

Oak Meadow

8

Physical Science

**Assignment Summaries and
Learning Assessments**



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Grade 8

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Learning Assessments



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UNIT I: Scientific Habits and Properties of Matter

Lesson 1

Measurements and Quantitative Data

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Reflect on how knowledge is built on the work of others.
- Identify objective and subjective observations.
- Record qualitative and quantitative observations.
- Measure and describe household objects.
- Optional Activity: Scientists and Scientific Discoveries
- Complete lesson 1 test.

Learning Checklist

This learning checklist can be filled out by either you or the adult who is supervising your work. This checklist will help you keep track of how your skills are progressing and what you need to work on. You or your home teacher can also add notes about where you'd like help.

Here is what the different headings mean:

Developing: You still need to work on this skill.

Consistent: You use this skill correctly most of the time.

Competent: You show mastery of this skill.

Please remember that these skills continue to develop over time so you aren't expected to be able to do all of them yet. The main goal is to be aware of which skills you need to focus on.

SKILLS	Developing	Consistent	Competent	Notes
Differentiate between subjective and objective observations				
Define quantitative and qualitative data				
Record accurate measurements				
Use scientific terminology in explanations				

Lesson 2

Controlled Experiments and the Scientific Method

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Make a list of variables and how they can be controlled.
- Lab Investigation: Sink or Float?
- Complete lesson 2 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Describe the steps of the scientific method				
Write a concise, testable hypothesis				
Identify variable and constant factors				
Write a step-by-step procedure for an experiment				
Record data with accuracy				
Write a conclusion based on results				
Describe a controlled environment				
Differentiate between causation and correlation				

Lesson 3

Matter and Elements

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Give examples of different states of matter.
- Explain how molecules behave differently in different states of matter.
- Draw two elements.
- Do calculations based on the periodic table of elements.
- Lab Investigation: States of Matter
- Optional Activity: Is It Matter?
- Complete lesson 3 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Gather information from the periodic table of elements				
Calculate the numbers of protons, electrons, and neutrons in an atom				
Identify properties of metals, nonmetals, and metalloids				
Explain the difference between an atom and a molecule				
Draw an accurate representation of an element				
Identify examples of different states of matter				

Lesson 4

Scientific Inquiry: Modeling an Element or Molecule

ASSIGNMENT SUMMARY

- Research and choose an element or molecule to model.
- Make a list of materials and design how the model will be built.
- Discuss the project with others to refine the design.
- Create a scientifically accurate three-dimensional model.
- Share the project with others.
- Reflect on project design and learning experience.

UNIT II: Chemical Reactions

Lesson 5

Mixtures and Compounds

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Give examples of mixtures.
- Identify and explain the chemical formula for common compounds.
- Illustrate and explain the process of oxidation.
- Identify the number and type of atoms in different molecules.
- Lab Investigation: Oxidation and Combustion
- Complete lesson 5 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Interpret a chemical formula				
Follow a lab procedure accurately				
Take accurate measurements and compile data				
Use data as evidence to support a claim				
Illustrate and explain the process of oxidation				

Lesson 6

Types of Mixtures

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Identify homogeneous and heterogeneous substances.
- Create a graphic showing different types of matter.
- List soluble and insoluble substances.
- Answer questions about temperature and solubility of gases.
- Identify compounds and mixtures.
- Lab Investigation: Mixtures and Solutions
- Lab Investigation: Saturation of Sugar Solution
- Optional Activities:
 - Activity A: Soda Shake
 - Activity B: Oil Marble
 - Activity C: Ocean in a Bottle
- Complete lesson 6 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Identify similarities and differences between types of mixtures				
Differentiate between homogeneous and heterogeneous substances				
Differentiate between miscible and immiscible liquids				
Use scientific terminology in writing lab results and conclusions				
Record observations with accuracy and clear language				

Lesson 7

Temperature and Pressure

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Experience and explain the concept of thermal transfer.
- Apply knowledge of convection currents to weather.
- Research why popcorn pops.
- Predict how a change in water properties would affect aquatic life.
- Calculate metric temperature conversions.
- Lab Investigation: Insulators and Conductors
- Lab Investigation: Thermal Expansion and Contraction of a Gas
- Lab Investigation: Water Depth and Pressure
- Optional Activity: Sensing Temperature
- Complete lesson 7 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Explain methods of thermal transfer				
Differentiate between thermal conductors and insulators				
Explain molecular activity related to thermal expansion and contraction				
Identify unique properties of water related to thermal expansion and contraction				
Perform calculations to convert between temperature units (C and F)				

