

Michigan Middle School Science Performance Expectations for Life Science

ADI Investigations for Middle School Life Science	Performance Expectation
<i>From Molecules to Organisms: Structures and Processes</i>	
LS1	
Lab 1. Cellular Respiration: Do Plants Use Cellular Respiration to Produce Energy?	MS-LS1-2 MS-LS1-6 MS-LS1-7
Lab 2. Photosynthesis: Where Does Photosynthesis Take Place in Plants?	MS-LS1-3 MS-LS1-6
Lab 3. Osmosis: How Does the Concentration of Salt in Water Affect the Rate of Osmosis?	MS-LS1-2
Lab 4. Cell Structure: What Type of Cell Is on the Unknown Slides?	MS-LS1-1
Lab 5. Temperature and Photosynthesis: How Does Temperature Affect the Rate of Photosynthesis in Plants?	MS-LS1-2 MS-LS1-6
Lab 6. Energy in Food: Which Type of Nut Is Best for a New Energy Bar?	MS-LS1-7
Lab 7. Respiratory and Cardiovascular Systems: How Do Activity and Physical Factors Relate to Respiratory and Cardiovascular Fitness?	MS-LS1-3
Lab 8. Memory and Stimuli: How Does the Way Information Is Presented Affect Working Memory?	MS-LS1-8
<i>Ecosystems: Interactions, Energy, and Dynamics</i>	
LS2	
Lab 9. Population Growth: What Factors Limit the Size of a Population of Yeast?	MS-LS2-1 MS-LS2-4
Lab 10. Predator-Prey Relationships: How Is the Size of a Predator Population Related to the Size of a Prey Population?	MS-LS2-2 MS-LS2-3 6-8-LS2-4
Lab 11. Food Webs and Ecosystems: Which Member of an Ecosystem Would Affect the Food Web the Most If Removed?	MS-LS2-2 MS-LS2-3 MS-LS2-4
Lab 12. Matter in Ecosystems: How Healthy Are Your Local Ecosystems?	6-8-LS2-3 MS-LS2-4
Lab 13. Carbon Cycling: Which Carbon Cycle Process Affects Atmospheric Carbon the Most?	-
<i>Heredity: Inheritance and Variation in Traits</i>	
Lab 14. Variation in Traits: How Do Beetle Traits Vary Within and Across Species?	-
Lab 15. Mutations in Genes: How Do Different Types of Mutations in Genes Affect the Function of an Organism?	MS-LS3-1
Lab 16. Mechanisms of Inheritance: How Do Fruit Flies Inherit the Sepia Eye Color Trait?	MS-LS4-5
<i>Biological Evolution: Unity and Diversity</i>	
LS4	
Lab 17. Mechanisms of Evolution: Why Does a Specific Version of a Trait Become More Common in a Population Over Time?	MS-LS1-4 MS-LS4-4
Lab 18. Environmental Change and Evolution: Which Mechanism of Microevolution Caused the Beak of the Medium Ground Finch Population on Daphne Major to Increase in Size From 1976 to 1978?	MS-LS4-4 MS-LS4-6
Lab 19. Phylogenetic Trees and the Classification of Fossils: How Should Biologists Classify the Seymouria?	MS-LS4-1 MS-LS4-2
Lab 20. Descent With Modification and Embryonic Development: Does Animal Embryonic Development Support or Refute the Theory of Descent With Modification?	MS-LS4-3

Michigan Middle School Science Performance Expectations for Physical Science

ADI Investigations for Middle School Physical Science	Performance Expectations
Matter and its Interactions	PS1
Lab 1. Thermal Energy and Matter: What happens at the molecular level when thermal energy is added or removed from a substance?	MS-PS1-4
Lab 2. Chemical and Physical Change: What set of rules should we use to distinguish between chemical and physical changes in matter?	MS-PS1-2
Lab 3. Physical Properties of Matter: What are the identities of the unknown substances?	-
Lab 4. Conservation of Mass: How does the total mass of the substances formed as a result of a chemical change compare to the mass of the original substances?	MS-PS1-2 MS-PS1-5
Lab 5. Design a Koozie: Which koozie design will cool a soda the best?	MS-PS1-6 MS-PS3-3
Motion and Stability: Forces and Interactions	PS2
Lab 6. Strength of Gravitational Force: How is distance and mass related to the strength of gravitational forces?	MS-PS2-4
Lab 7. Gravity and Free Fall: How does mass affect the amount of time it takes for an object to fall to the ground?	MS-PS2-4
Lab 8. Pulling Force and Motion: How do changes in pulling force affect the motion of an object?	MS-PS2-2
Lab 9. Mass and Motion: How do changes in the mass of an object affect its motion?	MS-PS2-2
Lab 10. Electromagnets: How does the number of turns of wire affect the strength of an electromagnet?	MS-PS2-3 MS-PS2-5
Lab 11. Strength of Magnetic Force: Which electromagnet design is best for picking up 50 paperclips?	MS-PS2-3
Lab 12. Unbalanced Forces: How does surface area influence friction and the motion of an object?	MS-PS2-2
Energy	PS3
Lab 13. Kinetic Energy: How does the mass and speed of an object affect its kinetic energy?	MS-PS3-1 MS-PS3-5
Lab 14. Potential Energy: How can you make an action figure jump higher?	MS-PS3-2
Lab 15. Thermal Energy and Specific Heat: Which material has the greatest specific heat?	MS-PS3-4
Lab 16. Electrical Energy and Light Bulbs: How does the arrangement of light bulbs that are connected to a battery affect the brightness of a single bulb in that circuit?	-
Lab 17. Rate of Energy Transfer: How does the surface area of a substance affect the rate at which thermal energy is transferred from one substance to another?	-
Lab 18. Radiation and Energy Transfer: What color should we paint a building to reduce cooling costs?	MS-PS3-3 MS-PS3-4
Waves and their Applications	PS4
Lab 19. Wave Properties: How do amplitude and wavelength of a transverse wave relate to the energy carried by the wave?	MS-PS4-1
Lab 20. Reflection and Refraction: How can someone predict where light will go when it comes in contact with different types of materials?	MS-PS4-2
Lab 21. Light and Information Transfer: How much light is lost during transmission through a tube?	MS-PS4-3
Lab 22. Design of Eyeglasses: How should eyeglasses be shaped to correct near and far sightedness?	MS-PS4-2

