# STUDENT ACTIVITY IDEAS

# FOR THE

# TECHNOLOGY SEQUENCE SYSTEMS AND FOUNDATION COURSES

First Edition - compiled by
Bureau of Career Awareness and
Practical Arts Program as a
resource for Technology Education
Teachers

# HIGH SCHOOL TECHNOLOGY EDUCATION
# STUDENT ACTIVITY IDEAS

## Introduction

The following single page, outlines provide brief ideas for student activities in each of the System and Foundation Courses of the State-approved Technology sequence.

The idea outlines are provided only as a resource, to assist teachers in the development of student learning activities. Teachers should select those particularly appropriate for their own instructional program and student needs. In identifying the activity to be undertaken by students the teacher should consider carefully the Performance Objectives and supporting competencies identified in the State syllabus.

The first edition of an idea compendium will be distributed at the 1987-88 Occupational Education Regional Conferences. Many of the activity ideas were prepared during the summer teacher inservice workshop at SUNY Oswego. Where possible, the individual responsible for preparing the activity has been identified.

We appreciate the work of Daniel Nelson, Technology Education Teacher at Shenendehowa High School, who assumed responsibility for editing this publication.

If we can obtain more activity suggestions, we intend to produce a more extensive edition of this document. We will appreciate receiving additional activity suggestions. Please follow the format used here and submit to:

Technology Education Staff
NYS Education Department
One Commerce Plaza, Room 1619
Albany, New York 12234

# Communications

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Mr. William Mulvey

**School** Geneva High School
101 Carter Road
Geneva, New York 14556

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| __X__ Communication | _____ Energy |

**Title:** Analysis of a Television Commercial-Scripting and Storyboarding

## Overview/Description

A study of mass communications requires an analysis of television advertising. In the audio/audiovisual module of Communications Systems, the concepts of message design, storyboarding, script writing and planning & production for commercial advertising can best be introduced by examining any commercial seen on television. If a sample videotape is made available for class discussion and student teamwork, a script and series of storyboards can be developed that demonstrate the high level of planning, timing and scene changes that are part of such production.

## Problem Statement

Given a video tape showing a 30 second television commercial, students will be able to discuss the evidence of planning and pre-production efforts necessary to convey a message effectively. Given a teacher prepared storyboard with the audio script and scene sketches in place, the students should be able to add director's cues during class discussion and enter times for scene changes, camera motion, etc., when viewing the tape in teams of two.

## Activities

1. After distributing a teacher prepared video storyboard, develop a class discussion on the effectiveness of merely reading the audio script of a television commercial. Describe the various scenes that take place and the approximate number of seconds that each scene appears. Discuss the need for props, talent, production crew, client approval and director's responsibilitites.
2. Using a monitor and VCR, view the tape with the class and then examine each scene and subtle points by using the pause control or frame advance. Add selected details to the video storyboard/assignment sheet.
3. Assign teams of students to view the tape and add required items to the assignment sheet with a degree of accurancy acceptable to the instructor.

## Sample Topics

1. The power of television advertising and influence on the consumer/viewer
2. Scripting and storyboarding and the need for planning
3. Resources, particularly capital, required for commercial air time
4. How to operate a VCR and monitor

## References

Costello, M and Katz, C. Breaking Into Video. Simon and Schuster, Inc., New York, NY, 1985.
Winston, Brian and Keydel, J. Working with Video. Billboard Publications, New York, NY, 1986.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

Broadcasting technology, video/sound engineering

**Recommended Facility:** Communications Lab

# High School Technology Education
# Suggested Idea-Activity Outline

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101 Carter Road
Geneva, New York 14556

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|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| __x__ Communication | _____ Energy |

**Title:** Image Assembly for Graphic Arts-Paste-Up Design Exercise

## Overview/Description

Whatever technologies are used to assemble images for printing on commercial products, several universal concepts remain: the application of design principles to image position, the overall effect of the designer's use of color, contrast, shape, etc., the accuracy of measurement and copy handling, and the acceptability of the final result for either client review and approval of printing.

## Problem Statement

Given prepared clip art, adhesive, a teacher prepared layout sheet reproduced in the format of a flyer, poster, or magazine ad, students will be able to choose and select appropriate images for layout. Following design principles, students will assemble images in a form consistent with related lessons.

## Activities

1. Participate and take notes in a lesson on principles of design.
2. Participate and take notes in a lesson on various graphic formats, i.e., flyers, brochures, posters, magazine ads, packaging graphics, etc.
3. Participate and take notes in a demonstration on paste-up techniques.
4. Participate in a lesson on careers in layout and design in the graphics industries.
5. Identify the overall concept and general intent of the graphic message to be designed.
6. Select from a distributed sheet of clip art the images suitable for an effective design.
7. Generate a series of thumbnail sketches that represent various plans for the layout.
8. Present and discuss various solutions with at least three other people.
9. Assemble images in a pleasing design by mounting clip art on a layout sheet with a degree of accuracy, copy handling and application of design principles acceptable to the instructor when submitted with all thumbnails and work sheets.

## Sample Topics

1. Effective Design
2. Careers in graphic layout
3. Pre-press imaging in graphic arts
4. Paste-up techniques

## References

Adams, J.M., and Faux, D.D. Printing Technology, 2nd ed. Delmar Publishers, Albany, NY, 1982.
Jones, R.E. and Robb, J.L. Discovering Technology-Communications. Harcourt Brace Jovanovich Publishers, San Diego, CA, 1986.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

**Recommended Facility:** Communications Lab

# High School Technology Education
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| _x_ Communication | _____ Energy |

**Title:** Introduction to Video Recording through Animation Techniques

## Overview/Description

Initial use of a video recording and playback system requires a basic working knowledge of the controls. A means to facilitate the first hands-on experience after a demonstration involves a brief production using the pause control of a VCR or camcorder for stop action/animation effects. The activity can be set up as a team situation or individual work with a minimum of props and pre-production planning. Using chalkboard images, objects on a table, or people in a group, the scene can be changed during a pause in the tape giving the illusion of animation--objects or people that move unassisted or that appear and disappear.

## Problem Statement

Given appropriate instruction on the operation of a video camera and recording controls, the student will be able to set up a scene, frame and focus the camera, load the tape, activate the record start control, direct movement among the props or talent, and activate the pause control.

## Activities

1. Participate in all related instruciton on video recording and playback.
2. Select an animation topic involving people, objects or drawn images (people appearing or disappearing in a group, two pair of shoes meeting at a street corner, scissors chasing a piece of paper across a table, letters of a work appearing on a chalkboard, a person sliding across a floor without any visible means of movement).
3. Set up the first frame and check lighting, focus, image size and secure tripod.
4. Push record start switch on camera and immediately push pause. This records the first frame and then holds the tape in position while the scene is altered.
5. Repeat operation for as many frames needed to show full motion.
6. Play back the video tape for quality control an submit for approval and class viewing.

## Sample Topics

1. Claymation and its use in film making and commercial advertising (The Noid and Sunkist Raisin commercials)
2. Special effects
3. Video recording and playback system operation

## References

Owners Manual, for available video recording and playback systems.
Winston, Brian, and Keydel, J. Working with Video. Billboard Publication, Inc., New York, NY, 1986.
Costello, M. and Katz, C. Breaking into Video. Simon and Schuster, Inc., New York, NY, 1985.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

**Recommended Facility:** Communications Lab

# High School Technology Education
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| _____ Production | _____ Tech. Drawing |
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| _X_ Communication | _____ Energy |

**Title:** Video Production in the Lab

## Overview/Description

A high school communications lab may serve as a recording studio when its equipment can serve as props and its processes can be demonstrated. A unique learning experience is possible for students who research a technical process, such as film development, camera operation, press operation, etc., and generate a script, prop list, and rehearsal schedule.

## Problem Statement

Given a video recording and playback system, a technology lab and resources for researching a technical topic, and space and equipment suitable for a video demonstration, student teams will produce video programs dealing with technology demonstrations.

## Activities

1. Identify production teams of 2 - 4 students with assignments spanning script writers, storyboard artist, floor director, talent, etc.
2. Select from a list of possible topics the demonstration to be produced by the team, based on available equipment, time constraints, number of teams, etc.
3. Using resources available in the lab or library, research technical background for the video demonstration.
4. Using available forms for storyboarding, create a simple sketch of each scene and the audio script that accompanies it. Insert camera motion, time, special effects, angle of view, and transition to next scene.
5. Give consideration to the addition of graphics, titles and credits to be inserted in post production.
6. Rehearse scene first without, then with, the camera.
7. Roll tape and record scenes in sequential order if editing equipment is not available.
8. Playback and monitor production quality, insert graphics, and submit tape with members' roles noted.

## Sample Topics

1. Television production
2. Topical research techniques
3. Scriptwriting
4. Planning for production
5. Careers in video

## References

Winston, Brian, and Keydel, J. Working with Video. Billboard Publication, Inc., New York, NY, 1986.
Costello, M. and Katz, C. Breaking into Video. Simon and Schuster, Inc., New York, NY, 1985.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

**Recommended Facility:** Communications Lab

# High School Technology Education
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| __x__ Communication | _____ Energy |

**Title:** A Team Produced Public Relations Campaign

## Overview/Description

This extensive effort directs all energies and resources within a communications lab toward one public relations campaign. The systems and subsystems of mass communications are studied in the graphic and audio/audiovisual course modules and various processes will yield a communications package in the form of audio cassettes, screen printed bumper stickers, offset printed buttons, posters, newsletters, slides and video productions, all promoting a theme, concept, attitude or audience action. This should take place in conjunction with students, individual activities.

## Problem Statement

Given lessons, demonstrations, and the necessary equipment, students will plan and produce the components of a public relations campaign. They will be able to identify the inputs and resources common to graphic and audio/audiovisual processes, select the most effective means of communicating the message to the target audience, and work in a team setting while producing the message.

## Activities

1. Identify the intent of a selected public relations campaign and similarities in the solutions that would be available to or considered by an advertising agency and a Technology Education program in communications.
2. Study the resources and inputs required by such an undertaking.
3. Identify the processes (printing systems, audio systems, audiovisual systems) that can be used in the campaign.
4. Identify any logos or common design themes that are part of the campaign.
5. Assign teams to production areas and brainstorm proposals to be presented to the class.
6. The class, acting as the advertising agency, will approve all media proposals in the forms of mock-ups, dummies, video storyboards or audio scripts.
7. Produce the messages and solicit analysis from other media and communications classes in the school.

## Sample Topics

1. Media and Mass Communications
2. Graphic Design
3. Radio Advertising
4. Commercial Television Advertisements
5. Careers in Communications

## References

Winston, Brian, and Keydel, J. Working with Video. Billboard Publication, Inc. New York, NY, 1986.
Costello, M. and Katz, C. Breaking into Video. Simon and Schuster, Inc., New York, NY, 1985
Jones, R.E. and Robb, K. L. Discovering Technology - Communications. Harcourt Brace Jovanovich Publishers, San Diego, CA, 1986.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

**Recommended Facility:** Communications Lab

# High School Technology Education
# Suggested Idea-Activity Outline

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**School** Geneva High School
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**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
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| __x__ Communication | _____ Energy |

**Title:** Producing a Sound/Slide Presentation

## Overview/Description

The combination of sound and projected slides are considered a powerful media when designed effectively. Whether the audio component is voice narration or combined with appropriate music, the visual impact is generally superior to other media. Students studying Communications Systems can produce such a package in the audio/audiovisual module of the course. Individual students or teams may photograph slides on a variety of topics with basic 35mm cameras and record the audio track on a cassette recorder. `Existing instructional slides on file may be organized as well, and an audio track produced, synchronized, and advance-pulsed with the projector.

## Problem Statement

Given an assignment to photograph a series of slides on an identified theme or topic, or a grouping of existing slides, students will plan and produce a slide/tape presentation. The planning will consist of a storyboard and script, time schedule, and a working knowledge of the inputs and resources. The audio track will be recorded on a cassette recorder or mixed with other sources of sound, and auto-advance pulses will be dubbed in. Slides will be placed in sequential order.

