



Main Criteria: Massachusetts Curriculum Frameworks

Secondary Criteria: JoVE

Subject: Science

Grade: 9-12

Correlation Options: Show Correlated

Adopted: 2016

FOCUS / COURSE	MA.HS-ESS.	High School Earth and Space Science
STRAND	ESS1.	Earth's Place in the Universe
STANDARD / CONCEPT / SKILL	HS-ESS1-5.	<p>Evaluate evidence of the past and current movements of continental and oceanic crust, the theory of plate tectonics, and relative densities of oceanic and continental rocks to explain why continental rocks are generally much older than rocks of the ocean floor.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
FOCUS / COURSE	MA.HS-ESS.	High School Earth and Space Science
STRAND	ESS2.	Earth's Systems
STANDARD / CONCEPT / SKILL	HS-ESS2-2.	<p>Analyze geoscience data to make the claim that one change to Earth's hydrosphere can create feedbacks that cause changes to other Earth systems.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Algae Enumeration via Culturable Methodology • Determining the Solubility Rules of Ionic Compounds • Dissolved Oxygen in Surface Water • Introduction to Mass Spectrometry • Le Châtelier's Principle • Making a Geologic Cross Section • Nutrients in Aquatic Ecosystems • Turbidity and Total Solids in Surface Water • Water Quality Analysis via Indicator Organisms

STANDARD / CONCEPT / SKILL	HS-ESS2-5.	<p>Describe how the chemical and physical properties of water are important in mechanical and chemical mechanisms that affect Earth materials and surface processes.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Turbidity and Total Solids in Surface Water
STANDARD / CONCEPT / SKILL	HS-ESS2-6.	<p>Use a model to describe cycling of carbon through the ocean, atmosphere, soil, and biosphere and how increases in carbon dioxide concentrations due to human activity have resulted in atmospheric and climate changes.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Biofuels: Producing Ethanol from Cellulosic Material • Carbon and Nitrogen Analysis of Environmental Samples • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Measuring Tropospheric Ozone • Metabolic Labeling • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Using GIS to Investigate Urban Forestry
FOCUS / COURSE	MA.HS-ESS.	High School Earth and Space Science
STRAND	ESS3.	Earth and Human Activity
STANDARD / CONCEPT / SKILL	HS-ESS3-1.	<p>Construct an explanation based on evidence for how the availability of key natural resources and changes due to variations in climate have influenced human activity.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Igneous Intrusive Rock • Proton Exchange Membrane Fuel Cells • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry

STANDARD / CONCEPT / SKILL	HS-ESS3-2.	<p>Evaluate competing design solutions for minimizing impacts of developing and using energy and mineral resources, and conserving and recycling those resources, based on economic, social, and environmental cost-benefit ratios.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Self-report vs. Behavioral Measures of Recycling
STANDARD / CONCEPT / SKILL	HS-ESS3-3.	<p>Illustrate relationships among management of natural resources, the sustainability of human populations, and biodiversity.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Electrophoretic Mobility Shift Assay (EMSA) • Measuring Tropospheric Ozone • Proton Exchange Membrane Fuel Cells • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry
FOCUS / COURSE	MA.HS-LS.	High School Biology
STRAND	LS1.	From Molecules to Organisms: Structures and Processes
STANDARD / CONCEPT / SKILL	HS-LS1-1.	<p>Construct a model of transcription and translation to explain the roles of DNA and RNA that code for proteins that regulate and carry out essential functions of life.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Epigenetics • An Overview of Gene Expression • Chromatin Immunoprecipitation • DNA Methylation Analysis • Detecting Reactive Oxygen Species • Electrophoretic Mobility Shift Assay (EMSA) • Expression Profiling with Microarrays • Gene Silencing with Morpholinos • Genome Editing • Molecular Cloning • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • RNA-Seq • Whole-Mount In Situ Hybridization
STANDARD / CONCEPT / SKILL	HS-LS1-2.	<p>Develop and use a model to illustrate the key functions of animal body systems, including (a) food digestion, nutrient uptake, and transport through the body; (b) exchange of oxygen and carbon dioxide; (c) removal of wastes; and (d) regulation of body processes.</p>

JoVE

- **Abdominal Exam I: Inspection and Auscultation**
- **Abdominal Exam II: Percussion**
- **Abdominal Exam III: Palpation**
- **Abdominal Exam IV: Acute Abdominal Pain Assessment**
- **An Introduction to Behavioral Neuroscience**
- **An Introduction to Caenorhabditis elegans**
- **An Introduction to Cellular and Molecular Neuroscience**
- **An Introduction to Cognition**
- **An Introduction to Developmental Neurobiology**
- **An Introduction to Learning and Memory**
- **An Introduction to Modeling Behavioral Disorders and Stress**
- **An Introduction to Motor Control**
- **An Introduction to Neuroanatomy**
- **An Introduction to Neurophysiology**
- **An Introduction to Reward and Addiction**
- **An Introduction to the Chick: Gallus gallus domesticus**
- **An Introduction to the Zebrafish: Danio rerio**
- **Anesthesia Induction and Maintenance**
- **Ankle Exam**
- **Anterograde Amnesia**
- **Anxiety Testing**
- **Approximate Number Sense Test**
- **Assessing Dexterity with Reaching Tasks**
- **Balance and Coordination Testing**
- **Basic Care Procedures**
- **Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation**
- **Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation**
- **Binocular Rivalry**
- **Blood Pressure Measurement**
- **Blood Withdrawal I**
- **Blood Withdrawal II**
- **C. elegans Chemotaxis Assay**
- **C. elegans Development and Reproduction**
- **C. elegans Maintenance**
- **Calcium Imaging in Neurons**
- **Cardiac Exam I: Inspection and Palpation**
- **Cardiac Exam II: Auscultation**
- **Cardiac Exam III: Abnormal Heart Sounds**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **Color Afterimages**
- **Compound Administration I**
- **Compound Administration II**
- **Compound Administration III**
- **Compound Administration IV**
- **Considerations for Rodent Surgery**
- **Cranial Nerves Exam I (I-VI)**

- Cranial Nerves Exam II (VII-XII)
- Crowding
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Diagnostic Necropsy and Tissue Harvest
- Dichotic Listening
- Drosophila Larval IHC
- Elbow Exam
- Electro-encephalography (EEG)
- Emergency Tube Thoracostomy (Chest Tube Placement)
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Explant Culture of Neural Tissue
- Eye Exam
- Finding Your Blind Spot and Perceptual Filling-in
- Foot Exam
- Fundamentals of Breeding and Weaning
- Habituation: Studying Infants Before They Can Talk
- Hand and Wrist Exam
- Hip Exam
- Histological Staining of Neural Tissue
- Inattentive Blindness
- Incidental Encoding
- Just-noticeable Differences
- Knee Exam
- Language: The N400 in Semantic Incongruity
- Learning and Memory: The Remember-Know Task
- Lower Back Exam
- Male Rectal Exam
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Mental Rotation
- Modeling Social Stress
- Motion-induced Blindness
- Motor Exam I
- Motor Exam II
- Motor Learning in Mirror Drawing
- Motor Maps
- Multiple Object Tracking
- Murine In Utero Electroporation

- **Mutual Exclusivity: How Children Learn the Meanings of Words**
- **Neck Exam**
- **Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment**
- **Neuronal Transfection Methods**
- **Object Substitution Masking**
- **Ophthalmoscopic Examination**
- **Patch Clamp Electrophysiology**
- **Percutaneous Cricothyrotomy (Seldinger Technique)**
- **Pericardiocentesis**
- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Perspectives on Sensation and Perception**
- **Physiological Correlates of Emotion Recognition**
- **Primary Neuronal Cultures**
- **Prospect Theory**
- **Respiratory Exam I: Inspection and Palpation**
- **Respiratory Exam II: Percussion and Auscultation**
- **Rodent Stereotaxic Surgery**
- **Self-administration Studies**
- **Sensory Exam**
- **Shoulder Exam I**
- **Shoulder Exam II**
- **Spatial Cueing**
- **Spatial Memory Testing Using Mazes**
- **Sterile Tissue Harvest**
- **Surgical Cricothyrotomy**
- **The Ames Room**
- **The Attentional Blink**
- **The Inverted-face Effect**
- **The McGurk Effect**
- **The Precision of Visual Working Memory with Delayed Estimation**
- **The Rubber Hand Illusion**
- **The Split Brain**
- **The Staircase Procedure for Finding a Perceptual Threshold**
- **Thyroid Exam**
- **Tissue Regeneration with Somatic Stem Cells**
- **Using Diffusion Tensor Imaging in Traumatic Brain Injury**
- **Using TMS to Measure Motor Excitability During Action Observation**
- **Verbal Priming**
- **Visual Attention: fMRI Investigation of Object-based Attentional Control**
- **Visual Search for Features and Conjunctions**
- **Visual Statistical Learning**
- **Within-subjects Repeated-measures Design**

