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ABSTRACT

This publication, a guide for the improvement of instruction in industrial arts education for the state of Louisiana, is intended to help local administrators, teacher educators, and industrial arts teachers to determine the extent to which their programs are meeting the needs of the state's youth. The guide contains course information for five subject areas: manufacturing, construction, communication, transportation, and craftwork. For each subject area, a course outline, unit teaching guide, and unit inventories are provided. Course outlines consist of information on grade levels, prerequisites, course goals, and topics to be taught. Unit guides contain objectives, topics in outline form, student activities, teacher activities, and suggested resources. (KC)

STATE OF LOUISIANA

DEPARTMENT OF EDUCATION

BULLETIN NO. 1682

INDUSTRIAL ARTS CURRICULUM GUIDE

for

GRADES 6, 7, and 8

Issued by

Office of Vocational Education

N. J. Stafford, Jr., Ed.D.
Assistant Superintendent

J. KELLY NIX
State Superintendent

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Foreword

This publication is a guide for the improvement of instruction in Industrial Arts Education for the State of Louisiana. It should be of benefit to industrial arts teachers, supervisors, counselors, and administrators. These operational guidelines will help local administrators, teacher educators, and industrial arts teachers to determine the extent to which their programs are meeting the needs of our youth. Industrial Arts Education Programs must be organized to meet the needs of all students.

A constant concern for educators is the construction and revision of curriculum. Industry and technology are the core of industrial arts instruction. Both are constantly changing; therefore, curriculum and instruction must change in order to provide students a realistic and accurate understanding of industry and its function in our complex technological society.

J. KELLY NIX
State Superintendent of Education

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The following teachers spent many hours writing, field testing, and completing these guidelines: Dr. James F. Fales, Mr. Johnny O. Hamilton, Mr. Sidney J. Sanders, Mrs. Beatrice J. Williams, Mr. H. Carl Schaff, Jr., Mr. Joseph Ledet, Mr. William A. Malone, Mr. Michael Beauvais, and Mr. Silas H. Connor.

N. J. Stafford, Jr., Ed.D.
Assistant Superintendent
Office of Vocational Education

CONTENTS

MANUFACTURING

Grade Level:
6, 7, and 8

Prerequisites:
None

Course Goals:

A study of manufacturing will help students reach the following goals:

1. Be able to understand what people who work in manufacturing do.
2. Get firsthand experience in working with the knowledge and techniques which they use to earn a living.
3. Be able to work together in using tools, materials, and techniques to produce products.
4. Learn about management, personnel, and production techniques of manufacturing.
5. Develop cognitive and psychomotor skills and attitudes by performing manufacturing practices, experiments, and role playing.
6. Learn how industry integrates men, machines, and materials into efficient production systems.
7. Learn how to work individually and in groups to apply their knowledge.
8. Learn about the many vocations in manufacturing industries.
9. Develop an awareness of self-realization and generate self-activating behaviors.

Course Outline

MANUFACTURING

I. Introduction to manufacturing

A. The manufacturing industry

1. Production system

2. Personnel system

3. Management system

B. Evolution of manufacturing

1. Primitive man

2. The first technology

a. Agriculture

b. Crafts

C. Institutions of society

1. Family

2. Religion

3. Education

4. Ownership

5. Government

D. Industry today

1. How goods are acquired

a. Extraction

b. Reproduction

2. How goods are processed

a. Manufacturing

b. Construction

E. Tools, materials, and processes

1. Basic hand tools

2. Portable power tools

3. Machine tools

   a. Basic

   b. Special

4. Industrial materials

   a. Natural

      (1) Wood

      (2) Metal

   b. Synthetics

      (1) Plastics

      (2) Nylon

   c. Processes

      (1) Forming

      (2) Separating

      (3) Combining

F. Types of production

   a. Custom production

   b. Mass production

   c. Job lot

II. Manufacturing management technology

A. Functions of management technology

   1. Planning

      a. Formulating

      b. Researching

      c. Designing

      d. Engineering

2. Organizing

a. Structuring

b. Supplying

3. Controlling

a. Directing

b. Monitoring

c. Reporting

d. Correcting

B. Inputs

1. Natural resources

a. Cotton

b. Petroleum

c. Ores

2. Energy

a. Waterpower

b. Coal

c. Petroleum

3. Finance and capital

a. Fixed capital

b. Working capital

4. Labor force

III. Organization

A. Sole proprietorship

B. Partnership

C. Corporations

1. Owned by stockholders

2. Privately owned

2. Types of corporations

a. Holding company

b. Merger

IV. Identifying consumer demand

A. Consumer

1. Individuals

2. Organizations

a. Manufacturers

b. Constructors

c. Wholesalers and retailers

d. Institutions

e. Government

B. Consumer demands

1. Market potentials

2. Population group

3. Trends

4. Preference

5. Competition

6. Volume

V. Research and development

A. Research

1. Retrieving

2. Describing

3. Experimenting

B. Development

1. Designing

a. New products

b. Existing products

2. Engineering

C. Importance of research and development

D. People and organizations in research and development

1. Private funds

2. Public funds

3. Universities

4. Government agencies

5. Foundations

VI. Designing and engineering

A. Consumer demand

1. Ideas

2. New knowledge

B. Design problem

1. Alternate solution

a. Making sketches

b. Rendering

c. Making three-dimensional mock-ups

2. Evaluations of solutions

3. Design solutions

C. Refining the design solution

1. Making three-dimensional models

2. Studying alternate solutions

3. Selecting materials and techniques

D. Prototypes

E. Product planning meetings for final approval

1. First meeting - design meeting

2. Second meeting - feasibility

3. Third meeting - presentation

4. Fourth meeting - rehearsal

5. Fifth meeting - final approval

VII. Production planning

A. Planning processes

1. List processes and operations

2. Select work stations

3. Analyze work floor

4. Analyze work methods

B. Automation

1. Feedback

2. Mechanical handling

3. Program control

4. Data processing

C. Measuring work

1. Machine time

2. Man time

a. Loading

b. Unloading

c. Assembling

d. Adjusting

e. Moving

D. Estimating cost

1. Materials

2. Direct labor

3. Overhead

4. Profit

E. Tooling up for production

1. What machines, equipment, and tools will be needed
2. Choosing and ordering all standard machines, tools, and equipment
3. Designing and ordering special tools and machines
   a. Dies
   b. Patterns
   c. Jigs and fixtures
   d. Gauges
   e. Supervising the installation of machines, start up, and trial runs

F. Installing production control system

1. Order
   a. Custom production
   b. Intermittent
2. Flow
3. Continuous production
4. Batch
5. Block
6. Load
7. Special project

G. Material handling system

1. Receiving
2. Unpacking
3. Handling
4. Storing

5. Protecting

VIII. Quality control

A. Directing

B. Monitoring

1. Receiving inspection

2. Reporting

3. Correcting

IX. Designing and engineering the plant

A. Problem identification

1. Recognize need

2. Gather data

3. Evaluate

B. Preliminary idea

1. Develop ideas

2. Make sketches

3. Write ideas

4. Record thoughts

C. Refinement

1. Select better preliminary ideas

2. Make scale drawing

3. Determine lengths, sizes, and shapes

D. Analysis

1. Site analysis

2. Functional analysis

3. Structural analysis

4. Cost analysis

E. Decision

1. Repair graphs, charts, and schematics

2. Present to the group

3. Decide

F. Implementation

1. Prepare working drawing specification

2. Construct the manufacturing plant

X. Define equipment and material

A. Equipment

1. Technical requirements

2. Economic factors

3. Management decision

a. To make

b. To buy

c. To lease or rent

d. Security

B. Materials

1. Types of materials

a. Raw materials

b. Industrial materials

c. Component parts

2. Procurement of materials

a. Purchasing agent

b. Commodity buyer

c. Expedites

3. Purchasing procedure

a. Requisition

b. Selection from register

c. Screening

d. Bid or quotation

e. Purchase

4. Methods of purchasing

a. Hedging

b. Budgeting

5. Authority for purchasing

a. Management

b. Purchasing agent

XI. The computer

A. Programming

1. Identifying problem

2. Flow charting

3. Writing program

B. Input form

1. Cards

2. Tapes

C. Central processing

1. Control

2. Memory

3. Arithmetic

4. Logic

D. Output form

1. Printed page

2. Cards

3. Tapes

E. Job opportunities

1. Systems analysis

2. Programmers

3. Technicians

F. Manufacturing and the computer

1. Repetitive clerical work

a. Accounting

b. Payrolling

2. Sales forecasting

3. Production planning and controlling

4. Machine operations

XII. Manufacturing personnel technology

A. Manufacturing employment and the labor force estimated number by age group and years

B. Categories of manufacturing employment

1. Durable goods employment

2. Non-durable goods employment

C. Production occupations

1. Unskilled

2. Semi-skilled

a. Use of machines

b. Assembling parts

c. Driving forklift trucks

3. Skilled

a. Machinists

b. Job setters

c. Tool makers

d. Plumbers

e. Electricians

D. Managerial occupations

1. President
2. General manager
3. Shop superintendent
4. Shop foreman
5. Personnel manager
6. Engineer/technicians

E. Personnel technology

1. Hiring
   a. Recruiting
   b. Selecting
   c. Inducting
2. Training
   a. On the job
   b. Vestibule school
   c. Apprenticeship
   d. Classroom
   e. Cooperative
   f. Management
3. Working
   a. Providing economic rewards
   b. Providing physical setting
   c. Providing social environment
4. Advancing
   a. Promoting
   b. Demoting

c. Discharging

5. Retiring

a. Counseling

b. Preretirement job engineering

c. Recognizing service

d. Awarding retirement benefits

F. Organized labor

1. Unions

Agreements - contracts

2. History of organized labor

a. Shoemakers and printers

b. National federations

(1) A.F.L.