UNIT III: Forces and Interactions

Lesson 8

Force and Motion

ASSIGNMENT SUMMARY

- Complete the reading selections.
- List examples of force being exerted in daily life.
- Identify different forces at work.
- Draw and explain examples of resultants of two force vectors.
- Draw and explain examples of opposing forces.
- Complete lesson 8 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Differentiate between different types of forces				
Identify elements of a force vector				
Illustrate and calculate force vectors and resultants				
Model force vectors and resultants				
Explain force vectors and resultants				
Illustrate and calculate opposing force vectors and resultants				
Differentiate between applied and action-at-a-distance forces				

Lesson 9

Mass, Weight, and Gravity

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Apply Newton's Law of Universal Gravitation to imaginary scenarios.
- Calculate your mass on Earth and weight on the moon.
- Demonstrate finding the center of gravity.
- Hypothesize the center of gravity using measurements of length.
- Experiment with your center of gravity.
- Lab Investigation: Mass and Gravitational Force
- Lab Investigation: Gravity, Buoyancy, and Weight
- Lab Investigation: Center of Gravity of Irregular Shapes
- Optional Activity: Gravity on an Incline
- Complete lesson 9 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Define Newton's Law of Universal Gravitation				
Perform calculations related to Newton's Law of Universal Gravitation				
Differentiate between mass and weight				
Calculate mass based on weight on Earth				
Identify elements influencing center of gravity				

Lesson 10

First Law of Motion

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Perform a demonstration of inertia.
- List examples of friction.
- Describe a machine subject to friction.
- Describe life without friction.
- Lab Investigation: Inertia
- Optional Activity: Braking and Friction
- Complete lesson 10 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Define Newton's First Law of Motion				
Demonstrate the principle of inertia				
Differentiate between static and kinetic friction				
Give examples of frictional force				
Identify elements influencing the amount of friction				

Lesson 11

Second and Third Laws of Motion

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Perform calculations related to velocity.
- Explain principles of Newton's Second Law of Motion.
- Give examples of Newton's Third Law of Motion.
- Explain principles of Newton's Third Law of Motion.
- Lab Investigation: Equal and Opposite
- Optional Activity: Action and Reaction
- Complete lesson 11 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Perform calculations related to velocity				
Differentiate between speed and velocity				
Explain principles and examples of Newton's Second Law of Motion				
Explain principles and examples of Newton's Third Law of Motion				
Identify standard units of measure for mass, acceleration, and force				

Lesson 12

Scientific Inquiry: Interest-Led Learning

ASSIGNMENT SUMMARY

- Identify forces involved in a favorite activity.
- Plan a project to show the effect of the forces on the activity.
- Discuss the project with others to refine the design.
- Create the project and share it with others.

UNIT IV: Energy

Lesson 13

Types of Energy

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Record types of energy found in daily life.
- Identify different types of energy.
- Give examples of potential energy converting into kinetic energy.
- Explain the principles of potential and kinetic energy.
- Identify transitions between potential and kinetic energy.
- Locate sources of released thermal energy.
- Complete lesson 13 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Identify different types of energy				
Explain how potential energy is converted into kinetic energy				
Explain energy efficiency				
Identify examples of energy changing form				

Lesson 14

Thermodynamics and Conservation of Energy

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Identify the changes in forms of energy that lead to household electricity.
- Relate household appliances to the laws of thermodynamics.
- Apply the conservation of mechanical energy to a realistic scenario.
- Lab Investigation: Converting Mechanical Energy to Thermal Energy
- Optional Activity: Swing Time
- Complete lesson 14 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Identify ways in which energy changes form				
Apply the conservation of mechanical energy to a realistic scenario				
Demonstrate how kinetic energy is converted to heat				
Explain and give an example of the First Law of Thermodynamics				
Explain and give an example of the Second Law of Thermodynamics				

Lesson 15

Work and Power

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Perform calculations regarding work and power.
- Lab Investigation: Generating Power
- Complete lesson 15 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Use formulas to calculate work and power				
Differentiate between work and power				
Identify and use standard units of measure for work and power				
Identify examples of work and power				
Explain the concepts of work and power				

Lesson 16

Harnessing Energy

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Draw a diagram and explain one type of renewable energy.
- Research radioactive nuclear waste.
- Track your reliance on fossil fuels.
- Create a graph showing forms of energy used in the U.S.
- Identify ways to conserve energy.
- Optional Activity: Solar Cooking
- Lab Investigation: Solar Heating
- Complete lesson 16 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Draw a diagram to show how a renewable resource is converted into energy				
Conduct research using a variety of sources				
Write a summary of research findings				
Create a graph or chart that presents data in a clear way				
Record data accurately				
Draw conclusions using data as supporting evidence				
Identify environmental concerns related to nonrenewable energy sources				

Lesson 17/18

Scientific Inquiry: Energy in Food Systems

ASSIGNMENT SUMMARY

- Research an element of energy use in food production.
- Design a project to convey your findings.
- Discuss the project with others to refine the design.
- Create a scientifically accurate graphic related to energy use in food production.
- Share the project with others.
- Reflect on project design and learning experience.
- Complete semester 1 review.