		<ul style="list-style-type: none"> • Zebrafish Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
STANDARD / CONCEPT / SKILL	HS-LS1-3.	<p>Provide evidence that homeostasis maintains internal body conditions through both body-wide feedback mechanisms and small-scale cellular processes.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain <p>Assessment</p> <ul style="list-style-type: none"> • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Molecular Developmental Biology • An Introduction to Reward and Addiction • An Introduction to Stem Cell Biology • Anesthesia Induction and Maintenance • Ankle Exam • Annexin V and Propidium Iodide Labeling • Arterial Line Placement • Assessing Dexterity with Reaching Tasks • Auscultation • Balance and Coordination Testing • Basic Care Procedures • Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation • Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation • Basic Mouse Care and Maintenance • Blood Pressure Measurement • Blood Withdrawal I • Blood Withdrawal II • C. elegans Development and Reproduction • Calcium Imaging in Neurons • Cardiac Exam I: Inspection and Palpation • Cardiac Exam II: Auscultation • Cardiac Exam III: Abnormal Heart Sounds • Cell-surface Biotinylation Assay • Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance • Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance • Central Venous Catheter Insertion: Subclavian Vein • Compound Administration I

- **Compound Administration II**
- **Compound Administration III**
- **Compound Administration IV**
- **Comprehensive Breast Exam**
- **Considerations for Rodent Surgery**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Detecting Reactive Oxygen Species**
- **Diagnostic Necropsy and Tissue Harvest**
- **Ear Exam**
- **Elbow Exam**
- **Electro-encephalography (EEG)**
- **Embryonic Stem Cell Culture and Differentiation**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Explant Culture of Neural Tissue**
- **Eye Exam**
- **FM Dyes in Vesicle Recycling**
- **Fear Conditioning**
- **Foot Exam**
- **General Approach to the Physical Exam**
- **Hand and Wrist Exam**
- **Hip Exam**
- **Histological Staining of Neural Tissue**
- **In ovo Electroporation of Chicken Embryos**
- **Induced Pluripotency**
- **Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation**
- **Intraosseous Needle Placement**
- **Isolating Nucleic Acids from Yeast**
- **Knee Exam**
- **Lower Back Exam**
- **Lymph Node Exam**
- **Male Rectal Exam**
- **Measuring Vital Signs**
- **Motor Exam I**
- **Motor Exam II**
- **Murine In Utero Electroporation**
- **Neck Exam**
- **Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment**
- **Nose, Sinuses, Oral Cavity and Pharynx Exam**
- **Observation and Inspection**
- **Ophthalmoscopic Examination**
- **Palpation**
- **Patch Clamp Electrophysiology**
- **Pelvic Exam I: Assessment of the External Genitalia**
- **Pelvic Exam II: Speculum Exam**
- **Pelvic Exam III: Bimanual and Rectovaginal Exam**
- **Percussion**

		<ul style="list-style-type: none"> • Percutaneous Cricothyrotomy (Seldinger Technique) • Pericardiocentesis • Peripheral Vascular Exam • Peripheral Vascular Exam Using a Continuous Wave Doppler • Peripheral Venous Cannulation • Physiological Correlates of Emotion Recognition • Proper Adjustment of Patient Attire during the Physical Exam • Reconstitution of Membrane Proteins • Respiratory Exam I: Inspection and Palpation • Respiratory Exam II: Percussion and Auscultation • Self-administration Studies • Sensory Exam • Shoulder Exam I • Shoulder Exam II • Spatial Memory Testing Using Mazes • Sterile Tissue Harvest • Surgical Cricothyrotomy • The ATP Bioluminescence Assay • The TUNEL Assay • Thyroid Exam • Tissue Regeneration with Somatic Stem Cells • Tree Identification: How To Use a Dichotomous Key • Using a pH Meter • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Maintenance and Husbandry
STANDARD / CONCEPT / SKILL	HS-LS1-4.	<p>Construct an explanation using evidence for why the cell cycle is necessary for the growth, maintenance, and repair of multicellular organisms. Model the major events of the cell cycle, including (a) cell growth and DNA replication, (b) separation of chromosomes (mitosis), and (c) separation of cell contents.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Division • An Introduction to <i>Saccharomyces cerevisiae</i> • Cell Cycle Analysis • Live Cell Imaging of Mitosis • Yeast Reproduction • Yeast Transformation and Cloning
STANDARD / CONCEPT / SKILL	HS-LS1-5.	<p>Use a model to illustrate how photosynthesis uses light energy to transform water and carbon dioxide into oxygen and chemical energy stored in the bonds of sugars and other carbohydrates.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Metabolism

STANDARD / CONCEPT / SKILL	HS-LS1-6.	<p>Construct an explanation based on evidence that organic molecules are primarily composed of six elements, where carbon, hydrogen, and oxygen atoms may combine with nitrogen, sulfur, and phosphorus to form monomers that can further combine to form large carbon-based macromolecules.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Caenorhabditis elegans</i> • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Developmental Genetics • An Introduction to Molecular Developmental Biology • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to Transfection • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Annexin V and Propidium Iodide Labeling • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Biofuels: Producing Ethanol from Cellulosic Material • <i>C. elegans</i> Maintenance • Carbon and Nitrogen Analysis of Environmental Samples • Cell Cycle Analysis • Cell-surface Biotinylation Assay • Chromatin Immunoprecipitation • Chromatography-Based Biomolecule Purification Methods • Co-Immunoprecipitation and Pull-Down Assays • Column Chromatography • Community DNA Extraction from Bacterial Colonies • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Cytogenetics • DNA Gel Electrophoresis • DNA Ligation Reactions • DNA Methylation Analysis • Density Gradient Ultracentrifugation • Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis • Detecting Reactive Oxygen Species
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- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Dialysis: Diffusion Based Separation
- Drosophila Larval IHC
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
- Electrophoretic Mobility Shift Assay (EMSA)
- Embryonic Stem Cell Culture and Differentiation
- Enzyme Assays and Kinetics
- Explant Culture for Developmental Studies
- Expression Profiling with Microarrays
- Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction
- FM Dyes in Vesicle Recycling
- Förster Resonance Energy Transfer (FRET)
- Gel Purification
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- In ovo Electroporation of Chicken Embryos
- Induced Pluripotency
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Isolating Nucleic Acids from Yeast
- Live Cell Imaging of Mitosis
- MALDI-TOF Mass Spectrometry
- Metabolic Labeling
- Molecular Cloning
- Mouse Genotyping
- Nutrients in Aquatic Ecosystems
- PCR: The Polymerase Chain Reaction
- Photometric Protein Determination
- Plasmid Purification
- Protein Crystallization
- Purification of a Total Lipid Extract with Column Chromatography
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Restriction Enzyme Digests

		<ul style="list-style-type: none"> • SNP Genotyping • Separating Protein with SDS-PAGE • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Spectrophotometric Determination of an Equilibrium Constant • Tandem Mass Spectrometry • Testing For Genetically Modified Foods • The ATP Bioluminescence Assay • The ELISA Method • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / CONCEPT / SKILL	HS-LS1-7.	<p>Use a model to illustrate that aerobic cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and new bonds form, resulting in new compounds and a net transfer of energy.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Metabolism • Biofuels: Producing Ethanol from Cellulosic Material • Detecting Reactive Oxygen Species • The ATP Bioluminescence Assay
FOCUS / COURSE	MA.HS-LS.	High School Biology
STRAND	LS2.	Ecosystems: Interactions, Energy, and Dynamics
STANDARD / CONCEPT / SKILL	HS-LS2-2.	<p>Use mathematical representations to support explanations that biotic and abiotic factors affect biodiversity, including genetic diversity within a population and species diversity within an ecosystem.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Extraction of Biomarkers from Sediments - Accelerated

		<p>Solvent Extraction</p> <ul style="list-style-type: none"> • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy
<p>STANDARD / CONCEPT / SKILL</p>	<p>HS-LS2-5.</p>	<p>Use a model that illustrates the roles of photosynthesis, cellular respiration, decomposition, and combustion to explain the cycling of carbon in its various forms among the biosphere, atmosphere, hydrosphere, and geosphere.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Carbon and Nitrogen Analysis of Environmental Samples • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Metabolic Labeling • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment
<p>STANDARD / CONCEPT / SKILL</p>	<p>HS-LS2-7.</p>	<p>Analyze direct and indirect effects of human activities on biodiversity and ecosystem health, specifically habitat fragmentation, introduction of non-native or invasive species, overharvesting, pollution, and climate change. Evaluate and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Analysis of Earthworm Populations in Soil • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Introduction to Mass Spectrometry • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone

		<ul style="list-style-type: none"> • Nutrients in Aquatic Ecosystems • Self-report vs. Behavioral Measures of Recycling • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water • Water Quality Analysis via Indicator Organisms
FOCUS / COURSE	MA.HS-LS.	High School Biology
STRAND	LS3.	Heredity: Inheritance and Variation of Traits
STANDARD / CONCEPT / SKILL	HS-LS3-1.	<p>Develop and use a model to show how DNA in the form of chromosomes is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Cell Division • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Zebrafish: Danio rerio • C. elegans Development and Reproduction • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Drosophila Development and Reproduction • Genetic Crosses • Recombineering and Gene Targeting • Yeast Reproduction • Zebrafish Reproduction and Development
STANDARD / CONCEPT / SKILL	HS-LS3-2.	<p>Make and defend a claim based on evidence that genetic variations (alleles) may result from (a) new genetic combinations via the processes of crossing over and random segregation of chromosomes during meiosis, (b) mutations that occur during replication, and/or (c) mutations caused by environmental factors. Recognize that mutations that occur in gametes can be passed to offspring.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Developmental Genetics • An Introduction to Drosophila melanogaster • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Saccharomyces cerevisiae • An Introduction to Transfection • An Introduction to the Zebrafish: Danio rerio • An Overview of Epigenetics • An Overview of Gene Expression

		<ul style="list-style-type: none"> • An Overview of Genetic Analysis • An Overview of Genetics and Disease • Drosophila Development and Reproduction • Genetic Crosses • Genetic Engineering of Model Organisms • Genetic Screens • Isolating Nucleic Acids from Yeast • Passaging Cells • The TUNEL Assay
STANDARD / CONCEPT / SKILL	HS-LS3-3.	<p>Apply concepts of probability to represent possible genotype and phenotype combinations in offspring caused by different types of Mendelian inheritance patterns.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Developmental Genetics • An Introduction to Drosophila melanogaster • An Overview of Epigenetics • An Overview of Genetic Analysis • An Overview of Genetics and Disease • C. elegans Development and Reproduction • Drosophila Development and Reproduction • Fundamentals of Breeding and Weaning • Genetic Crosses • Genetic Screens • Mouse Genotyping
STANDARD / CONCEPT / SKILL	HS-LS3-4(MA).	<p>Use scientific information to illustrate that many traits of individuals, and the presence of specific alleles in a population, are due to interactions of genetic factors and environmental factors.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Drosophila melanogaster • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Epigenetics • An Overview of Genetic Analysis • An Overview of Genetics and Disease • Basic Chick Care and Maintenance • C. elegans Development and Reproduction • C. elegans Maintenance • DNA Methylation Analysis • Drosophila Development and Reproduction • Drosophila Larval IHC • Drosophila melanogaster Embryo and Larva Harvesting and Preparation • Fundamentals of Breeding and Weaning

		<ul style="list-style-type: none"> • Genetic Crosses • Genetic Screens • Invertebrate Lifespan Quantification • Mouse Genotyping • RNAi in <i>C. elegans</i> • SNP Genotyping • Yeast Maintenance • Yeast Reproduction • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Reproduction and Development
FOCUS / COURSE	MA.HS-LS.	High School Biology
STRAND	LS4.	Biological Evolution: Unity and Diversity
STANDARD / CONCEPT / SKILL	HS-LS4-1.	<p>Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence, including molecular, anatomical, and developmental similarities inherited from a common ancestor (homologies), seen through fossils and laboratory and field observations.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Caenorhabditis elegans</i> • An Introduction to <i>Drosophila melanogaster</i> • An Introduction to the Chick: <i>Gallus gallus domesticus</i> • An Introduction to the Laboratory Mouse: <i>Mus musculus</i> • An Introduction to the Zebrafish: <i>Danio rerio</i> • An Overview of Genetic Analysis • <i>Drosophila</i> Development and Reproduction • <i>Drosophila melanogaster</i> Embryo and Larva Harvesting and Preparation • High-Performance Liquid Chromatography (HPLC)
STANDARD / CONCEPT / SKILL	HS-LS4-2.	<p>Construct an explanation based on evidence that Darwin’s theory of evolution by natural selection occurs in a population when the following conditions are met: (a) more offspring are produced than can be supported by the environment, (b) there is heritable variation among individuals, and (c) some of these variations lead to differential fitness among individuals as some individuals are better able to compete for limited resources than others.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis
STANDARD / CONCEPT / SKILL	HS-LS4-4.	<p>Research and communicate information about key features of viruses and bacteria to explain their ability to adapt and reproduce in a wide variety of environments.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Algae Enumeration via Culturable Methodology

		<ul style="list-style-type: none"> • An Introduction to Transfection • An Introduction to the Laboratory Mouse: <i>Mus musculus</i> • An Overview of Genetic Engineering • Aseptic Technique in Environmental Science • Bacterial Growth Curve Analysis and its Environmental Applications • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Biofuels: Producing Ethanol from Cellulosic Material • Carbon and Nitrogen Analysis of Environmental Samples • Co-Immunoprecipitation and Pull-Down Assays • Community DNA Extraction from Bacterial Colonies • Culturing and Enumerating Bacteria from Soil Samples • Cyclic Voltammetry (CV) • Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis • Detection of Bacteriophages in Environmental Samples • Genetic Engineering of Model Organisms • Genetic Screens • Gram Staining of Bacteria from Environmental Sources • Isolation of Fecal Bacteria from Water Samples by Filtration • Molecular Cloning • Plasmid Purification • Protein Crystallization • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • Recombineering and Gene Targeting • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms
STANDARD / CONCEPT / SKILL	HS-LS4-5.	<p>Evaluate models that demonstrate how changes in an environment may result in the evolution of a population of a given species, the emergence of new species over generations, or the extinction of other species due to the processes of genetic drift, gene flow, mutation, and natural selection.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis
FOCUS / COURSE	MA.HS-PS.	High School Chemistry
STRAND	PS1.	Matter and Its Interactions
STANDARD / CONCEPT / SKILL	HS-PS1-1.	Use the periodic table as a model to predict the relative properties of main group elements, including ionization energy and relative sizes of atoms and ions, based on the patterns of electrons in the outermost energy level of each element. Use the patterns of valence electron

		<p>configurations, core charge, and Coulomb's law to explain and predict general trends in ionization energies, relative sizes of atoms and ions, and reactivity of pure elements.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes
STANDARD / CONCEPT / SKILL	HS-PS1-2.	<p>Use the periodic table model to predict and design simple reactions that result in two main classes of binary compounds, ionic and molecular. Develop an explanation based on given observational data and the electronegativity model about the relative strengths of ionic or covalent bonds.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Chromatography-Based Biomolecule Purification Methods • Column Chromatography • Determining the Empirical Formula • Determining the Solubility Rules of Ionic Compounds • Dialysis: Diffusion Based Separation • Freezing-Point Depression to Determine an Unknown Compound • Growing Crystals for X-ray Diffraction Analysis • Performing 1D Thin Layer Chromatography • Purifying Compounds by Recrystallization
STANDARD / CONCEPT / SKILL	HS-PS1-3.	<p>Cite evidence to relate physical properties of substances at the bulk scale to spatial arrangements, movement, and strength of electrostatic forces among ions, small molecules, or regions of large molecules in the substances. Make arguments to account for how compositional and structural differences in molecules result in different types of intermolecular or intramolecular interactions.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Common Lab Glassware and Uses • Coordination Chemistry Complexes • Determining the Density of a Solid and Liquid • Determining the Mass Percent Composition in an Aqueous Solution • Electrophoretic Mobility Shift Assay (EMSA) • Freezing-Point Depression to Determine an Unknown Compound • Growing Crystals for X-ray Diffraction Analysis • Introduction to Catalysis • Physical Properties Of Minerals I: Crystals and Cleavage • Physical Properties Of Minerals II: Polymineralic Analysis • Protein Crystallization

		<ul style="list-style-type: none"> • Purifying Compounds by Recrystallization • Reconstitution of Membrane Proteins
STANDARD / CONCEPT / SKILL	HS-PS1-4.	<p>Develop a model to illustrate the energy transferred during an exothermic or endothermic chemical reaction based on the bond energy difference between bonds broken (absorption of energy) and bonds formed (release of energy).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Determining Rate Laws and the Order of Reaction • Le Châtelier's Principle • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
STANDARD / CONCEPT / SKILL	HS-PS1-5.	<p>Construct an explanation based on kinetic molecular theory for why varying conditions influence the rate of a chemical reaction or a dissolving process. Design and test ways to slow down or accelerate rates of processes (chemical reactions or dissolving) by altering various conditions.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Coordination Chemistry Complexes • Determining Rate Laws and the Order of Reaction • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Enzyme Assays and Kinetics • Introduction to Catalysis
STANDARD / CONCEPT / SKILL	HS-PS1-6.	<p>Design ways to control the extent of a reaction at equilibrium (relative amount of products to reactants) by altering various conditions using Le Chatelier's principle. Make arguments based on kinetic molecular theory to account for how altering conditions would affect the forward and reverse rates of the reaction until a new equilibrium is established.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Le Châtelier's Principle • Separation of Mixtures via Precipitation • Spectrophotometric Determination of an Equilibrium Constant
STANDARD / CONCEPT / SKILL	HS-PS1-7.	<p>Use mathematical representations and provide experimental evidence to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. Use the mole concept and proportional relationships to evaluate the quantities (masses or moles) of specific reactants needed in order to obtain a</p>