(2) C.I.O.

3. Arbitration

4. Strike

5. Collective bargaining

(National labor relations act)

G. Establishing accident prevention programs

1. Establishing safety programs

(People and safety)

2. Safety in manufacturing

3. Personal safety practices

4. General safety practices

5. Careers in safety

a. Industrial health

b. Ecology

XIII. Production technology

A. Preprocessing

1. Receiving

2. Unpacking

3. Handling

4. Storing

5. Protecting

B. Processing

1. Forming

2. Separating

3. Combining

C. Post processing

1. Installing

2. Maintaining

3. Repairing

4. Altering

D. Securing raw materials

1. Extraction

(Ores, petroleum)

2. Reproduction

(Plants, etc.)

E. Kinds of materials

1. Wood

2. Leather

3. Metal

4. Plastics, etc.

F. Converting raw materials

1. Butchering
2. Distilling
3. Melting
4. Evaporating
5. Filtering
6. Roasting

G. Making industrial materials
1. Plates
2. Sheets
3. Tubes
4. Paperboard
5. Fiberboard
6. Cardboard

H. Making assemblies
1. Combining components
a. Mixing
b. Coating
c. Bonding
d. Mechanical fastening
2. Forming
a. Casting or molding
b. Compressing or stretching
c. Conditioning
3. Separating
a. Shearing
b. Chip removing
c. Other processes

I. Combining assemblies

1. Batch or lot assembly

2. Continuous assembly

J. Preparing for distribution

1. Protecting

a. Rough handling

b. Moisture

c. Bad weather

2. Labeling

a. Manufacturer

b. Name of product

c. Quantity

d. Directions

e. Descriptions

f. Other special information

3. Storing

a. Handling

b. Sorting and counting

c. Using space

d. Displaying

e. Using product

K. Distribution

1. Shipper

2. Wholesaler

3. Retailer

4. Consumer

L. Servicing manufactured products

1. Types of manufactured products

a. Durable

b. Non-durable

2. Types of servicing

a. Installing

b. Maintaining

c. Repairing

d. Altering

M. Harnessing energy from nature

1. Classes of energy

a. Mechanical

(Turbine)

b. Radiant

(Light)

c. Chemical

(Fuels)

d. Heat

(Steam)

e. Electrical

(Magnets)

f. Nuclear

(Core of atom)

2. Harnessing energy

a. Collection

b. Control

c. Containment

3. Future energy sources

   a. Ocean tides

   b. Sun

   c. Heat under surface of earth

   d. Laser beam

   e. Nuclear fusion

UNIT 1 Introduction to Manufacturing

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
The student, after completing Unit 1, Introduction to Manufacturing, will be able to discuss, recall and illustrate the following: What is manufacturing? How manufacturing evolved from primitive man to the present. The five institutions of society. How tools, materials and processes are used to make products. Three types of production.	I. What is Manufacturing? The Manufacturing Industry A. Production System B. Personnel System C. Management System II. Evolution of Manufacturing A. Primitive man B. The first technology 1. Agriculture 2. Crafts C. Institutions of society 1. Family 2. Religion 3. Education 4. Ownership 5. Government D. Industry today III. Tools, Materials and Processes - How They Are Used to Make Products IV. Types of Production A. Custom B. Line C. Job-Lot	Read and discuss what manufacturing is. Answer study questions. Make charts of evolution of manufacturing and the institutions of society. Discuss and give examples of custom production, line production, and job-lot production. Students will discuss their ideas of industry in the future. Make a collection of pictures or a list showing manufactured products. View and discuss film "The Industrial Revolution." Illustrate primitive technology by forming a simple clay pot. Students will produce a coat hanger which illustrates custom production.	Begin the unit by having a general discussion of the major topics: What is manufacturing, what are the institutions of society, and what can be expected of industry in the future. Have students read text and discuss the various phases in the growth of manufacturing. Present filmstrip. Conduct lab activity on the clay pot. Make chart showing the five institutions of society and discuss each. Illustrate how tools, materials, and processes are used to produce goods. Display different kinds of tools and materials and have students identify each. Make a list of study questions so that students may pick out the main ideas of the unit. Have students answer.	Fales, et al. Manufacturing - A Basic Text for Industrial Arts. McKnight Pub., 1980, pp.14-35. Lux, et al. The World of Manufacturing. McKnight Pub., pp.1-9. Gerbracht, et al. Understanding America's Industries. 1971. Fales, pp.10-11 Gerbracht, pp.37-74 Lux, pp.155-156 Gerbracht. pp.209-213

UNIT I Introduction to Manufacturing

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
			Questions after reading and discussing the chapter. Arrange field trip to a local manufacturing company. Show 16mm sound film "The Industrial Revolution" Demonstrate the procedure for making a coat hanger.	

UNIT II Manufacturing Management Technology

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
After discussions, demonstrations, and readings, the student will be able to exhibit some knowledge in the following areas of management technology: Functions of management technology. Inputs to manufacturing. Organizing a company. Identifying consumer demands. Research and development. Designing and engineering the product. Tooling up. Production planning. Quality control. Designing and engineering the plant. Supplying equipment. Processing data. Using the computer.	I. Functions of Management Technology A. Planning B. Organizing C. Controlling II. Inputs to Manufacturing A. Natural resources B. Energy C. Finance and capital D. Human resources E. Knowledge III. Organization A. What is a company? B. Sole proprietorship C. Partnership D. Corporation E. Holding company F. Merger IV. Identifying consumer demands A. Potential Market for the Product B. Who Makes Up the Market C. What is the Trend in Sales D. Consumer Preference E. Effects of Competition F. Sales Forecast G. Profit from Sales	Discuss the three phases of management technology. Students will read chapter one and carefully study the pictures Fig. 1-12. Fales, pp.14-21. Students will give definitions to all new terms listed at the end of chapter one, Fales, p.23: Organizing a Company. Draw an organizational chart of line and staff. Explain the terms: partnership, sole proprietorship, corporation, merger, and holding company. Discuss the advantages of each and make a market research report. After reading and studying chapter one, give answers to all questions in the study guide. Define consumer and consumer demands.	Display the chart showing the three phases of manufacturing. Exhibit a picture wall chart giving a description of manufacturing. Gather and disseminate information of one particular job in manufacturing as a guide to the student. Display organizational charts. Discuss stocks and bonds. Cite an example of how new ideas and inventions can lead to formation of a company. Discuss consumer surveys. Supply consumer survey forms.	Lux, pp.23-24 Fales, pp.14-21 Fales, pp.110-112 Fales, p.38 Lux, pp.34-37 Lux, p.23 Lux, pp.39-45 (3-104) Fales, pp.105-108 Lux, Teacher's Guide p.121 Gerbracht, pp.225-238 Lux, pp.48-52 Fales, p.19 Fales, pp.10-11 Study Guide

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	V. Research and Development A. Research and Development Defined B. Importance of Research and Development C. How People and Organizations Affect Research and Development D. What Research and Development Entail	State the main goals of research and development. Discuss how research is carried on. Do lab activity on retrieving information. Answer study questions.	Discuss text on research and development. Discuss the following terms: A. Retrieving B. Describing C. Experimenting Provide materials for use in laboratory activity. Present list of study questions. Arrange field trip to R & D Laboratory.	Lux, pp.53-58 Lux, p.29 Lab. Manual Fales, pp.70-79 Fales, pp.26-28 Inst. Guide
	VI. Designing and Engineering the Product A. Design Processes B. Presenting Design Ideas C. Mock-up D. Design Decisions E. Drafting the plans F. The Prototype G. Final Approval	Read and discuss designing and engineering. List four steps in design. Participate in laboratory activities. A. Prepare models B. Make mock-ups View and discuss visual aids. Discuss clearance or allowance. Participate in laboratory activity on clearance. Make working draft for product Participate in laboratory activity making the prototype.	Discuss the four steps in product design. Demonstrate alternate design solutions. Discuss and illustrate making three dimensional models. Discuss safety precautions. Present visual aids. Discuss different kinds of working drawings. Conduct laboratory activities.	Lux, pp.62-66 Lux, pp.88-92 Lux, p.35 Teacher's Guide Fales, p.19 Fales, p.72 Lux, p.52 Teacher's Guide Gerbracht, pp.10-13

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	VII. Production Planning A. Planning Processes B. Automating Processes C. Measuring Work D. Estimating Cost E. Tooling Up	Read and discuss production planning. Make an operation sheet. Draw a production chart. Define automation and list the reasons and principles of automation. Make a conveyer sheet. Determine the processing time for fabricating the product. Describe the steps in tooling up and the use of jigs, fixtures, etc. Make jigs and fixtures for proposed product.	Explain how to make an operation sheet. Illustrate a product flow chart. Discuss principles of automation. Discuss safety. Show film on mass production. Demonstrate how to make a conveyer belt. Demonstrate how to make jigs and fixtures.	Lux, pp.116-150 Fales, pp.124-125 Fales, p.130 Fales, pp.137-139 Gerbracht, pp.232-236 Gerbracht, pp.214-217
	VIII. Quality Control A. Monitoring B. Reporting C. Correcting	Describe the three main stages of quality contol system. Discuss the necessary procedure for inspecting every mass produced product. Develop gauges and devices for quality control.	Discuss the elements of a quality control system. A. Three basic steps B. Conditions under which products are tested Show visual aids on quality control.	Lux, pp.162-168 Fales, pp.146-149 Lux, pp.129-131 Lab Manual Gerbracht, pp.216-235
	IX. Designing and Engineering the Plant A. Site factors B. Planning the Plant Layout C. Advantages of a Good Plant Layout	Discuss basic factors in site selection and planning. Draw a floor plan of the shop and label all equipment. Walk through the station locations. Use drawings to discuss proper routing through stations. Arrange shop layout.	Discuss factors in designing and engineering the plant. Provide chart of plant layout. Assist in arranging shop layout.	Lux, pp.168-174 Lux, pp.83-84 Teacher's Guide Fales, pp.130-131

