

Physical Science

Unit 1: What is Science?

2 ½ weeks

PS9.1, PS9.2, PS9.3, PS9.7

Biblical Worldview Essential Questions

How does physical science fit into the Creation Mandate?

How does a person's worldview influence how one interprets scientific data?

Objectives	Methods	Resources	Assessments
The student will: <ul style="list-style-type: none">•recognize and explain the correct use of the safety features in the science lab•define science, emphasizing the importance of observations•explain the five steps of the scientific method and apply them to real-life experiments•create line, bar, and best line graphs from data gathered•write a lab report that explains the results of a lab with another person•explain the limitations of a scientist•distinguish between the theories of evolution, creation, and theistic evolution	<ul style="list-style-type: none">•Discussion•Group reading•Group lab activities•Lecture•Teacher modeling•Discussion	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 1 and 2•Lab 1A: Laboratory Safety, <i>Laboratory Manual: The Physical World, An Introduction to Physical Science</i>, BJU Press•Lab 1B: Observations and Classification, physical science lab manual•Lab 2A: Scientific Method, physical science lab manual•Lab 2B: Scientific Reports, physical science lab manual•Poem: The Three Blind Men of Indostan, <i>Basic Science for Christian Schools</i>, BJU Press	<ul style="list-style-type: none">•Responses to questions from activities found in the lab manual•Responses on graphing worksheet•Lab report on conductivity•Paragraph responding to poem on the blind men•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 2: The Collection of Data

3 weeks

PS9.1, PS9.2, PS9.3

Biblical Worldview Essential Questions

Why is accuracy in measurements important to a Christian scientist?

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none"> •define matter using its two components of mass and volume •identify metric prefixes and use them to describe quantities or mass, length, volume, and density •convert measurements within the metric system using both the Down Right Easy Method and Unit Analysis •explain the necessity of using significant digits in making any measurements •distinguish between mass and weight •correctly use significant digits in mathematical calculations demonstrate the proper use of scientific equipment •determine the volume and density of different objects using a variety of methods 	<ul style="list-style-type: none"> •Discussion •Lecture •Teacher modeling •Group lab activities •Bingo game 	<ul style="list-style-type: none"> •<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 3 •Down Right Easy stair steps on transparency sheet •Metric Quizmo •Lab 3A: Significant Digits/ Reading Scales, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press •Lab 3B: Significant Digits in Calculations, physical science lab manual •Lab 3C: Measuring, physical science lab manual •Lab 3D: Density, physical science lab manual 	<ul style="list-style-type: none"> •Responses on metric conversion worksheet •Participation in Metric Quizmo •Quiz on metric conversions •Responses to questions for activities found in the lab manual •Responses on significant digits worksheet •Responses on measurement worksheet •Responses on density worksheet •Responses to chapter review worksheet •Teacher-made test

Physical Science

Unit 3: The Properties of Matter

3 weeks

PS9.1, PS9.2, PS9.3, PS9.4

Biblical Worldview Essential Questions

What characteristics of God are evident from our study of the atom?

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none">•distinguish between a physical and a chemical property•distinguish between a physical and a chemical change•explain the past and current theories scientist have for the composition of matter•distinguish between the four states of matter•use the kinetic theory to explain the physical composition of the four states of matter•explain the changes, using Boyle's and Charles' Law, which will occur when the physical properties of a gas (pressure, volume, and temperature) are modified•solve for the unknown quantity in various situations, given the gas law formulas	<ul style="list-style-type: none">•Lecture•Group lab activities•Teacher demo.	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 4 & 15C•Lab 4A: Chemical and Physical Changes, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press•Lab 4B: Finding Absolute Zero, physical science lab manual•Investigation 4B: The Kinetic Theory, <i>Basic Science for Christian Schools Laboratory Manual</i>, BJU Press	<ul style="list-style-type: none">•Responses to questions from activities found in the lab manual•Responses to questions on physical and chemical changes worksheet•Responses to demonstration questions•Responses to Gas Laws worksheet•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 4: The Classification of Matter

2 weeks

PS9.1, PS9.2, PS9.3, PS9.4, PS9.6

Biblical Worldview Essential Questions

How does understanding the composition of matter allow us to design materials to keep people safer?