		<p>specific amount of product.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Conducting Reactions Below Room Temperature • Coordination Chemistry Complexes • Determining Rate Laws and the Order of Reaction • Determining the Empirical Formula • Determining the Solubility Rules of Ionic Compounds • Introduction to Catalysis • Introduction to Titration • Nuclear Magnetic Resonance (NMR) Spectroscopy • Preparing Anhydrous Reagents and Equipment • Proton Exchange Membrane Fuel Cells • Solutions and Concentrations • Spectrophotometric Determination of an Equilibrium Constant • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
STANDARD / CONCEPT / SKILL	HS-PS1-9(MA).	<p>Relate the strength of an aqueous acidic or basic solution to the extent of an acid or base reacting with water as measured by the hydronium ion concentration (pH) of the solution. Make arguments about the relative strengths of two acids or bases with similar structure and composition.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • High-Performance Liquid Chromatography (HPLC) • Introduction to Titration • Ion-Exchange Chromatography • Le Châtelier's Principle • Passaging Cells • Two-Dimensional Gel Electrophoresis • Using a pH Meter
STANDARD / CONCEPT / SKILL	HS-PS1-10(MA).	<p>Use an oxidation-reduction reaction model to predict products of reactions given the reactants, and to communicate the reaction models using a representation that shows electron transfer (redox). Use oxidation numbers to account for how electrons are redistributed in redox processes used in devices that generate electricity or systems that prevent corrosion.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Cyclic Voltammetry (CV) • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat

		<ul style="list-style-type: none"> • Introduction to Titration • Photometric Protein Determination • Proton Exchange Membrane Fuel Cells
STANDARD / CONCEPT / SKILL	HS-PS1-11(MA).	<p>Design strategies to identify and separate the components of a mixture based on relevant chemical and physical properties.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to the Centrifuge • Assembly of a Reflux System for Heated Chemical Reactions • Calibration Curves • Capillary Electrophoresis (CE) • Carbon and Nitrogen Analysis of Environmental Samples • Chromatography-Based Biomolecule Purification Methods • Co-Immunoprecipitation and Pull-Down Assays • Column Chromatography • Degassing Liquids with Freeze-Pump-Thaw Cycling • Density Gradient Ultracentrifugation • Determining the Empirical Formula • Determining the Mass Percent Composition in an Aqueous Solution • Determining the Solubility Rules of Ionic Compounds • Dialysis: Diffusion Based Separation • Electrophoretic Mobility Shift Assay (EMSA) • Fractional Distillation • Gas Chromatography (GC) with Flame-Ionization Detection • High-Performance Liquid Chromatography (HPLC) • Internal Standards • Ion-Exchange Chromatography • MALDI-TOF Mass Spectrometry • Performing 1D Thin Layer Chromatography • Purification of a Total Lipid Extract with Column Chromatography • Rotary Evaporation to Remove Solvent • Schlenk Lines Transfer of Solvents • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Tandem Mass Spectrometry • Two-Dimensional Gel Electrophoresis
FOCUS / COURSE	MA.HS-PS.	High School Chemistry
STRAND	PS2.	Motion and Stability: Forces and Interactions
STANDARD / CONCEPT / SKILL	HS-PS2-6.	Communicate scientific and technical information about the molecular-level structures of polymers, ionic compounds, acids and bases, and metals to justify why these are useful in the functioning of designed materials.

		<p>JoVE</p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Chromatography-Based Biomolecule Purification Methods • Coordination Chemistry Complexes • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Introduction to Mass Spectrometry • Introduction to Titration • Ion-Exchange Chromatography • Le Châtelier's Principle • Two-Dimensional Gel Electrophoresis • Using a pH Meter • X-ray Fluorescence (XRF)
<p>STANDARD / CONCEPT / SKILL</p>	<p>HS-PS2-7(MA).</p>	<p>Construct a model to explain how ions dissolve in polar solvents (particularly water). Analyze and compare solubility and conductivity data to determine the extent to which different ionic species dissolve.</p> <p>JoVE</p> <ul style="list-style-type: none"> • An Introduction to the Micropipettor • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Assembly of a Reflux System for Heated Chemical Reactions • Calibration Curves • Capillary Electrophoresis (CE) • Chromatography-Based Biomolecule Purification Methods • Column Chromatography • Conducting Reactions Below Room Temperature • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Cyclic Voltammetry (CV) • Degassing Liquids with Freeze-Pump-Thaw Cycling • Density Gradient Ultracentrifugation • Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis • Determining the Mass Percent Composition in an Aqueous Solution • Determining the Solubility Rules of Ionic Compounds • Dialysis: Diffusion Based Separation • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Freezing-Point Depression to Determine an Unknown

		<p>Compound</p> <ul style="list-style-type: none"> • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • High-Performance Liquid Chromatography (HPLC) • Internal Standards • Introduction to Serological Pipettes and Pipettors • Introduction to Titration • Introduction to the Microplate Reader • Introduction to the Spectrophotometer • Ion-Exchange Chromatography • Le Châtelier's Principle • Making Solutions in the Laboratory • Method of Standard Addition • Performing 1D Thin Layer Chromatography • Photometric Protein Determination • Preparing Anhydrous Reagents and Equipment • Purification of a Total Lipid Extract with Column Chromatography • Purifying Compounds by Recrystallization • Reconstitution of Membrane Proteins • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Rotary Evaporation to Remove Solvent • Sample Preparation for Analytical Preparation • Schlenk Lines Transfer of Solvents • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Solutions and Concentrations • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Spectrophotometric Determination of an Equilibrium Constant • Two-Dimensional Gel Electrophoresis • Understanding Concentration and Measuring Volumes • Using a pH Meter
<p>STANDARD / CONCEPT / SKILL</p>	<p>HS-PS2-8(MA).</p>	<p>Use kinetic molecular theory to compare the strengths of electrostatic forces and the prevalence of interactions that occur between molecules in solids, liquids, and gases. Use the combined gas law to determine changes in pressure, volume, and temperature in gases.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Rate Laws and the Order of Reaction • Fractional Distillation • Ideal Gas Law • The Ideal Gas Law
<p>FOCUS / COURSE</p>	<p>MA.HS-PS.</p>	<p>High School Chemistry</p>
<p>STRAND</p>	<p>PS3.</p>	<p>Energy</p>

STANDARD / CONCEPT / SKILL	HS-PS3-4b.	<p>Provide evidence from informational text or available data to illustrate that the transfer of energy during a chemical reaction in a closed system involves changes in energy dispersal (enthalpy change) and heat content (entropy change) while assuming the overall energy in the system is conserved.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
FOCUS / COURSE	MA.HS-PS.	High School Introductory Physics
STRAND	PS2.	Motion and Stability: Forces and Interaction
STANDARD / CONCEPT / SKILL	HS-PS2-3.	<p>Apply scientific principles of motion and momentum to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Raman Spectroscopy for Chemical Analysis
STANDARD / CONCEPT / SKILL	HS-PS2-5.	<p>Provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • fMRI: Functional Magnetic Resonance Imaging
FOCUS / COURSE	MA.HS-PS.	High School Introductory Physics
STRAND	PS3.	Energy
STANDARD / CONCEPT / SKILL	HS-PS3-1.	<p>Use algebraic expressions and the principle of energy conservation to calculate the change in energy of one component of a system when the change in energy of the other component(s) of the system, as well as the total energy of the system including any energy entering or leaving the system, is known. Identify any transformations from one form of energy to another, including thermal, kinetic, gravitational, magnetic, or electrical energy, in the system.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • fMRI: Functional Magnetic Resonance Imaging
STANDARD / CONCEPT / SKILL	HS-PS3-2.	<p>Develop and use a model to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles and objects or energy stored in fields.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam II: Percussion • Auscultation • Cyclic Voltammetry (CV) • Ear Exam • Electrochemical Measurements of Supported Catalysts