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	X. Supplying Equipment and Materials A. Ordering Materials and Supplies B. Sources of Supply C. Inventory	Read and discuss supplying equipment and material. List factors that affect the purchase of equipment and materials. List standard procedures for securing equipment and materials. Participate in laboratory activity.	Discuss the factors to consider in buying equipment and material. Conduct laboratory activity. See Lux, p.86-87.	Lux, pp.182-189 Lux, pp.86-87 Teacher's Guide Fales, p.132
	XI. Processing Data or Information A. Unit Record Punchcard B. Functions of Data Process 1. Recording 2. Classifying 3. Calculating 4. Summarizing data occupation in data processing	Discuss the basic functions of data processing. Fill out porta punchcard. Identify occupations in data processing.	Discuss the function of recording, classifying, calculating and summarizing data. Provide porta punchcards. Show visual aids, occupations, etc.	Lux, pp.190-194 Lux, p.100 Lab Manual Fales, p.165
	XII. Using the Computer A. Input B. Central Processing Unit C. Output D. Controlling the Computer E. Programming F. Job Opportunities G. Advantages of Computers H. Management and the Computer	List the things computers can do. Discuss the two basic flow charts. Identify the four basic symbols used in a computer flow chart. View visual aids. List some job opportunities in computers. Point out how computers help manufacturing.	Discuss the use of computers and computer flow charts. Conduct laboratory activities. Show visual aids. "Programming"	Lux, pp.195-201 Lux, pp.103-106 Teacher's Guide Fales, p.34 Fales, p.153 Gerbracht, pp.237-242

UNIT III Manufacturing Personnel Technology

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
The student on completing this unit will be able to discuss and demonstrate the following: Occupations in manufacturing. Elements of hiring and training. Advancing and retiring. The importance of collective bargaining. Description of the basic principles of accident problem solving programs.	I. Employment and Occupations in Manufacturing II. Hiring and Training A. Job Openings B. Applying for Jobs C. The Job Application D. The Interview E. Training the Worker III. Advancing and Retiring A. Advancing 1. Promoting 2. Demoting 3. Discharging B. Retiring 1. Counseling 2. Recognizing service 3. Retirement benefits IV. Organized Labor A. Background B. Collective Bargaining V. Establishing Accident Prevention Programs A. People and Safety B. Safety in Shop C. Safety in Manufacturing D. Personal Safety Practices E. General Safety Practices	Identify some of the jobs in manufacturing. Define new terms. Read chapters on occupations in manufacturing. Using several occupations, the student will rate the importance of data, people and things with a three digit code number. Complete a job application and compete for a job. Participate in a discussion on what an employment manager looks for in job applicants. Help choose the best of several job applicants for a job opening. Participate in a discussion on advancing and retiring. Solve a labor-management problem between management and union representatives. Read chapter on safety. Discuss the importance of the following: A. Personal Safety B. Shop Safety C. Safety in Manufacturing Look around the room and locate safety hazards. Suggest how they can be corrected. Draw a personal safety chart. Demonstrate the safe way to lift and carry a box.	Discuss various kinds of occupations. Review new words. Illustrate the people, data and things number code. Show 35mm filmstrip on job classification. Provide several kinds of job applications. Discuss job applications and job interviews. Select an employment manager. Give out job assignments. Present visual aids. Job interviews, etc. Invite employment counselor for visit. Discuss safety in the shop and safety in manufacturing. Prepare and present a list of study questions before the reading. Display safety charts for tools and machines. Display personal safety chart. Show a safety film.	Lux, pp.202-208, 209-225, 89-92 Teacher's Guide Fales, pp.140-142 Gerbracht, pp.243-247 Lux, pp.221-225, p.145 Teacher's Guide Gerbracht, pp.245-247 Lux, pp.228-231, p.142 Teacher's Guide Fales, p.141 Gerbracht, p.246 Lux, pp.175-181 (3-54), 146 Teacher's Guide Fales, pp.54-59 Gerbracht, p.8

UNIT III Manufacturing Personnel Technology

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
		Make a list of personal safety practices. Participate in a discussion of general safety practices.		

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Given the unit on production technology and after participating in all activities, the student will be able to discuss: Securing raw materials. Processing raw materials. Making materials to standard stock. Making components and assemblies. Techniques of distribution. Servicing products. Harnessing energy.	I. Securing Raw Materials A. Extraction B. Reproduction C. Kinds of Materials 1. Wood 2. Leather 3. Metal and plastic 4. Rubber, etc. II. Converting Raw Materials A. Butchering B. Distilling C. Melting D. Evaporation E. Filtering F. Roasting III. Making Industrial Materials A. Plates B. Sheets C. Tubes D. Paperboard E. Fiberboard F. Cardboard IV. Making Components by Forming and Separation A. Forming 1. Casting or molding 2. Compressing or stretching B. Separating 1. Shearing 2. Chip Removing 3. Other Processes	Read and discuss the securing of raw materials. Make a list of materials that are extracted and reproduced. Draw a chart showing how raw materials are processed. View and discuss visual aids. Collect samples of materials that have been made into standard stock. Conduct experiments showing how materials are converted. Do experiments in forming, separating and combining. Make a chart showing the distribution process. Illustrate the elements in servicing products. Answer study questions. Discuss the advantages of mass production. Participate in laboratory activity on mass production. Discuss the following: Changing form. Forming and separating practices View filmstrip. Select a product and count the number of parts. Make a list of one piece products. Participate in lab activities.	Discuss extraction and reproduction. Display different kinds of materials. Discuss how raw materials are converted. Display examples of standard stock. Demonstrate the methods of forming and separating. Discuss and illustrate how components are combined. Discuss the steps in preparing for distributions. Give examples of service industries. Present a list of study questions. Secure visual aids Farming Forestry Mining Mass Production Discuss and demonstrate forming and separating. Present filmstrips. Demonstrate forming and separating. Arrange for field trip to local plant.	Lux, pp.228-243 Fales, pp.43-46 Lux, pp.246-269, 156 Teacher's Guide Fales, p.46 Gerbracht, pp.56-74 Lux, pp.272-27- 159 Teacher's Guide Fales, pp.46-51 Lux, pp.306-332, 173-194 Teacher's Guide

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	V. Making Assemblies A. Combining Components 1. Mixing 2. Coating 3. Bonding 4. Mechanical fastening B. Combining Sub-assemblies	Read and discuss combining components. List the basic combining processes. View filmstrips. Answer study questions.	Discuss and demonstrate combining components. Show filmstrip. Conduct laboratory activity.	Lux, pp.363-376, 196-199 Teacher's Guide Fales, pp.49-51
	VI. Preparing for Distribution A. Packaging B. Protecting C. Labeling D. Storing	Read and discuss sub-assemblies. List ways to set up assembly of parts and sub-assemblies. A. Batch or lot assembly B. Continuous assembly List products made by batch and continuous assembly.	Display products made by batch and by continuous assembly. Conduct laboratory activity.	Lux, pp.404-409, 254 Fales, p.165 Gerbracht, p.286, 291-302
	VII. Distribution A. Distributor B. Wholesaler C. Retailer D. Consumer	Select and discuss the packaging of a product. List the steps in distribution. Describe the importance of each step in the distribution process.	Present a variety of packages to be analyzed. Conduct laboratory experiment. Invite the following: A. Commercial artist B. Sales person	Lux, pp.404-409, 254 Fales, p.165
	VIII. Servicing Manufactured Products A. Durable and Non-durable products B. Types of Servicing 1. Maintenance service 2. Altering	List the four steps in the distribution process. Discuss ways for distributing the class product. Read and discuss servicing of manufactured products. Describe the phases of servicing products. Complete crossword puzzle. Lux, p. 256. Diagnose and locate the malfunction in a product. List some servicing occupations.	Display a chart showing how a product is prepared for distribution and distributed. Discuss the four kinds of servicing. Display chart showing the servicing of manufactured products. Show visual aids. Invite servicemen for class visit. Bring products that are out of service.	Lux, pp.412-415,256-261 Teacher's Guide

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	IX. Harnessing Energy A. General Kinds of Energy B. Forms of Nature's Energy C. Ways Man Harnesses Energy D. Forms of Energy for the Future	Explain the different kinds of energy. Discuss the ways man harnesses energy. List the different forms of energy. Construct samples or models of energy producing methods. Discuss energy sources in the future.	Illustrate the classes of energy. Display charts and pictures of energy sources. Conduct a discussion on energy.	Lux, pp.244-260, 148-149 Teacher's Guide Fales, p.35 Gerbracht, pp.267-271

CONSTRUCTION

Grade Level:
6, 7, and 8

Prerequisites:
None

Course Goals:

1. To develop in the student an understanding and an insight into the construction technology and the students' place in society based upon a free enterprise system.