## Activities

1. Develop an overall plan and production strategy for a slide/tape presentation.
2. When a topic is assigned or selected, identify the visual images and the sounds necessary to communica the message to the intended audience.
3. Create a storyboard and script of the presentation.
4. Assemble all props, set up scenes, and photograph on slide file or review available slides.
5. Time the sequence of slides and guidelines for maximum and minimum projection times.
6. Following script, record voice narration or background music on audio tape.
7. If auto--advance equipment is available, dub in auto-advance pulses for projector.
8. Run program for quality control.
9. Submit ro review; evaluation; presentation to class and feedback.

## Sample Topics

1. Audiovisual communication
2. Scripting and storyboarding
3. Slide Photography
4. Photo Composition

## References

Close, Burt. How to Create Super Slide Shows. Writer's Digest Books, Cincinnati, Ohio, 1984.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

**Recommended Facility:** Communications Lab

# High School Technology Education
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**School** Geneva High School
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**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _x_ Communication | _____ Energy |

**Title:** Computer Imaging for Graphics-Digitized Images

## Overview/Description

A major portion of images used in the graphics industries are in digital form, whether type or clip art, and the technology used to accomplish this can be simulated in the communications lab. Using a digitizer, i.e., a video interface for three dimensional scenes, an optical printer/scanning interface, or a scanner, students can store images on disc. Once digitized and loaded into a personal computer, images can be cropped enlarged, stretched, etc. and outputed on laser or dot matric printers. These originals can then be used for camera ready copy for conventional printing methods.

## Problem Statement

Given a computer workstation, instruction, and a video or optical scanning interface, students can digitize images for use in the offset or screen printing processes. These images may be video portraits of classmates, clip art for memopads, halftones for class newsletters, or applications discovered during problem solving.

## Activities

1. Participate in lessons, demonstraitons, and discussions pertaining to applications of digital images in the graphics industry and the careers involved.
2. Observe the interface connections and operating procedures of digitizer hardware and software.
3. Digitize images with the equipment available, save to disc, and name file.
4. Output the digital image with examples of how the image can be manipulated on screen.

## Sample Topics

1. Computer Interfacing
2. Image Generation for Graphic Arts
3. Digital Scanning Technology
4. Uses of digitizing technology in mapmaking, plastic surgery, computer typesetting,
5. health and beauty care

## References

Software for the Apple Macintosh:
MacVision by Koala Technologies
Thunderscan by Thunderware, Inc.
Scanner by Dest, Inc.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

Optics, Computer Technology

**Recommended Facility:** Communications Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Mr. William Mulvey

**School** Geneva High School
101 Carter Road
Geneva, New York 14556

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _X_ Communication | _____ Energy |

**Title:** Telecommunications

## Overview/Description

Telecommunications technology is a means by which vast amounts of information is transmitted instantly among multiple locations. Addressed in the Communication Systems syllabus under image assembly (PO 2 p. 38) where sources of copy and data must be identified, collected and assembled, telecommmunications is a significant subject. Telecommunications can be simulated in three ways into a communications lab: through subscription to a commercial service, through transmission within the school by modem, or transmission of data with commercial printers, community college/university graphics programs, other schools, or telecommunicating typesetting services.

## Problem Statement

Given a personal computer, modem, phone line, telecommunications software, and related instruction, the student will be able to set up parameters, explain the need for compatibility, initiate a call, send a file and receive a file, and disconnect. The use and applications of telecommunications should be listed and described.

## Activities

1. Participate in lessons and demonstrations regarding the role of telecommunications in industry and home life.
2. Participate in a software and hardware demonstration of a telecommunications system: modem, phone line computer, software, connections and settings; baud rate, handshake, file transfer, etc.
3. Initiate a call.
4. Set up to receive messages, data, or files.
5. Set up to send messages, data, or files.
6. Terminate the call.

## Sample Topics

1. Telecommunications
2. Satellite transmission, orbits, uplinks and downlinks
3. Land Lines transmission, hard wire, fibre optics
4. Microwave transmission

## References

Software documentation for telecommunications system in use

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 214

## Related Technology Applications (cross over areas)

**Recommended Facility:** Communications Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Mr. William Mulvey

**School** Geneva High School
101 Carter Road
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**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _x_ Communication | _____ Energy |

**Title:** Image Transfer: Introduction to Offset Printing

## Overview/Description

Communication Systems offer exploratory and introductory information on major systems that generate, reproduce, and deliver messages. Students' involvement in particular image transfer systems consists of overview, procedure, and simulation; skill development may occur but is not a prerequisite. In order to experience challenge and success in offset duplicator operation, an introductory experience is needed so that the individual product or group effort can be printed by the student.

## Problem Statement

Given a safety demonstration on the offset duplicator, a labeled illustration of the subsystems of the machine, and a step-by-step demonstration of press operation, the student will be able to operate the controls and produce copy. The student will be able to list and describe the input, resource, process, output and feedback/control components of the duplicator.

## Activities

1. Observe all safety rules when near or operating the equipment.
2. Insert demonstration or student master into a fully inked, set-up offset duplicator.
3. Check paper supply.
4. Idle press and ink the master and offset to blanket.
5. Check for image quality.
6. Start paper feed.
7. Produce required number of copies.
8. Shut down equipment; remove the master and preserve.

## Sample Topics

1. Graphic Communications
2. Offset Lithography
3. Careers
4. Emerging developments in technology

## References

Adams, J.M., and Faux, D.D. Printing Technology, 2nd ed. Delmar Publishers, Albany, NY 1982.
Jones, R.E. and Robb, J.L. Discovering Technology-Communications. Harcourt Brace Jovanovich Publishers,San Diego, CA, 1986.

## Resource Contacts

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## Related Technology Applications (cross over areas)

**Recommended Facility:** Communications Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Mr. William Mulvey

**School** Geneva High School
101 Carter Road
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**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _X_ Communication | _____ Energy |

**Title:** Computer Generated Images for Memopads

## Overview/Description

Nearly all images created in the commercial printing, packaging and publishing industries are created on computer typesetting systems, personal computers, or desktop publishing systems. In order to simulate imaging technology in the graphics module of Communication Systems, students should have available to them a network of personal computers linked to a laser output device. This yields typeset quality images and computer graphics that are equivalent to current technologies.

## Problem Statement

Given a system of personal computers networked to a laser output printer, related instruction, and orientation to design principles, students should generate text and graphic images for personally designed memopads. An understanding of message design, the computer system and its operation, the application of software, and an approved hand generated sketch of the intended design should precede the activity.

## Activities

1. Consult with client to discuss variations in design of a memopad to be printed by the offset printing process.
2. Generate a full-size mock-up of the design with specifications regarding typeface, typestyles, rule width, length of run, etc.
3. Create a file on a disc and generate all printer's marks: trim lines, center lines, and register marks within the specifications of final memopad size.
4. Set type in the specified style, size, and location.
5. Add graphics, computer clip-art, and ruling to the layout.
6. Save the file to the disc.
7. Output the memopad original on laser output system in order to generate camera-ready copy for client approval and eventual image conversion.

## Sample Topics

1. Use of computers in image generation and imaging technology in the graphics communications industries
2. Quality assurance and matching of output with original specifications
3. Concepts of design principles applied to graphic messages

## References

Aldus, Inc., Pagemaker.
Apple Computer, Inc., Macintosh SE.
Jones, R.E. and Robb, K.L. Discovering Technology - Communications. Harcourt Brace Jovanovich Publishers, San Diego, CA, 1986.

## Resource Contacts

William Mulvey, (315) 781-0400 Ext. 215

## Related Technology Applications (cross over areas)

Comuputer Applications, Graphic Communications

**Recommended Facility:** Communications Lab

# *Transportation*

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Gary Shelhamer

**School** Dryden High School
Dryden, NY 13053

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __X__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Propeller Driven Land Vehicles

## Overview/Description

By using propellers, one of the easiest ways of transmitting power from a high speed model glow plug engine, students will design and construct a model land transportation vehicle. Subsystems of land vehicles will be emphasized.

## Problem Statement

Given a .049 Cox glow plug engine and a selection of materials, wheels, etc., each student will design and construct a model land vehicle which will attain the highest speed along a straight guide wire 100 feet long. In addition, a completed subsystems specification sheet and a design log must be submitted when the vehicle is to be evaluated.

## Activities

1. Subsystems of land vehicles.
2. Introduce the above problem statement.
3. Review the appropriate safety rules, use of materials, and machine and tool operations.
4. Students will then design, construct, and operate the vehicles.

## Sample Topics

1. Susbystems
2. Aerodynamics
3. Use of tools, machines, and materials
4. Safety
5. Vehicle guidance and control

## References

Willard, Ken. 8 Easy Projects for 1/2 A Engines. Kalmbach Books, Milwaukee, WI, 1985.
Deold, Alan, Everett Sheets and William Alexander. Transportation-The Technology Of Moving People and Products Activity Act Manual. Davis, Worcester, MA, 1986.

## Resource Contacts

Cox Hobbies, Inc. 1525 E. Warner Ave., Santa Anna, CA 92705 (Special School Packages).
Gary Shelhamer, Dryden High School, Dryden, NY 13053 (607-844-8694).

## Related Technology Applications (cross over areas)

Systems, Subsystems, Aerodynamics, Safety.

**Recommended Facility:** Transportation or Production (Woods/Metals)

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Gary Shelhamer

**School** Dryden High School
Dryden, NY 13053

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __X__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** "Cross Country USA": A Simulation of Land Vehicle Guidance, Control, and Support Subsystems

## Overview/Description

The use of trucks for transporting goods is extremely important to our economy. An inexpensive computer program will be utilized to simulate the dispatching, routing, map reading, daily routine, economics, and the guidance, control, and support subsystems of the trucking industry. The software will enable each student to simulate the entire routine of the long distance shipping of goods, from pick-up to delivery.

## Problem Statement

Using computer software entitled "Cross Country USA," each student will be assigned a commodity to pick-up, carry and deliver. The student driver's efficiency will be determined by time spend, losses incurred, and profits accumulated. A print out of this information will be used for verification purposes.

## Activities

1. Introduce the problem
2. Demonstrate the program.
3. Students use software to read dispatch notice and commodity list, pick-up and deliver goods, print-out time, expenses, and profits.

## Sample Topics

1. Vehicle subsystems (guidance, control, and support)
2. Dispatch notices
3. Map reading
4. Truck driver safety

## References

Cross Country USA. Didatech Software Ltd., 3812 William St., Buraby, B.C., Canada, V5C 349.
McCory, David and George Maughan. Resources In Technology. Davis, Worcester, MA, 1985.

## Resource Contacts

Local trucking firm, truck drivers, etc.
Gary Shelhamer, Dryden High School, Dryden, NY 13053 (607)844-8694.

## Related Technology Applications (cross over areas)

Systems, Subsystems, Reading a compass

**Recommended Facility:** Transportation Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Gary Shelhamer

**School**

Dryden High School
Dryden, NY 13053

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __x__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Experimental Hovercraft

## Overview/Description

Hovercrafts are examples of rather unique and somewhat uncommon, but exciting forms of transportation. Extremely large hovercrafts, each carrying hundreds of passengers, make hourly trips across the English Channel from France to England and back. Using recycled motor/fan units from inexpensive hand held hair dryers as blower units, students will construct model hovercrafts. They will be operated over water as well as land.

## Problem Statement

Students will plan , design, construct, and test model hovercraft. The motor/fan units from inexpensive hand held hair dryers will be used for lift; two 9 volt batteries will be used for an on board energy source. Students may add additional propulsion and energy sources for forward and/or lateral movement. Light weight materials such as plastic sheets and foam will be used for structural integrity.

## Activities

1. List the subsystems and uses of a hovercraft.
2. Introduce the problem.
3. Experiment with motor/fan units.
4. Cut and fabricate plastic materials.
5. Design and construct hovercraft
6. Test, modify, and evaluate the design.