UNIT V: Waves

Lesson 19

Properties of Waves

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Perform demonstrations of visible sound waves.
- Calculate wavelength, frequency, and velocity.
- Determine resulting amplitude of wave interference.
- Lab Investigation: Transverse Waves and Wave Interference
- Optional Activity: Physics of Surfing
- Complete lesson 19 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Use correct terminology when discussing properties of waves				
Differentiate between wavelength, wave frequency, and wave velocity				
Perform calculations to determine wavelength, wave frequency, and wave velocity				
Explain the difference between constructive and destructive wave interference				
Identify the relationship between wavelength and wave frequency				

Lesson 20

Sound Waves

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Collect data on sounds.
- Compare sound quality or timbre.
- Explore how sound is reflected or absorbed in different rooms.
- Use knowledge of sound waves to answer a classic question.
- Research the use and concerns of LFA sonar.
- Lab Investigation: Reflection and Absorption of Sound
- Lab Investigation: Transmission of Sound Waves
- Optional Activity: Wind Instrument
- Complete lesson 20 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Use correct terminology when discussing sound waves				
Identify factors that influence how sound travels				
Classify matter in terms of its capacity to reflect or absorb sound				
Support an opinion with reasoning and scientific knowledge				

Lesson 21

Light Energy and the Electromagnetic Spectrum

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Categorize colors by wavelengths.
- Learn about one type of invisible light wave.
- List luminous and illuminated objects.
- Apply your knowledge of the primary colors of light.
- Lab Investigation: Rainbow Disc
- Complete lesson 21 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Categorize colors by wavelength				
List light waves in the electromagnetic spectrum in order by wavelength				
Differentiate between luminous and illuminated objects				
Demonstrate an understanding of how reflected or absorbed wavelengths result in the appearance of color				
Demonstrate and explain how energy is related to wavelength and wave frequency				

Lesson 22

Properties of Light Waves

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Perform and explain demonstrations of reflection and refraction.
- Identify examples of materials that reflect and absorb light.
- Apply knowledge of refraction to a real-life scenario.
- Lab Investigation: Refraction and Dispersion
- Optional Activity: The Light Mystery
- Complete lesson 22 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Demonstrate and explain light reflection				
Demonstrate and explain light refraction				
Demonstrate and explain light dispersion				
Explain how scattering of light waves determines sky color				
Draw the angle of incidence and angle of reflection				
Draw the angle of incidence and angle of refraction				
Form and test a hypothesis				

Lesson 23

Sight and Lenses

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Explain the difference between convex and concave shapes.
- Identify and draw one type of lens.
- Complete demonstrations regarding perspective and focus.
- Demonstrate and explain depth perception.
- Describe observations of double image.
- Lab Investigation: Image Projection
- Optional Activities:
 - Activity A: Anatomy of the Eye
 - Activity B: Focusing a Light Beam
- Complete lesson 23 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Differentiate between concave and convex lenses				
Illustrate refraction of light through a convex lens				
Illustrate refraction of light through a concave lens				
Explain the difference between a converging lens and a diverging lens				
Identify correlation between focal length and distance from object to lens				

Lesson 24

Scientific Inquiry: Wave Technology

ASSIGNMENT SUMMARY

- Research one aspect of wave technology.
- Identify key information to highlight.
- Locate and develop visual presentations of information.
- Incorporate feedback into the design process.
- Share the final project.
- Reflect on the process.

UNIT VI: Electricity and Magnetism

Lesson 25

Electricity

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Identify different uses for household electricity.
- Make a booklet or poster on electrical safety.
- Lab Investigation: Charged Balloons
- Lab Investigation: Attraction and Repulsion
- Lab Investigation: Electroscope
- Complete lesson 25 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Demonstrate electrical forces of attraction and repulsion				
Apply knowledge of electrical conductors and insulators				
Explain the laws of electric charge				
Demonstrate knowledge of electrical safety				

Lesson 26

Batteries and Circuits

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Draw a diagram of an open circuit and closed circuit wet cell.
- Research different types of batteries.
- Draw a diagram of a household circuit.
- Lab Investigation: Electrical Conductors
- Complete lesson 26 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Draw a diagram of how energy flows through a wet cell				
Differentiate between an open and closed circuit				
Identify similarities and differences between a dry cell and a wet cell				
Explain how series and parallel circuits work				
Demonstrate the electrical conductivity of different materials				
Make predictions based on data				

Lesson 27

Measuring and Controlling Electricity

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Compare different types of batteries.
- Calculate and compare wattage of household appliances.
- Examine how resistance and energy influence the design of an electrical cord.
- Examine how resistance and energy influence the design of power lines.
- Lab Investigation: Voltaic Pile
- Optional Activity: Lighting Comparisons
- Complete lesson 27 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Apply formulas to calculate electrical power, current, and resistance				
Identify elements that influence electrical resistance				
Explain and apply Ohm's Law				
Make predictions based on data				