		Using a Potentiostat/Galvanostat • Percussion
STANDARD / CONCEPT / SKILL	HS-PS3-3.	Design and evaluate a device that works within given constraints to convert one form of energy into another form of energy. <u>JoVE</u> • fMRI: Functional Magnetic Resonance Imaging
STANDARD / CONCEPT / SKILL	HS-PS3-4a.	Provide evidence that when two objects of different temperature are in thermal contact within a closed system, the transfer of thermal energy from higher temperature objects to lower-temperature objects results in thermal equilibrium, or a more uniform energy distribution among the objects and that temperature changes necessary to achieve thermal equilibrium depend on the specific heat values of the two substances. <u>JoVE</u> • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
STANDARD / CONCEPT / SKILL	HS-PS3-5.	Develop and use a model of magnetic or electric fields to illustrate the forces and changes in energy between two magnetically or electrically charged objects changing relative position in a magnetic or electric field, respectively. <u>JoVE</u> • Introduction to Mass Spectrometry • Nuclear Magnetic Resonance (NMR) Spectroscopy
FOCUS / COURSE	MA.HS-PS.	High School Introductory Physics
STRAND	PS4.	Waves and Their Applications in Technologies for Information Transfer
STANDARD / CONCEPT / SKILL	HS-PS4-1.	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling within various media. Recognize that electromagnetic waves can travel through empty space (without a medium) as compared to mechanical waves that require a medium. <u>JoVE</u> • Nuclear Magnetic Resonance (NMR) Spectroscopy • Raman Spectroscopy for Chemical Analysis
STANDARD / CONCEPT / SKILL	HS-PS4-5.	Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. <u>JoVE</u>

- Abdominal Exam I: Inspection and Auscultation
- Abdominal Exam IV: Acute Abdominal Pain Assessment
- An Introduction to Behavioral Neuroscience
- An Introduction to Cognition
- An Introduction to Learning and Memory
- An Introduction to Motor Control
- An Introduction to Neuroanatomy
- An Introduction to Neurophysiology
- An Overview of Alkenone Biomarker Analysis for Paleothermometry
- An Overview of bGDGT Biomarker Analysis for Paleoclimatology
- Auscultation
- Color Afterimages
- Community DNA Extraction from Bacterial Colonies
- Conducting Reactions Below Room Temperature
- Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry
- Coordination Chemistry Complexes
- Cranial Nerves Exam I (I-VI)
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy
- Determining the Empirical Formula
- Ear Exam
- Electro-encephalography (EEG)
- Emergent Lateral Canthotomy and Inferior Catholysis
- Event-related Potentials and the Oddball Task
- Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction
- Eye Exam
- Eye Tracking in Cognitive Experiments
- Fear Conditioning
- Finding Your Blind Spot and Perceptual Filling-in
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Growing Crystals for X-ray Diffraction Analysis
- Histological Sample Preparation for Light Microscopy
- Internal Standards
- Introduction to Catalysis
- Introduction to Fluorescence Microscopy
- Introduction to Light Microscopy
- Introduction to Mass Spectrometry
- Introduction to the Spectrophotometer
- Language: The N400 in Semantic Incongruity
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy

		<ul style="list-style-type: none"> • Learning and Memory: The Remember-Know Task • MALDI-TOF Mass Spectrometry • Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain • Metabolic Labeling • Method of Standard Addition • Motion-induced Blindness • Motor Maps • Nuclear Magnetic Resonance (NMR) Spectroscopy • Nutrients in Aquatic Ecosystems • Ophthalmoscopic Examination • Percussion • Pericardiocentesis • Peripheral Vascular Exam Using a Continuous Wave Doppler • Photometric Protein Determination • Physical Properties Of Minerals I: Crystals and Cleavage • Plasmid Purification • Protein Crystallization • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Rodent Stereotaxic Surgery • Solid-Liquid Extraction • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Spatial Cueing • Spectrophotometric Determination of an Equilibrium Constant • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The Attentional Blink • The Rubber Hand Illusion • The Staircase Procedure for Finding a Perceptual Threshold • Turbidity and Total Solids in Surface Water • Ultraviolet-Visible (UV-Vis) Spectroscopy • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using GIS to Investigate Urban Forestry • Using TMS to Measure Motor Excitability During Action Observation • Visual Attention: fMRI Investigation of Object-based Attentional Control • X-ray Fluorescence (XRF) • Yeast Maintenance • fMRI: Functional Magnetic Resonance Imaging
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FOCUS / COURSE	MA.HS-ETS.	High School Technology/Engineering
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STRAND	ETS2.	Materials, Tools, and Manufacturing
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STANDARD / CONCEPT / SKILL	HS-ETS2-1(MA).	<p>Determine the best application of manufacturing processes to create parts of desired shape, size, and finish based on available resources and safety.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Saccharomyces cerevisiae</i> • Coordination Chemistry Complexes • Cyclic Voltammetry (CV) • Degassing Liquids with Freeze-Pump-Thaw Cycling • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Fractional Distillation • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • High-Performance Liquid Chromatography (HPLC) • Introduction to Catalysis • Introduction to Mass Spectrometry • Introduction to Titration • Le Châtelier's Principle • Nuclear Magnetic Resonance (NMR) Spectroscopy • Preparing Anhydrous Reagents and Equipment • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Scanning Electron Microscopy (SEM) • Schlenk Lines Transfer of Solvents • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • X-ray Fluorescence (XRF)
STANDARD / CONCEPT / SKILL	HS-ETS2-2(MA).	<p>Explain how computers and robots can be used at different stages of a manufacturing system, typically for jobs that are repetitive, very small, or very dangerous.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Saccharomyces cerevisiae</i> • Coordination Chemistry Complexes • Cyclic Voltammetry (CV) • Degassing Liquids with Freeze-Pump-Thaw Cycling • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Fractional Distillation • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • High-Performance Liquid Chromatography (HPLC) • Introduction to Catalysis • Introduction to Mass Spectrometry • Introduction to Titration • Le Châtelier's Principle

		<ul style="list-style-type: none"> • Nuclear Magnetic Resonance (NMR) Spectroscopy • Preparing Anhydrous Reagents and Equipment • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Scanning Electron Microscopy (SEM) • Schlenk Lines Transfer of Solvents • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • X-ray Fluorescence (XRF)
<p>STANDARD / CONCEPT / SKILL</p>	<p>HS-ETS2-3(MA).</p>	<p>Compare the costs and benefits of custom versus mass production based on qualities of the desired product, the cost of each unit to produce, and the number of units needed.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Saccharomyces cerevisiae • Coordination Chemistry Complexes • Cyclic Voltammetry (CV) • Degassing Liquids with Freeze-Pump-Thaw Cycling • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Fractional Distillation • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • High-Performance Liquid Chromatography (HPLC) • Introduction to Catalysis • Introduction to Mass Spectrometry • Introduction to Titration • Le Châtelier's Principle • Nuclear Magnetic Resonance (NMR) Spectroscopy • Preparing Anhydrous Reagents and Equipment • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Scanning Electron Microscopy (SEM) • Schlenk Lines Transfer of Solvents • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • X-ray Fluorescence (XRF)
<p>STANDARD / CONCEPT / SKILL</p>	<p>HS-ETS2-4(MA).</p>	<p>Explain how manufacturing processes transform material properties to meet a specified purpose or function. Recognize that new materials can be synthesized through chemical and physical processes that are designed to manipulate material properties to meet a desired performance condition.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Saccharomyces cerevisiae • Coordination Chemistry Complexes • Cyclic Voltammetry (CV)

		<ul style="list-style-type: none"> • Degassing Liquids with Freeze-Pump-Thaw Cycling • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Fractional Distillation • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • High-Performance Liquid Chromatography (HPLC) • Introduction to Catalysis • Introduction to Mass Spectrometry • Introduction to Titration • Le Châtelier's Principle • Nuclear Magnetic Resonance (NMR) Spectroscopy • Preparing Anhydrous Reagents and Equipment • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Scanning Electron Microscopy (SEM) • Schlenk Lines Transfer of Solvents • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • X-ray Fluorescence (XRF)
FOCUS / COURSE	MA.HS-ETS.	High School Technology/Engineering
STRAND	ETS3.	Technological Systems
STANDARD / CONCEPT / SKILL	HS-ETS3-1(MA).	<p>Model a technological system in which the output of one subsystem becomes the input to other subsystems.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • fMRI: Functional Magnetic Resonance Imaging
STANDARD / CONCEPT / SKILL	HS-ETS3-2(MA).	<p>Use a model to explain how information transmitted via digital and analog signals travels through the following media: electrical wire, optical fiber, air, and space. Analyze a communication problem and determine the best mode of delivery for the communication(s).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Using GIS to Investigate Urban Forestry
FOCUS / COURSE	MA.HS-ETS.	High School Technology/Engineering
STRAND	ETS4.	Energy and Power Technologies
STANDARD / CONCEPT / SKILL	HS-ETS4-1(MA).	<p>Research and describe various ways that humans use energy and power systems to harness resources to accomplish tasks effectively and efficiently.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Proton Exchange Membrane Fuel Cells • Raman Spectroscopy for Chemical Analysis

STANDARD / CONCEPT / SKILL	HS-ETS4-2(MA).	<p>Use a model to explain differences between open fluid systems and closed fluid systems. Determine when it is more or less appropriate to use one type of system instead of the other.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining the Density of a Solid and Liquid
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Grade: 9 - Adopted: 2010

