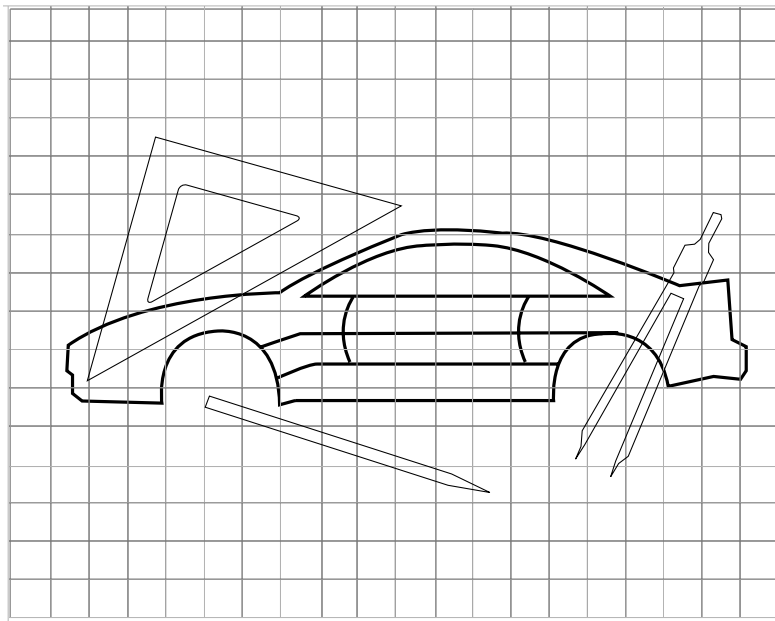


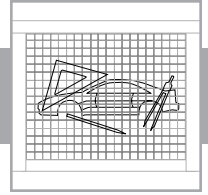
Automotive Design



Scope & Sequence 80519

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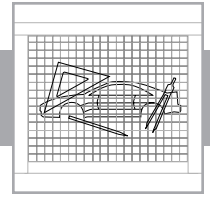


Module Description

Automobiles have become such a part of everyday life that we take them for granted, yet about 100 years ago, they did not exist. One can only imagine what it would be like to live back in the horse and buggy days. The history and development of the automobile is an interesting look back to fascinating inventions and inventors.

The design and manufacture of a new automobile involves many forms of technology, engineering concepts, and different careers. Automotive designers must take into consideration what the car will be used for and how it will be used. Many factors are taken into consideration in the production of an automobile. Computers and wind tunnels, to name a few, are extensively used during the design process. A full-size prototype of a new vehicle is constructed using clay. The vehicle must be designed and tested many times before actual production begins.

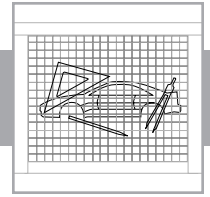
In the *Automotive Design* module, students complete 10 activities while learning about automobile design. They discover the fascinating history and development of the automobile and explore its design and manufacture. They use computer software to design a concept car working from a design brief. Students also develop a multiview drawing, and design, build, and test a clay model concept car. Finally, they use a wind tunnel to test the aerodynamics of their concept car. In Activities 1 through 9, they use videotapes, computer software, special equipment and tools, and hands-on exercises to learn about automotive design. For Activity 10, they complete a posttest to help evaluate what they have learned.



Module Goals

The *Automotive Design* module offers students an opportunity to:

- Discover the important events in the history and development of the automobile.
- Identify the steps and guidelines used in automobile design.
- Explore the processes involved in automobile manufacturing.
- Explore the principles of automotive aerodynamics.
- Discover the characteristics that improve aerodynamics.
- Recognize how a wind tunnel is used in automobile design.
- Investigate the operation of a wind tunnel.
- Investigate airflow and drag.
- Discover the aerodynamic characteristics of different vehicles.
- Discover several factors and steps involved in the design of an automobile.
- Differentiate between concept cars, prototypes, mock-ups, and models.
- Design and test a concept car using a computer and software.
- Recognize how multiview drawings are used in the automotive industry.
- Demonstrate the proper use of basic drafting equipment.
- Create a multiview drawing of their concept car.
- Recognize how templates are used in automotive design.
- Discover the function of armatures in the modeling process.
- Develop a set of templates for their concept car.
- Create an armature for their concept car.
- Begin development of a scale model concept car.
- Discover how clay modeling is used in automotive design.
- Identify and compare basic clay modeling tools and their uses.
- Demonstrate the principles of clay modeling.
- Apply principles used in the design and construction of automobiles.
- Test and evaluate the aerodynamics of their completed model concept car.
- Discover the various jobs, careers, and occupations associated with automotive design, manufacturing, and service.
- Recognize the nature of work, education or training, and starting salaries of various automotive occupations.