2. To help each student discover and develop to the fullest potential individual talents, attitudes, and interests related to construction technology.

3. To develop in the student problem solving abilities within the context of construction technology.

4. To help the student develop basic skills in the safe use of tools and machines.

5. To help the student understand and appreciate the tools, materials, and processes used in providing goods and services for human kind.

6. To develop an awareness of vocations in construction technology.

7. To understand the interrelationship of construction technology and community development.

Course Outline

Construction

I. Introduction to construction

A. The construction industry

1. Production system

2. Personnel system

3. Management system

B. Evolution of construction

1. Primitive man

2. The first technology

a. Agriculture

b. Crafts

C. Institutions of society

1. Family

2. Religion

3. Education

4. Ownership

5. Government

D. Industry today

1. How goods are acquired

a. Extraction

b. Reproduction

2. How goods are processed

a. Manufacturing

b. Construction

E. Tools materials and processes

1. Basic hand tools

2. Portable power tools

3. Machine tools

a. Basic

b. Special

4. Industrial materials

a. Natural

(1) wood

(2) metal

b. Synthetics

(1) plastics

(2) nylon

c. Processes

(1) Forming

(2) Separating

(3) Combining

F. Types of production

1. Custom production

2. Mass production

3. Job lot

II. Beginning the project

A. Selecting a site

B. Buying real estate

C. Surveying and mapping

D. Soil testing

E. Designing and engineering construction projects

1. Identifying the design problem

a. Developing preliminary ideas

b. Refining ideas

2. Selecting the design

3. Making working drawings

F. Selecting a builder

1. Contracting

2. Estimating and bidding

3. Scheduling

4. Making inspections

a. Working as a contractor

b. Training and educating for construction

c. Advancing in construction

III. Construction production technology

A. Getting ready to build

1. Clearing the site

2. Locating the structure

3. Earthmoving

B. Setting foundations

1. Building forms

2. Setting reinformcement

3. Mixing concrete

4. Placing and finishing concrete

IV. Framing structures

A. Floor framing

Prefabricated floors

1. Concrete decking

2. Wood

B. Walls, windows, and door framing

1. Walls

a. Load-bearing

b. Partition

2. Masonry wall

a. Block

b. Brick

3. Framed wall

a. Steel

b. Concrete

c. Wood

4. Inspecting

C. Ceiling framing

1. Exposed

2. Suspended

D. Roofs framing

1. Hip

2. Gable

3. Flat

V. Installing utilities

A. Installing heating, cooling, and ventilating systems

B. Installing plumbing systems

C. Installing piping systems

D. Installing electrical power systems

E. Installing electrical communications systems

VI. Enclosing framed superstructures

A. Roofing

1. Sheathing

2. Shingling

B. Enclosed exterior wall

1. Wood

2. Brick

3. Glass

4. Stone

5. Insulating

C. Enclosing interior walls

D. Applying ceiling materials

E. Laying floors

F. Trimming and painting

G. Landscaping and completing the site

UNIT I Introduction to Construction

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to: Outline and give information related to construction in the past, present and future. Identify the various careers in construction. Discuss phases or elements of construction. 39	I. Construction Meets Human Needs A. The Dawn of Man B. Beginning of an Economic system II. Planning Construction A. Inputs-Outputs B. Element of Construction 1. Management a. Planning b. Drganizing c. Controlling 2. Personnel in Construction a. Hiring b. Training c. Working d. Advancing e. Retiring 3. Production in Construction a. Clearing (site) b. Earthmoving c. Foundation d. Structures e. Utilities f. Finishing the project	Read chapters; answer study questions. Identify tools of the past and present. Work with tools of the past and present. List new words. List types of careers in the construction field that are skilled and unskilled jobs. List new words. Trace the steps of a worker from filling out an application for employment to retirement. Study all new words in this unit. View and discuss film.	Issue the following charts, pictures, handout sheets, and activity sheets or tools for the activity. Explain and discuss the purpose of construction. Have a construction engineer speak to the class about his progression. Explain and give information about careers in construction. Discuss major topics in the field of construction. Show film on occupations in construction.	(1) Lux, D., Ray, W. The World of Construction. McKnight Pub., pp.1-6. (2) Lux, D., Ray, W. Laboratory Manual. McKnight Pub., pp.1-2. (3) Lux, D., Ray, W. Teacher's Guide. McKnight Pub., pp.6-16. (4) Betts, P. Exploring the Construction Industry. McKnight Pub., pp. 148-156. (5) Betts, P. Teacher's Guide. McKnight Pub., pp.148-156. (1) pp.7-14, 17-20, 133-158 (2) p.5 (3) pp.11-18 (4) pp.12, 21-33, 31-36, 148, 148, 149 (5) pp.14, 151

UNIT II Beginning the Project

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to: Discuss how community planning meets the need of the community. Identify, refine, and make decisions on buying and selling real estate. Implement the design process, using design factors. Identify types of working drawings and understand specification sheets. Describe what to look for in a builder and identify the four types of builders.	I. Community Planning A. Selecting a Site 1. Surveying 2. Mapping B. Cost 1. Personnel 2. Equipment 3. Supplies C. Zoning Laws D. Soil Testing II. Buying and Selling Real Estate III. Designing to Build A. Steps of Designing B. Selecting the Design IV. Drafting Skills A. Drafting Tools B. Types of Drawing C. Writing Specification 1. Content 2. Kinds of "spec" V. Selecting a Builder A. Fixed Price B. Cost plus Fixed Price C. Cost plus a Percentage of Construction	Give solutions to problems in selecting a site by cost, location, climate, soil and zoning. List new words. Study how structures are bought and sold. Fill out an "Offer to Purchase" form. List new words. Read and work activities to learn skills in designing. Make simple designs of park structures. Study all new words. Read chapter on basic drafting tools. Do several drawings to better understand drafting. Fill out a "spec" sheet. From a list of contractors, the student will select the best contractor for a special job. (Explain below)	Present the student with charts, pictures, handouts (sheets), and activities sheets or tools for the community planning activity. Explain the purpose of community planning. Advantage and disadvantage. Have a real estate broker speak to the class on buying real estate and his job. Explain how designing prevents problems in structure. Explain and discuss basic drafting. Display drawings, charts, and filmstrips and discuss their specification sheets. Explain the importance of selecting a builder and discuss types of contractors.	(1) pp.45-52, 479-481 (3) pp.22-31 (4) pp.30-37, 71-73, 99-101 (1) pp.38-43 (2) pp.8,9 (2) pp.272-275 (4) pp.485-500 (1) pp.60-83 (2) pp.45-56 (4) pp.75-89 (1) pp.75-78 (4) p.82 (1) pp.83-86 (1) pp.97-101 (4) pp.157

UNIT II Beginning the Project

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Identify how bidding and scheduling is done.	VI. Estimating and Bidding VII. Scheduling	Student will take one card from a box of several with job identification and select one contractor for that job. Complete a contract form. Estimate whether a brick veneer or aluminum siding house will give the most profit considering a planned cost. Schedule a job and the time required to do each task.	List new words. Explain how estimating saves you money in construction and why contractors bid for jobs. Explain and discuss influence on scheduling.	(1) pp.107-109 (1) p.79 (1) pp.114-118 (2) p.85

UNIT III Pre-Construction

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to: Identify the kinds of zones, the importance of safety and protection of zoning. Outline what is involved in clearing sites. List reasons for surveying. List the many kinds of earthmoving equipment in use today. Identify what parts of a structure constitute substructure and superstructure.	I. Getting Ready to Build A. Clearing the Site B. Locating the Structure C. Earthmoving II. Classifying Structures A. Parts of a Foundation B. Finishing Concrete	List zoning laws in his or her community. List practical procedures and equipment to use when clearing the site. Locate the four corners of a building by intersecting lines attached to batter boards. List parts of a structure and material used in a simple structure. Mix, rod, screen, float, and finish concrete in a form.	Present the student with charts, pictures, handouts (sheets), activities sheets, filmstrips, and tools for the activity. Give a presentation pertaining to regulations and site planning, building code and safety. Demonstrate how to locate a structure. Explain and discuss structure. Study all new words in this unit.	(1) pp.160-165 (2) pp.109-115 (3) pp.100-102 (1) pp.168-172 (1) pp.174-176 (1) Ch. 31 (1) pp. 174-178 (1) pp.200-203 (4) pp.6, 14

UNIT IV Framing Structures

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to: Outline the various types of floor framing. Outline the construction of walls and windows. Identify door framing. Identify the types of ceilings, roofs, and materials used today. List parts of a conventional wood frame.	I. Floor Framing A. Prefabricated Floors 1. Concrete decking 2. Steel decking B. Mass and Masonry Floors/Concrete Slabs C. Framed Floors 1. Steel 2. Wood II. Wall, Window, and Door Framing A. Walls 1. Load-bearing 2. Partition B. Masonry Wall 1. Block 2. Brick C. Framed Wall 1. Steel 2. Concrete 3. Wood D. Inspecting III. Ceiling Framing A. Exposed B. Suspended IV. Roof Framing A. Hip B. Gable C. Flat	Install floor materials by framing a floor. Select materials (floor) from catalog in your area. List new words. Read chapter and study measuring of walls, windows, and doors. Select doors and windows from catalog using basic sizes. Select stock measure, mark, saw, and assemble, wall and window. Student will use a checklist to inspect walls for quality and accuracy. List types of material used to frame ceiling. Name eight types of roofs. Construct a roof and ceiling.	Discuss, explain and demonstrate using floor material. Demonstrate measure, mark, and saw materials to length for framing a structure. Construct a flow chart depicting avenues of study and their job outcome. Discuss roof and ceiling. Issue picture, charts, and handout sheets. Present filmstrips or transparencies if possible. Demonstrate how to build a roof.	(1) pp.231-239 (4) pp.191-204 (1) Ch. 47 (3) p.63 (4) pp.191-231 (1) pp.268-275 (4) pp.204-231 (4) p.233 (4) pp.240-271