## Sample Topics

1. Hovercraft: function and uses
2. Motor/fan units--weight and energy requirements
3. Guidance and control of air cushion vehicles
4. Fabrication of light weight plastics

## References

McLeavey, Roy. Hovercraft and Hydrofoils, Arco, New York, NY, 1980
Mitchel, James (ed.). The Illustrated Reference Book of Modern Technology. Windward, Leicester, U.<., 1982.
Felman, Anthony and Bill Gunston. Technology at Work. Aldus, London, U.K., 1980.

## Resource Contacts

Gary Shelhamer, Dryden High School, Dryden, NY 13053 (607) 844-8694).

## Related Technology Applications (cross over areas)

Fabrication of light weight plastics, vehicle subsystems.

**Recommended Facility:** Transportation

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Gary Shelhamer

**School** Dryden High School
Dryden, NY 13053

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __X__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Water Trough Marine Transportation

## Overview/Description

A body of water for testing marine transportation vessels that suits your needs in terms of accessibility, safety, and ease of use may be difficult to find. A 10 foot eve trough works quite well for testing small vessels. In this activity students will use teacher furnished materials and supplies to construct a vessel which will float in a water filled eve trough.

## Problem Statement

Given access to tools, materials, and supplies, students will plan, design, and construct a marine vessel which will carry its own propulsion unit and energy supply. The vessel must float in an ordinary plastic eve trough. the vessel will be evaluated on its speed, originality of design, and craftsmanship. The vessel must have a student hand drafted hull.

## Activities

1. List hull types and uses.
2. Plan and design the marine vessels.
3. Construct a hull (vacuum forming, fiberglass, carved from wood or plastic foam, etc.).
4. Install propulsion and energy supply units.
5. Test, modify, and race the vessels.

## Sample Topics

1. Types of hulls and vessels, buoyancy, displacement
2. Hull design
3. Hull production (vacuum forming, fiberglass molding, etc.)
4. Propulsion unit selection and installation
5. Operational energy requirements
6. Calculating speed

## References

Make Sure, Make Shore. Bureau of Parks and Recreation, Albany, NY.
Felman, Anthony and Bill Gunston. Technology at Work. Aldus, London, U.K., 1980.

## Resource Contacts

Gary Shelhamer, Dryden High School, Dryden, NY 13053 (607) 844-8694.

## Related Technology Applications (cross over areas)

Flotation, buoyancy, subsystems, hydrodynamics, calculating speed

## Recommended Facility: Transportation

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Gary Shelhamer

**School** Dryden High School
Dryden, NY 13053

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __x__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Boost Gliders and the Space Shuttle

## Overview/Description

The space shuttle program is an example of an "on the edge" technology. Students can emulate the operational sequences of the space shuttle by constructing boost gliders. A boost glider is a rocket engine powered craft that leaves the launch pad under thrust, gains altitude, ejects the engine, and gently glides back to earth for recovery and reuse.

## Problem Statement

Given a set of plans and procedures, the student will produce the required parts, then construct, balance, and test fly a boost glider. A contest will be held and the gliders with the longest glide times will be declared winners. The gliders will also be evaluated according to dimensions specified, craftsmanship, finish, etc.

## Activities

1. Layout and cut boost glider parts.
2. Assemble gliders.
3. Test glide, balance, and trim for flight.
4. Test launch with first flight engines.
5. Make refinements as required.
6. Glide duration contests.

## Sample Topics

1. Space shuttle and its recovery techniques
2. Introduce plans and procedures
3. Demonstrate cutting parts and glider assembly
4. Flight theory
5. Trimming for flight
6. Rocket/boost glider safety code
7. Launch preparation
8. Trimming for glides

## References

Smith, Harry and Henry Warden. Industrial Arts Teachers Manual for Modern Rocketry. Estes Industries, Penrose Do., 1980

Stein, Harry. The Model Rocketry Manual. Sentitnel Books, New York, NY, 1970

## Resource Contacts

Estes Industries, 1295 H. Street, Penrose, DO 81240

Gary Shelhamer, Dryden High School, Dryden, NY 13053 (607) 844-8694

## Related Technology Applications (cross over areas)

Physics, Principles of Flight, Laws of Motion, Safety, Emerging Space Technologies, Aerodynamics

**Recommended Facility:** Transportation

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Gary Shelhamer

**School** Dryden High School
Dryden, NY 13053

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __x__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** "Solo Flight:" A Basic Flight Simulator Program

## Overview/Description

Flight simulation is extremely important to the aerospace transportation system. An inexpensive computer program will be utilized by students to simulate takeoff, flying, and landing. The basic flight instrument`44s and controls will be used to guide and control the simulation.

## Problem Statement

Utilizing software entitled "Solo Flight", a computer system, and a joystick, each student will plan, take off, fly to another airport, circle, reverse heading, flyback to original point of departure, and safely land the simulation.

## Activities

1. Prepare flight plan.
2. Fuel aircraft.
3. Check instruments.
4. Take off.
5. Maintain 3,000 foot altitude.
6. Reverse heading upon arriving at the destination.
7. Fly to point of origin.
8. Safely land the aircraft.

## Sample Topics

1. Flight theory
2. Aircraft controls and instrumentation
3. Simple navigation
4. Flight simulation

## References

Solo Flight, Micro Prose Software, 120 Lake Front Dr., Hunt Valley, MD 21030.
Bacon, Harold, Warren Garthwright and Isaac Vass. Aerospace: The Challenge. Civil Air Patrol, Maxwell AFB, Alabama, 1983.

## Resource Contacts

Local pilots and regional airports
Federal Aviation Administration, Eastern Region, JFK International Airport, Jamaica, NY 11430

## Related Technology Applications (cross over areas)

Navigation, Physics Principles, Reading a Compass

**Recommended Facility:** Transportation Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Gary Shelhamer

**School** Dryden High School
Dryden, NY 13053

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __X__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Fiberglass Hull Construction

## Overview/Description

Fiberglass reinforced polyester resin materials are commonly used for the construction of recreational boat hulls. Using polyethylene department store model boat hulls or commercially available model boat hull molds, students will hand lay up a duplicate fiberglass hull. Strong emphasis will be made on the safe handling of materials.

## Problem Statement

Each student will select a mold which will be used to suplicate a fiberglass reinforced polyester resin model boat hull. The hull will be outfitted with the appropriate subsystems (motor, rudder, etc.) and will later compete against others to cover a given distance in the shortest possible time.

## Activities

1. Prepare mold (clean, release agent, etc.).
2. Apply gel coat.
3. Apply reinforcing materials (cloth, matt, etc.).
4. Saturate reinforcing with resin.
5. Remove and finish hull when appropriate.

## Sample Topics

1. Theory of reinforced plastic hulls
2. Demonstration of lay up procedures/techniques
3. Safety: personal, materials handling, materials storage, etc.
4. Outfitting marine vessesl with subsystems
5. Repairing reinforced plastic hulls

## References

IASCO, 5724 West 36th St., Minneapolis, MN 54416
Baird, Ronald. Industrial Plastics, Goodheart-Willcox Co., Inc., South Holland, IL, 1982.

## Resource Contacts

Local marinas or auto parts stores
Gary Shelhamer, Dryden High School, Dryden, NY 13053 (607) 844-8694

## Related Technology Applications (cross over areas)

Safe materials handling, Aerospace and land utilization of reinforced plastics

**Recommended Facility:** Transportation, Production (Good ventilation and proper storage facilities)

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Charles Catarelli

**School** Elmont Memorial High School
Elmont, NY

**Check appropriate course**

| | |
|---|---|
| ____ Production | __X__ Tech. Drawing |
| __X__ Transportation | ____ Electronic/Electricity |
| ____ Communication | ____ Energy |

**Title:** "Flight of Fancy": Paper Glider Design Competition

## Overview/Description

Design a paper glider using known criteria for achieving flight. Construct a stiff paper model and test for length and duration of flight. Redesign and compete with fellow students.

## Problem Statement

Design a paper glider that will have a long distance, or long duration, flight.

## Activities

1. Design sketches.
2. Technical drawing of design.
3. Test flight.
4. Redesign.
5. Competition.

## Sample Topics

1. Air foil and basics of flight
2. Variables of flight performance
3. Using proportion and math variables

## References

Whitewings, AG Co. Ltd., Yodogawa-Ku, Osaka, Japan.

## Resource Contacts

Charles Catarelli, Elmont Memorial High Schol

## Related Technology Applications (cross over areas)

Transportation, (Physical) Tech.

**Recommended Facility:** Mechanical Drawing Room and Outdoor Area (or gym)

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __x__ Transportation | __x__ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** Testing Automotive Energy Use

## Overview/Description

The alternator of an automobile uses one form of energy to produce another form of energy; it does not run for "free." Each time an electrical device is used in the automobile, it causes the alternator to use energy produced by the fuel being burned in the engine.

## Problem Statement

Identify the fuel consumption caused by the operation of electrical accessories. Using a fuel flow meter, students will measure the amount of additional fuel needed when each electrical device is activated. Develop a chart showing the comparison of energy use for those accessories tested.

## Activities

1. Connecting fuel flow meter to vehicle or test engine.
2. Measuring fuel flow, charting fuel use.

## Sample Topics

1. Energy consumption

## References

Smith, Howard, Instructor's Guide for Exploring Energy. Goodheart-Willcox Co., Inc., South Holland, IL, 1985.

## Resource Contacts

Robert S. Berkowitz, Long Beach High School, Long Beach, NY 11561

## Related Technology Applications (cross over areas)

Transportation, Electricity/Electronics

**Recommended Facility:** Energy Lab, Transportation Lab, Electricity/Electronics Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** William Davis

**School** John Glenn High School
330 Cuba Hill Rd.
Huntington, NY 11743

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __x__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Reusable Spacecraft

## Overview/Description

If a space airplane is propelled to a point in space by a rocket engine, the craft can then glide back to earth for a safe landing and may be flown again on other missions.

## Problem Statement

Design and build: A. stable booster rocket; B. test launch.
Design a "piggy back" glider that will ride on a booster.

## Activities

1. Build and construct rocket and glider.
2. Hand launch glider - adj./opt. glide ratio

## Sample Topics: Rocket Stability and Construction

1. Center of balance
2. Center of pressure
3. Method of testing
4. Boost glider - (a) Aerodynamic principles - (b) Trimming for proper glide

## References

Stine, G. Harry. Handbook of Model Rocketry
Model Rocketry Magazine
NAR Pink Book (comnpetition handbook)

## Resource Contacts

Estes Industries, Inc., Box 227, Penrose, CO 81240 (request catalog)

## Related Technology Applications (cross over areas)

Science, Math

## Recommended Facility: Shot Lab and Football Field

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Roger Harwood

**School** Plattsburg High School
Plattsburg, NY 12901

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| __X__ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Lower Unit Maintenance

## Overview/Description

The periodic maintenance of a lower unit of an outboard or inboard/outbard marine propulsion unit is extremely important. Students will experience the basic maintenance procedures as suggested by the manufacturers of the engine/drive units.

## Problem Statement

Given an outboard engine, the students (working in pairs) will inspect and perform routine maintenance on the engines lower unit. A procedural inspection/maintenance check sheet will be used by the students to insure all points are covered.

## Activities

1. Fill out heading of inspection sheet (mfg. h.p., etc.).
2. Visual inspection: prop nut, shear pin/clutch, propeller, seals, bearings, sket, water intake, etc.
3. Drain, check, and replace or add lower unit lubricant.
4. Spring ready and Winter storage procedures.

## Sample Topics

1. Review the lower unit: functions, parts, etc.
2. Lower unit inspection (cotter pin, prop nut, shear pin/clutch, propeller damage, leaking seals, water intake, etc.)
3. Basic maintenance and lubrication

## References

Abos Marine Publications, Intertec Publishing Corp., 1014 Wayandotte, Kansas City, MO 64105
Glenn and Young. OMC Inboard/Outboard Repair and Tune-Up. Henry Regnery Co., Chicago, IL, 1976.