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none">•explain the importance of classification in their lives•distinguish between an atom and its element•distinguish between a molecule and its compound•distinguish between an element, a compound, and a mixture•write the correct symbol for many of the elements on the periodic table•name the elements composing a compound and give the number of atoms of each element present in the formula unit when given any compound formula•write the correct chemical formula for compounds that were identified by the teacher	<ul style="list-style-type: none">•Lecture•Discussion•Group lab activities•Bingo game	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 5•Lab 5A: Elements, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press•Lab 5B: Compounds, physical science lab manual•Lab 5C: Mixtures, physical science lab manual•Investigation 5C: Classification, <i>Basic Science for Christian Schools Laboratory Manual</i>, BJU Press•Teacher created bingo game of element symbols and chemical formulas	<ul style="list-style-type: none">•Participation in class discussion•Responses to questions from activities found in the lab manual•Quiz on element symbols and chemical formulas•Participation in element symbols and chemical formula bingo game•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 5: The Atomic Model

2 ½ weeks

PS9.2, PS9.3, PS9.6

Biblical Worldview Essential Questions

As Christians, how should we handle our knowledge of the nuclear atom?

Objectives	Methods	Resources	Assessments
The student will: <ul style="list-style-type: none">•identify the contributions of several scientists in formulating the modern theory of the atomic model•describe the subatomic particles of an atom, their properties, and their locations within the atom•use isotopic notation to determine the number of protons and neutrons in the nucleus of an atom•explain the relationship between an electron's change in energy level and the production of light•draw and create correct Bohr models of various elements	<ul style="list-style-type: none">•Lecture•Teacher demo.•Teacher modeling•Group lab activities•Individual creations of atoms	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 6, pages 106 - 119•Lab 6A: Flame Tests, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press	<ul style="list-style-type: none">•Responses to questions from activity found in the lab manual•Responses to scientists worksheet•Responses to questions on Bohr models worksheet•3D creation of a Bohr model•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 6: Chemical Bonding

3 ½ weeks

PS9.1, PS9.2, PS9.3, PS9.5, PS9.6

Biblical Worldview Essential Questions

Pharmacology is the study of creating chemical compounds. How can this field of study be used to satisfy the Creation Mandate?

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none">•explain the history behind the development of the periodic table•identify the patterns created by the periodic table•identify several properties of elements based on the position on the periodic table•distinguish between metals, nonmetals, and metalloids•familiarize themselves with one element in order to create a compelling advertisement to sell the element•explain the role of valence electrons in ionic and covalent bonding•explain the octet rule as the underlying principle driving the formation of chemical bonds•illustrate the bonding between two or more elements using Bohr models and Lewis dot structures•explain the free electron theory as it relates to the bonding of metals•explain the relationship between bond type and material properties for ionic, covalent, and metallic substances	<ul style="list-style-type: none">•Lecture•Group lab activities•Teacher modeling•Individual projects	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 7 and 8•Lab 7: Metals and Nonmetals, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press•Lab 8A: Ionic Bonding, physical science lab manual•Lab 8B: Covalent Bonding, physical science lab manual•Lab 8C: Bonding Summary, physical science lab manual•Lab 8D: Identifying Bond Types, physical science lab manual•Investigation 7C: Charting the Elements, <i>Basic Science for Christian Schools Laboratory Manual</i>, BJU Press•Library resources•Internet	<ul style="list-style-type: none">•Responses to questions from activities found in the lab manual•Responses on review sheet of atomic and molecular structure•Element advertisement project•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 7: Types of Energy

1 week

PS9.2, PS9.3, PS9.7, PS9.8

Biblical Worldview Essential Questions How does energy show the power of God?

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none"> •define energy •distinguish between the eight forms of energy and recognize the primary transformation that can occur between them •distinguish between potential and kinetic energy •determine the potential and kinetic energy of an object when given the appropriate formula •explain the conservation laws of energy •explain the concept of momentum and its application to the motion of physical objects •determine momentum for specific situations when given the appropriate formula 	<ul style="list-style-type: none"> •Lecture •Group lab activities •Collage creation •Watch video 	<ul style="list-style-type: none"> •<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 12 •Lab 12: Stopping Distances, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press Investigation 14D: Conservation of Momentum, <i>Basic Science for Christian Schools Laboratory Manual</i>, BJU Press •Video: <i>Energy Transformation in an Automobile</i>, National Foundation for Energy Education. 	<ul style="list-style-type: none"> •Responses to questions from activities found in the lab manual •Responses on review sheet of potential and kinetic energy computations •Responses on energy transformations worksheet •Energy collage •Responses to chapter review worksheet •Teacher-made test

Physical Science

Unit 8: Mechanical Energy

1 ½ weeks

PS9.1, PS9.2, PS9.8, PS9.9

Biblical Worldview Essential Questions

How can we use the study of mechanics to design safer vehicles and amusement park rides?