UNIT V Installing Utilities

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon the completion of this unit, the student will be able to: Outline the local plumbing code. Identify galvanized pipe, copper tubing, and plastic tubing. Outline local code for an electrician. Trace the path of electricity from the plant to the service panel of a structure.	I. Plumbing Systems A. Water Hot and Cold B. Natural Gas C. Steam for Heat D. Sewage E. Drainage Removal II. Electrical Systems A. Roughing-in B. Firing Light and Outlets C. Inspecting	Design, cut and assemble pipes and tubing. Follow all steps in performing plumbing skills. Review and discuss film. Wire one light, switch, and wall receptacle. Review and discuss film. Study all new words in this unit.	Present filmstrips. Have a resource person speak to the class about plumbing. Instructor demonstrates measuring, threading, cutting, and sweating. Have an electrician speak to the class about his profession. Instructor demonstrates striping, connecting wires, bending conduits and roughing-in junction boxes. Present filmstrips.	(1) pp.278-280 (2) (4) pp.276-298 (1) (2) (4) Ch. 19

UNIT VI Enclosing and Finishing

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to: Identify types of sheathing and shingles. Outline types of materials used for enclosing walls. List some advantages and disadvantages of exterior wall materials. List reasons for insulating. Name some types of insulation. Demonstrate how to enclose interior walls. Discuss and illustrate the installation of various ceiling materials. Demonstrate and discuss the different types of floors and their application.	I. Roofing A. Sheathing B. Shingling II. Enclosing Exterior Wall A. Wood B. Brick C. Glass D. Stone E. Insulating III. Enclosing Interior Wall A. Dry Wall B. Plaster C. Panel D. Wall Paper IV. Applying Ceiling Material A. Dry Wall B. Suspended C. Tile V. Laying Floors A. Concrete B. Terrazzo C. Ceramic Tile and Stone D. Wood E. Carpeting	Nail roof sheathing to the upper chords (rafters). Measure, cut, and apply building felt. Lay several courses of shingles as practiced. Locate, measure, cut, and install vertical siding on the gable end of a structure, corner board. Install flashing and a window frame unit in a structure. Apply building insulation to an interior wall. Install dry wall section, wall paneling section, and wall paper by gathering materials, measuring, cutting, and installing. Install tile ceiling section. Study vocabulary words. Install vinyl sheet flooring or carpet flooring.	Present filmstrip and transparencies. Review and ask questions about film. Demonstrate how roofing material is applied. Demonstrate method used to enclose exterior wall. Discuss the various types of insulation. Issue the handout sheets and tools for the activity. Demonstrate the method and procedure of enclosing the interior wall. Demonstrate the application of ceiling material. Give illustration of laying floors.	(3) p.66 (4) pp.402-412 (3) pp.183-187 (4) p.67 (3) pp.188-189 (1) pp.359-363 (3) pp.190-194 (4) pp.438-448 (2) pp.231-239 (2) pp.241 242 (3) pp.196-198 (4) p.234 (1) pp.368-372 (3) p.197 (4) pp.454-455

UNIT VI Enclosing and Finishing

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Demonstrate how to install molding. List various types of trimming paints. List the operation involved in completing the site. Study tools and their uses on special jobs.	VI. Trimming and Painting VII. Landscaping and Completeing the Site VIII. Maintenance, Repair, and Remodeling	Cut and trim molding to fit various types of corners. Build a sidewalk on the school grounds. Perform needed servicing activities on a structure as determined by a prior inspection.	Demonstrate painting using brush and roller. Discuss the two methods used to landscape a site. Discuss sodding. Show filmstrip to understand the purpose of building. Discuss how to select, use, and maintain tools.	(1) pp.378-379 (3) pp.200-201 (4) pp.455-457 (1) pp.393-397 (3) pp.207-210 (4) pp.459-463 (1) p.459 (4) pp.505-506

COMMUNICATIONS

Grade Level:
6, 7, and 8
Prerequisites:
None

Course Goals:

1. To present the content of communication technology within a broader context of communications technology.

2. To help the student become aware of the evolution of language and communications media.

3. To value, comprehend and perform basic communication functions of decoding, encoding, transmitting, receiving, storing, and retrieving.

4. Appreciate, understand and perform selected management, personnel and production processes as they relate to communication systems.

5. To help the student appreciate, understand, and perform activities related to careers and occupations in communications.

6. To develop responsible and safe work attitudes, habits, and the ability to function as a member of a group.

7. To help the student develop an awareness of self-realization and generate self-actuating behaviors.

8. To develop ability to send and receive more effectively and efficiently through writing, gesturing, reading, speaking, and listening.

9. To develop an understanding of the communications industry concern for resources, consumer preferences, management, decision-making, personnel practices, production, marketing, distribution, sales, and profits and losses.

Communication

I. Introduction to communication

A. Definition of communication

B. Communication and man

1. How does man communicate

a. Communication viewpoints

(1) Sender

(2) Receiver

b. Person to person

c. Person to machine

d. Machine to person

e. Machine to machine

transmission methods

mechanical, electrical, visual, audio, and a combination of these

2. Why does man communicate?

a. To inform

b. To influence

c. To entertain

C. History and development of communication

1. Gestures, symbols, [illegible]ns, and painting

2. Oral language

3. Written language

4. Communication tools

a. Printing press

b. Telegraph

c. Radio

d. Photography

e. Motion pictures

f. Television

g. Computers

II. Communication process

A. Encoding

1. Perceiving

2. Comprehending

3. Symbolizing

4. Organizing

5. Valuing

B. Transmitting

1. Gesturing

2. Touching

3. Speaking

4. Writing

5. Drawing

C. Receiving

1. Sensing

a. Seeing

b. Reading

c. Hearing

d. Feeling

e. Smelling

f. Tasting

2. Perceiving

a. Comprehending

b. Understanding

3. Valuing

a. Appraising message in light of emotions

b. Appraising message in light of attitudes

D. Decoding

1. Perceiving

2. Interpreting

3. Synthesizing

4. Responding

E. Storing

1. Recording

2. Filing

F. Retrieving

1. Obtaining

2. Retransmitting

G. Definition of "noise"

III. The communications industry

A. Management

1. Planning

2. Organizing

3. Controlling

B. Production

1. Formulating an idea

2. Deciding on a format (media)

3. Developing the chosen format

4. Producing the idea using the format

5. Transmitting the idea

6. Distributing

C. Personnel

1. Hiring

2. Training

3. Working

4. Advancing

5. Retiring

IV. Mass Communication

A. Types of mass communication

1. Audio

a. Definition

b. Methods of transmission

c. Methods of receiving

d. Some audio communication systems

(1) One way systems

(a) Radio broadcast

(b) Recording

(c) Emergency warning devices

(2) Two way systems

(a) Telephone

(b) Radio (i.e. CB, short-wave)

(c) Oral

(d) Telegraph

2. Visual

a. Definition (only a receiver)

b. Methods of transmitting

c. Methods of receiving

d. Some visual communication systems

(1) One way (only a receiver)

(a) Drawings, signs, symbols

(b) Printed matter (books, magazines, newspapers)

(c) Photographs (still and motion)

(d) Sign and body language

3. Audiovisual

a. Definition

b. Methods of transmission

c. Methods of receiving

d. Some audiovisual communication systems

(1) One-way systems

(a) Television

(b) Motion pictures

(c) Theatre (live performances)

(2) Two-way systems

(a) Socializing

(b) Computers

B. Materials and processes of mass communication

1. Graphic arts communication

a. Planning, layout, and design

b. Relief printing, linoleum block

c. Silk-screen printing

d. Letterpress printing

e. Off-set printing

f. Lithography

g. Book binding

h. Rubber stamp making

2. Telecommunications

a. Electrical

(1) Telegraph

(2) Telephone

b. Electronics

(1) Radio

(2) Tape recording

(3) Television

(4) Computers

(5) Satellites

3. Photography

a. History of photography

b. Purpose of lenses

c. Latent images

d. Types of film

e. Handling and care of film

f. Types of cameras and components

g. Camera techniques

h. F numbers and exposure

i. Composition

j. Theory of film processing

k. Methods of printing

l. Enlarging to enhance the final product

4. Drafting

a. Freehand sketching

b. Lettering

c. Care and use of instruments

d. Geometric constructions

e. Pattern development

f. Orthographic projection

g. Pictorial drawing

h. Reproduction methods

5. Other

UNIT I Introduction to Communication

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to: Write the definition of communication. Explain in his own words the different ways man can communicate. Explain the three reasons why man communicates.	I. Definition of Communication II. Communication and Man--How Man Communicates A. Communication Viewpoint 1. Sender 2. Receiver B. Person to Person C. Person to Machine D. Machine to Person E. Machine to Machine III. Why Does Man Communicate? A. To Inform B. To Influence C. To Entertain	Give the origin of the word communication. Write the definition of communication. Discuss man's need to communicate. Explain the cycle of man to man communication. Illustrate the following methods of communicating: 1. Man to Man 2. Man to Machine 3. Machine to Man 4. Machine to Machine Role play each method of communication. Read chapter: The Reason for Communication (4) pp.21-31. List and discuss the three reasons for communication. Make a poster depicting each of the three reasons for communication.	Discuss the origin of the word communication. (from the Latin word communicatus.) Display several charts showing how man communicates. Discuss the text on the reasons for communication.	(4) p.1 (4) pp.2-6 (1) p.5 (1) pp.22-32 (4) pp.21-31