## Resource Contacts

Local Marinas and Mechanics

## Related Technology Applications (cross over areas)

Lubrication, the physics of propellers, transmission of power

**Recommended Facility:** Transportation

# *Production*

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| __X__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Home-Built Surveying Instruments for Construction

## Overview/Description

Building construction requires accurate layout of foundations, elevations, and development of plot plans. Construction of basic surveying equipment common to building construction applications in site development can be accomplished in construction, manufacturing, and technical drawing classes.

## Problem Statement

Construction layout instruments will be built by students in class for use in leveling and plot plan development. Instruments that can be student-built include the following: plane table (with tripod), level rod, and siting device (alidade).

## Activities

1. Drafting (working drawings).
2. Instrument construction (by teams).
3. Instrument "calibration" and testing.

## Sample Topics

1. Instrument applications
2. Construction techniques
3. Leveling
4. Field layout

## References

Nelson, John A. Drafting for Trades Industry: Civil. Delmar Publishing, Albany, NY, 1979.
Spence, William P. Architecture: Design, Engineering, Drawing. McKnight Publishing Co., Bloomington, IL., 1979.

## Resource Contacts

Daniel A. Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architectural Drawing, Residential Structures, Production

**Recommended Facility:** Production Lab, Drafting Room, Model Shop

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Utility System Hands-On Activity (Plumbing, Electrical, Heating/Cooling, Communications)

## Overview/Description

As part of an "Exploratory" Activity, students will be assigned hands-on activities dealing with utilities systems and their importance in the construction industry. Students will be exposed to sweat soldering, pvc assembly, basic plumbing layout, electrical systems-wiring of a switch, heating/cooling systems, and various communications. Students will also explain delivery methods.

## Problem Statement

Students will be instructed to sweat solder a tee-joint, cap two ends together, and test joints. Students will also connect this system of plumbing, using pvc tubing, and test it for leaks. A pictorial drawing of wiring a light switch and outlet for exposure purposes will be provided. Instructors will give students a tour of High School Building to see how utilities are delivered and distributed; also, instructors will get a building schematic. Students will survey their homes for utility systems and their manner of delivery.

## Activities

1. Bring in and dismantle faucets, drains, shut-offs; discuss their maintainence.
2. Sweat solder copper.
3. Join PVC tubing.
4. Electrical wiring panel board.
5. Telephone jack system.
6. Cable System - Branch off System.
7. Installing door bell circuit.

## Sample Topics

1. Tools and materials for sweat soldering
2. Plumbing systems vs. Electrical systems vs. Heating/cooling systems vs. Communications Systems
3. Discuss sources, delivery, distribution within a structure (Block System Diagram)

## References

Step by Step Plumbing Guide for Do-It-Yourselfer
Mix, Floyd M. Houswire Simplified. Goodheart-Willcox, Inc., South Holland, IL.
Simplified Electrical Wiring, Sears, Roebuck Company

## Resource Contacts

Use Head Maintainence Personnel Staff for Building Tour - Rockwell International, Pittsburg, PA.
Bernard W. Przelski, West Canada Valley Central School

## Related Technology Applications (cross over areas)

Electricity, Energy, Communications

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, New York 13416

**Check appropriate course**

| | |
|---|---|
| __X__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Foundation Types & Hands-On Activity

## Overview/Description

The student will research and demonstrate the various methods used as foundation systems in construction. This activity will involve the various foundation systems such as poured, block, wood, and bonding. Students should be able to demonstrate layout of a foundation, pouring a footer, and laying bricks (blocks). They should be able to determine quantity of materials needed, completing a slump test and pouring a floor or sidewalk; students will also be given information on how to calculate sand, stone, and cement quantities.

## Problem Statement

Students will be given activity sheets and select hands-on activity--making forms, making and pouring concrete for a footer on patio block, laying bricks. Students must be able to calculate quantities needed when given necessary specifications.

## Activities

1. Layout - Board and Bat. Scale or Actual
2. Footer Layout
3. Lay Bricks or Blocks on footer.
4. Mix concrete.
5. Mix mortar.
6. Complete a slump test.
7. Build a form for patio block and driveway car blocks.

## Sample Topics

1. What is a cubic yard?
2. Formula for cubic yard of concrete
3. Using slide scale for determining cubic yard
4. Compare wood, poured, block, bonding types of foundations
5. Layout of a footer
6. Mixing procedures
7. What makes good concrete?

## References

Handbook--Concrete and Masonry, Practical Workshop Library 053. Fawcet Publications.

## Resource Contacts

Local Concrete Supplier, Local Aggregate Supplier, Local Mason, brick layer or carpenter
Bernard W.. Przelski, West Canada Valley Central School

## Related Technology Applications (cross over areas)

Manufacturing (Casting)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _X_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Testing, Installing Various Types of Insulation

## Overview/Description

This activity will allow students to develop experiments and demonstrate testing of insulation heat reflective tests and heat conductivity tests when insulation is wet or dry. Students will become aware of conduction, convection, radiation and R-value. With the use of heat lamps, aluminum foil and thermometer (Science Tool Kit), students will demonstrate proper installation of batt, rolled, cellulose, blown fiberglass and styrofoam insulations.

## Problem Statement

Insulation is used to reduce heat and sound transfer. This activity is in the form of an experiment to determine the effectiveness of insulation in resisting conducted and radiant heat.

## Activities

1. Test insulation heat reflective test and heat conductivity test.
2. Installation of various insulations.
3. Home energy audit.

## Sample Topics

1. Differentiate between conduction, convection, radiation;....state examples of each
2. Heat flow vs. heat loss
3. R-value
4. Home energy audit - Niagara Mohawk Power - Software

## References

Wright and Henak. Exploring Production. Goodheart-Willcox co., Inc., South Holland, IL.

## Resource Contacts

Niagara Mohawk Power Corporation, New York State Gas and Electric Company,
Bernard W. Przelski, West Canada Valley Central School

## Related Technology Applications (cross over areas)

Energy

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Experiment Activity with Footer and Foundations

## Overview/Description

Students will build a building site box (4' x 4' x 5 1/2' ht.). Filled fine sand to simulate soil conditions in which the student can demonstrate footings and foundations (floating, bearing piles, spread and pier foundations).

## Problem Statement

Students will demonstrate and build forms necessary for floating, bearing piles, and spread and pier foundations in the building site box. Students will mix and pour concrete mix into form; they will use necessary reinforcing material according to specifications.

## Activities

1. Building forms.
2. Mixing concrete.
3. Making key for poured foundations.
4. Building footing, foundations, building floating foundations.
5. Building bearing piles.
6. Building spread footing.

## Sample Topics

1. Mixing concrete
2. Discussing types of footers
3. Making forms
4. Mixing vs. Ready-mix concrete
5. Advantages/disadvantages

## References

Wright/Henak, Exploring Productivity. Goodheart-Willcox Co., Inc., South Holland, IL.

## Resource Contacts

Bernard W. Przelski, West Canada Valley Central School

## Related Technology Applications (cross over areas)

Residential Structures, Architecture

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| __x__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Resin Castings with 'Poly' Molds (Chemical Conditioning)

## Overview/Description

Students will be exposed to casting/molding methods using a 'Poly' median. Students will follow given procedures for preparation, but may develop their own creation of casting on encapsulation. Frozen ocean layered, heart note holder, paperweight key identification tags, night light, pen holder, etc. The activity is primarily to simulate a casting, but should be compared to metal casting industry.

## Problem Statement

Students to create an object, paperweight, pen holder, etc., using a casting resin (easy cast) and catalyst, molds, dyes and pigments, and special effects and background.

## Activities

1. Create an object from a mold using a plastic resin, plaster of Paris, concrete (Patio Blocks).

## Sample Topics

1. Following and reading directions
2. What are casting resins, catalyst, colorant, and molds
3. Thermosetting plastics vs. thermoplastic

## References

Casting Craft Idea Book, Chemco (order through Iasco catalog).

## Resource Contacts

Bernard W. Przelski

## Related Technology Applications (cross over areas)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Fiberglass Clip Board "Combining Process"

## Overview/Description

As one part of combining process, students will make a standard size clip board out of fiberglass material using a logo of some sort and a colored background. Students will learn that this is only one basic method of combining (mechanical fasteners, adhesion/cohesion, coating and assembly).

## Problem Statement

The students will demonstrate their ability to complete a clip board with a logo of their choice following procedures from lasco clip board sheet.

## Activities

1. Professional sign maker software.
2. Computer eyes- -digitizer.
3. Print shop.
4. CHD to design logo.

## Sample Topics

1. Fiberglass--where else can it be used?
2. Fiberglass--molding objects
3. Casting concepts: molds, preparing, material, introducing material into mold
4. Difference between solidifying material extracting product, sand casting, permanent casting, injection molding, slip casting and the elements common to each

## References

How to Make a Fiberglass Clipboard. Get lasco. Wright/Hanak.
Exploring Production. Goodheart-Willcox Co., Inc., South Holland IL.

## Resource Contacts

Bernad W. Przelski

## Related Technology Applications (cross over areas)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Separating Materials - List Tools and Machines in Lab

## Overview/Description

The separating activity is designed to present conceptual structures for the process and provide an opportunity to perform related separating practices. Separating in the manufactruing process includes all practices to remove excess material to impact the desired size, shape, and/or surface finish of a part; this includes machining (forming chips and particles) and shoring (fracturing away the excess material).

## Problem Statement

Students will select and demonstrate the use of 5 hand tools and 5 machine tools relating to separation. Students will make a chart dealing with turning, drilling, milling and sawing, planing and shaping, grinding and shearing, and describe tools as single point or multi point or cutting action.

## Activities

1. Safety--tool and machine usage
2. Developing procedures to demonstrate above criteria.

## Sample Topics

1. Define and describe separating
2. Difference between machining and shearing
3. Discuss various movements (reciprocating--tool, work, rotating--tool,work; linear
4. What is a single point tool vs. multi point tool?

## References

Wright/Henak. Exploring Production. Goodheart-Willcox Co., Inc., South Holland, IL.

## Resource Contacts

Bernard W. Przelski

## Related Technology Applications (cross over areas)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Cental
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| __x__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** **Thermal, Chemical and Mechanical Conditioning Lab Activity**

## Overview/Description

The conceptual study of conditioning should include discussion and practice of several concepts and include several different conditioning practices. Conditioning is the manufacturing process which uses heat, chemical, or mechanical force to change the mechanical properties of a material; the property change is caused by a change of internal structure of the material.

## Problem Statement

Divide students into small groups and select conditioning practices which represent 3 conditioning processes: thermal; chemical, and mechanical conditioning. Develop safety procedures and safe work habits. Have students summarize results. Typical observation might include: plaster got warmer as it hardened; or screw driver could not be filed after plaster hardened.

## Activities

1. Thermal conditioning: Harden and temper a screwdriver (which could have been produced in the forming session).
2. Seasoning of wood: Firing of a ceramic
3. Chemical conditioning - cast a liquid plastic
   - plaster
   - concrete.
4. Mechanical conditioning - bend a strip of metal until it breaks; material work hardened as it was bent became brittle and broke.
5. Discuss steps involving conditioning.

## Sample Topics

1. Vocabulary -- temper, annealing, hardening, ductile, elastic, stiffer
2. Conditioning

## References

Wright & Henak, Exploring Production. Goodheart-Willcox Co., Inc., South Holland, IL.

## Resource Contacts

Bernard W. Przelski

## Related Technology Applications (cross over areas)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| __x__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** **Assembly Manufacturing Process**

## Overview/Description

Students will use materials, tools, and machines found in the lab or at home to perform assembly practices. Assembly is a manufacturing process which permanently or temporarily fastens parts together. Two basic methods of assembly are: Bonding---permanent fastening of parts together using heat, pressure, and/or bonding agent; mechanical fasteners--a temporary or permanent method of holding parts together using mechanical devices or force.