FOCUS / COURSE	MA.RST.9-10.	Reading Standards for Literacy in Science and Technical Subjects
STRAND		Craft and Structure
STANDARD / CONCEPT / SKILL	RST.9-10.4.	<p>Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to Working in the Hood • An Introduction to the Centrifuge

- An Introduction to the Chick: *Gallus gallus domesticus*
- An Introduction to the Laboratory Mouse: *Mus musculus*
- An Introduction to the Micropipettor
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- **Making a Geologic Cross Section**
- **Male Rectal Exam**
- **Manipulating an Independent Variable through Embodiment**

Embodiment

- **Measuring Children's Trust in Testimony**
- **Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain**

Morphometry: The Musical Brain

- **Measuring Mass in the Laboratory**
- **Measuring Reaction Time and Donders' Method of Subtraction**

Subtraction

- **Measuring Tropospheric Ozone**
- **Measuring Verbal Working Memory Span**
- **Measuring Vital Signs**
- **Memory Development: Demonstrating How Repeated Questioning Leads to False Memories**

Questioning Leads to False Memories

- **Mental Rotation**
- **Metabolic Labeling**
- **Metacognitive Development: How Children Estimate Their Memory**

Their Memory

- **Method of Standard Addition**
- **Modeling Social Stress**
- **Molecular Cloning**
- **Motion-induced Blindness**
- **Motor Exam I**
- **Motor Exam II**
- **Motor Learning in Mirror Drawing**
- **Motor Maps**
- **Mouse Genotyping**
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- **Murine In Utero Electroporation**
- **Mutual Exclusivity: How Children Learn the Meanings of Words**

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- **Neck Exam**
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Temporizing Tension Pneumothorax Treatment

- **Neuronal Transfection Methods**
- **Nose, Sinuses, Oral Cavity and Pharynx Exam**
- **Nuclear Magnetic Resonance (NMR) Spectroscopy**
- **Numerical Cognition: More or Less**

- **Nutrients in Aquatic Ecosystems**
- **Object Substitution Masking**
- **Observation and Inspection**
- **Observational Research**
- **Ophthalmoscopic Examination**
- **PCR: The Polymerase Chain Reaction**
- **Palpation**
- **Passaging Cells**
- **Patch Clamp Electrophysiology**
- **Pelvic Exam I: Assessment of the External Genitalia**
- **Pelvic Exam II: Speculum Exam**
- **Pelvic Exam III: Bimanual and Rectovaginal Exam**
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- **Percutaneous Cricothyrotomy (Seldinger Technique)**
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- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
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- **Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium**
- **Solid-Liquid Extraction**
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- **Sonication Extraction of Lipid Biomarkers from Sediment**
- **Soxhlet Extraction of Lipid Biomarkers from Sediment**
- **Spatial Cueing**
- **Spatial Memory Testing Using Mazes**
- **Spectrophotometric Determination of an Equilibrium Constant**
- **Sterile Tissue Harvest**
- **Surface Plasmon Resonance (SPR)**
- **Surgical Cricothyrotomy**
- **Tandem Mass Spectrometry**
- **Testing For Genetically Modified Foods**
- **The ATP Bioluminescence Assay**
- **The Ames Room**
- **The Attentional Blink**
- **The Costs and Benefits of Natural Pedagogy**
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- **The Ideal Gas Law**
- **The Inverted-face Effect**
- **The McGurk Effect**
- **The Morris Water Maze**
- **The Multi-group Experiment**
- **The Precision of Visual Working Memory with Delayed**

Estimation

- **The Rouge Test: Searching for a Sense of Self**
- **The Rubber Hand Illusion**
- **The Simple Experiment: Two-group Design**
- **The Split Brain**
- **The Staircase Procedure for Finding a Perceptual Threshold**
- **The TUNEL Assay**
- **The Transwell Migration Assay**
- **The Western Blot**
- **Thyroid Exam**
- **Tissue Regeneration with Somatic Stem Cells**
- **Transplantation Studies**
- **Tree Identification: How To Use a Dichotomous Key**
- **Tree Survey: Point-Centered Quarter Sampling Method**
- **Turbidity and Total Solids in Surface Water**
- **Two-Dimensional Gel Electrophoresis**
- **Ultraviolet-Visible (UV-Vis) Spectroscopy**
- **Understanding Concentration and Measuring Volumes**
- **Using Differential Scanning Calorimetry to Measure Changes in Enthalpy**
- **Using Diffusion Tensor Imaging in Traumatic Brain Injury**
- **Using GIS to Investigate Urban Forestry**
- **Using TMS to Measure Motor Excitability During Action Observation**
- **Using Topographic Maps to Generate Topographic Profiles**
- **Using Your Head: Measuring Infants' Rational Imitation of Actions**
- **Using a pH Meter**
- **Verbal Priming**
- **Visual Attention: fMRI Investigation of Object-based Attentional Control**
- **Visual Search for Features and Conjunctions**
- **Visual Statistical Learning**
- **Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy**
- **Water Quality Analysis via Indicator Organisms**
- **Whole-Mount In Situ Hybridization**
- **Within-subjects Repeated-measures Design**
- **X-ray Fluorescence (XRF)**
- **Yeast Maintenance**
- **Yeast Reproduction**
- **Yeast Transformation and Cloning**
- **Zebrafish Breeding and Embryo Handling**
- **Zebrafish Maintenance and Husbandry**
- **Zebrafish Microinjection Techniques**
- **Zebrafish Reproduction and Development**
- **fMRI: Functional Magnetic Resonance Imaging**

STANDARD / CONCEPT / SKILL	RST.9-10.5.	<p>Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).</p> <p>JoVE</p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to Working in the Hood • An Introduction to the Centrifuge • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Micropipettor • An Introduction to the Zebrafish: Danio rerio • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • An Overview of bGDGT Biomarker Analysis for
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- The ELISA Method
- The Factorial Experiment
- The Ideal Gas Law
- The Inverted-face Effect
- The McGurk Effect
- The Morris Water Maze
- The Multi-group Experiment
- The Precision of Visual Working Memory with Delayed Estimation
- The Rouge Test: Searching for a Sense of Self
- The Rubber Hand Illusion
- The Simple Experiment: Two-group Design
- The Split Brain
- The Staircase Procedure for Finding a Perceptual

		<p>Threshold</p> <ul style="list-style-type: none"> • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Thyroid Exam • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy • Understanding Concentration and Measuring Volumes • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using GIS to Investigate Urban Forestry • Using TMS to Measure Motor Excitability During Action Observation • Using Topographic Maps to Generate Topographic Profiles • Using Your Head: Measuring Infants' Rational Imitation of Actions • Using a pH Meter • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Whole-Mount In Situ Hybridization • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF) • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
FOCUS / COURSE	MA.RST.9-10.	Reading Standards for Literacy in Science and Technical Subjects
STRAND		Integration of Knowledge and Ideas
STANDARD / CONCEPT / SKILL	RST.9-10.7.	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

JoVE

- **Algae Enumeration via Culturable Methodology**
- **An Introduction to Aging and Regeneration**
- **An Introduction to Behavioral Neuroscience**
- **An Introduction to Caenorhabditis elegans**
- **An Introduction to Cell Division**
- **An Introduction to Cell Metabolism**
- **An Introduction to Cognition**
- **An Introduction to Developmental Neurobiology**
- **An Introduction to Drosophila melanogaster**
- **An Introduction to Endocytosis and Exocytosis**
- **An Introduction to Learning and Memory**
- **An Introduction to Modeling Behavioral Disorders and Stress**
- **An Introduction to Motor Control**
- **An Introduction to Neurophysiology**
- **An Introduction to Reward and Addiction**
- **An Overview of Alkenone Biomarker Analysis for Paleothermometry**
- **An Overview of Genetic Analysis**
- **An Overview of Genetics and Disease**
- **An Overview of bGDGT Biomarker Analysis for Paleoclimatology**
- **Analysis of Earthworm Populations in Soil**
- **Annexin V and Propidium Iodide Labeling**
- **Anterograde Amnesia**
- **Anxiety Testing**
- **Approximate Number Sense Test**
- **Are You Smart or Hardworking? How Praise Influences Children's Motivation**
- **Assembly of a Reflux System for Heated Chemical Reactions**
- **Assessing Dexterity with Reaching Tasks**
- **Bacterial Growth Curve Analysis and its Environmental Applications**
- **Balance and Coordination Testing**
- **Basic Mouse Care and Maintenance**
- **Binocular Rivalry**
- **Biofuels: Producing Ethanol from Cellulosic Material**
- **Blood Pressure Measurement**
- **C. elegans Chemotaxis Assay**
- **Calcium Imaging in Neurons**
- **Calibration Curves**
- **Capillary Electrophoresis (CE)**
- **Carbon and Nitrogen Analysis of Environmental Samples**
- **Categories and Inductive Inferences**
- **Cell Cycle Analysis**
- **Cell-surface Biotinylation Assay**
- **Children's Reliance on Artist Intentions When Identifying Pictures**

