





- d) Test and evaluate solutions from a given design problem against design criteria and constraints to validate function
- e) Derive improvements to design solutions to produce an optimized product or system

## 2. USE AND MAINTAIN TECHNOLOGICAL PRODUCTS AND SYSTEMS

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### STUDENTS WILL:

- a) Use information resources, manuals, documents, or experienced people to describe how systems work
- b) Utilize tools, materials, and machines to diagnose, adjust, and repair a system
- c) Utilize computer and information resources to operate and maintain a system

## 3. ASSESS THE IMPACT OF PRODUCTS AND SYSTEMS

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### STUDENTS WILL:

- a) Utilize instruments to measure and gather data
- b) Identify trends or patterns in data to be applied toward decision making and identify positive and negative effects of technologies
- c) Interpret and evaluate accuracy of information to determine the quality of products and systems

## 4. CAREER PATHWAYS

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### STUDENTS WILL:

- a) Explain roles and functions of individuals engaged in technical careers involving problem solving and troubleshooting
- b) Investigate education, training requirements, and opportunities for career paths involving problem solving and troubleshooting
- c) Assess personal employability skills for technical careers and evaluate personal suitability for such careers

## ILLUSTRATIVE ACTIVITIES BY THEME MODULE

These activities are intended to serve as examples of how the content in this module could be tied to each of the six middle level themes.



## PROBLEM SOLVING AND INNOVATION

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### RACE CAR DESIGN

Students design a rubber band powered speed racing vehicle using design, drawing, and fabrication skills. Students utilize the scientific method to develop basic experiments to measure the vehicle's performance, modifying their vehicle for performance by altering weight distribution, airfoils, and fins. Students then measure multiple distances that the vehicle travels with each modification, record the data, and determine averages for each modification. Students analyze the statistical calculations to determine optimal design. Alternative activities include designing and testing air racers, catapult designs, water rocket, and rubber powered dragsters.

## SUSTAINABILITY

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### DESIGN A SOLAR HEATER

Using concepts of light collection, focusing, and absorption, students design a solar collector that captures solar energy to heat water for human use. Students develop a prototype to heat 50 mL of water and test the prototype on a sunny day. Students measure the temperature increases every minute for a 20 minute period and then remove the prototype from the sun. Students measure the heat loss every minute for a 20 minute period and graph the resulting temperature data as a function of time. Variations of this activity include a solar cooker or a window solar heater for a bedroom.

## STANDARDS ADDRESSED

### NEW YORK STATE CAREER DEVELOPMENT AND OCCUPATIONAL STUDIES (CDOS) STANDARDS

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#### STANDARD 1: CAREER DEVELOPMENT

Students will be knowledgeable about the world of work, explore career options, and relate personal skills, aptitudes, and abilities to future career decisions

#### STANDARD 2: INTEGRATED LEARNING

Students will demonstrate how academic knowledge and skills are applied in the workplace and other settings

#### STANDARD 3A: UNIVERSAL FOUNDATION SKILLS

Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace





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