UNIT I Introduction to Communciation

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Trace the history and development of communication.	IV. History and Development of Communication A. Gestures, Symbols, Signs, and Painting B. Oral Language C. Written Language D. Communication Tools 1. Printing press 2. Telegraph 3. Radio 4. Photography 5. Motion pictures 6. Television 7. Computers	Read chapter: Evolution of Communication. Demonstrate how to communicate using gestures and signs. Give examples of symbols that are used to communicate. View visual aid: Evolution of Communication. List five slang words and explain their meaning in standard English. Select a concept and design a symbol. Make picture poster showing communication tools.	Prepare a line chart showing the history and development of communication. Discuss how early man communicated. Present film: "Evolution of Man." Have student show their symbols and have class members try to recognize them.	(4) pp.10-20 (1) pp.12-21 (4) pp.10-20

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UNIT II Communication Process

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Given the text and other activities for Unit II, the student will: Identify and discuss the six communication processes.	I. Encoding A. Perceiving B. Comprehending C. Symbolizing D. Organizing E. Valuing II. Transmitting A. Gesturing B. Touching C. Speaking D. Writing E. Drawing	Read chapter on the communication process. Define the list of new words. Illustrate and explain the system of sending and accepting messages. View a film describing the action of a football game; identify the who, what, when, where, and why elements contained in the audio-visual message. Read a newspaper article describing the action of football game; identify the who, what, when, where, and why elements in visual message. Read and discuss the systems used to transmit messages. List the three types of communication systems. Explain how each system is used to transmit information to people. Bring examples of media used to send messages. Discuss the advantages and disadvantages of each type of system. Demonstrate each type of system.	Conduct reading session on the chapter entitled The Communication Process. Display charts showing the factors upon which successful communication depends. Provide visual aids and discuss each. Make up a list of new words. Discuss systems used to transmit messages. Display a chart showing types of communication systems. Have each student demonstrate each method used to send messages.	(4) pp.32-40 (1) pp.33-39 (1) pp.68-74 (4) p.34 (1) pp.33-38 (1) pp.114-119

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	III. Receiving A. Sensing 1. Seeing 2. Hearing 3. Feeling 4. Smelling 5. Tasting B. Perceiving 1. Comprehending 2. Understanding C. Valuing 1. Appraising message in light of emotions 2. Appraising message in light of attitudes	Define receiving. List five way to receive messages. Describe how each of the methods of receiving is done. Demonstrate the following: Seeing Hearing Feeling Smelling Tasting Describe the advantages and disadvantages of each method of receiving messages.	Conduct discussions. Display charts illustrating how messages are received. Invite resource person to demonstrate.	(4) pp.36-37 (1) pp.36-37
	IV. Decoding A. Perceiving B. Interpreting C. Synthesizing D. Responding	Define decoding. Describe the steps in decoding messages. View a film and decode the who, when, where, and why elements of the message.	Display a chart showing how messages are decoded. Present audiovisual film for discussion.	(1) p.60 (1) p.36 (4) pp.37-38
	V. Storing A. Recording B. Filing	Define storing. Discuss the two methods of storing messages. Give examples of recording and filing methods.	Discuss the methods of storing messages. Display a graph showing storing.	(1) p.38 (4) p.39 (4) pp.236-239

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	VI. Retrieving A. Obtaining (recall) B. Retransmitting (restate) VII. Definition of "Noise"	List some kinds of messages that are stored. Make a list of recording devices. Make a list of filing devices. Define retrieving. Discuss the two methods of retrieving messages. Explain the terms recall and restate. List some kinds of messages that are recalled and restated. List some devices that are used to retrieve messages. Define noise and explain its importance in communication. List some examples of how noise affects communication.	Conduct discussions. Display a graph showing retrieving. Discuss noise in communication. Illustrate how noise interferes with communication.	(1) p.38 (4) p.39 (4) p.240 (4) p.22

UNIT III The Communication Industry

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to: Outline and give information related to communications, past, present, and future. Identify the various careers in communications. Discuss phases or elements of communications. Develop a format giving type of material, style of presentation, script, the amount of time the production will last, and how often and what time of day it will be broadcast.	I. Management A. Planning 1. Formulating 2. Researching 3. Designing 4. Engineering B. Organizing 1. Structuring 2. Supplying C. Controlling 1. Directing 2. Monitoring 3. Reporting 4. Correcting II. Production A. Formulating an Idea B. Deciding on a Format C. Developing the Chosen Format D. Producing the Idea Using the Format E. Transmitting the Idea F. Distributing	Read chapter and answer study questions. Study all new words in this unit. View and discuss film.		(4) Reading 8 (1) Reading 31 (4) Reading 10 (4) Reading 11 (4) Reading 23 (4) Reading 25 (1) Reading 18 (1) Reading 9

UNIT III The Communication Industry

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will be able to discuss and demonstrate the following: Occupations in communications. Elements of hiring and training. Advancing and retiring. The importance of collective bargaining. The basic principles of accident problem solving programs.	III. Personnel A. Hiring B. Training C. Working D. Advancing E. Retiring	Identify some to the jobs in communications. Define new terms. Read chapter on occupations in communications. Complete a job application and compete for a job. Participate in a discussion on what an employment manager looks for in job applicants. Participate in a discussion on advancing and retiring.	Discuss various kinds of occupations. Review new words. Show 35mm filmstrip on communications. Give out job assignments. Present visual aids. Conduct job interviews.	(4) Reading 9 (1) Reading 13 (1) Reading 32

UNIT IV Mass Communication

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
After reading the information and participation in all of the activities of the unit, the student will be able to discuss and define the following phases of mass communication: Audio Visual Audiovisual	I. Introduction to Mass Communication Systems A. Definition B. Need for Mass Communication C. Types of Mass Media Systems II. Kinds of Communication Systems A. Visual B. Audio C. Audiovisual III. Visual and Audio A. Printed Image B. Sound C. Sight and Sound IV. Parts of a Communication System A. Inputs B. Processes C. Outputs	Read the introduction to mass communication systems. Define mass communication. Explain the needs for mass communication. List the types of mass media systems. Describe what visual communication is. List some methods of visual communications. Explain what audio communication is.	Discuss mass communications.	(4) p.42

UNIT V Electronic Communication

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	I. Telecommunications A. Introduction 1. Definition - telecommunication at a distance; it has its own language. 2. The language of telecommunication; it communicates through signals produced by electrical frequencies, electromagnetic waves, electromagnetic impulses. It transmits these signals by means of wires, light, and electromagnetic wave radiation. 3. Why we use telecommunication: to communicate over a long distance, to speed up the communication process, to store communication, and to retrieve communication. 4. Who uses telecommunication? a. Man to Man b. Man to Machine c. Machine to Man d. Machine to Machine			

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	5. What are some types of telecommunication a. Electrical b. Telegraph c. Telephone d. Electronic e. Radio f. Recordings (records, tapes) g. T.V. h. Satellite and microcomputers, radar) i. Other types (future)		Display and relate as to audiovisual or audiovisual communication.	Steinberg and Ford, Electricity and Electronics, Third Edition. American Technical Society, 1964, Units 24, 25, 31 Lopes, Ashe, and Clendenning, Introduction to Electricity and Electronics, Delmar Pub., 1979, Ch. 19.
	B. Telecommunication Systems 1. Telegraph a. History b. How does it work (technical) c. How to operate it (functional)	Build a telegraph and wire it.		
	2. Radio a. History and development b. Types of radios (explain each type) c. Basic principle of operation (technical) d. How to operate it (functional) e. Careers	Build a simple radio receiver, radio transmitter, and conduct a radio broadcast.		

UNIT V Electronic Communication

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	C. Telephone a. History and development b. Basic principle of operation (technical) c. How to operate it (functional) d. Careers	Construct a simple telephone hook up and use it to communicate. Relate that the P.A. system in school is basically a telephone.		

UNIT VI Graphic Arts Communication

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	I. Planning Graphic Arts A. Planning B. Layout C. Design II. Relief Printing A. Linoleum Block B. Lithographic Stones III. Printing A. Silk Screen B. Letterpress C. Off-set IV. Lithography V. Book Binding VI. Rubber Stamp Making			

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UNIT VII Drafting

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will: Sketch the following things: Horizontal, vertical and slanted lines. A corner in one plane. Arcs, circles, and irregular curves. Identify the correct position of the pencil when lettering. Form letters (capital and lower case) and/or incline fashion. Identify and name the use of each of the following drafting instruments: T-Square Compass Dividers Triangles Scale Sketch the following geometric constructions: Hexagon Octagon Isometric Box Cabinet Box	I. Drafting A. Freehand Sketching B. Lettering C. Care and Use of Instruments D. Geometric Constructions	Complete an exercise on sketching types of lines. Complete and exercise in lettering. Identify and name the drawing instruments that have been demonstrated. Complete an exercise on sketching geometric constructions.	Using the chalkboard, demonstrate how to sketch various lines. Explain and demonstrate how letters should be formed using stroke method. Display one of each of the most often used drawing instruments, and demonstrate their use and care. Demonstrate how to sketch geometric constructions.	

