

IT'S ABOUT TIME, HERFF-JONES EDUCATION DIVISION
ACTIVE PHYSICS CORESELECT 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.

PHYSICS
High School
Standards for Inquiry and Physics

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

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

86-88; 88-93; 129-131
132-134; 142-146; 167-169
194-195; 411-415; 748-751

4-8; 15-25; 31-44; 80-85
117-122; 142-146; 167-169
208-217; 703-708

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.

Correlation Location:

612-613

612-613

1. Using observable properties, place an object or event into a classification system.
2. Identify the properties by which a classification system is based.

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

614-616

3. Graphically classify physical relationships (e.g., linear, parabolic, inverse)

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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776**

1. Evaluate the design of a physics investigation.

**80-85; 117-119; 119-123
160-165; 184-193; 218-227
239-250; 709-712**

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; 697-702;
777-780**

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; 709; 725; 771**

4. Identify a hypothesis for a given problem in physics investigations.

**117-118; 118-122; 232;
417; 473; 749**

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

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.

Correlation Location:

**15; 31; 45; 46-58; 58-60
80-85; 117-118; 118-122**

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

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

129-131; 131-134; 142
147; 151; 167; 208; 216
533-535; 537-541; 416
425; 450; 576

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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776

56-58; 58-60; 129-131
131-136; 159; 175; 533-536
537-541; 602-603

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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776

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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776

2-3; 78-79; 140-141
206-207; 394-395; 444-445
546-547; 692-693; 746-747

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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776

56-60; 129-134; 156-159
400-401; 429-432; 533-541
759-761

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 physics investigation.

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

6. Prepare a written report describing the sequence, results, and interpretation of a physics 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.

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

Correlation Location:

**86-93; 147-150; 151-155;
171-175; 229-255; 572-574**

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

**86-93; 147-150; 151-155;
171-175; 229-255; 572-574**

2. Select predictions based on models.

**86-93; 147-150; 151-155;
171-175; 229-255; 572-574**

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.

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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776**

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

**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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776**

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

**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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776**

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

**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
472-482; 556-560; 576-581;
709-712; 725-729; 748-749;
771-776**

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.

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

PHYSICS
High School

Standard 1: Motions 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 and inquiry 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; 194-202
225; 253-265; 703-707

15-25; 26-30; 31-44; 45-49
50-60; 184-191; 194-200
253-258; 703-707

450-454; 472-485; 551-555
605-611; 612-619; 587-594
716-720; 726-730; 748-753
755-766; 779-784; 785-791

450-454; 455-462; 472-485
517-520; 521-525; 526-532
533-538

1. Objects change their motion only when a net force is applied. Newton's laws of motion are used to calculate precisely the effects of forces on the motion of objects.

2. Gravitation is a universal force that each mass exerts on any other mass. The strength of the gravitational attractive force between two masses is proportional to the masses and inversely proportional to the square of the distance between them.

3. The electric force is a universal force that exists between any two charged objects. The strength of the force is proportional to the charges and, as with gravitation, inversely proportional to the square of the distance between them.

4. Electricity and magnetism are two aspects of a single electromagnetic force.

Standard 2: Conservation of Energy - The total energy of the universe is constant. The student will engage in investigations that integrate the process and inquiry standards and lead to the discovery of the following objectives:

Correlation Location:

35-44; 234-238; 416-420
433-440; 486-497; 512-516

30-42; 377-384; 218-227
630-633; 716-717; 805-807

411-415; 416-420; 433-436
437-440; 489-497

1. Energy can be transferred but never destroyed. As these transfers occur, the matter involved becomes steadily less ordered.

2. All energy can be considered to be kinetic energy, potential energy, or energy contained by a field.

3. Heat consists of random motion and the vibrations of atoms, molecules, and ions. The higher the temperature, the greater the atomic or molecular motion.

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

Correlation Location:

326-339; 354-361; 362-370
377-385; 726-727; 609-610

1. Waves have energy and can transfer energy when they interact with matter. Sound waves and electromagnetic waves are fundamentally different.

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

647; 650-655; 678-682
683-688; 766-770; 774-776

2. Electromagnetic waves result when a charged object is accelerated or decelerated.