## Problem Statement

Students are to demonstrate 12 different assembly methods, listing procedures, and method of fastening or assembly using a variety of materials, tools, or machines. Given an item (product) to dismantle, students will list methods used in product assembly.

## Activities

1. List and demonstrate 12 various methods of assembly (wood, metal, plastics, ceramics).
2. Take apart an old appliance; list methods of assembly of product.

## Sample Topics

1. Define, describe, assemble
2. Difference between bonding and mechanical fasteners
3. List fasteners provided in lab

## References

Wright and Henak. Exploring Production. Goodheart-Willcox Co., Inc., South Holland, IL.

## Resource Contacts

Bernard W. Przelski

## Related Technology Applications (cross over areas)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** **Model Shed to 4" x 1' Scale**

## Overview/Description

With the objective to keep cost of construction shed materials down, students will design one of the following structures to a 4" = 1' scale: storage shed, greenhouse/garden room, swimming room changing building. Students will research the needs, specifications, design, and materials to be used for building a shed. They will also compare various prices and complete a bill of materials. Building a scale model will follow the same format as an actual size structure.

## Problem Statement

Students will have to set equipment to mass produce scale lumber for model to build to scale an 8' x 12' shed, no higher than 9'; students are to build a door opening of 5' x 6' x 8' and standard size window openings using conventional building techniques; and make structures must be made so it can be loaded onto a flat bed or tilt bed. Students will design, layout, and dimension their drawings. They must set up mass production techniques to produce scale lumber, and build and assemble structure.

## Activities

1. Scales conversions.
2. Layout plates.
3. Cutting studs to length.
4. Platform construction.
5. Bill of materials.

## Sample Topics

1. Floor plan
2. Architectural drawings/dimensionings
3. Stud length
4. Rough opening
5. Plate Layout
6. Rafter calculation (framing sq./computer (10 to A)
7. Foundation types
8. Sheathing methods/types
9. Roofing material/comparison

## References

Utility Building Design, Material, Plans - American Association for Vocational Instruction Material
Planning Project Construction. Hobar Publications.
Wright, R.T., R.M. Henak Exploring Production. Goodheart-Willcox Co., Inc., South Holland, IL.

## Resource Contacts

Local: Lumber Supplier, Carpenters.
Bernard W. Przelski

## Related Technology Applications (cross over areas)

Architectural Drawing, Manufacturing

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Saw Horses Construction - Layout With a Framing Square

## Overview/Description

Students will work in teams of two to construct a pair of saw horses using materials, tools, and machines that would be found at a construction site. Students will design their own or use plans already provided. Students will complete a list of costs of materials and tools needed to complete construction of horses. They will become more familiar with tools and equipment used on site. (See attached sheets.)

## Problem Statement

Students will build a pair of saw horses to meet needs of its owner, i. e., height, width, stacking ability, collapsible or folding, adjustable.

## Activities

1. Safety, demonstration of portable construction equipment.
2. Layout, dimensioning.
3. Layout, cutting, assembly.
4. Bill of materials.

## Sample Topics

1. Safety
2. Introduction to portable equipment used on site
3. Framing square usage to aid in saw horse construction
4. Fastener to be used

## References

Saw Horse Layout With a Framing Square. Hobak Publication. 1234 Tiller Lane, St. Paul, MN. 555112.

## Resource Contacts

Bernard W. Przelski, West Canada Valley Central School

## Related Technology Applications (cross over areas)

Production, Technical Drawing, CAD

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** Wanada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Constructing A Partition

## Overview/Description

Students will become better acquainted with enclosure systems by designing and laying out an actual partition in the lab, given basic specifications for a rough door and window openings. Each student will complete a bill of materials and, upon approval, order materials. Students will be able to calculate materials for the partition and how they are related on the job, such as the amount of structural members needed for a given part--floor joists, studs, plates, shingles, felt paper, insulation, etc.

## Problem Statement

Students will design and layout a partition for ceiling height of 8', main wall will consist of one door, one window, and 10' wall length with two 4' legs (corners)to stand upright during construction. Students will first draw to scale the stud layout and dimensioning of door and window locations. Students will insulate, sheath, side, and sheet rock, tape interior.

## Activities

1. Design.
2. Draw/Dimensioning.
3. Computer design.
4. Computer software for ordering and pricing.
5. Layout of studs.
6. Calculating stud length, rough opening.

7 & 8. Bill of materials/ordering.

## Sample Topics

1. Architectural Drawing--Dimensioning
2. Stud layout 16" o.c. vs. 24" o.c. vs. 12" o.c.
3. Stud length calculation (shoulder stud)
4. Calculation of sheathing needed, sheet rock
5. Types of interior finishing or exterior siding
6. Platform vs. balloon construction
7. Calculation rough opening for doors/windows
8. Simplified corner posts vs. standard corner
9. 2 x 4 walls vs. 2 x 6 walls and how to assemble

## References

Wright, R.T. and R.M Henak. Exploring Production. Goodhart-Willcox Co., Inc., South Holland, IL.
Wright, R.T. and R.M. Henak. Exploring Production Student Manual.

## Resource Contacts

Contractor - Local Person
Bernard Przelski, West Canada Valley Central School

## Related Technology Applications (cross over areas)

CAD, Architectural Drawing, Energy (Insulation)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Bernard W. Przelski

**School** West Canada Valley Central
Newport, NY 13416

**Check appropriate course**

| | |
|---|---|
| __x__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Technology Education Update

## Overview/Description

Students will be required to provide an update on a current trend that an industry i.e., manufacturing, construction may be using to improve its manufacturing process or construction materials or material. As updated material is handed in, students will place it on a data base so future information may be added to research. (see attached work sheet.)

## Problem Statement

Students will review a technology update article, list the important facts about it, and present the information to class. Students will respond to the need for the particular technology, their feelings and reactions to it, and the effects it may have --environmental, personal, economic, and social. Attach article to assignment sheet listing source or material.

## Activities

1. Research topic.
2. Summarize article.
3. Prepare an oral report.
4. Place information on a data base.

## Sample Topics

1. Wooden foundations
2. Bonding foundations
3. Styrofoam forms for poured foundations
4. Effects of robots on the assembly line
5. Impacts of a particular product on building site
6. Techniques, procedures, new processes, materials, new methods, new tools or equipment

## References

For students - Library periodicals "Handyman", "Shelter"

## Resource Contacts

Bernard W. Przelski

## Related Technology Applications (cross over areas)

Communication skills in writing and making oral presentations. Computer - data base.

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** A. Steinhorst

**School** Cazenovia Central
Green St.
Cazenovia, NY 13035

**Check appropriate course**

| | |
|---|---|
| __x__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** House Wiring

## Overview/Description

This activity is designed to give students an understanding of proper house wiring techniques as well as code installation procedures.

## Problem Statement

Students should be provided with background information regarding the electrical system in housing, materials used, circuits, and national and local codes. Demonstrations must also be given on wiring procedures. Each student will then wire, on a previously built wall section, two duplex outlets and a SPST switch controlling a light fixtures.

## Activities

1. Complete a wiring diagram exercise.
2. Complete an electrical term and safety work sheet.
3. Measure and mount electrical boxes on wall section.
4. Cut, strip and install wire (connect to components).
5. Install light bulb and perform safety use check.

## Sample Topics

1. Discussion of electrical sub-systems in housing
2. Materials used in wiring: copper wires, gauges, insulation, cable, outlet boxes and receptacles, switches, fuses, circuits, resistance

## References

Mix, F. House Wiring Simplified. Goodheart-Willcox co., Inc., South Holland, IL. 1973.
N.Y.S. Guidelines for Electrical Inspection.1987.

## Resource Contacts

Local village electrician
A. Steinhorst, Cazenovia Central School

## Related Technology Applications (cross over areas)

Systems Technology, Math Science

**Recommended Facility:** Tech Lab or Science Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** A. Steinhorst

**School** Cazenovia Central
Green St.
Cazenovia, NY 13035

**Check appropriate course**

| | |
|---|---|
| __x__ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** **Block Wall Foundation**

## Overview/Description

The students will be exposed to the block type foundation wall, discussion materials used, advantages and disadvantages and sizes and construction.

## Problem Statement

In this activity, the student will engage in the construction of a masonry block foundation wall. The wall shall be 5 courses high, using corner blocks, and will be evaluated on being plumb, level, square and neat.

## Activities

1. Mix mortar (3 sand, 1 lime).
2. Set up work station.
3. Measure and layout.
4. Lay blocks.
5. Use corner block and string.
6. Use level to check plumb and levelness.
7. Edge joints.

## Sample Topics

1. Mortar mixing
2. Mason tools and use
3. Cost factors
4. Anchor bolts
5. Block cutting
6. Efficient use of time
7. Footings
8. Backfilling

## References

House Building Basics, American Plywood Association
Kicklighter, C. Modern Masonry. Goodheart-Willcox Co., Inc., South Holland, IL., 1977.

## Resource Contacts

Local area mason contractor
A. Steinhorst, Cazenovia Central School

## Related Technology Applications (cross over areas)

Technical Drawing, Manufacturing, Math and Science

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Robert W. Logan

**School** Mynderse Academy
105 Troy Street
Seneca Falls, NY 13148

**Check appropriate course**

| | |
|---|---|
| _X_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Concrete Testing

## Overview/Description

Concrete has been a major building material because of its strength and appearance. Concrete consists of aggregate (gravel/stone), sand, cement, and water; these ingredients must be mixed in varying proportions in order for the concrete to attain a predetermined strength.

## Problem Statement

The students will understand the importance of mixing and curing concrete properly, based on the results of testing the samples of various mixes and curing conditions.

## Activities

1. Build a testing device that will indicate the relative strengths of 1" x 2" x 12" samples.
2. The samples will have various ratios of ingredients, reinforcing rods (coat hangers, welding rods, ) and will have been cured in a damp area (wet sponge and plastic bag); on a shelf in the room, exposed to outside weather, and under water. The test will be to find the weight that is needed to break each of the samples. The weights will be recorded as graphed to indicate the effect that the various conditions have on concrete's strength.

## Sample Topics

1. The composition of concrete
2. The slump test used to control the quality of concrete
3. Reasons and uses of reinforced concrete
4. How concrete can be altered in setting time; water, resistance with additives.

## References

Huth, Mark. Introduction to Construction, Delmar, 1980.
Wright, R. Thomas and Richard M. Henak. Exploring Production. Goodheart-Willcox Co., Inc., 1985.

## Resource Contacts

Concrete supplier/mason contractor
Robert W. Logan, Mynderse Academy

## Related Technology Applications (cross over areas)

Production Systems, Science, and Math

**Recommended Facility:** Production Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Robert W. Logan

**School** Mynderse Academy
105 Troy Street
Seneca Falls, NY 13148

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Joining Plumbing Materials

## Overview/Description

Plumbing for a residence consists of one or two functions: to supply fresh water throughout the house or carry used water and waste away from the residence. The two subsystems of a plumbing system are the supply plumbing system and the sanitary plumbing system. Supply plumbing includes all pipes and fittings used to bring fresh water to the house from wells or municipal supplies. Sewage plumbing, also know as DWV (drainage, waste, and vent), consists of pipes and fittings which carry the used water and waste to septic systems or municipal treatment plants.

## Problem Statement

Students will compare and evaluate the advantages and disadvantages of the various plumbing materials by cutting, fitting, and joining several pieces with fittings. Students will be able to identify the common materials and tools used in plumbing systems. They will also develop an understanding of the plumbing systems in a residential structure.

## Activities

1. Following a diagram, the students will construct and test a cutting and joining exercise using copper and plastic pipe; it should be joined and capped, then tested by the student, using the sink in the lab.
2. Using a model wall section, connect a faucet system using the various materials commonly used in a residential structure.
3. Test for leaks.

