

**IT'S ABOUT TIME, HERFF-JONES EDUCATION DIVISION**  
**ACTIVE PHYSICAL SCIENCE CORRELATIONS WITH OKLAHOMA'S**  
**PRIORITY ACADEMIC STUDENT SKILLS (PASS)**

Because of the nature of our guided-inquiry instructional design, in most cases students conduct investigations prior to reading the content. In some instances students learn about concepts while doing the activities and are formally introduced to the concepts afterwards while reading the content. The instructional approach used does *not* match the traditional one of reading and telling first (concept introduction), then completing worksheets and lab activities (concept practice). Our approach uses student-centered investigations to introduce the concept, with reading, group work, formal teacher/student presentations, and additional investigations as practice components.

**PHYSICAL SCIENCE**  
**High School**

**Standards for Inquiry and the Physical Sciences**

The *Priority Academic Student Skills (PASS)* should be taught by investigating broad, integrated content, concepts, and principles of major themes in the physical sciences.

**SCIENCE PROCESSES AND INQUIRY**

**Process Standard 1: Observe and Measure - Observing is the first action taken by the learner to acquire new information about an object or event. Opportunities for observation are developed through the use of a variety of scientific tools. Measurement allows observations to be quantified. The student will accomplish these objectives to meet this process standard.**

**Correlation Location:**

**4-8; 15-25; 31-44; 80-85**

**117-122; 142-146; 147-150**

**802-807**

**86-88; 88-93; 129-131**

**132-134; 142-146; 167-169**

**194-195; 634-643; 411-415**

**772-778; 777-782; 800-805**

**4-8; 15-25; 31-44; 80-85**

**117-122; 142-146; 167-169**

**208-217; 634-641**

**411-415; 433-436; 800-805**

1. Identify qualitative and quantitative changes given conditions (e.g., temperature, mass, volume, time, position, length) before, during, and after an event.

2. Use appropriate tools (e.g., metric ruler, graduated cylinder, thermometer, balances, spring scales, stopwatches) when measuring objects and/or events.

3. Use appropriate System International (SI) units (i.e., grams, meters, liters, degrees Celsius, and seconds); and SI prefixes (i.e., micro-, milli-, centi-, and kilo-) when measuring objects and/or events.

**Process Standard 2: Classify - Classifying establishes order. Objects and events are classified based on similarities, differences, and interrelationships. The student will accomplish these objectives to meet this process standard.**

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**Correlation Location:**

**644-695; 696-701; 816-824**  
**612-613**

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1. Using observable properties, place an object or event into a classification system.

**644-695; 696-701; 816-824**  
**612-613**

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2. Identify the properties by which a classification system is based.

**Process Standard 3: Experiment - Experimenting is a method of discovering information. It requires making observations and measurements to test ideas. The student will accomplish these objectives to meet this process standard.**

**Correlation Location:**

**4-8; 15-25; 31-44; 45-49**  
**50-53; 56-50; 86-88; 88-93**  
**129-131; 131-133; 142-146**  
**147-150; 160-165; 167-170**  
**184-193; 218-227; 239-250**  
**626-628; 634-661; 425-428**  
**758-760; 763-769; 772-777**  
**802-807; 472-482; 556-560**  
**576-581**

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1. Evaluate the design of a physics investigation.

**80-85; 117-119; 119-123**  
**160-165; 184-193; 218-227**  
**239-250; 634-641; 772-777**

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2. Identify the independent variables, dependent variables, and controls in an experiment.

**4-8; 15-25; 31-44; 50-52**  
**56-58; 58-60; 129-131**  
**131-133; 142-146; 147-150**  
**160-165; 533-536; 537-541**  
**472-482; 561-566**

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3. Use mathematics to show relationships within a given set of observations.

**15; 31; 45; 46-58; 58-60**  
**80-85; 117-118; 118-122**  
**129-131; 131-134; 142**  
**147; 151; 167; 208; 216**  
**533-535; 537-541; 416**  
**425; 450; 773; 576**

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4. Identify a hypothesis for a given problem in physical science investigations.

**117-118; 118-122; 232;**  
**626-633; 634-643; 644-649**  
**720-721; 417; 473; 787**

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5. Recognize potential hazards and practice safety procedures in all physical science activities.

