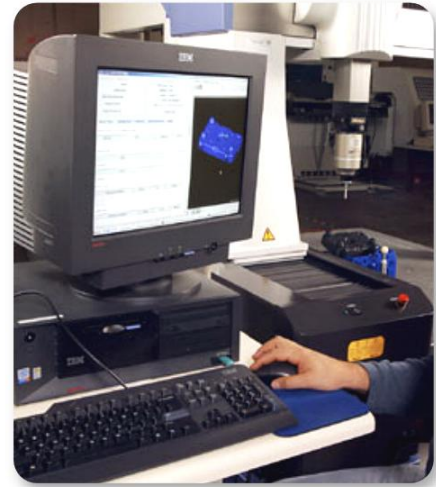




## Specific Competencies and Skills Tested in this Assessment:

### Overview of Engineering

- Describe major engineering fields
- Identify functions an engineer performs
- Describe education required to be an engineer
- Identify ethics related to engineering situations
- Describe relationships between the engineer and other technical personnel
- Identify the progression of the engineering field



### Design Process/Problem Solving

- Identify principles of the problem solving process
- Outline the steps in the design process
- Translate word problems into mathematical statements
- Analyze solutions, identifying strengths and weaknesses
- Develop details of a solution
- Develop, test, and redesign prototypes



### Manufacturing

- Explain components of set up, machining, casting, molding, welding, and finishing
- Identify and use common hand tools
- Identify and properly use fasteners
- Estimate and measure the size of objects using SI and US units
- Explain the role of quality control in manufacturing
- Measure with precision tools and instruments

### Assembly and Fabrication

- Explain the role of quality control in assembly and fabrication
- Identify situations of supplying and outsourcing
- Identify the order and methodology of the assembly process

**Specific Competencies and Skills continued:****Materials**

- Identify common materials
- Compare and contrast physical properties of materials
- Select correct materials for specific functions
- Test materials for specific characteristics

**Communication and Teamwork**

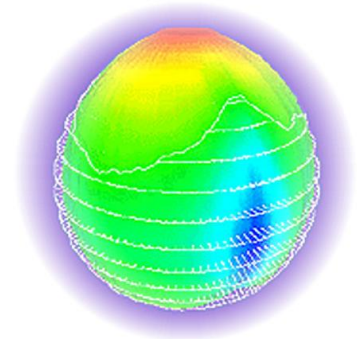
- Read and understand design documentation and technical manuals
- Write technical reports
- Make an oral presentation
- Interpret critical aspects and/or types of engineering drawings and plans
- Express data in tables, graphs, and charts
- Contribute to a team project

**Safety**

- Exhibit knowledge of appropriate personal safety procedures
- Describe the role of OSHA in the technical workplace
- Describe and use safety equipment
- Describe the function of safety devices

**Engineering Systems**

- Solve problems using vectoring, predict resultant forces
- Demonstrate the effect of resistance
- Apply Ohm's Law, Watt's Law, and Kirchoff's Law
- Identify series, parallel, and combination circuits
- Apply knowledge of AC and DC systems
- Identify what causes resistance in a fluid system
- Apply knowledge of hydraulic and pneumatic systems
- Identify the three ways heat is transferred
- Explain the difference between Celsius and Fahrenheit scales
- Describe heat conductors and insulators
- Solve thermal problems using appropriate units