## Sample Topics

1. Identification of various types of tool, materials, and techniques used in plumbing
2. Procedures for cutting, joining, and testing plumbing systems
3. Systems and procedures for supplying fresh water and for disposing and treating generated waste
4. The explanation of how a toilet operates and the importance of a vented waste system

## References

Huth, Mark. Introduction to Construction. Delmar, 1980.
Wright, R. Thomas and R. M. Henak. Exploring Production. Goodheart-Willcox, Co., Inc., South Holland, IL., 1985.

## Resource Contacts

Robert W. Logan, Mynderse Academy

## Related Technology Applications (cross over areas)

## Recommended Facility:

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Robert W. Logan

**School** Mynderse Academy
105 Troy St.
Seneca Falls, NY 13148

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** **Residential Flooring Systems**

## Overview/Description

In residential structures, the flooring systems used to build the deck of a house relate to the cost of the structure. The deck system consists of joist headers, floor joists, bridging, and subfloor materials.

## Problem Statement

Students will explore, understand, and identify the various methods and materials used for constructing a floor system of a house. They will be able to evaluate the system's validity based on the cost of materials, labor, and the proper design for its use.

## Activities

1. Discuss the types of decking systems in use and their advantages and disadvantages.
2. Students will research, draw, and/or build a model of one decking system. Present this to the class.
3. Discuss and identify the various framing members and materials used in the decking system.
4. Have a local contractor come in and discuss decking systems.
5. Visit a local building site.
6. Build a small shed or deck system in the lab.

## Sample Topics

1. New building practices and materials being used for deck systems
2. Methods for calculating and size of framing members using charts and tables
3. Layout of joists, joist headers, bridging, and other related materials

## References

Buttery, William A. and H. G. Miller. Carpentry. South-Western Publishing Company, 1984.
Spence, William P. General Carpentry. Prentice-Hall, Inc., 1983.

## Resource Contacts

Local building supplies store, local builder
American Plywood Association

## Related Technology Applications (cross over areas)

Science and Math

**Recommended Facility:** Production/Construction Lab

# Electricity - Electronics

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | __X__ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Power Supply

## Overview/Description

Electronic devices often require a low DC voltage power supply. Either only 120 AC line voltage may be available, or there may not be a battery of the right voltage. Only a few components are needed to construct a two voltage DC power supply, resulting in not only a power supply, but a device which help students learn some of the fundamentals of electricity, as well.

## Problem Statement

Construct a low-voltage DC power supply for a specified voltage.

## Activities

1. Select the DC voltage required.
2. Determine the components needed to provide the voltage and the amperes needed.
3. Assemble the components and test the unit.

## Sample Topics

1. Ohm's Law
2. Component selection
3. Power formula
4. Soldering
5. Electrical safety

## References

Forrest, M.Mims III. Getting Started in Electronics. Archer Publications. Fort Worth, TX, Radio Shack. 1983.
Robert Caswell, Liverpool High School, Liverpool, NY.

## Resource Contacts

Radio Shack retail store. Local electrical repair shops.

## Related Technology Applications (cross over areas)

**Recommended Facility:** Electricity/Electronics lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kelinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | __x__ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Voltage Regulator

## Overview/Description

Power supply devices and batteries provide the electrical energy needed to operate many low voltage devices. The exact voltage needed for a particular device may not always be available. Several options are available to allow the experimentor to select the desired voltage.

## Problem Statement

Construct a voltage regulator for one or more specific voltages. Select components and lay out the circuit for proper operation.

## Activities

1. Selection of components.
2. Development of circuit diagrams.
3. Installation and mounting of components.
4. Testing for proper operation.

## Sample Topics

1. Ohm's Law
2. Electronic components
3. Circuit analysis

## References

Forrest M. Mimms, III. Getting Started in Electronics. Archer Publications, Fort Worth, TX, Radio Shack, 1986.
Ronald A. Reis. AC-DC The Fundamentals of Power Supplies. Electronic Kits International, Laguna Hills, CA, 1983.

## Resource Contacts

Local Radio Shack store

## Related Technology Applications (cross over areas)

**Recommended Facility:** Electricity/Electronics lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | __X__ Electronic/Electricity |
| _____ Communication | __X__ Energy |

**Title:** **Build a Solar Insolation Meter**

## Overview/Description

The intensity of the sun varies with seasonal changes and the condition of the atmosphere. Measurement of the sun's intensity is vital when constructing solar devices, but commercial meters may be too costly for low-budget programs. Quite accurate measurements of solar intensity can be made, however, with relatively inexpensive equipment.

## Problem Statement

Construct an inexpensive, accurate solar insolation meter. Select an appropriate milliamp meter movement and one or more solar cells. Construct a suitable housing unit for mounting the meter and solar cell(s). Calibrate the meter using a standard (commercial) meter.

## Activities

1. Study of solar insolation.
2. Solar cell construction.
3. Construction and mounting of components.
4. Electrical wiring.

## Sample Topics

1. Solar insolation
2. PV cells
3. Meters
4. Soldering

## References

## Resource Contacts

Thomas Altman, Oswego High School. Oswego, NY 13126
Roger Hinricks, SUNYCO. Oswego, NY 13126

## Related Technology Applications (cross over areas)

Electricity/Electronics

**Recommended Facility:** Electricity/Electronics Lab Energy lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _x_ Electronic/Electricity |
| _____ Communication | _x_ Energy |

**Title:** Producing an Energy Cell

## Overview/Description

Two dissimilar metals separated by an electrolyte will produce electricity. Both "dry: and "wet" cells can be produced using the procedure identified.

## Problem Statement

The student will use dissimilar metals and various electrolyte materials to produce the test electricity cells.

## Activities

1. Selection of dissimilar metals and electrolyte materials.
2. Assembly of cells.
3. Meter usage.
4. Measurement of voltage and current levels.
5. Effect of electrolyte materials on metals over time.
6. Development of comparison charts.

## Sample Topics

1. Energy conversion

## References

DiLavore, Philip. Energy: Insights From Physics. John Wiley. 1973.

## Resource Contacts

Mark Russel, Liverpool Central School, Liverpool, NY 13090.

## Related Technology Applications (cross over areas)

Electricity/Electronics, Production

**Recommended Facility:** Energy lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Fred Dillenback

**School** Homer Senior High School
Rt. 281 - West Road
Homer, NY 13077

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | __X__ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** **Resistor Board Measurement Exercise**

## Overview/Description

A printed circuit board holding six resistors of various resistance sizes can be constructed to demonstrate methods utilized in printed circuit board construction. After resistors are properly soldered to the circuit board, a multimeter will be used to read them as either single resistors or multiple resistor configurations of series or parallel circuits. Students will determine the effects of series and parallel circuit configurations on resistance and also be able to read color codes.

## Problem Statement

A circuit board, copper clad on one side, will be cut of different ohm sizes i.e., 470 Ω, I K Ω, 4.7 K Ω, 47 K Ω, 150 K Ω and 22o K Ω. A circuit pattern may be placed on the copper clad board with resist pew or resist tape and spots, and etched in acid; the pattern should allow a series connection of the resistors down the board. Resistors, may be taken on individual resistors or series combinations down the board. By utilizing short jumper wires with alligator clips on the ends, circuits can be changed into parallel combinations and measurements made accordingly. A work sheet may be made to accompany the exercise.

## Activities

1. Circuit Board Construction.
2. Soldering.
3. Series and Parallel circuit reading.
4. Usage of Multimeter - OHM scale.

## Sample Topics

1. Series and Parallel circuits
2. Resistance -- Resistance Color Codes

## References

High School Level Electricity/Electronics Text

## Resource Contacts

Kelvin Electronics, P. O. Box #8, 1900 New Highway, Farmingdale, NY 11735.

## Related Technology Applications (cross over areas)

Plastic/Metal Production of Case for Circuit Board.

**Recommended Facility:** Electricity/Electronics Facility

# *Technical Drawing*

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | __x__ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Perspective Projection

## Overview/Description

Perspective is a method of representing three-dimensional objects on a flat plane illustrating the view as the eye sees the object. Perspective drawings are more realistic to the eye than other types of projections, and are used in architectural renderings and production illustrations

## Problem Statement

Develop sketches and finished drawings of geometric objects illustrating parallel perspective (one-point), and angular perspective (two-point) projection techniques and procedures.

## Activities

1. Object selection.
2. Sketching.
3. Layout and projection.
4. Final drawing.

## Sample Topics

1. Types of pictorial drawings
2. Intersection and projection
3. Layout techniques
4. View selection
5. Rendering (samples)
6. Industrial applications

## References

French, Thomas E. et. al. Mechanical Drawing (10th Edition). McGraw-Hill. New York, 1985.
Spencer, Henry C. and J. T. Dygdon. Basic Technical Drawing. MacMillan, 1980.

## Resource Contacts

Daniel A. Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architecture, Residential Structures

**Recommended Facility:** Drafting Room

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, New York 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | __x__ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Basic Cartography and Construction Layout

## Overview/Description

Basic concepts of cartography (map drafting) and construction layout can be illustrated through plotting exercises in the drafting room. Mapping and layout activities can be supplemented through the use of student-developed field data utilizing basic surveying instruments and drafting procedures.

## Problem Statement

Develop plot plan drawings illustrating boundary identification, site characteristics, contours, and grid cross-sections. Field data may either be assigned or gathered from direct field observations and procedures.

## Activities

1. Site selection.
2. Data analysis.
3. Boundary plotting, contour plotting.
4. Plot plan development.
5. Field illustrations.

## Sample Topics

1. Bearings
2. Differential leveling
3. Contour plotting
4. Section plotting
5. Scale conversion
6. Building layout

## References

Nelson, John A. Drafting for Trades Industry: Civil. Delmar Publishing, Albany, NY, 1979.
Spence, William P. Architecture: Design, Engineering, Drawing. McKnight Publishing, Bloomington, IL, 1979.

## Resource Contacts

Daniel A. Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architecture, Residential Structures

**Recommended Facility:** Drafting Room

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| ____ Production | __x__ Tech. Drawing |
| __x__ Transportation | ____ Electronic/Electricity |
| ____ Communication | ____ Energy |

**Title:** **Aircraft Design: Airfoil Plotting**

## Overview/Description

Fundamental understanding of aircraft flight characteristics may be introduced through a technical drawing activity requiring students to develop a plotting of an airfoil, followed by research and development of a wing-section drawing. Basic principles of flight and high speed vehicle performance may be introduced through a simple drafting activity which relates the principles of co-ordinate plotting, basic mathematics, measurement, and modeling.

## Problem Statement

Students wil be provided with background information describing the fundamentals of flight and the relationship of airfoil design to performance. Airfoil types and characteristics will be illustrated and discussed from both historical and practical performance standpoints. Students will be furnished with a set of airfoil co-ordinates from which an airfoil will be plotted graphically, according to appropriate drafting procedures.

## Activities

1. Research: background, model analysis.
2. Airfoil Plotting: drafting, wing design characteristics.
3. Model Construction, performance testing (possible wind tunnel testing).

## Sample Topics

1. Historical Development: birds, Leonardo Da Vinci, Curtiss, Wright Brothers
2. Flight Characteristics: forces, performance, applications
3. Airfoil Design
4. Aircraft Industries: engineering, design, careers

## References

Gierke, C.D. and D.A. Nelson et. al. Aerospace Curriculum. NYSED, 9/15/84.
Basic Principles of Flight. Scott Educational Division, Holyoke, MA.
Flight Technology. National Air and Space Museum, Washington, DC.

## Resource Contacts

NASA, Goddard Space Flight Center
National Air and Space Museum
National Soaring Museum, R.D. #3, Harris Hill, Elmira, NY 14903.

## Related Technology Applications (cross over areas)

Architectural Drawing, CAD, Energy

**Recommended Facility:** Drafting Room, Model Shop, Transportation Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Frank Mattera

**School** Bethpage High School
Bethpage, NY 11714

**Check appropriate course**

| | |
|---|---|
| _____ Production | __X__ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Geometric Constructions and Figures

## Overview/Description

The students, after having completed two basic orthographic projection drawings, will draw a plate including many geometric shapes and constructions. This exercise will introduce the students to more of the basic tools and some of the more sophisticated uses of drafting equipment.

