

Wallenpaupack Area School District

COURSE: Principles of Technology I

GRADE LEVEL: 10-12

LENGTH OF COURSE: 120 hours

TEXT: Principles of Technology, second edition

PUBLISHER: CORD

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COURSE DESCRIPTION:

This course is designed to allow students to apply scientific training in the following areas: force, work, rate, resistance, energy, and power and force transformers. Students will use these principles where applicable in a hands-on approach in mechanical, fluid, electrical and thermal systems.

CURRICULUM WRITING TEAM:

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August 2004

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: Grade 10 – 12

Unit: Laboratory Skills

PA Standards: 3.2.10.B
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics: Measurement Linear Mass Temperature Volume Force	Skills: Know correct use of measurement equipment Perform correct laboratory techniques
Activities: Learning and exercises in using various measurement devices: triple beam balance, spring scales, thermometers, graduated cylinder, pressure gauges and force scales Cooperative learning groups Board demonstrations Guided practice Homework	Performance Assessments: Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Laboratory skills, equipment identification, use of and safety factors involved with equipment

PA Standards: 3.1.10.A
3.1.10.C
3.1.12.C

Topics:	Skills:
Trainer introduction Mechanical bread boarding Circuit construction Safety in mechanical and electrical systems Laboratory hazards	Equipment inventory Mounting mechanical components to breadboard Identifying correct and incorrect wiring procedures Safeguards commonly used when working with electricity Recognize hazards associated with mechanical moving parts
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Force, Torque and Vectors

PA Standards: 3.1.10.D
3.1.10.E
3.1.12.D
3.1.12.E
3.2.10.C
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
Vectors Measuring and drawing vectors in the metric system Problem solving and dimensional analysis Measuring torque	Setting a scale and maintaining it Using a protractor Drawing a vector on graph paper Finding a resultant
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Force in Fluid Systems

PA Standards: 3.1.10.B
3.1.10.C
3.1.10.D
3.1.12.C
3.1.12.D
3.4.10.A
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
Pressure in fluid systems Specific gravity Pressure	Measure pressure using various devices Measure specific gravity and density
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Force in Electrical Systems

PA Standards: 3.1.10.B
3.1.10.C
3.1.10.D
3.1.12.C
3.1.12.D
3.1.12.E
3.2.12.A
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
Electrical forces Voltage Current AC and DC circuits Series and parallel circuits	Measure voltages using voltmeters Measure current using ammeters
Activities:	Performance Assessments:
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Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Force in Thermal Systems

PA Standards: 3.1.10.B
3.1.10.C
3.1.12.C
3.4.10.C
3.4.12.C

Topics:	Skills:
Scaled thermometers Unscaled thermometers Thermocouples	Measure temperature using scaled and unscaled thermometers Making a scaled thermometer Measuring temperature using a thermocouple
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Work in Mechanical Systems

PA Standards: 3.1.10.C
3.1.12.C
3.4.10.C
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
Work in mechanical systems Pulleys winches	Metric units of work Measuring force and distance and calculating work done Operation of a winch
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

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Course: Principles of Technology I

Grade Level: 10-12

Unit: Work done in Fluid Systems

PA Standards: 3.1.10.B
3.1.10.C
3.4.10.C
3.4.12.C

Topics:	Skills:
Work done by a piston, pump, motor and solenoid	Measure work done by using a piston, winch, motor and solenoid
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Rate

PA Standards: 3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics:	Skills:
Rate in mechanical systems Introduction of term and demonstration of how it is measured	Measuring linear rate on conveyers Measuring rate with a stroboscope
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

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Course: Principles of Technology I

Grade Level: 10-12

Unit: Rate in Fluid Systems

PA Standards: 3.4.10.A
3.4.12.A
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics:	Skills:
Liquid flow rate in a channel Gas flow rates with an orifice	Measure the flow rate in a channel Measure gas flow rate
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