***Specific Competencies and Skills continued:***

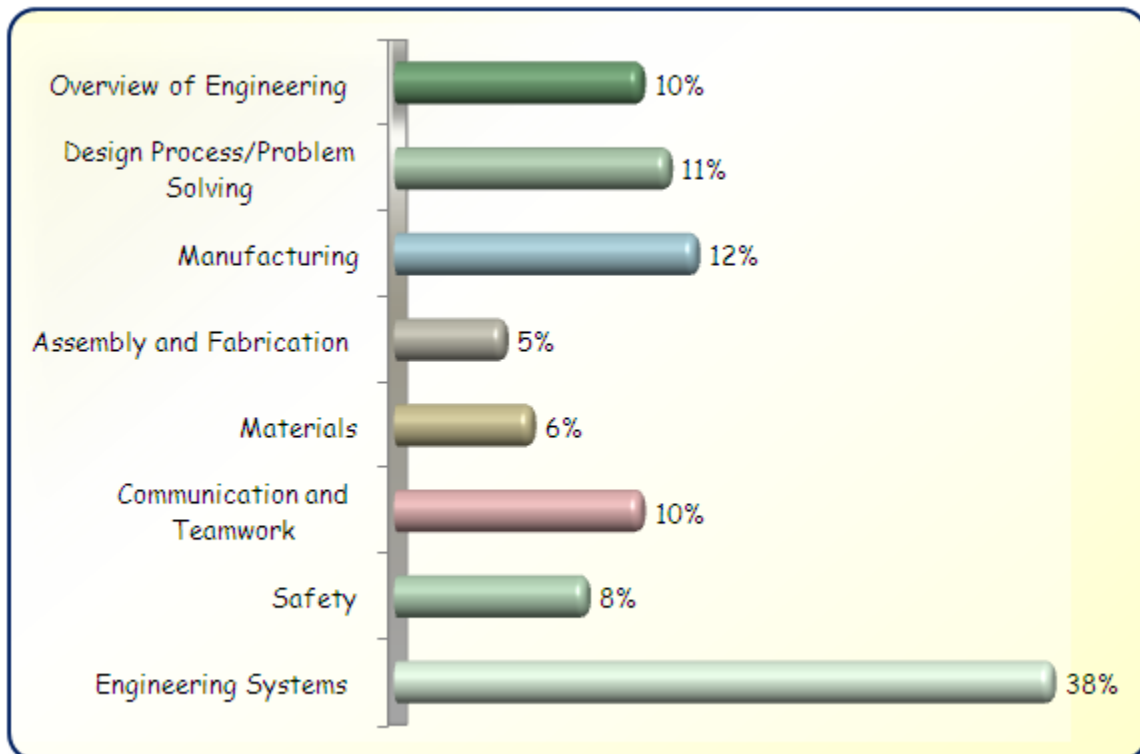
- Identify the six simple machines and their applications
- Solve problems using appropriate units in engineering systems
- Identify the uses and types of inductors and capacitors
- Use appropriate electrical units to solve problems
- Draw a circuit diagram and lay out the circuit
- Identify the difference between analog and digital signals
- Identify direction of heat flow given differences in temperature
- Understand the use of insulation to minimize heat flow
- Identify electrical components and their functions

## Written Assessment:

Administration Time: 3 hours

Number of Questions: 202

### Areas Covered:



## Sample Questions:

Which of the following is a method of prototype testing?

- A. destructive
- B. visualization
- C. brainstorming
- D. manufacturing

What is the approximate piston area for a 5-inch diameter cylinder?

- A. 3.93 square inches
- B. 15.7 square inches
- C. 19.6 square inches
- D. 78.5 square inches

A protractor can measure

- A. volume
- B. angles
- C. polygons
- D. area

Which of the following is a ferrous metal?

- A. aluminum
- B. copper
- C. magnesium
- D. mild steel

Winds blowing west at a speed of 10 to 15 mph are called

- A. scalars
- B. vectors
- C. directons
- D. magnitudes



## Performance Assessment:

**Administration Time:** 3 hours and 30 minutes

**Number of Jobs:** 2

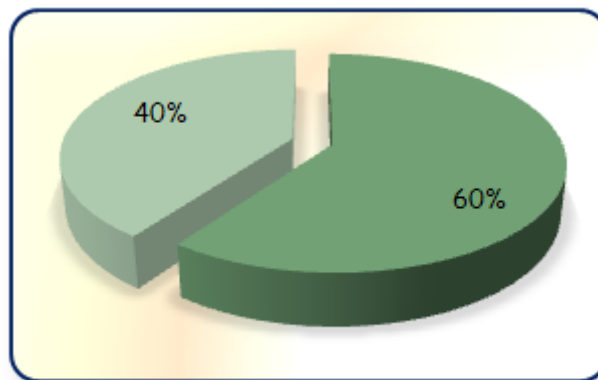
### Areas Covered:

#### 60% **Technical Writing**

Identify problem and/or need, evaluate alternatives, design a solution, test the solution, analyze results, draw conclusions, and format.

#### 40% **Oral Presentation**

Presentation time, headings followed the technical report, number or slides, slide with chart, question/answer period, and overall presentation.



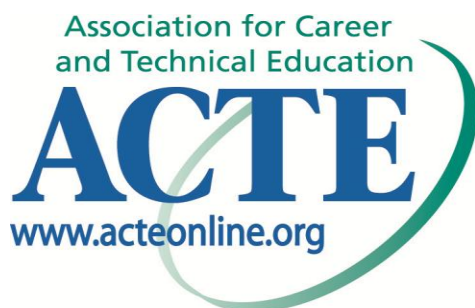
**Sample Job:** Oral Presentation

**Maximum Time:** 1 hour

**Participant Activity:** The participant will prepare and present an oral presentation on the previously prepared technical report.



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in



career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!