## Problem Statement

The students will use drafting tools to do some geometric constructions and figures. They will also learn tangencies, intersections, parallels, etc. P.O. #'s>

## Activities

1. Students will draw and/or construct and label the following: circumference, diameter, radius, chord, tangent, arc, perpendicular line bisector, angle bisector, parallel lines, line divided into equal parts,perilag, inscribed circumscribed hexagon and octagon using the method preferred by draftsperson.

## Sample Topics

1. Working on more complex drawings and shapes
2. Layout and problem solving in technical classes

## References

Gieseche, F. Technical Drawing 5th Ed. Macmillan Publishing Co., New York.

## Resource Contacts

Frank mattera, Bethpage High school

## Related Technology Applications (cross over areas)

Math, Art, Technical Labs, Driver Education, Physics, Chemistry, and Social Studies.

**Recommended Facility:** Drafting table, T-square, scale, compass, dividers, lettering guides, pencil,eraser, brush & drafting tape.

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Wayne P. Leithner

**School** Arlington High school
110 Stringham Road
LaGrangeville, NY 12540

**Check appropriate course**

| | |
|---|---|
| _____ Production | __x__ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Donuts For Sectioning

## Overview/Description

The common donut can serve as an intriguing teaching aid to help develop the concept of sectioning within students.

## Problem Statement

Since some students have trouble understanding the concept of sectioning, using a variety of approaches may enhance learning in this area. The common donut is an unusual teaching aid and an effection attention getter.

## Activities

1. The instructor may use an actual donut during the sectioning lesson, though the mere mention of it and follow-up sketches should provide students with an understandable image.
2. The instructor may have a donut with which to demonstrate the concept, or may provide each student with one of his or her own, along with a plastic knife or thin stiff piece of cardboard with which to do the slicing; a donut with a hole in the middle and a solid jelly filled donut are good choices.
3. Different types of sections can be demonstrated: full half, annd revolved.
4. Freehand sketches can be made on paper with different cross-hatch lines for varying materials (ingredients).
5. Students may munch on the teaching aids after the concept has been discussed.

## Sample Topics

## References

## Resource Contacts

Technical Drawing textbooks; Dunkin' Donuts (!)
Wayne P. Leithner, Arlington High School

## Related Technology Applications (cross over areas)

Best suited for technical drawing courses but may be applicable wherever plans are used, drawn, and discussed. (i.e., production systems)

**Recommended Facility:** Wherever technical drawing is taught.

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Wayne P. Leithner

**School** Arlington High School
110 Stringham Road
LaGrangeville, NY 12540

**Check appropriate course**

| | |
|---|---|
| _____ Production | __x__ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Orthographic Visualization Activity

## Overview/Description

By positioning easily identifiable items on an isometric pictorial of a simple building, students will better understand 3-view orthographic projection theory.

## Problem Statement

Man students have difficulty grasping the 3-view orthographic concept.

## Activities

1. Students will be given a horizontal and vertical grid sheet with an isometric pictorial of a simple building in the upper right hand corner.
2. They will sketch the three standard views of that building using the correct format on the grid portion of the sheet.
3. Using the overhead projector, the instructor positions a common item such as dog or chicken at a particular location on the pictorial; the students are to locate the items on EACH of the orthographic views. Do this a few times with different items in different positions. Have students suggest items and locations.
4. This has been and can be a fun short term follow-up activity.

## Sample Topics

## References

Brown, Walter. Drafting For Industry. Goodheart-Wilcox Co., Inc., South Holland, IL, 1984.
Spencer, Henry C. and J. T. Dygdon. Basic Technical Drawing, Madmillan Publishing Co., New York, NY, 1980.

## Resource Contacts

Wayne P. Leithner, Arlington High School

## Related Technology Applications (cross over areas)

Production Systems cources during the planning stages of any manufacturing of construction product.

**Recommended Facility:** Drafting Room.

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** John Bertoni

**School** Maine Endwell Senior High School
Endwell, NY

**Check appropriate course**

| | |
|---|---|
| ____ Production | __X__ Tech. Drawing |
| ____ Transportation | ____ Electronic/Electricity |
| ____ Communication | ____ Energy |

**Title:** **Sheet Metal Development**

## Overview/Description

This activity is designed to promote the students' interest and encourage their creativity while teaching elements and methods of surface development. Students are to bring containers to class to create a duct system, which will channel air from one point to another over given obstacles using containers and a transition piece.

## Problem Statement

The students will design a duct system using containers brought in from home (i.e., tubes, boxes, cans). The path can take different bearing angles and rise or fall a specific number of times before reaching a specific point, certain number of size changes may be required.

## Activities

1. Study transition of shape to shape.
2. Individual or group project to span a certain distance with packages and transition pieces connecting.

## Sample Topics

1. Cost estimation
2. Sheet metal and surface development
3. Fastening
4. Transition
5. Material and suspension study
6. Geometric shapes and packaging
7. Wind factor in air conditioning or heat retention

## References

Giesecke, Frederick et. al. Technical Drawing, Macmillan Publishing Co., New York, NY, 1980.

## Resource Contacts

John Bertoni, Maine-Endwell High School

## Related Technology Applications (cross over areas)

Air Conditioning Production
Heating

**Recommended Facility:** Production Lab, Drafting Room

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Frank Pasquale

**School** Mepham High School
Bellmore, NY 11710

**Check appropriate course**

| | |
|---|---|
| _x_ Production | _x_ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | _____ Energy |

**Title:** Model Bridge

## Overview/Description

Balsa wood model bridge construction.

## Problem Statement

Construct a model bridge according to size and weight specifications. bridge should be able to hold a load over twenty times its own weight.

## Activities

1. Full scale drawing.
2. Draw various designs.
3. Measure and cut wood.
4. Measure and cut steel for gauges.

## Sample Topics

1. Measurement
2. Tolerances
3. Gauges
4. 3-view drawing
5. Stress testing
6. Efficiency = load ÷ mass
7. Bridge specifications

## References

Mechanical Drawing Text, French and Svensen
Modern Metalworking, Walker
Machinery Handbook, Oberg and Jones
Physical Prop, Balsa Wood, Brookhaven Lab.

## Resource Contacts

Brookhaven Nat. Laboratories
U. S. Dept. of Agriculture - Lab. Report #511
Frank Pasquale, Mepham High School

## Related Technology Applications (cross over areas)

Strength of materials
Braze Welding (Gauges)
Pictorial Drawing
Blueprint Reading
Computer Drafting (CAD)
Metal Cutting (Gauges)

**Recommended Facility:** Drafting Room, Wood Shop, Metal Shop

# Energy

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** **Passive Solar Heating Design**

## Overview/Description

Building heating requirements can be supplemented through the application of passive solar design techniques which can result in substantial energy savings for the owners. Passive solar design techniques can be developed through the application of natural and man-made techniques and materials.

## Problem Statement

Design, develop, and test a model simulation of a passive solar building utilizing readily available materials and techniques. Collect and compare performance data of multiple passive solar design schemes.

## Activities

1. System analysis (design review).
2. Material testing, model construction, design testing, data gathering and comparison.
3. Design review.

## Sample Topics

1. Solar thermal properties
2. Building orientation
3. Passive design techniques
4. Data recording and analysis

## References

Mazria, Edward. The Passive Solar Energy Book. Rodale Press, Emmaus, PA, 1979
Gierke, C. David and Nelson, D.A. Energy Applications: Resource Guide. NYSED-Occupational Ed. Division, Albany, NY. March, 1986.

## Resource Contacts

Dan Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architecture, Production (construction), Residential Structures

**Recommended Facility:** Energy Lab, Model Shop, Production Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton, Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** **Natural Energy Flow: Active/Passive Solar Energy Systems**

## Overview/Description

Understanding basic natural energy flow is fundamental to the study of all energy systems and applications. Development of a foundation of background information will assist in the proper analysis and design of functional energy conversion systems.

## Problem Statement

Determine types and techniques of natural energy flow through definition and identification of fundamental energy flow concepts.

## Activities

1. Research readings, illustrations).
2. Model and material testing.
3. Model construction and simulation.

## Sample Topics

1. Types of energy
2. Energy fundamentals
3. Heat flow (conduction, convection, radiation, and transport)
4. Solar radiation
5. Types of systems (active, passive, hybrid)

## References

Mazria, Edward. The Passive Solar Energy Book. Rodale Press, Emmaus, PA, 197?
Kroner, Walter M. Natural Energy Flow for Active and Passive Solar Energy Systems. Troy, NY, RPI, 1980.

## Resource Contacts

Dan Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architecture, Production (Construction)

**Recommended Facility:** Energy Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __X__ Energy |

**Title:** Building Design: Climate Analysis (HDD)

## Overview/Description

Proper design of building energy systems depends upon accurate analysis of local climatic conditions. Determination of heating degree day (HDD) requirements for localitiies over seasonal and yearly periods is necessary for proper design of energy-conscious building systems.

## Problem Statement

Heating degree day data accumulation and calculation will be conducted for a specific locality over a one-month period. Data and findings will be compared with readings for previous months and years and will be compared with historical records for the locality. Analysis of HDD data will assist in the selection of appropriate energy-conscious building design features for residential and commercial structures.

## Activities

1. Data accumulation.
2. HDD calculation.
3. Historical data comparison.
4. Building energy system evaluation.

## Sample Topics

1. HDD calculation
2. Local climate
3. Fuel consumption
4. Insulation
5. Building design characteristics
6. Heat storage
7. Shading and cooling

## References

Falconer, Ray and Falconer, P. Climate in and Around the Home. Falconer Weather Information Service, Burnt Hills, NY, 1981.

Gierke, C. David and Nelson, D.A. Energy Applications and Curriculum. NYSED-Division of Occupational Education. Albany, NY, March, 1986

## Resource Contacts

Daniel A. Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architecture, Production (Construction), Residential Structures

**Recommended Facility:** Energy Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehow High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** Energy-Conscious Design: Remote Environment

## Overview/Description

Each student is to develop a structure that will allow an individual to reside year-round in a remote area of New York State. Each designer will consider human factors required for the "population" to function within the environment over a specified period of time under varied climatic conditions. Specific emphasis in the deisgn will be placed upon the development of a strategy utilizing energy-conscious design principles based upon availability of resources, climatic conditions, and human needs.

## Problem Statement

Students will design and develop a year-round structure in a remote area of New York State (Adirondacks, Catskills). The structure will accommodate the needs of a given population (1-2 permanent resident) with provisions for occasional guests. Energy-conscious design principles are the primary focus of the design, based upon availability of resources and population needs. Students are to develop a design strategy through sketches, drawings, and mock-ups of proposed design solutions.

## Activities

1. Human Needs Assessment, climatic evaluation, resource assessment.
2. Site Analysis: sketches, drawings.
3. Design Development: models/mock-ups, class presentation/review.

## Sample Topics

1. Energy Conscious Design: passive/active systems, structures, human comfort
2. Climatic Evaluation: heating degree days, weather
3. Human Needs Assessment: heating/cooling, supplies, sanitation
4. Building Systems: insulation, heating, shading, orientation
5. Technology Applications: photovoltaics, wind power, batteries, heat storage

## References

Gierke, C. David and Nelson, D.A. Energy Applications Curriculum. NYSED, Albany, NY. March, 1986.
Eccli, E. Low-Cost Energy-Efficient Shelter. Rodale Press, Emmaus, PA, 1976.

## Resource Contacts

New York State Energy Office (HOTLINE: 1-800-342-3722)
New York Power Pool, 3890 Carman Road, Schenectady, NY 12303 (1-518-381-2243)
Daniel A. Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architectural Drawing, Production (Construction), Technical Drawing

**Recommended Facility:** Drafting Room, Model Shop, Production Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** Solar Energy Conversion: Concentration Devices

## Overview/Description

Through the use of solar energy concentrating devices, students will design and develop operational solar test apparatus through the application of valid mathematical principles, basic drafting plotting procedures and techniques, hands-on application of appropriate construction tools and materials, and performance testing and evaluation of solar thermal energy conversion (STECO) systems.