UNIT VII Drafting

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Name the four types of pattern development. Make enlargements and full-size patterns. Draw two and three view drawings of simple objects using projection method of developing. Name three kinds of pictorial drawings. Name some reproduction systems, giving their uses, advantages, and disadvantages. Blueprint Diazo print Electrostatic Secondary original Photographic Microfilm Lithography	II. Pattern Development III. Orthographic Projections IV. Pictorial Drawing V. Reproduction Methods	Make a full-sized pattern layout for a teacher-directed design. Make an enlargement for a teacher-directed design. Complete an exercise on drawing orthographic projections assigned by instructor. Complete an exercise on drawing pictorial views of different sizes of square objects. Make diazo print from working drawing. Make a 35mm black and white negative.	Explain and demonstrate how to enlarge a pattern and make a full-sized pattern layout. Prove by demonstration that while three views may suffice, more views may be necessary. Explain and demonstrate how to draw pictorial views of different sizes of square objects. Demonstrate and discuss how to make a diazo print. Demonstrate how to make a black and white negative. Discuss safety measures pertaining to handling ammonia.	

UNIT VIII Photography

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit the student will: Briefly describe the history of photography and note major or significant developments. Explain and summarize the basic theory of photography. Describe the operation of a pinhole camera. 8	I. History of Photography II. Bias Theory of Light A. Diffraction B. Diffusion III. Purposes of Lenses	Construct a pinhole camera. Use simple reading glass lenses to focus the image of a light bulb on a screen to determine the focal length of the lens.	Show film or filmstrip to support lesson (Kodak Educational Materials Catalog). Have students bring "oatmeal" or similar containers for pinhole camera. Purchase slow speed B & W Sheet film (Low ASA Number) or high speed blue line paper. Borrow simple lenses (magnifying glass) from Science department. Illustrate effect of converging and diverging lenses.	(1) McCoy, Practical Photography, Third Edition. McKnight Pub., 1972, Ch. 1. (1) Ch. 2 (1) Ch. 3 (2) Kodak Photobook 56, Advanced Camera Techniques. pp.2-8.

TRANSPORTATION

Grade Level:
6, 7, and 8

Prerequisities:
None

Course Goals:

A study of transportation will help students reach the following goals:

1. To understand what people who work in transportation do.
2. To gain experience in the knowledge and techniques of the transportation industry.
3. To learn about management, personnel, and production techniques of transportation.
4. To learn about the many vocations in the transportation industry.
5. To develop an awareness of self-realization and generate self-activating behaviors.

Key to transportation text:

(1) Kimbrell, Grady. Succeeding in the World of Work. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1975.

(2) Kuetemeyer, Vincent and Fales, James F. Transportation in Louisiana. Baton Rouge, Louisiana: Louisiana State Department of Education, 1974.

(3) Walker, John R. Exploring Power Technology. South Holland, Illinois: Goodheart-Willcox Company, 1976.

(4) Duffy, Joseph W. Power, Prime Mover of Technology. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1972.

(5) Harper, Donald V. Transportation in America. Englewood Cliffs New Jersey: Prentice Hall Publishing Company, 1978.

TRANSPORTATION

I. Transportation Technology

A. Requisities for transportation (inputs)

1. People
   a. Hiring
   b. Training
   c. Working
   d. Advancing and retiring

2. Know-how
   a. Engineering
   b. Environmental/ethical concerns
   c. Knowledge or rules and regulations
   d. Safe operation

3. Capital
   a. Vehicles
   b. Equipment
   c. Buildings and structures

4. Finance
   a. Operating monies
   b. Expansion monies
   c. Fixed costs
   d. Rates and fares
   e. Revenue, sales

5. Energy

6. Natural resources

B. Managing inputs

1. Planning
   a. Formulating
   b. Researching
   c. Designing
   d. Engineering

2. Organizing
   a. Structuring
   b. Supplying

3. Controlling
   a. Directing
   b. Monitoring
   c. Reporting
   d. Correcting

C. Producing Transportation

1. Preparing to move
   a. Handling cargo
   b. Storing cargo
   c. Protecting cargo

2. Moving
   a. Operating vehicles
      1. Controlling speed
      2. Controlling direction
   b. Enroute services

3. Completing the move

D. Modes

1. Land
   a. Highway
   b. Rail
   c. Pipeline

2. Water
   a. Ships
   b. Barges

3. Air
   a. Lighter than air craft
   b. Heavier than air craft

II. Sources of Power

A. Wind

B. Water

C. Solar

D. Muscle

E. Fossil Fuel

F. Nuclear

III. Propulsion systems

A. Engines
1. Internal combustion
a. Reciprocating
-4 stroke cycle (gasoline, diesel, etc.)
-2 stroke cycle (gasoline, diesel, etc.)
b. Reaction (thrust)
-rocket
-gas turbine
c. Rotary
-rotary piston (i.e. "Wankel")
-gas turbine

2. External combustion
a. Reciprocating
-piston steam engine
-stirling
b. Reaction
-"Hero's" engine
c. Rotary
-Steam engine

B. Motors
1. Electric
2. Fluid turbine

IV. Transmission and Control of Power

A. Mechanical Power
1. Transmission
a. lever
b. inclined plane
c. screw
d. wheel and axle
e. wedge

2. Control
a. clutches
b. brakes
c. bearings
d. friction and lubrication

B. Fluid Power (hydraulics and pneumatics)
   1. Transmission
      a. pipes
      b. tubes
      c. passageways

   2. Control
      a. pumps
      b. valves

C. Electrical
   1. Transmission

   2. Control
      a. manual switches
      b. solenoids and relays
      c. transformers

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit and given the proper equipment and supplies, the student will be able to: Identify and discuss transportation of the past, present, and future. Name three basic steps in hiring. Advertise for a job and identify the most important aspects in applying for a job. Identify a training program and determine if training is necessary at all levels. State how a person succeeds in life and give two reasons for working. State three ways in which workers advance and successfully retire from a job. Identify the process of travel time. State why a system must be engineered.	I. Introduction to Transportation II. Transportation Technology A. Requisites for Transportation 1. People a. Hiring b. Training c. Working d. Advancing and retiring 2. Technology a. Engineering Note: b. on next page	Discussion by student on a brief history of transportation. Student could construct a model of the early type of construction. Students will fill out a job application form and go through the process of getting interviewed for a job. Handle cargo with forklift. How to operate a bulldozer (optional). Student will act as labor and management and conduct a strike. Students will strengthen their concepts of advancing on a job by planning an advancement game. Calculate a gasoline mileage chart. Design a turn-around for 12 mile I-10 twin span bridge located between LaPlace and Kenner, Louisiana.	Secure a film on transportation. Lecture on transportation. Instructor will stress certain points such as accuracy in filling out the form, neatness, brevity, and references. Field trip to local warehouse or heavy equipment dealer (optional). Instructor will discuss important facts on how labor and management operate during a strike. Instructor will explain how the game works. Demonstrate how to calculate gas mileage. Locate the twin span bridge on a Louisiana State highway.	(1) pp.30-51 (1) pp.56, 57 (1) pp.60-61 (1) pp.231, 232 (1) pp.561-563

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Identify some environmental problems of transportating goods or cargo today. Identify the rules and regulations involved in transportating cargo. Gain knowledge and practice of safety procedures in power and transportation technology laboratory. Identify the activities that control vehicles in transportation. Be aware of the different types of equipment used in transportation systems. Identify the types of building and networks used in transportation systems.	b. Environmental concerns c. Knowledge of rules and regulations d. Safe operation 3. Capital a. Vehicles b. Storage facilities B. Equipment C. Buildings and Structures	Plan the best way of transporting some dangerous chemical (ex. liquified natural gas from New Orleans to Baton Rouge). Discuss the safety rules and regulations involved in moving cargo in your community. Identify methods of control for different vehicles. The student will land a model airplane and operate a model pipeline. Make a list or charts of the equipment that is vital to transportation systems. Students will construct models of buildings or structures.	Demonstrate a formula for determining time. Lecture on safety factors involved when transporting dangerous chemicals. Bring in a resource person. Discuss the different modes of transportation in your community. Explain historical perspective of transportation and its contributions. Teacher will discuss the different techniques used to control the vehicle of transportation. Brirg in a resource person. Plan a field trip.	(1) p.22

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Calculate the wealth of an airline. Identify how finance is important to an airline. Define the two types of energy. Be aware of the sources of energy and how they relate to transportation. Understand the historical development and significance of natural power. Give a presentation on planning. State if it is feasible to plan the operations of a small transportation system. Explain the historical development of transportation systems. Define research and development. Utilize source material in the laboratory. Prepare and develop a report on a transportation system.	4. Finance a. Operatings b. Expansion c. Fixed costs d. Rate fare e. Revenue sales 5. Energy 6. Natural Resources B. Managing Inputs 1. Planning a. Formulating b. Researching	Make a list of the expenses that you think may be incurred by an airline. Visit your city airport and seek information on how the finance part of an airline operates. Construct a model sailboat with riggings to show how wind power is used to control the sailboat. Write library reports on natural power sources. Measure the distance for commuter trips and calculate the cost for each trip and for each different type of trip. Prepare and develop a report on a transportation mode. Build a scale model of a transportation system.	Explain to students the ways the transportation system finances equipment. Conduct a field trip to city airport. Bring in a resource person from a major airline. Aid in the construction of the sailboat. Demonstrate how kinetic energy differs from potential energy. Discuss the historical perspective of natural sources of power and their contributions. Lecture on factors such as time, cost, speed, comfort, and safety of others when planning a transportation system. Explain the historical development of transportation systems. Go over the various methods of research. Discuss and illustrate how to prepare a research report on a transportation system.	(4) pp.336-337 (4) pp.351-355