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Grade Level: 10-12

Unit: Rate in Electrical Systems

PA Standards: 3.2.10.B

3.2.12.B

3.4.10.A

3.4.12.A

Topics:	Skills:
Measuring, current, voltage and frequency	Measure current and voltage with an AC/DC ammeter Measure frequency with an oscilloscope
Activities:	Performance Assessments:
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Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Resistance in Mechanical Systems

PA Standards: 3.1.10.E
 3.1.12.E
 3.4.12.A
 3.7.10.A
 3.7.10.B
 3.7.12.A
 3.7.12.B

Topics:	Skills:
Measuring resistance in mechanical systems Friction Streamlining to reduce friction	Measure resistance in mechanical friction systems Measuring the reduced effects of streamlining on air friction
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Resistance in Fluid Systems

PA Standards: 3.1.10.E
3.1.12.E
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics:	Skills:
Measuring resistance in fluid systems and air filters	Measure the resistance that liquids experience when the flow Measure the resistance that a filter presents to the flow of air
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

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Course: Principles of Technology I

Grade Level: 10-12

Unit: Resistance in Electrical Systems

PA Standards: 3.2.10.C
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
Ohm's Law and series circuits Ohm's Law and parallel circuits	Determine resistance of a resistor using the universal color code Measure the resistance of a resistor using an Ohmmeter Calculate the total resistance in series and parallel circuits
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Course: Principles of Technology I

Grade Level: 10-12

Unit: Resistance in Thermal Systems

PA Standards: 3.1.10.E
3.1.12.E
3.2.10.C
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
Insulating materials resist flow of heat Effectiveness of thermal insulating materials	Measure temperature differences using thermocouples and scaled thermometers Determine the effectiveness of thermal insulation materials Measure heat loss in a system
Activities:	Performance Assessments:
Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework	Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

Wallenpaupack Area School District

Course: Principles of Technology I

Grade Level: 10-12

Unit: Energy

PA Standards: 3.1.10.D
 3.2.10.C
 3.4.10.B
 3.4.12.B
 3.7.10.A
 3.7.10.B
 3.7.12.A

Topics:	Skills:
<ul style="list-style-type: none"> Energy in mechanical and fluid systems Potential and kinetic energy Work and efficiency 	<ul style="list-style-type: none"> Understanding potential and kinetic energy systems Measure energy and work Compare energy expended to work accomplished/efficiency Measure the potential energy of a spring Measure the kinetic energy of a rotating flywheel
Activities:	Performance Assessments:
<ul style="list-style-type: none"> Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework 	<ul style="list-style-type: none"> Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam

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Course: Principles of Technology I

Grade Level: 10-12

Unit: Energy in Electrical Systems

PA Standards: 3.1.10.E
3.1.12.E
3.2.10.C
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
Potential energy in electrical systems Capacitors Inductors and inductance	Measure the energy stored in a capacitor Use the equation $E = 1/2CVV$ to calculate the energy stored in a capacitor Measure the electrical energy stored in an inductor
Activities:	Performance Assessments:
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Grade Level: 10-12

Unit: Energy in Thermal Systems

PA Standards: 3.1.10.E
 3.1.12.E
 3.2.10.C
 3.4.10.B
 3.4.12.B
 3.7.10.A
 3.7.10.B
 3.7.12.A

Topics:	Skills:
<ul style="list-style-type: none"> Thermal energy and thermal work Energy transferred between objects Temperature differences and energy transfer Specific heat of a metal Equilibrium temperature of a mixture 	<ul style="list-style-type: none"> Measure the transfer of heat energy Describe how heat energy changes states form solids to liquid to gases and back again Measure and calculate the specific heat of a metal Measure the equilibrium temperature of a mixture and compare this temperature to the expected equilibrium temperature
Activities:	Performance Assessments:
<ul style="list-style-type: none"> Laboratory work in laboratory groups Group projects and individual projects Cooperative learning groups Board demonstrations Guided practice Homework 	<ul style="list-style-type: none"> Teacher made chapter tests and quizzes Student notebook Projects (individual and group) Laboratory work and reports Final Exam