- Chromatin Immunoprecipitation
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Column Chromatography
- Community DNA Extraction from Bacterial Colonies
- Conducting Reactions Below Room Temperature
- Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry
- Coordination Chemistry Complexes
- Crowding
- Culturing and Enumerating Bacteria from Soil Samples
- Cyclic Voltammetry (CV)
- DNA Methylation Analysis
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Degassing Liquids with Freeze-Pump-Thaw Cycling
- Density Gradient Ultracentrifugation
- Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis
- Detecting Reactive Oxygen Species
- Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy
- Determination of Moisture Content in Soil
- Determining Rate Laws and the Order of Reaction
- Determining Spatial Orientation of Rock Layers with the Brunton Compass
- Determining the Density of a Solid and Liquid
- Determining the Empirical Formula
- Determining the Mass Percent Composition in an Aqueous Solution
- Determining the Solubility Rules of Ionic Compounds
- Development and Reproduction of the Laboratory Mouse
- Dialysis: Diffusion Based Separation
- Dichotic Listening
- Dissolved Oxygen in Surface Water
- Drosophila Development and Reproduction
- Electro-encephalography (EEG)
- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Electrophoretic Mobility Shift Assay (EMSA)
- Enzyme Assays and Kinetics
- Ethics in Psychology Research
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Experimentation using a Confederate
- Expression Profiling with Microarrays
- Extraction of Biomarkers from Sediments - Accelerated

Solvent Extraction

- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- From Theory to Design: The Role of Creativity in Designing Experiments
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Screens
- Growing Crystals for X-ray Diffraction Analysis
- Habituation: Studying Infants Before They Can Talk
- High-Performance Liquid Chromatography (HPLC)
- How Children Solve Problems Using Causal Reasoning
- Ideal Gas Law
- Igneous Intrusive Rock
- Igneous Volcanic Rock
- Inattentive Blindness
- Incidental Encoding
- Internal Standards
- Introducing Experimental Agents into the Mouse
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Introduction to Titration
- Introduction to the Microplate Reader
- Introduction to the Spectrophotometer
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Ion-Exchange Chromatography
- Isolating Nucleic Acids from Yeast
- Just-noticeable Differences
- Language: The N400 in Semantic Incongruity
- Le Châtelier's Principle
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy
- Learning and Memory: The Remember-Know Task
- MALDI-TOF Mass Spectrometry
- Making Solutions in the Laboratory
- Making a Geologic Cross Section
- Manipulating an Independent Variable through Embodiment
- Measuring Children's Trust in Testimony
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction

- Measuring Tropospheric Ozone
- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Memory Development: Demonstrating How Repeated Questioning Leads to False Memories
- Mental Rotation
- Metabolic Labeling
- Metacognitive Development: How Children Estimate Their Memory
- Method of Standard Addition
- Modeling Social Stress
- Motion-induced Blindness
- Motor Learning in Mirror Drawing
- Motor Maps
- Multiple Object Tracking
- Mutual Exclusivity: How Children Learn the Meanings of Words
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Numerical Cognition: More or Less
- Nutrients in Aquatic Ecosystems
- Object Substitution Masking
- Observational Research
- PCR: The Polymerase Chain Reaction
- Patch Clamp Electrophysiology
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Perspectives on Cognitive Psychology
- Perspectives on Neuropsychology
- Photometric Protein Determination
- Physical Properties Of Minerals I: Crystals and Cleavage
- Physical Properties Of Minerals II: Polymineralic Analysis
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Pilot Testing
- Placebos in Research
- Plasmid Purification
- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment
- Prospect Theory
- Protein Crystallization
- Proton Exchange Membrane Fuel Cells
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq

- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Realism in Experimentation
- Reconstitution of Membrane Proteins
- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Rotary Evaporation to Remove Solvent
- SNP Genotyping
- Sample Preparation for Analytical Preparation
- Scanning Electron Microscopy (SEM)
- Schlenk Lines Transfer of Solvents
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Separation of Mixtures via Precipitation
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction
- Solutions and Concentrations
- Sonication Extraction of Lipid Biomarkers from Sediment
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Surface Plasmon Resonance (SPR)
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Factorial Experiment
- The Ideal Gas Law
- The Inverted-face Effect
- The Morris Water Maze
- The Multi-group Experiment
- The Precision of Visual Working Memory with Delayed Estimation
- The Rouge Test: Searching for a Sense of Self
- The Simple Experiment: Two-group Design
- The Split Brain
- The Staircase Procedure for Finding a Perceptual Threshold
- The TUNEL Assay
- The Transwell Migration Assay
- The Western Blot
- Tree Identification: How To Use a Dichotomous Key
- Tree Survey: Point-Centered Quarter Sampling Method
- Turbidity and Total Solids in Surface Water
- Two-Dimensional Gel Electrophoresis

		<ul style="list-style-type: none"> • Ultraviolet-Visible (UV-Vis) Spectroscopy • Understanding Concentration and Measuring Volumes • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using GIS to Investigate Urban Forestry • Using TMS to Measure Motor Excitability During Action Observation • Using Topographic Maps to Generate Topographic Profiles • Using Your Head: Measuring Infants' Rational Imitation of Actions • Using a pH Meter • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF) • Yeast Maintenance • fMRI: Functional Magnetic Resonance Imaging
FOCUS / COURSE	MA.WHST.9-10.	Writing Standards for Literacy in Science and Technical Subjects
STRAND		Text Types and Purposes
STANDARD / CONCEPT / SKILL	WHST.9-10.1.	Write arguments focused on discipline-specific content.
INDICATOR	WHST.9-10.1(a)	<p>Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design
FOCUS / COURSE	MA.WHST.9-10.	Writing Standards for Literacy in Science and Technical Subjects
STRAND		Text Types and Purposes
STANDARD / CONCEPT / SKILL	WHST.9-10.2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
INDICATOR	WHST.9-10.2(a)	<p>Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to</p>

		<p>aiding comprehension.</p> <p>JoVE</p> <ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design
<p>INDICATOR</p>	<p>WHST.9-10.2(d)</p>	<p>Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to Working in the Hood • An Introduction to the Centrifuge • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Micropipettor • An Introduction to the Zebrafish: Danio rerio • An Overview of Alkenone Biomarker Analysis for Paleothermometry

- An Overview of Epigenetics
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
- An Overview of bGDGT Biomarker Analysis for Paleoclimatology
- Analysis of Earthworm Populations in Soil
- Anesthesia Induction and Maintenance
- Ankle Exam
- Annexin V and Propidium Iodide Labeling
- Anterograde Amnesia
- Anxiety Testing
- Approximate Number Sense Test
- Are You Smart or Hardworking? How Praise Influences Children's Motivation
- Arterial Line Placement
- Aseptic Technique in Environmental Science
- Assembly of a Reflux System for Heated Chemical Reactions
- Assessing Dexterity with Reaching Tasks
- Auscultation
- Bacterial Growth Curve Analysis and its Environmental Applications
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Balance and Coordination Testing
- Basic Care Procedures
- Basic Chick Care and Maintenance
- Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Basic Mouse Care and Maintenance
- Binocular Rivalry
- Biofuels: Producing Ethanol from Cellulosic Material
- Blood Pressure Measurement
- Blood Withdrawal I
- Blood Withdrawal II
- C. elegans Chemotaxis Assay
- C. elegans Development and Reproduction
- C. elegans Maintenance
- Calcium Imaging in Neurons
- Calibration Curves
- Capillary Electrophoresis (CE)
- Carbon and Nitrogen Analysis of Environmental Samples
- Cardiac Exam I: Inspection and Palpation
- Cardiac Exam II: Auscultation
- Cardiac Exam III: Abnormal Heart Sounds
- Categories and Inductive Inferences

- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chick ex ovo Culture
- Children's Reliance on Artist Intentions When Identifying Pictures
- Chromatin Immunoprecipitation
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Color Afterimages
- Column Chromatography
- Common Lab Glassware and Uses
- Community DNA Extraction from Bacterial Colonies
- Compound Administration I
- Compound Administration II
- Compound Administration III
- Compound Administration IV
- Comprehensive Breast Exam
- Conducting Reactions Below Room Temperature
- Considerations for Rodent Surgery
- Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry
- Coordination Chemistry Complexes
- Cranial Nerves Exam I (I-VI)
- Cranial Nerves Exam II (VII-XII)
- Crowding
- Culturing and Enumerating Bacteria from Soil Samples
- Cyclic Voltammetry (CV)
- Cytogenetics
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- DNA Methylation Analysis
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Degassing Liquids with Freeze-Pump-Thaw Cycling
- Density Gradient Ultracentrifugation
- Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis
- Detecting Reactive Oxygen Species
- Detection of Bacteriophages in Environmental Samples
- Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy
- Determination of Moisture Content in Soil
- Determining Rate Laws and the Order of Reaction
- Determining Spatial Orientation of Rock Layers with

