Personal and Community Health

37. Explain how fitness and health maintenance can result in a longer human life span (LS-H-G1)
38. Discuss mechanisms of disease transmission and processes of infection (LS-H-G2) (LS-H-G4)
39. Compare the functions of the basic components of the human immune system (LS-H-G3)
40. Determine the relationship between vaccination and immunity (LS-H-G3)
41. Describe causes, symptoms, treatments, and preventions of major communicable and noncommunicable diseases (LS-H-G4)
42. Summarize the uses of selected technological developments related to the prevention, diagnosis, and treatment of diseases or disorders (LS-H-G5)