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**Process Standard 4: Interpret and Communicate - Interpreting is the process of recognizing patterns in collected data by making inferences, predictions, or conclusions. Communicating is the process of describing, recording, and reporting experimental procedures and results to others. Communication may be oral, written, or mathematical and includes organizing ideas, using appropriate vocabulary, graphs, other visual representations, and mathematical equations. The student will accomplish these objectives to meet this process standard.**

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15; 31; 45; 46-58; 58-60  
80-85; 117-118; 118-122  
129-131; 131-134; 142  
147; 151; 167; 208; 216  
533-535; 537-541; 416  
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131-136; 159; 175; 533-536  
537-541; 602-603

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1. Select appropriate predictions based on previously observed patterns of evidence.

2. Report data in an appropriate manner.

3. Interpret data tables, line, bar, trend, and/or circle graphs.

4. Accept or reject hypotheses when given results of a physical science investigation.

5. Evaluate experimental data to draw the most logical conclusion.

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2-3; 78-79; 140-141

206-207; 394-395; 444-445

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546-547; 692-692; 745-746

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576-581

56-60; 129-134; 156-159

533-541; 634-641; 697-699

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400-401; 429-432

6. Prepare a written report describing the sequence, results, and interpretation of a physical science investigation or event.

7. Communicate or defend scientific thinking that resulted in conclusions.

8. Identify and/or create an appropriate graph or chart from collected data, tables, or written description.

**Process Standard 5: Model - Modeling is the active process of forming a mental or physical representation from data, patterns, or relationships to facilitate understanding and enhance prediction. The student will accomplish these objectives to meet this process standard.**

**Correlation Location:**

641; 708-712; 716; 726-728

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572-574

641; 708-712; 716; 726-728

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572-574

641; 708-712; 716; 726-728

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572-574

1. Interpret a model which explains a given set of observations.

2. Select predictions based on models.

3. Compare a given model to the physical world.

**Process Standard 6: Inquiry - Inquiry can be defined as the skills necessary to carry out the process of scientific or systemic thinking. In order for inquiry to occur, students must have the opportunity to ask a question, formulate a procedure, and observe phenomena. The student will accomplish these objectives to meet this process standard.**

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4-8; 15-25; 31-44; 45-49

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576-581

1. Formulate a testable hypothesis and design an appropriate experiment relating to the physical world.

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2. Design and conduct physical science investigations in which variables are identified and controlled.

3. Use a variety of technologies, such as hand tools, measuring instruments, and computers to collect, analyze, and display data.

4. Inquiries should lead to the formulation of explanations or models (physical, conceptual, and mathematical). In answering questions, students should engage in discussions (based on scientific knowledge, the use of logic, and evidence from the investigation) and arguments that encourage the revision of their explanations, leading to further inquiry.

**PHYSICAL SCIENCE**  
**High School**

**Standard 1: Structure and Properties of Matter - All matter is made up of atoms. Its structure is made up of repeating patterns and has characteristic properties. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:**

**Correlation Location:**

678-682; 702-706; 706-711  
713-715; 716-720; 558-559  
564-565; 591-592;

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1. Matter is made up of minute particles called atoms, and atoms are composed of even smaller components (i.e., protons, neutrons, and electrons).

2. An element is composed of a single type of atoms. When elements are listed in order according to the number of protons (called the atomic number), repeating patterns of physical and chemical properties identify families of elements with similar properties.

731-737; 564-565; 587-591

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**634-643; 696-671; 721-725**  
**726-730; 738-747; 785-788**  
**788-791; 612-619**

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3. Matter has characteristic properties, such as boiling points, melting points, and density, which distinguish pure substances and can be used to separate one substance from another.

**Standard 2: Motion and Forces - The motion of an object can be described by its position, direction of motion, and speed. A change in motion occurs when a net force is applied. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:**

**Correlation Location:**

**4-14; 15-25; 31-44; 45-49**  
**50-55; 61-68; 69-74; 99-104**  
**122-128; 184-191; 225**  
**15-25; 26-30; 31-44; 45-49**  
**184-191; 194-200**

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1. Objects change their motion only when a net force is applied. Laws of motion are used to determine the effects of forces on the motion of objects.
2. Gravitation is a universal force that each mass exerts on any other mass.

**Standard 3: Interactions of Energy and Matter - Energy, such as potential, kinetic, and field, interacts with matter and is transferred during these interactions. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:**

**Correlation Location:**

**30-42; 377-384; 218-227**  
**630-633; 805-807**  
**326-339; 354-361; 362-370**  
**377-385; 726-727; 609-610**

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1. All energy can be considered to be either kinetic energy, which is the energy of motion; potential energy, which depends on relative position; or energy contained by a field, such as electromagnetic waves.
2. Waves, including sounds and seismic waves, waves on water, and light waves, have energy and can transfer energy when they interact with matter (such as used in telescopes, solar power, and telecommunication technology).