## Problem Statement

Based upon background information presented by the instructor, students will calculate, construct, and test a basic solar radiation concentrating device. Design will be based upon accurate calculation and transfer of data to plottings of geometric shapes utilizing appropriate drafting layout and plotting procedures. Patterns and working prototypes will be constructed using readily available construction materials (cardboard, matte board, reflective foil, tape, coat hangers, scrap materials, etc.)

## Activities

1. Background Research: commercial applications, energy conversions.
2. Calculation and plotting of geometric shapes, prototype construction.
3. Performance testing, data gathering/analysis.

## Sample Topics

1. Commercial/consumer applications
2. STEC: Solar Energy - Direct Conversion
3. Systems Design

## References

Calhoun, E. 20 Simple Solar Projects. Rodale Pess, 1983.
Barling, J. John Barling's Solar Fun Book. Farisita, CO. EARS, 1980.
Kleinbach, Merlin and Salvagin, C. Energy Technologies and Conversion Systems. Englewood Cliffs, NJ. Prentice-Hall, 1986.

## Resource Contacts

Daniel A. Nelson, Shenendehowa High School
Sandia National Laboratories, Albuquerque, NM.
American Petroleum Institute, Washington, DC.

## Related Technology Applications (cross over areas)

Electricity/Electronics, Production (Manufacturing), Technical Drawing

**Recommended Facility:** Drafting Room, Energy Lab, Model Shop, Production Lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** Daniel A. Nelson

**School** Shenendehowa High School
970 Route 146
Clifton Park, NY 12065-3688

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** Energy Conversion - Power Generating Systems

## Overview/Description

In order to convert renewable and nonrenewable (finite) sources of energy into useable forms (electrical and mechanical energy), sources of energy must be modified to be used in power generation applications. End-use energy requirements dictate the quantities of electrical and mechanical energy consumed by a given population. The availability and costs of specific renewable and finite energy sources determine the type of energy converter that can be applied in order to meet end-use requirements of a given population

## Problem Statement

The class will be divided into small groups for the purpose of conducting investigations into the relationships between the five World Sources of Energy -- solar (direct and indirect), chemical, geothermal, gravitational, and nuclear -- and the conversion of energy sources for the power requirements of identified populations.

## Activities

1. Topic Research (library resources and periodicals, material acquisition, communication with resource entities).
2. Model and diorama construction (graphic displays).
3. Class presentation and idea exchange.

## Sample Topics

1. Nuclear power generagion (light water reactors)
2. Hydropower
3. Tidal/Wave Power
4. Wind Energy Conversion
5. Photovoltaics
6. Geothermal Energy Conversion
7. Solar Thermal Energy Conversion

## References

Gierke, C. David and Nelson, D.A. (et. al.). Energy Systems Curriculum. NYS Education Dept., Division of Occupational Education, Albany, NY, 1984-1986.
Kleinbach, M.H. and Salvagin, C., Energy Technologies and Conversion Systems, Prentice-Hall, Englewood Cliffs, NJ, 1986

## Resource Contacts

New York State Energy Office, 2 Rockefeller Plaza, Albany, NY 12223 (NYS Energy "HOTLINE:" 1-800-342-3722)
Coordinator of Educational Services, NY Power Pool, 3890 Carman Road, Schenectady, NY 12303 (Phone: 518-38[illegible] 22431 • Daniel A. Nelson, Shenendehowa High School

## Related Technology Applications (cross over areas)

Architecture, Drafting, Power, Engineering

**Recommended Facility:** Drafting Room, Model Shop, Library Area, Graphics

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kelinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** **Insulation Materials**

## Overview/Description

Homes, offices, and commercial and industrial buildings are constructed to provide protection from the elements--heat and cold, rain, snow and sleet--as well as for security and privacy. Contractors must consider how well each building is heated and cooled. Insulating a building makes it more energy efficient.

## Problem Statement

Determine which insulation materials are the best for retention of heat or which reduce heat transfer. Select several insulating materials commonly used in construction. Construct containers to be used to monitor heat gain/loss.

## Activities

1. Selection of insulation materials.
2. Construction of containers.
3. Insertion and removal of insulation materials.
4. Comparison of results of different materials.

## Sample Topics

1. Conduction and convection
2. Vapor barriers
3. R-values
4. U-values

## References

Anderson, Bruce. Solar Energy: Fundamentals in Building Design. Total Environmental Action, Incl, Harrisville, NH, 1977.

Leckie, Jim, et. al. More Other Homes and Garbage. Sierra Club Books, San Francisco, CA. 1981.,

## Resource Contacts

Carlton Salvagin, SUNYCO, Oswego, NY 13126.
Local hardware dealers, local contractors.

## Related Technology Applications (cross over areas)

Production (construction), Residential Construction

**Recommended Facility:** Energy lab, Production lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | __X__ Electronic/Electricity |
| _____ Communication | __X__ Energy |

**Title:** **Solar Flashlight**

## Overview/Description

A flashlight in the sun? Ridiculous! But, a flashlight which can be recharged by the sun--that's different. Any flashlight left in the glove box of an automobile will discharge over time. If a solar cell recharger is placed on the dash and connected to the flashlight, the flashlight will remain charged.

## Problem Statement

Construct a flashlight which can be recharged without removing the cells from the flashlight, and can be used simply by disconnecting from the charger unit.

## Activities

1. Selection of a flashlight which will lend itself to modification for recharging, or materials to house one or more cells for the construction of a flashlight.
2. Modification of the flashlight for recharging.
3. Study of solar cells, charging rates, diodes and polarities.

## Sample Topics

1. Conductors and insulators
2. Insolation
3. Solar cells
4. Rechargable cells
5. Connectors
6. Soldering

## References

DiLavore, Philip, Energy: Insights From Physics. John Wiley, New York, NY, 1984.

## Resource Contacts

James Juczak, South Jefferson Central School, Watertown, NY 13601

## Related Technology Applications (cross over areas)

Electricity/Electronics, Production

**Recommended Facility:** Energy lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** **Simplified BioGas Generation**

## Overview/Description

Biogas is produced when animal waste products are allowed to decompose in an airless environment. The process takes place with the aid of anerobic bacteria. Biogas is methane plus a small amount of other gases such as hydrogen sulfide and carbon dioxide.

## Problem Statement

Students will plan and construct a simple biogas generator. Caution! Biogas will burn and can explode if the air/gas mixture is between 5 and 14%; it is lighter than air and will rise in an enclosed area.

## Activities

1. Determine quantity of animal waste to be used and amount of methane expected to be generated.
2. Design and construct biogas generator and collection tank.
3. Construct devices to remove hydrogen sulfide and carbon dioxide from gas produced.
4. Use methane generated to operate an engine or light a burner.
5. Measure the Btu content of the gas generated.

## Sample Topics

1. Energy conversion
2. Safety in use of fuels

## References

Auerbach, Les. A Homesite Power Unit: Methane Generator. 242 Copse Road, Madison, CT 06443.
Meynell, Peter-John. Methane: Planning a Digester. Schocken Books, New York, NY, 1976.

## Resource Contacts

Carlton Salvagin, SUNYCO, Oswego, NY 13126.

## Related Technology Applications (cross over areas)

Transportation

**Recommended Facility:** Energy lab, Transportation lab, Outside

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** Thermal Conduction

## Overview/Description

Thermal conduction is the movement of heat energy through an object or material. The rate of movement is determined by one or more of the following factors: absence of insulation, type of insulation, material of the conductor.

## Problem Statement

Determine the effect on conduction using bars of different materials, with and without insulation. Using bars (bent into a U-shape) but of different metals, the student will measure the rate at which heat is conducted from one container (cup or beaker) to another.

## Activities

1. Selection of metals, measurement, forming.
2. Selection of insulation materials, means of attachment to avoid heat loss.
3. Development of charts and diagrams.

## Sample Topics

1. Thermal conduction
2. Insulation properties

## References

Smith, Howard, Exploring Energy. The Goodheart-Wilcox Co. Inc., South Holland, IL. 1985.

## Resource Contacts

David Chabe, Liberty Central High School, New Paltz, NY 12561
Local hardware (insulation) dealer

## Related Technology Applications (cross over areas)

Production

**Recommended Facility:** Energy lab, Production lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __X__ Energy |

**Title:** The Chimney Effect

## Overview/Description

A chimney is an important part of any heating plant that uses fossil fuels to deliver energy to a building, as it provides a means of escape for the products of combustion. This convective process can also be used to cool an area. The model to be constructed will demonstrate how convective currents can be used to bring cooler air into a room or building.

## Problem Statement

Students will construct a model of a building which has a "chimney" and one or more openings for air to enter. A small bulb or solar collector will be used to heat the air in one part of the structure. Temperature measurements will be taken to determine the decrease (or increase) of air temperature in the structure.

## Activities

1. Background research in solar heating and cooling.
2. Planning and design of intake and outflow openings.
3. Temperature/time chart development.

## Sample Topics

1. Energy Conscious Design: passive/active systems

## References

Kleinbach, Merlin and Salvagin, C. Energy Technologies and Conversion Systems. Prentice-Hall, Englewood Cliffs, NJ. 1986.

Smith, Howard. Exploring Energy. The Goodheart-Willcox Co., Incl, South Holland, IL. 1985.

## Resource Contacts

Cliff Ehmke, PO Box 238, Chittenango, NY 13077

## Related Technology Applications (cross over areas)

Construction, Drafting, Modelmaking

**Recommended Facility:** Energy lab, Production lab, Drafting lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __X__ Energy |

**Title:** Cost of Energy Use

## Overview/Description

All electrical appliances consume energy. Computing the cost of use requires calculation of amount of use multiplied by time of use. The terms used in the calculation of energy use are those which all consumers need to know.

## Problem Statement

Students will identify those electrical appliances used in a day, week or month and determine the wattage rating and the time each appliance is used. The cost of electricity per kilowatt-hour is to be found and used to calculate the total electricity bill for each student.

## Activities

1. Identification of appliances, power requirements and amounts of usage.
2. Definition of terms used in electricity.
3. Conversion from watts to kilowatts.

## Sample Topics

1. Electricity generation
2. Electricity usage
3. Electricity terms

## References

Smith, Howard. Exploring Energy. The Goodheart-Willcox Co., Inc., South Holland IL. 1985.

## Resource Contacts

Local electric utility company

## Related Technology Applications (cross over areas)

Electricity/Electronics

**Recommended Facility:** Energy lab, Electricity/Electronics lab

# High School Technology Education
# Suggested Idea-Activity Outline

**Contributor** M. H. Kleinbach

**School** SUNYCO
Oswego, NY 13126

**Check appropriate course**

| | |
|---|---|
| _____ Production | _____ Tech. Drawing |
| _____ Transportation | _____ Electronic/Electricity |
| _____ Communication | __x__ Energy |

**Title:** Solar Water Heater

## Overview/Description

The sun is a powerful source of energy and may be used to heat many substances, including the water we use in our homes. The sun's rays can be collected by flat plate collectors and focusing collectors

## Problem Statement

Build a focusing solar collector using readily available materials. Determine the quantity of water used during the day and the amount to be heated during the daylight hours.

## Activities

1. Determine hot water usage.
2. Identify appropriate solar collection sites
3. Select workable solar collector design(s).
4. Construct the collector, observe the heating effects, and measure the temperature increase.

## Sample Topics

1. Solar energy
2. Energy transfer
3. Conduction and convection

## References

Leckie, Jim et.al More Other Homes and Garbage. Sierra Club Books, San Francisco, CA. 1981.

## Resource Contacts

M. H. Kleinbach, SUNYCO, Oswego, NY 13126.
Carlton Salvagin, SUNYCO, Oswego, NY 13126.

## Related Technology Applications (cross over areas)

Production

**Recommended Facility:** Energy lab, Production lab