	<p>the Brunton Compass</p> <ul style="list-style-type: none">• Determining the Density of a Solid and Liquid• Determining the Empirical Formula• Determining the Mass Percent Composition in an Aqueous Solution <p>Aqueous Solution</p> <ul style="list-style-type: none">• Determining the Solubility Rules of Ionic Compounds• Development and Reproduction of the Laboratory Mouse <p>Mouse</p> <ul style="list-style-type: none">• Development of the Chick• Diagnostic Necropsy and Tissue Harvest• Dialysis: Diffusion Based Separation• Dichotic Listening• Dissolved Oxygen in Surface Water• Drosophila Development and Reproduction• Drosophila Larval IHC• Drosophila Maintenance• Drosophila melanogaster Embryo and Larva Harvesting and Preparation• Ear Exam• Elbow Exam• Electro-encephalography (EEG)• Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat• Electrophoretic Mobility Shift Assay (EMSA)• Embryonic Stem Cell Culture and Differentiation• Emergency Tube Thoracostomy (Chest Tube Placement)• Emergent Lateral Canthotomy and Inferior Catholysis• Enzyme Assays and Kinetics• Ethics in Psychology Research• Event-related Potentials and the Oddball Task• Executive Function and the Dimensional Change Card Sort Task• Executive Function in Autism Spectrum Disorder• Experimentation using a Confederate• Explant Culture for Developmental Studies• Explant Culture of Neural Tissue• Expression Profiling with Microarrays• Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction• Eye Exam• Eye Tracking in Cognitive Experiments• FM Dyes in Vesicle Recycling• Fate Mapping• Fear Conditioning• Filamentous Fungi• Finding Your Blind Spot and Perceptual Filling-in• Foot Exam• Fractional Distillation• Freezing-Point Depression to Determine an Unknown Compound
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- From Theory to Design: The Role of Creativity in Designing Experiments
- Fundamentals of Breeding and Weaning
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gel Purification
- Gene Silencing with Morpholinos
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
- Habituation: Studying Infants Before They Can Talk
- Hand and Wrist Exam
- High-Performance Liquid Chromatography (HPLC)
- Hip Exam
- Histological Sample Preparation for Light Microscopy
- Histological Staining of Neural Tissue
- How Children Solve Problems Using Causal Reasoning
- Ideal Gas Law
- Igneous Intrusive Rock
- Igneous Volcanic Rock
- In ovo Electroporation of Chicken Embryos
- Inattentive Blindness
- Incidental Encoding
- Induced Pluripotency
- Internal Standards
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Introduction to Catalysis
- Introduction to Fluorescence Microscopy
- Introduction to Light Microscopy
- Introduction to Mass Spectrometry
- Introduction to Serological Pipettes and Pipettors
- Introduction to Titration
- Introduction to the Bunsen Burner
- Introduction to the Microplate Reader
- Introduction to the Spectrophotometer
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Ion-Exchange Chromatography
- Isolating Nucleic Acids from Yeast
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Just-noticeable Differences
- Knee Exam

- **Language: The N400 in Semantic Incongruity**
- **Le Châtelier's Principle**
- **Lead Analysis of Soil Using Atomic Absorption Spectroscopy**
- **Learning and Memory: The Remember-Know Task**
- **Live Cell Imaging of Mitosis**
- **Lower Back Exam**
- **Lymph Node Exam**
- **MALDI-TOF Mass Spectrometry**
- **Making Solutions in the Laboratory**
- **Making a Geologic Cross Section**
- **Male Rectal Exam**
- **Manipulating an Independent Variable through Embodiment**
- **Measuring Children's Trust in Testimony**
- **Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain**
- **Measuring Mass in the Laboratory**
- **Measuring Reaction Time and Donders' Method of Subtraction**
- **Measuring Tropospheric Ozone**
- **Measuring Verbal Working Memory Span**
- **Measuring Vital Signs**
- **Memory Development: Demonstrating How Repeated Questioning Leads to False Memories**
- **Mental Rotation**
- **Metabolic Labeling**
- **Metacognitive Development: How Children Estimate Their Memory**
- **Method of Standard Addition**
- **Modeling Social Stress**
- **Molecular Cloning**
- **Motion-induced Blindness**
- **Motor Exam I**
- **Motor Exam II**
- **Motor Learning in Mirror Drawing**
- **Motor Maps**
- **Mouse Genotyping**
- **Multiple Object Tracking**
- **Murine In Utero Electroporation**
- **Mutual Exclusivity: How Children Learn the Meanings of Words**
- **Neck Exam**
- **Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment**
- **Neuronal Transfection Methods**
- **Nose, Sinuses, Oral Cavity and Pharynx Exam**
- **Nuclear Magnetic Resonance (NMR) Spectroscopy**
- **Numerical Cognition: More or Less**
- **Nutrients in Aquatic Ecosystems**
- **Object Substitution Masking**

- Observation and Inspection
- Observational Research
- Ophthalmoscopic Examination
- PCR: The Polymerase Chain Reaction
- Palpation
- Passaging Cells
- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Perspectives on Sensation and Perception
- Photometric Protein Determination
- Physical Properties Of Minerals I: Crystals and Cleavage
- Physical Properties Of Minerals II: Polymineralic Analysis
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Pilot Testing
- Placebos in Research
- Plasmid Purification
- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment
- Primary Neuronal Cultures
- Proper Adjustment of Patient Attire during the Physical Exam
- Prospect Theory
- Protein Crystallization
- Proton Exchange Membrane Fuel Cells
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Realism in Experimentation
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins
- Regulating Temperature in the Lab: Applying Heat
- Regulating Temperature in the Lab: Preserving

Samples Using Cold

- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- Restriction Enzyme Digests
- Rodent Handling and Restraint Techniques
- Rodent Identification I
- Rodent Identification II
- Rodent Stereotaxic Surgery
- Rotary Evaporation to Remove Solvent
- SNP Genotyping
- Sample Preparation for Analytical Preparation
- Scanning Electron Microscopy (SEM)
- Schlenk Lines Transfer of Solvents
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Sensory Exam
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Shoulder Exam I
- Shoulder Exam II
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction
- Solutions and Concentrations
- Sonication Extraction of Lipid Biomarkers from Sediment
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Sterile Tissue Harvest
- Surface Plasmon Resonance (SPR)
- Surgical Cricothyrotomy
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The Ames Room
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Factorial Experiment
- The Ideal Gas Law
- The Inverted-face Effect
- The McGurk Effect
- The Morris Water Maze
- The Multi-group Experiment
- The Precision of Visual Working Memory with Delayed

Estimation

- **The Rouge Test: Searching for a Sense of Self**
- **The Rubber Hand Illusion**
- **The Simple Experiment: Two-group Design**
- **The Split Brain**
- **The Staircase Procedure for Finding a Perceptual Threshold**
- **The TUNEL Assay**
- **The Transwell Migration Assay**
- **The Western Blot**
- **Thyroid Exam**
- **Tissue Regeneration with Somatic Stem Cells**
- **Transplantation Studies**
- **Tree Identification: How To Use a Dichotomous Key**
- **Tree Survey: Point-Centered Quarter Sampling Method**
- **Turbidity and Total Solids in Surface Water**
- **Two-Dimensional Gel Electrophoresis**
- **Ultraviolet-Visible (UV-Vis) Spectroscopy**
- **Understanding Concentration and Measuring Volumes**
- **Using Differential Scanning Calorimetry to Measure Changes in Enthalpy**
- **Using Diffusion Tensor Imaging in Traumatic Brain Injury**
- **Using GIS to Investigate Urban Forestry**
- **Using TMS to Measure Motor Excitability During Action Observation**
- **Using Topographic Maps to Generate Topographic Profiles**
- **Using Your Head: Measuring Infants' Rational Imitation of Actions**
- **Using a pH Meter**
- **Verbal Priming**
- **Visual Attention: fMRI Investigation of Object-based Attentional Control**
- **Visual Search for Features and Conjunctions**
- **Visual Statistical Learning**
- **Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy**
- **Water Quality Analysis via Indicator Organisms**
- **Whole-Mount In Situ Hybridization**
- **Within-subjects Repeated-measures Design**
- **X-ray Fluorescence (XRF)**
- **Yeast Maintenance**
- **Yeast Reproduction**
- **Yeast Transformation and Cloning**
- **Zebrafish Breeding and Embryo Handling**
- **Zebrafish Maintenance and Husbandry**
- **Zebrafish Microinjection Techniques**
- **Zebrafish Reproduction and Development**
- **fMRI: Functional Magnetic Resonance Imaging**

FOCUS / COURSE	MA.WHST.9-10.	Writing Standards for Literacy in Science and Technical Subjects
STRAND		Text Types and Purposes
STANDARD / CONCEPT / SKILL	WHST.9-10.3.	(See note; not applicable as a separate requirement)
INDICATOR	WHST.9-10.3(a)	<p>Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design