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none"> •distinguish between speed and velocity •calculate the velocity, acceleration, and deceleration of an object •determine any unknown quantity using the various formulas of motion, given the other variables in the formulas •distinguish between Newton’s 3 laws of motion •recognize which of Newton’s 3 laws of motion is responsible for a particular action. •explain how two objects influence each other in regards to gravity •use the acceleration formula for free falling objects to determine an object’s velocity or an object’s height 	<ul style="list-style-type: none"> •Lecture •Group lab activities •Skit on Newton’s 3 laws of motion 	<ul style="list-style-type: none"> •<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 13 •Lab 13A: Yellow Light: Stop or Go?, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press •Lab 13B: Center of Gravity, physical science lab manual •Lab: What Breaks the Thread?, <i>Invitations to Science Inquiry 2nd Edition</i>, Science Inquiry Enterprises •Lab: The Match Missile, <i>Invitations to Science Inquiry 2nd Edition</i>, Science Inquiry Enterprises 	<ul style="list-style-type: none"> •Responses to questions from activities found in the lab manual •Responses on review worksheet of math problems on speed, acceleration, and deceleration •Responses to review worksheet on Newton’s Laws •Responses to chapter review worksheet •Teacher-made test

Physical Science

Unit 9: Simple Machines

3 weeks

PS9.2, PS9.3, PS9.8, PS9.9

Biblical Worldview Essential Questions

How can we take advantage of the knowledge God has given us about his physical laws to create simple machines that make life easier for others?

Objectives	Methods	Resources	Assessments
The student will: <ul style="list-style-type: none">•calculate work and power when given the appropriate formulas•identify types of simple machines by sight•distinguish between the 3 classes of levers•explain the law of moments and its application to the use of levers•distinguish between the different forms of pulleys•choose the appropriate formula from the ones given and determine the mechanical advantage of a simple machine•explain how a simple machine's mechanical advantage affects its ability to complete a job	<ul style="list-style-type: none">•Lecture•Group lab activities•Demonstrations•Individual project	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 14•Lab 14A: First-Class Levers, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press•Lab 14B: Second- and Third-Class Levers, physical science lab manual•Lab 14C: Inclined Planes, physical science lab manual	<ul style="list-style-type: none">•Responses to questions from activities found in the lab manual•Responses on work and power worksheet•Responses to review sheet on levers and pulleys•Responses to levers quiz•Creation of a simple machine toy•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 10: Electrical Energy

2 ½ weeks

PS9.1, PS9.2, PS9.3, PS9.8, PS9.9

Biblical Worldview Essential Questions

How has life changed for us since the discovery of electricity? Is this a blessing or a curse? (Indoor lighting)

Objectives	Methods	Resources	Assessments
The student will: <ul style="list-style-type: none">•distinguish between static and current electricity•explain how static electricity occurs•explain the law of charges•describe the parts of a circuit necessary for current electricity•define the amp, the volt, and the ohm, and use Ohm's law to show how they relate to each other•explain the use of switches and fuses in a circuit•construct a circuit of light bulbs in both series and parallel circuitry•determine the amount of electrical energy used in a household by reading an electrical meter	<ul style="list-style-type: none">•Lecture•Group lab activities•Teacher modeling•Circuit construction	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 17•Lab 17A: Static Electricity, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press•Lab 17B: Circuits, physical science lab manual	<ul style="list-style-type: none">•Responses to questions from activities found in the lab manual•Responses on review sheet of static electricity•Responses on static electricity quiz•Responses on review sheet of current electricity•Responses to worksheet on Ohm's Laws•Responses to worksheet on types of circuits•Creation of series and parallel circuits•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 11: Magnetic Energy

2 weeks

PS9.1 PS9.2, PS9.3, PS9.8, PS9.9

Biblical Worldview Essential Questions

How has life changed for us since the advent of electromagnetic technology? Is this a blessing or a curse? (Electronics)

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none"> • Explain the historical development of the theories of magnetism • Illustrate a force field and describe the orientation of a magnetic force field in relation to the poles • distinguish between ferromagnetic, paramagnetic, and diamagnetic materials • state the law of magnetic attraction • explain how electricity and magnetic energy influence one another • use the right-hand rule to determine the magnetic field direction around a wire • explain the structure of a solenoid and methods for increasing the magnetic field strength in a solenoid • demonstrate the operation of a motor using magnets 	<ul style="list-style-type: none"> • Lecture • Group lab activities • Teacher modeling 	<ul style="list-style-type: none"> • <i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 18 • Lab 18A: Magnetic Fields: Bar Magnets, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press • Lab 18B: Electromagnets, physical science lab manual • Lab: Exploring Electric Motors, <i>Practical Activities for Strengthening Your Teaching of Physical Science Concepts</i>, Bureau of Education and Research 	<ul style="list-style-type: none"> • Responses to questions from activities found in the lab manual • Responses on review sheet of magnets • Responses on review worksheet of electromagnets • Responses on review worksheet on electric motors • Responses to chapter review worksheet • Teacher-made test

