

ENGINEERING TECHNOLOGY—TES STANDARDS

HIGH SCHOOL

IDENTIFY THE ROLES, RESPONSIBILITIES AND REQUIREMENTS OF ENGINEERING.

- Describe the following engineering fields: mechanical, chemical, civil, and electrical.
- Identify the following job functions and responsibilities: research and development, design, production, supervision, management, testing, and analysis in mechanical, chemical, civil, and electrical engineering.
- Identify the following educational requirements in engineering: associate, bachelor, master, and doctorate degrees.
- Describe the employment opportunities of an engineer.
- Describe ethics related to engineering in the following situations: environmental, sustainable engineering, and corrupt practices.

USE THE DESIGN PROCESS TO SOLVE PROBLEMS BY CREATING AND REFINING PROTOTYPES.

Identify the components of the design process: define the problem, brainstorm, research, develop solutions, prototype, test/evaluate, and communicate results.

Identify the elements of a well-written problem statement.

Describe the process for researching relevant information.

Describe the process of brainstorming.

Brainstorm possible solutions.

Analyze and research between alternate solutions.

Describe the process of developing a solution.

Develop details of a solution.

Build a prototype from working drawings using appropriate materials.

Test prototype to defined criteria.

Redesign prototypes.

Communicate processes and results.

Use a variety of productivity software to explain the results of the design process, including, spreadsheets, word processing, data analysis, and presentations.

ENSURE QUALITY CONTROL USING THE MAJOR COMPONENTS OF MANUFACTURING PROCESSES INCLUDING MEASUREMENT SYSTEMS, TOOLS AND INSTRUMENTS TO PRODUCE A PRODUCT.

Explain the major manufacturing processes.

Explain the following quality controls: geometric dimensioning and tolerances, and go-no go gauge.

Use the following measurement tools and instruments: rulers, micrometers, and Vernier calipers.

Explain quality control.

Identify the following elementary statistical process controls: distribution curves, normal curves, and skew curves.

DESIGN USING THE APPROPRIATE MATERIALS IN ENGINEERING BY IDENTIFYING, COMPARING, SELECTING AND TESTING.

Identify common materials used in engineering.

Describe the following mechanical properties of steel, concrete, wood, and plastic: ductility/brittleness, tension, shear, and compression.

Test materials for specific characteristics.

Explain the process used for selecting the correct materials for specific functions.

WORKS COLLABORATIVELY IN ENGINEERING TEAMS THROUGHOUT THE DESIGN PROCESS.

Read and understand design documentation and technical manuals.

Write technical reports.

Make an oral presentation.

Actively contribute to a team project.

Identify the following characteristics of an effective design team: team norms, leadership, responsibility, respect, rapport, and time management.

Identify the roles and responsibilities of the following engineering design team members: team leader, designers, reporters, testers, and fabricators.

USE ENGINEERING EQUIPMENT, LABORATORY MATERIALS AND TOOLS APPROPRIATELY AND SAFELY.

Describe the function of a safety device.

Demonstrate safe personal behavior in the classroom.

Use all tools and equipment safely.

Describe and demonstrate the proper use of engineering laboratory equipment.

Describe and demonstrate the components of personal and group laboratory safety.

Describe and use safety laboratory equipment.

Explain and demonstrate the proper use of personal protective equipment (PPE).

IDENTIFY AND DEMONSTRATE THE USE OF VARIOUS SOFTWARE PROGRAMS USED IN THE ENGINEERING FIELD.

Identify available resources for researching problem solutions.

Use word processing software to develop reports.

Use presentation software to develop oral presentation of findings.

Describe and demonstrate the process for using CAD in a design solution.

Use spreadsheet software to develop tables, graphs and charts and track data.

DEMONSTRATE THE APPLICATION OF SCIENCE AND MATH PRINCIPLES TO THE ELECTRICAL ENGINEERING PROCESS.

Describe and apply the following electricity principles: Ohm's, Watt's, series, parallel, combination circuits, AC/DC systems, and conductors/insulators.

Use appropriate electrical units to solve problems.

Draw a circuit diagram and lay out the circuit.

Describe work in electrical systems.

Explain rate in electrical systems.

Describe resistance in electrical systems.

DEMONSTRATE THE APPLICATION OF SCIENCE AND MATH PRINCIPLES TO THE FLUIDS ENGINEERING PROCESS.

Identify what causes resistance in a fluid system.

Describe the following components and applications of fluid power principles: reservoir, fluid conductors, valves, pumps, actuators, Pascal's Law, and Bernoulli's Principle.

Describe components of hydraulic and pneumatic systems.

Describe work in electrical, mechanical, fluid and thermal systems.

Explain rate in electrical, mechanical, fluid and thermal systems.

Describe resistance in electrical, mechanical, fluid and thermal systems.

DEMONSTRATE THE APPLICATION OF SCIENCE AND MATH PRINCIPLES TO THE THERMAL ENGINEERING PROCESS.

Identify the three ways heat is transferred.

Describe the following principles and applications of thermodynamics: heat flow and transfer, convection, conduction, radiation, temperature scales, and conductors/insulators.

Solve thermal problems using appropriate units.

Describe work in thermal systems.

Explain rate in thermal systems.

Describe resistance in thermal systems.

DEMONSTRATE THE APPLICATION OF SCIENCE AND MATH PRINCIPLES TO THE MECHANICAL ENGINEERING PROCESS.

Describe and apply the following mechanical systems principles: Law of Conservation of Energy, six simple machines, mechanical advantage, efficiency, work, rate, and friction/resistance.

Solve problems using appropriate units in engineering systems.

Describe and apply the following statics principles: vectoring to predict resultant forces, equilibrium, trusses, and moment of inertia.

Explain the effects of gear ratios.

Describe work in mechanical systems.

Explain rate in mechanical systems.

Describe resistance in mechanical systems.