Interdisciplinary Skills

The *Automotive Design* module reinforces various skills about which the students are learning in other classes. Technology involves the practical application and use of math and science. The Modular Technology Education program is an activity-based, hands-on learning system; therefore, the students gain a practical understanding of many interdisciplinary skills. Some of the interdisciplinary skills implemented in this module are listed below.

Language Arts

- Read daily instructions for comprehension
- Gather and record information
- Explore automotive design terminology
- Write answers to short answer questions requiring creative thinking
- Summarize daily activities (Activity Journal Entry option)
- Summarize module outcomes (Module Journal Entry option)

Math

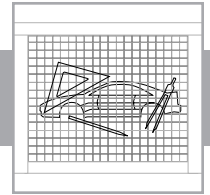
- Explore the concept of orthographic multiview drawings
- Complete a multiview drawing
- Measure with a standard ruler
- Draw to scale on graph paper
- Convert measurement units within the English standard system
- Identify the x and y axes of a grid system
- Locate coordinates using the Cartesian coordinate system
- Calculate the coefficient of drag of a vehicle

Problem Solving

- Conceptualize the solutions to a problem
- Design and draw a scale model concept car working from a design brief
- Investigate techniques used to develop a clay model concept car
- Design a concept car using computer software
- Design, construct, and test a clay model concept car

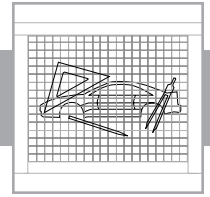
Science

- Explore automotive design
- Implement engineering design principles
- Experiment with model automobiles to explore aerodynamic design
- Describe the concept of aerodynamics
- Test the aerodynamic design of various vehicles
- Discover the uses and operation of a wind tunnel
- Demonstrate the use of templates and armatures in the design and construction of a clay model



Social Studies

- Discover the important events in the history of the automobile
- Explore the steps used in the design and manufacture of an automobile
- Investigate how real-world concept cars are developed
- Identify the concepts and terms related to automotive engineering
- Investigate the steps and processes in the design and manufacture of an automobile
- Discover careers related to automobiles



Career Opportunities

Each Hearlihy module is designed to introduce and provide students with an understanding of a different area of technology, thus helping them to become more technologically literate. Becoming technologically literate helps students to become a better consumer, and it increases their knowledge of potential career opportunities.

The *Automotive Design* module is designed to introduce students to the basic design, construction, and testing of automobiles. Listed below are some possible occupations and careers associated with this subject area. You may want to obtain the latest publication of the *Occupational Outlook Handbook*. As an optional career-oriented activity, you could have students research one of the job titles listed below in regard to the nature of work, specific job tasks, earnings, advancement possibilities, and so on, and have them write a short report or summary of their findings. This will enable students to begin thinking about career opportunities. At the very least, students should be made aware of this publication for future reference.

(See the Enrichment Activity in the Student Lesson Plan for a career activity.)

Assemblers and fabricators	Engineering technicians
Automotive air-conditioning repairers	Industrial designers
Automotive body and related repairers	Industrial engineers
Automotive glass installers and repairers	Industrial machinery mechanics
Automotive service technicians and mechanics	Industrial production managers
Brake repairers	Inspectors, testers, sorters, samplers, and weighers
CAD operators	Machine setters, operators, and tenders
CNC operators	Machinists
CNC programmers	Materials engineers
Collision repair and refinish technicians	Mechanical engineers
Computer control programmers and operators	Painting and coating workers
Computer hardware engineers	Quality control inspectors
Computer software engineers	Safety engineers
Designers	Tire builders
Diesel service technicians and mechanics	Tool and die makers
Drafters	Welding, soldering, and brazing workers
Electrical and electronics engineers	Woodworkers
Electrical and electronics engineers	