Physical Science

Unit 12: Thermal Energy

2 ½ weeks

PS9.1, PS9.2, PS9.3, PS9.8, PS9.9

Biblical Worldview Essential Questions

If Christians believe this Earth is not our final home, why bother to “reduce, reuse, and recycle”? (Solar panels)

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none"> • Review the definition of temperature in terms of the energy of motion of the particles of matter measure temperatures using the Fahrenheit, Celsius, and Kelvin scale • convert temperatures between the Celsius and Kelvin scale • distinguish between the three forms of thermal energy transfer – conduction, convection, and radiation • experimentally determine the specific heat of some common metals • explain how the specific heat of an object affects its ability to absorb and retain heat • explain the phenomenon of thermal expansion and show why water is a significant exception to the rule 	<ul style="list-style-type: none"> • Lecture • Group lab activities 	<ul style="list-style-type: none"> • <i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 16 • Lab 16A: Temperature, Heat, and Thermal Energy, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press • Lab 16B: Specific Heat, physical science lab manual • Investigation 4C: Melting, <i>Basic Science for Christian Schools Laboratory Manual</i>, BJU Press 	<ul style="list-style-type: none"> • Responses to questions from activities found in the lab manual • Responses on review sheet of thermal energy • Responses to chapter review worksheet • Teacher-made test

Physical Science

Unit 13: Sound Energy

3 weeks

PS9.2, PS9.3, PS9.8, PS9.9

Biblical Worldview Essential Questions

How has life changed for us as our understanding of sound waves has increased? Is this a blessing or a curse? (Communication and SONAR)

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none">•identify the parts of a wave•distinguish between a longitudinal and transverse wave•describe how sound is propagated by using longitudinal waves in a medium•state the key properties of sound (speed, pitch, intensity, and quality) and describe the factors that determine each•explain the characteristics that determine the acoustic properties of a room or auditorium and suggest ways to modify acoustics•state the four categories of musical instruments and describe how each type produces sound•demonstrate how a string, woodwind, and percussion instrument works	<ul style="list-style-type: none">•Lecture•Group lab activities•Teacher modeling•Individual project	<ul style="list-style-type: none">•<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 19•Lab 19A: Waves, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press•Lab 19B: Properties of Sound, physical science lab manual•Investigation 19B: Frequency and Pitch, <i>Basic Science for Christian Schools Laboratory Manual</i>, BJU Press	<ul style="list-style-type: none">•Responses to questions from activities found in the lab manual•Responses on review sheet of wave diagrams•Responses to sound and music crossword puzzle•Musical instrument project•Responses to chapter review worksheet•Teacher-made test

Physical Science

Unit 14: Light Energy

2 weeks

PS9.2, PS9.3, PS9.8, PS9.9

Biblical Worldview Essential Questions

How has life changed for us as our understanding of the electromagnetic spectrum has increased? Is this a blessing or a curse? (Fiber optics)

Objectives	Methods	Resources	Assessments
<p>The student will:</p> <ul style="list-style-type: none"> •explain the properties of visible light, including the sources of light, types of spectra, color perception, the speed of light, and light intensity •distinguish between reflection and refraction •state the law of reflection •explain reflection from plane, concave, and convex mirrors •explain the principles of refraction and dispersion •use the inverse square law to explain the relationship between light intensity and the objects distance from the light source 	<ul style="list-style-type: none"> •Lecture •Group lab activities 	<ul style="list-style-type: none"> •<i>The Physical World, An Introduction to Physical Science</i>, BJU Press, Ch. 20 •Lab 20A: Wave Properties, <i>Laboratory Manual: the Physical World – An Introduction to Physical Science</i>, BJU Press •Lab 20B: Virtual Images, physical science lab manual •Lab 20C: Lenses, physical science lab manual •Lab: Make a Pinhole Camera, <i>Invitations to Science Inquiry 2nd Edition</i>, Science Inquiry Enterprises •Lab: The Reappearing Coin, <i>Invitations to Science Inquiry 2nd Edition</i>, Science Inquiry Enterprises •Lab: The Broken Pencil, <i>Invitations to Science Inquiry 2nd Edition</i>, Science Inquiry Enterprises •Lab: Why Do We See Two Coins? <i>Invitations to Science Inquiry 2nd Edition</i>, Science Inquiry Enterprises 	<ul style="list-style-type: none"> •Responses to questions from activities found in the lab manual •Responses on review sheet of light energy •Responses on review worksheet on law of reflection •Responses to chapter review worksheet •Teacher-made test