Michigan High School Science Performance Expectations for Biology

ADI Investigations for High School Biology	Performance Expectations
<i>From Molecules to Organisms: Structures and Processes</i>	
Lab 1. Osmosis and Diffusion: Why do the red blood cells appear bigger after being exposed to distilled water?	HS-LS1-3
Lab 2. Cell Structure: How should the unknown microscopic organism be classified?	-
Lab 3. Cell Cycle: Do plant and animal cells spend the same proportion of time in each stage of the cell cycle?	HS-LS1-4
Lab 4. Normal and Abnormal Cell Division: Which of these patients could have cancer?	HS-LS1-4
Lab 5. Photosynthesis: Why do temperature and light intensity affect the rate of photosynthesis in plants?	HS-LS1-5 HS-LS1-6 HS-LS2-5
Lab 6. Cellular Respiration: How does the type of food source affect the rate of cellular respiration in yeast?	HS-LS1-7 HS-LS2-5
Lab 7. Transpiration: How does leaf surface area affect the movement of water through a plant?	HS-LS1-2 HS-LS1-3
Lab 8. Enzymes: How do changes in temperature and pH levels affect enzyme activity?	HS-LS1-1
<i>Ecosystems: Interactions, Energy, and Dynamics</i>	
Lab 9. Population Growth: How do changes in the amount and nature of the plant life available in an ecosystem influence herbivore population growth over time?	HS-LS2-1 HS-LS2-3 HS-LS2-4 HS-LS2-5
Lab 10. Predator-Prey Population Size Relationships: Which factors affect the stability of a predator-prey population size relationship?	HS-LS2-1 HS-LS2-6
Lab 11. Ecosystems and Biodiversity: How does food web complexity affect the biodiversity of an ecosystem?	HS-LS2-1 HS-LS2-2
Lab 12. Explanations for Animal Behavior: Why do great white sharks travel over long distances?	HS-LS2-8
Lab 13. Environmental Influences on Animal Behavior: How has climate change affected bird migration?	HS-LS2-2
Lab 14. Interdependence of Organisms: Why is the sport fish population of Lake Grace decreasing in size?	HS-LS2-2 HS-LS2-6 HS-LS2-7
Lab 15. Competition for Resources: How has the spread of the Eurasian collared-dove affected different populations of native bird species?	HS-LS2-6
<i>Heredity: Inheritance and Variation of Traits</i>	
Lab 16. Mendelian Genetics: Why are the stem and leaf color traits of the Wisconsin Fast Plant inherited in a predictable pattern?	HS-LS3-1
Lab 17. Chromosomes and Karyotypes: How do two physically healthy parents produce a child with Down syndrome and a second child with cri du chat syndrome?	HS-LS3-1 HS-LS3-2
Lab 18. DNA Structure: What is the structure of DNA?	HS-LS1-1
Lab 19. Meiosis: How does the process of meiosis reduce the number of chromosomes in reproductive cells?	HS-LS3-1 HS-LS3-2
Lab 20. Inheritance of Blood Type: Are all of Mr. Johnson's children his biological offspring?	HS-LS3-1
Lab 21. Models of Inheritance: Which model of inheritance best explains how a specific trait is inherited in fruit flies?	HS-LS3-1

ADI Investigations for High School Biology	Grade Level Expectations
<i>Biological Evolution: Unity and Diversity</i>	LS4
Lab 22. Biodiversity and the Fossil Record: How has biodiversity on Earth changed over time?	HS-LS4-1
Lab 23. Mechanisms of Evolution: Why will the characteristics of a bug population change in different ways in response to different types of predation?	HS-LS3-3 HS-LS4-2 HS-LS4-3 HS-LS4-4
Lab 24. Descent With Modification: Does mammalian brain structure support or refute the theory of descent with modification?	HS-LS4-1
Lab 25. Mechanisms of Speciation: Why does geographic isolation lead to the formation of a new species?	HS-LS3-3 HS-LS4-2 HS-LS4-3 HS-LS4-4 HS-LS4-5
Lab 26. Human Evolution: How are humans related to other members of the family Hominidae?	HS-LS4-1
Lab 27. Whale Evolution: How are whales related to other mammals?	HS-LS4-1

