Physics with Technology

Exam Information

Exam number
6961

Items
33

Points
34

Prerequisites
None

Recommended course length
One year

National Career Cluster
Science, Technology, Engineering, & Mathematics

Performance standards
Included (Optional)

Certificate available
Yes

Description

The Physics with Technology industry certification exam assesses a hands-on learning approach to studying the principles of force, work, rate, resistance, and energy as they relate to four energy systems: mechanical, fluid, electrical, and thermal. The exam evaluates learners' skills through lab activities that are designed to provide essential skills for technical and engineering professions. Learners demonstrate their understanding of these principles and their application in practical scenarios. Participation in the Technology Student Association (TSA) is encouraged but not required.

Exam Blueprint

Standard	Percentage of exam
1. Reporting & interpreting data	11%
2. Measuring in linear or rotational motion	15%
3. Forces & acceleration	15%
4. Energy & efficiency	15%
5. Voltage & current in circuits	22%
6. Characteristics of waves	11%
7. Thermal properties	11%

Standard 1

Students will report and interpret data appropriately

Objective 1 Obey all applicable lab safety policies and precautions.

Objective 2 Successfully interpret and accurately follow technical instruction.

Objective 3 Correctly identify variables in experiments.

Objective 4 Select and correctly use appropriate measurement tools to measure physical properties.

Objective 5 Properly report and record measured data.

Objective 6 Create and appropriately label a graph of measured data.

Objective 7 Correctly interpret the graphical representation of data.

Objective 8 Follow a problem-solving method to form an appropriate conclusion.

Standard 1 Performance Evaluation included below (Optional)

Standard 2

Students will measure and analyze objects in linear or rotational motion

Objective 1 Accurately measure time.

Objective 2 Accurately measure displacement.

Objective 3 Use an appropriate math formula to calculate velocity.

Standard 2 Performance Evaluation included below (Optional)

Standard 3

Students will correctly identify and measure forces and calculate acceleration

Objective 1 Create simple free body diagrams and identify the forces.

Objective 2 Measure mass and force.

Objective 3 Use an appropriate math formula to calculate acceleration.

Standard 3 Performance Evaluation included below (Optional)

Standard 4

Students will correctly identify and measure forces and calculate acceleration

Objective 1 Determine kinetic, gravitational, elastic, and dissipated energy.

Objective 2 Calculate work in, work out, and efficiency.

Objective 3 Explain energy loss in terms of the Law of Conservation of Energy.

Standard 4 Performance Evaluation included below (Optional)

Standard 5

Students will determine both voltage and current in circuits

Objective 1 Diagram and analyze series and parallel circuits.

Objective 2 Calculate voltage in parallel circuits.

Objective 3 **Calculate amperage in series circuits.**

Objective 4 Correctly measure resistance, voltage, and amperage in circuits using a multimeter.

Standard 5 Performance Evaluation included below (Optional)

Standard 6

Students will observe, analyze, and report characteristics of waves

Objective 1 Determine the amplitude of a wave using an oscilloscope or a simulator.

Objective 2 Determine the frequency of a wave using an oscilloscope or a simulator.

Objective 3 Use an appropriate formula to calculate the period of a wave.

Standard 6 Performance Evaluation included below (Optional)

Standard 7

Students will measure changes in thermal properties (heating or cooling)

Objective 1 Correctly use temperature measuring devices.

Objective 2 Accurately record temperature data over time in a graph, table, or chart.

Objective 3 Observe and record changes of state.

Objective 4 Calculate heat flow and heat loss/gain.

Standard 7 Performance Evaluation included below (Optional)

Physics with Technology

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of 8 or higher on the rating scale. Students may be encouraged to repeat the objectives until they average 8 or higher.

Student's Name: _____

Class: _____

Performance standards rating scale

0	Limited skills	2	→	4	Moderate skills	6	→	8	High skills	10

Standard 1 – Report and Interpret Data Appropriately Score:

- Obey all applicable lab safely policies and precautions
- Successfully interpret and accurately follow technical instruction
- Correctly identify variable in experiments
- Select and correctly use appropriate measurement tools to measure physical properties
- Properly report and record measured data
- Create and appropriately label a graph of measured data
- Follow a problem-solving method to form an appropriate conclusion

Standard 2 – Measuring objects in a Linear or Rotational Motion Score:

- Accurately measure time
- Accurately measure displacement
- Use an appropriate math formula to form an appropriate conclusion

Standard 3 – Measuring Forces and Calculating Acceleration Score:

- Create simple free body diagrams and identify the forces
- Measure mass and force
- Use an appropriate math formula to calculate acceleration

Standard 4 – Energy and Efficiency of a System Score:

- Determine kinetic, gravitational, elastic, and dissipated energy
- Calculate work in, work out, efficiency
- Explain energy loss in terms of the Law of Conservation of Energy

Standard 5 – Voltage and Current in Circuits Score:

- Diagram and analyze series and parallel circuits
- Calculate voltage in parallel circuits
- Calculate amperage in series circuits
- Correctly measure resistance, voltage, and amperage in circuits using a multimeter

Standard 6 – Characteristic of Waves Score:

- Determine the amplitude of a wave using an oscilloscope or a simulator
- Determine the frequency of a wave using an oscilloscope or a simulator
- Use an appropriate formula to calculate the period of a wave

Standard 7 – Thermal Properties (Heating or Cooling) Score:

- Correctly use temperature measuring devices
- Accurately record temperature data over time in graph, table, or chart
- Observe and record changes of state
- Calculate heat flow and heat loss/gain

Performance standard average score:

Evaluator Name: _____

Evaluator Title: _____

Evaluator Signature: _____

Date: _____