

Freetown Lakeville Public Schools

Tech Lab Science and Technology/Engineering
Unit Guide

8/20/2002

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Aerodynamics

Topic:

Student Learning Objectives

- 50367** Identify and compare examples of transportation systems and devices that operate on each of the following: land, air, water and space.
- 50369** Identify and describe three subsystems of a transportation vehicle or device, i.e., structural, propulsion, guidance, suspension, control, and support.
- 50370** Identify and explain lift, drag, friction, thrust, and gravity in a vehicle or device, e.g., cars, boats, airplanes, rockets.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Alternative Energy

Topic:

Student Learning Objectives

- 50346** Building a photoelectric car Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
- 50363** Describe and explain parts of a structure (e.g. foundation, flooring, decking, wall, roofing systems).

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Unit: Basic Electricity

Topic:

Student Learning Objectives

Textbook References, Resources and Materials

- 50360** Explain and give examples of the impacts of interchangeable parts, components of mass produced products, and the use of automation, e.g., robotics.

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Biomedical Technology

Topic:

Student Learning Objectives

Textbook References, Resources and Materials

50372 This standard is not taught or assessed in existing science curriculum.

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: CAD

Topic:

Student Learning Objectives

- 50347** Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, multiview drawings.
- 50356** Identify and explain the appropriate tools, machines, and electronic devices (e.g., drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (i.e., engineering drawings, prototypes, and reports).
- 50358** Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate a message.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Construction Technology

Topic:

Student Learning Objectives

- 50346** Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
- 50348** Describe and explain the purpose of a given prototype.
- 50350** Explain how such design features as size, shape, weight, function and cost limitations (i.e., ergonomics) would affect the construction of a given prototype.
- 50352** Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (i.e., weight, strength, hardness and flexibility).
- 50363** Describe and explain parts of a structure (e.g. foundation, flooring, decking, wall, roofing systems).
- 50364** Identify and describe three major types of bridges (e.g., arch, beam, and suspension) and their appropriate uses (e.g., site, span, resources and load).
- 50365** Explain how the forces of tension, compression, torsion, bending and shear affect the performance of bridges.
- 50366** Describe and explain the effects of loads and structural shapes on bridges.

Suggested Instructional Strategies

Assessment

Textbook References, Resources and Materials

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Digital Photography

Topic:

Student Learning Objectives

- 50347** Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, multiview drawings.
- 50356** Identify and explain the appropriate tools, machines, and electronic devices (e.g., drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (i.e., engineering drawings, prototypes, and reports).
- 50357** Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Unit: Digital Sound

Topic:

Student Learning Objectives

- 50355** Identify and explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
- 50357** Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.

Suggested Instructional Strategies

Assessment

Textbook References, Resources and Materials

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Electronic Communication

Topic:

Student Learning Objectives

- 50355** Identify and explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
- 50357** Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.
- 50358** Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate a message.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Graphics and Animation

Topic:

Student Learning Objectives

- 50347** Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, multiview drawings.
- 50356** Identify and explain the appropriate tools, machines, and electronic devices (e.g., drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (i.e., engineering drawings, prototypes, and reports).
- 50357** Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Materials and Processes

Topic:

Student Learning Objectives

- 50346** Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
- 50349** Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design.
- 50352** Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (i.e., weight, strength, hardness and flexibility).
- 50359** Describe and explain the manufacturing systems of custom and mass production.
- 50362** Explain basic processes in manufacturing systems, e.g. cutting, shaping, assembling, joining, finishing, quality control, and safety.

Suggested Instructional Strategies

Assessment

Textbook References, Resources and Materials

Unit: Mechanisms

Topic:

Student Learning Objectives

- 50346** Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
- 50349** Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design.
- 50360** Explain and give examples of the impacts of interchangeable parts, components of mass produced products, and the use of automation, e.g., robotics.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Unit: Navigation and GPS

Topic:

Student Learning Objectives

- 50357** Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.
- 50358** Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate a message.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Not Currently Assessed

Topic:

Student Learning Objectives

- 50353** This standard is not taught or assessed in any existing science curriculum. It may fit in the Industrial Arts curriculum.
- 50361** This standard is not taught or assessed in any existing science curriculum.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment

Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Research and Design

Topic:

Student Learning Objectives

- 50346** Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
- 50351** Identify the five elements of a universal systems model: goal, inputs, processes, outputs, and feedback.
- 50359** Describe and explain the manufacturing systems of custom and mass production.
- 50360** Explain and give examples of the impacts of interchangeable parts, components of mass produced products, and the use of automation, e.g., robotics.
- 50367** Identify and compare examples of transportation systems and devices that operate on each of the following: land, air, water and space.
- 50368** Given a transportation problem, explain a possible solution using the universal systems model.
- 50369** Identify and describe three subsystems of a transportation vehicle or device, i.e., structural, propulsion, guidance, suspension, control, and support.
- 50371** Explain examples of adaptive or assistive devices, e.g. prosthetic devices, wheel chairs, eyeglasses, grab bars, hearing aids, lifts, braces.

Suggested Instructional Strategies

Assessment

Textbook References, Resources and Materials



Grade Tech Lab Science and Technology/Engineering Curriculum Guideline

Unit: Robotics

Topic:

Student Learning Objectives

- 50351** Identify the five elements of a universal systems model: goal, inputs, processes, outputs, and feedback.
- 50359** Describe and explain the manufacturing systems of custom and mass production.
- 50360** Explain and give examples of the impacts of interchangeable parts, components of mass produced products, and the use of automation, e.g., robotics.
- 50371** Explain examples of adaptive or assistive devices, e.g. prosthetic devices, wheel chairs, eyeglasses, grab bars, hearing aids, lifts, braces.

Textbook References, Resources and Materials

Suggested Instructional Strategies

Assessment