Michigan High School Science Performance Expectations for Biology

ADI Investigations for High School Chemistry	Performance Expectations
<i>Structure and Properties of Matter</i>	
Lab 1. Bond Character and Molecular Polarity: How Does Atom Electronegativity Affect Bond Character and Molecular Polarity?	HS-PS1-1
Lab 2. Molecular Shapes: How Does the Number of Substituents Around a Central Atom Affect the Shape of a Molecule?	HS-PS1-1
Lab 3. Rate of Dissolution: Why Does the Surface Area of the Solute, the Temperature of the Solvent, and the Amount of Agitation That Occurs When the Solute and the Solvent Are Mixed Affect the Rate of Dissolution?	-
Lab 4. Molarity: What Is the Mathematical Relationship Between the Moles of a Solute, the Volume of the Solvent, and the Molarity of an Aqueous Solution?	-
Lab 5. Temperature Changes Due to Evaporation: Which of the Available Substances Has the Strongest Intermolecular Forces?	HS-PS1-3
Lab 6. Pressure, Temperature, and Volume of Gases: How Does Changing the Volume or the Temperature of a Gas Affect the Pressure of That Gas?	-
Lab 7. Periodic Trends: Which Properties of the Elements Follow a Periodic Trend?	HS-PS1-1
Lab 8. Solutes and the Freezing Point of Water: How Does the Addition of Different Types of Solutes Affect the Freezing Point of Water?	HS-PS1-3
Lab 9. Melting and Freezing Points: Why Do Substances Have Specific Melting and Freezing Points?	HS-PS1-3
Lab 10. Identification of an Unknown Based on Physical Properties: What Type of Solution Is the Unknown Liquid?	-
Lab 11. Atomic Structure and Electromagnetic Radiation: What Are the Identities of the Unknown Powders?	-
Lab 12. Magnetism and Atomic Structure: What Relationships Exist Between the Electrons in a Substance and the Strength of Magnetic Attraction?	HS-PS1-1
Lab 13. Density and the Periodic Table: What Are the Densities of Germanium and Flerovium?	HS-PS1-1
Lab 14. Molar Relationships: What Are the Identities of the Unknown Compounds?	-
Lab 15. The Ideal Gas Law: How Can a Value of R for the Ideal Gas Law Be Accurately Determined Inside the Laboratory?	-
<i>Chemical Reactions</i>	
Lab 16. Development of a Reaction Matrix: What Are the Identities of the Unknown Chemicals?	HS-PS1-2
Lab 17. Limiting Reactants: Why Does Mixing Reactants in Different Mole Ratios Affect the Amount of the Product and the Amount of Each Reactant That Is Left Over?	-
Lab 18. Characteristics of Acids and Bases: How Can the Chemical Properties of an Aqueous Solution Be Used to Identify It as an Acid or a Base?	HS-PS1-2
Lab 19. Strong and Weak Acids: Why Do Strong And Weak Acids Behave in a Different Manner Even Though They Have the Same Chemical Properties?	HS-PS1-2
Lab 20. Enthalpy Change of Solution: How Can Chemists Use the Properties of a Solute to Predict If an Enthalpy Change of Solution Will Be Exothermic or Endothermic?	HS-PS1-4
Lab 21. Reaction Rates: Why Do Changes in Temperature and Reactant Concentration Affect the Rate of a Reaction?	HS-PS1-4

ADI Investigations for High School Chemistry	Grade-Level Expectations
<i>Chemical Reactions</i>	
Lab 22. Equilibrium: Why Do Changes in Temperature, Reactant Concentration, and Product Concentration Affect the Equilibrium Point of a Reaction?	HS-PS1-5
Lab 23. Classification of Changes in Matter: Which Changes Are Examples of a Chemical Change and Which Are Examples of a Physical Change?	-
Lab 24. Identification of Reaction Products: What Are the Products of the Chemical Reactions?	HS-PS1-2 HS-PS1-7
Lab 25. Acid-Base Titration and Neutralization Reactions: What Is the Concentration of Acetic Acid in Each Sample of Vinegar?	-
Lab 26. Composition of Chemical Compounds: What Is the Empirical Formula of Magnesium Oxide?	HS-PS1-7
Lab 27. Stoichiometry and Chemical Reactions: Which Balanced Chemical Equation Best Represents the Thermal Decomposition of Sodium Bicarbonate?	HS-PS1-7
Lab 28. Designing a Cold Pack: Which Salt Should Be Used to Make an Effective but Economical Cold Pack?	HS-PS1-4
Lab 29. Rate Laws: What Is the Rate Law for the Reaction Between Hydrochloric Acid and Sodium Thiosulfate?	HS-PS1-5
Lab 30. Equilibrium Constant and Temperature: How Does a Change in Temperature Affect the Value of the Equilibrium Constant for an Exothermic Reaction?	HS-PS1-5