Lesson 28

Home Electricity

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Perform calculations involving resistors in series and parallel circuits.
- Sketch a circuit breaker box and calculate the total current.
- List the energy draw on one household circuit and compare to total current available.
- Examine how resistance and energy influence the design of power lines.
- Explain why birds don't get shocked by sitting on power lines.
- Optional Activity: Electricity Usage
- Complete lesson 28 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Calculate voltage, current, and resistance in series circuits				
Calculate voltage, current, and resistance in parallel circuits				
Explain difference in resistance between series and parallel circuits				
Draw a diagram of resistors in series and parallel circuits				
Demonstrate knowledge of how to prevent electric circuit overload				

Lesson 29

Magnetism

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Predict which objects will be attracted to a magnet.
- Demonstrate how combining magnets increases their strength.
- Research Earth's magnetic pole reversals or use declination to find a compass heading.
- Lab Investigation: Magnetic Force
- Lab Investigation: Magnetic Strength along a Magnet
- Lab Investigation: Magnetic Induction
- Optional Activity: Earth's Magnetic Poles
- Complete lesson 29 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Demonstrate and explain properties of magnetism				
Draw a diagram of a magnetic field				
Form and test a hypothesis				
Describe what happens at the atomic level when creating, strengthening, and weakening a magnet				

Lesson 30

Electromagnetism

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Identify electromagnetic fields in your home.
- Research the invention of the telegraph or telephone.
- Learn about the possible health effects of EMFs.
- Lab Investigation: Electromagnetic Fields
- Optional Activity: Alternating and Direct Current
- Complete lesson 30 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Define electromagnetism				
Demonstrate and explain electromagnetic fields				
Differentiate between AC and DC current				
Identify ways to strengthen an electromagnet				

UNIT VII: Engineering Design

Lesson 31

Mechanical Advantage

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Identify examples of different types of machines.
- Calculate the mechanical advantage of an inclined plane.
- List examples of screws in daily life.
- Draw a diagram of different types of levers.
- Lab Investigation: Archimedes Screw
- Lab Investigation: Lever and Fulcrum
- Optional Activity: Trebuchet
- Complete lesson 31 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Calculate the mechanical advantage of an inclined plane				
Draw diagrams of first-class, second-class, and third-class levers				
Identify the effort arm and resistance arm of a lever				
Explain the relationship between the length of the effort arm and the amount of force needed				
Explain the function of a wedge				

Lesson 32

Wheels and Pulleys

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Identify wheels, and their purposes and sources of force.
- Explain the concepts of centrifugal and centripetal force.
- Draw and describe possible uses of simple machines in ancient architecture.
- Lab Investigation: Torque and Mechanical Advantage
- Lab Investigation: Mechanical Advantage of a Block and Tackle
- Complete lesson 32 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Explain the relationship between torque and mechanical advantage				
Demonstrate the mechanical advantage of a system with multiple pulleys				
Calculate the mechanical advantage of a system with multiple pulleys				
Explain the relationship between centrifugal and centripetal force and Newton's First Law of Motion				

Lesson 33

Aerodynamics and Flight

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Demonstrate and explain Bernoulli's Principle.
- Do a research project related to aerodynamics.
- Lab Investigation: Aerodynamic Design
- Optional Activities:
 - Activity A: Bernoulli Ball
 - Activity B: Curve Ball Dynamics
- Complete lesson 33 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Demonstrate and explain Bernoulli's Principle				
Create a model to demonstrate principles of aerodynamics				
Refine model to address design problems				
Collect and analyze data to determine effectiveness of design solutions				
Draw and label a diagram showing how an airfoil influences air pressure and lift				

Lesson 34

Modern Machines

ASSIGNMENT SUMMARY

- Complete the reading selections.
- Write an essay about the influence of television.
- Research and report on a type of hybrid or electric car.
- Lab Investigation: Digital Communication
- Optional Activity: Flicker Book
- Complete lesson 34 test.

Learning Checklist

SKILLS	Developing	Consistent	Competent	Notes
Model the digital transfer of data				
Propose modifications to improve the process of digital data transfer				
Perform hydraulics calculations involving force, area, and pressure				

Lesson 35

Scientific Inquiry: Mechanical Engineering

ASSIGNMENT SUMMARY

- Design a machine or modify an existing design.
- Make a list of tools and supplies needed.
- Incorporate feedback into the design process.
- Share the final project.
- Reflect on the process.

Lesson 36

Learning Review and Reflection

ASSIGNMENT SUMMARY

- Complete the semester 2 review.
- Complete learning reflection.