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Name one example of designing. State what must be first done to design an efficient system. Identify the process of calculating travel time. State why a system must be engineered. State two functions of organizing. State whether establishing a schedule is organizing. Set up transportation routes and terminals. Calculate time for an 18 wheeler to travel from terminal to terminal. Know the definition of supplying. Identify who has the responsibility for supplying. Identify the four activities that make up controlling. State example of directing. State example of monitoring. State example of reporting. State example of correcting.	c. Designing d. Engineering 2. Organizing a. Structuring b. Supplying 3. Controlling a. Directing b. Monitoring c. Reporting d. Correcting	Design a transportation route for a trucking company. Design two routes--one passing through the city, one by-passing the city. Given a map of the U.S., students will determine the mileage, gas consumption, and cost of a trip from their home to California. Develop a corporation and carry out a corporation meeting. Determine the estimated time of arrival (ETA) for trucks from terminal to terminal. Act as a purchasing agent and purchase some delivery trucks. Control the flow of railroad cars in a plant. Locate and plot the location of various planes. Calculate the distance from the airport.	Give some good examples of a good design transportation system. Demonstrate to the students how to add up their mileage and gas consumption. Instructor will explain to students how to organize a transportation corporation. Briefly demonstrate to students how to do the activity. Show and explain transparencies 23-1 and 23-2. Give a brief lecture on the importance of supplying. State the responsibility of a purchasing agent. Instructor will lecture on how the four activities of controlling affect transportation. Instructor will lecture on control and demonstrate how to locate airplanes on a simulated radar screen.	(2) p.33 (2) pp.20-25 (1) p.44 (1) pp.46, 47 (1) pp. 48, 49 (2) pp.52-55

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
State three basic steps in producing transportation. Identify the effects of a load on a vehicle. Assemble a model airplane and load it for flight. Give an example of handling, storing, and protecting cargo. Give an example of handling, storing, and protecting passengers. List two activities that occur during moving of cargo and passengers. Identify the two activities that constitute operating vehicles--Speed and Direction. Identify who serves meals on an airplane. Identify who serves meals on a train. Identify who prepares meals on a ship. Identify two operations that go on at the end of the move.	C. Producing Transportation 1. Preparing to move a. Handling cargo b. Storing cargo c. Protecting cargo 2. Moving a. Operating vehicles b. Enroute services (In-service routes) 3. Completing the Move	Plan a game called Producing Transportation. Assemble a model airplane and observe flight characteristics to study load factor. Handle break-bulk cargo. Word puzzle game dealing with moving people and cargo. Identify the controls a pilot uses to control on airplane and compare this with the control of a train. Students will work a word puzzle about an in-service route. Students will be responsible for moving and transporting cargo.	Explain the need for transportation. Describe where and how transportation takes place in society. Lecture on why it is important to load passengers or cargo correctly. Lecture on the importance of handling, storing, and protecting cargo. Lecture and demonstrate on different types of control used to control an airplane and train locomotive. Instructor will lecture and ask questions about in-service routes. Hold a lecture and question period on completing the move.	(5) p.174 (5) p.437 (2) pp.80 81 (3) p.83

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Discuss the three modes of transportation. List two forms of transportation in each mode. List some types of vehicles that use transportation routes. Discuss how the lighter than air craft produce lift. Discuss how the heavier than air craft develop lift. 79	D. Mode 1. Land a. Highway . Trucks 2. Buses 3. Automobiles 4. Motorcycles b. Rails 1. Trains 2. Trolleys c. Pipeline 1. Liquid 2. Gas 2. Water a. Ships b. Barges 3. Air a. Lighter than air b. Heavier than air 1. Fixed wing 2. Rotary wing	Weigh object such as a stone in air then in water. Weigh the displaced water. Compare weight difference with that of the displaced water. Prepare and present report on findings. Blow a stream of air over a limp piece of paper. Observe lift. Build model of airfoil (air craft wing section) and test in a wind tunnel.	Discussion of Archimedes' Principle. Discuss Bernoulli's Principle of interaction of flowing fluids.	

UNIT II Sources of Power

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit and given the proper materials, the student will be able to: List six (6) sources of power that are used in transportation. Compare and contrast the effectiveness of square rigged and triangular rigged sails. Discuss how five (5) natural sources of power are harnessed for use in transportation. List applications of five (5) natural sources of power in transportation.	I. Wind II. Water III. Solar IV. Muscle	Build simple boat and test triangular sail and square rigged sail in a controlled situation. Make pinwheel from sheet metal and operate using stream of water from faucet. Make a solar-electric powered model car. Test student's horsepower rating by using timed, measured runs up a stairway.		

UNIT II Sources of Power

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
	V. Fossil Fuels A. Coal B. Petroleum C. Gas VI. Nuclear A. Fission B. Fusion	Construct a model windmill using various designs. Test power output of windmill using dynamometer. Do reports on nuclear powered ships of the U.S. Navy.		

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UNIT III Propulsion Systems

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit and given the proper equipment, the student will be able to: Differentiate between an engine and a motor. List four (4) strokes in proper order starting at any given point. Discuss the basic similarities between the gasoline and the diesel four (4) stroke cycle engine. Differentiate between the operating principles of a four (4) stroke cycle diesel engine and four (4) stroke cycle gasoline engine.	I. Engines - Consumes fuel A. Internal Combustion 1. Reciprocating Four (4) stroke cycle a. Principles b. Fuels c. Cooling d. Ignition e. Lubrication f. Mechanical g. Starting	Disassemble and assemble a four (4) stroke cycle gasoline engine by manufacturing specifications. Set up, start, run; adjust and stop a four (4) stroke cycle engine. Clean cooling system of small gasoline engine. Disassemble, clean, replace defective parts, reassemble and adjust a small gasoline engine carburetor. Change oil on small gasoline or diesel engine. List some reasons why oil should be changed and make report to class. Tune-up a working engine. Check and adjust ignition on small engine.	Go over the principles of operation of a four (4) stroke cycle gasoline and diesel engine. Present audiovisual materials on the principles of operation of various major systems of the small gasoline engine.	

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit and given the proper materials, the student will be able to: Compare and contrast the basic strokes of the two (2) stroke cycle engine and the four (4) stroke cycle engine. Give reasons for mixing oil with gasoline in many two (2) stroke cycle engines. Discuss the cooling function of most flywheels on many small two (2) stroke cycle engines. Compare and contrast the two (2) stroke cycle diesel and the two (2) stroke cycle engines. Explain how the lubrication system of the small gasoline two (2) stroke cycle engine compares to that of a large diesel two (2) stroke cycle engine.	2. Reciprocating Two (2) stroke cycle a. Principles b. Fuels c. Cooling d. Ignition e. Lubrication f. Mechanical g. Starting			

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit and given the proper materials, the student will be able to: Describe how the rocket engine and jet engine produce forward motion. Explain the differences between the jet and rocket.	I. Engines (cont'd) A. Internal Combustion (cont'd) 3. Reaction a. Rocket b. Gas turbine	While standing on skates, skateboard, or other freewheeling device, the student will toss a 20 pound object away and measure distance moved. Make air jet powered by balloon. Make and operate CO_2 powered "Metric 500" race cars. Make and launch model solid fuel rocket.	Show audiovisual materials about space and air travels. Discussion of Newton's Third Law of Motion.	Film: Golden Age of Air Travel - Western Airline Film: How the Jet Engine Works - American Gas Assoc. World of Manufacturing

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, and given the proper materials, the student will be able to: Explain how the four (4) stroke activities take place in the "Wankel" engine. Identify rotary engines and their major systems. Explain how a gas turbine works. 88	I. Engines (cont'd) A. Internal Combustion (cont'd) 4. Rotary piston "Wankel" a. Principles b. Fuels c. Cooling d. Ignition e. Lubrication f. Mechanical g. Starting 5. Gas turbine a. Principle b. Fuels c. Mechanical	Trip to Mazda dealership Prepare report on advantages and disadvantages of the "Wankel" engine. Prepare and present report on 1963 "Indianapolis 500" STP special turbine powered car.	Show audiovisual material.	

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, and given the proper materials, the student will be able to: Identify the parts of the piston steam engine and describe how they work. Give an example of three kinds of external combustion engines.	I. Engines (cont'd) B. External Combustion 1. Reciprocating a. Steam piston b. Stirling c. Reaction	Research report on Stirling engine. Use metal film can, fishing spinner, solder and copper tubing to make Hero's engine. Heat water inside Hero's engine to cause rotation.	Show models of steam piston engine.	

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, and given the proper materials, the student will be able to: Identify the steam turbine as an external combustion engine. Define external combustion engine. Define motor. Identify two (2) kinds of motors.	I. Engines (cont'd) B. External Combustion (cont'd) d. Rotary - Steam Turbine II. Motor - Does Not Produce Change in Fuel Used A. Electric B. Fluid Turbine	Build "pinwheel" turbine and operate off steam jet. Build simple electric motor and test run. Disassemble and assemble an electric motor and a fluid turbine according to manufacturer's specifications.	Show audiovisual material on steam turbine.	

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, and given the proper materials, the student will be able to: List the six (6) simple machines. Name one example of a tool based on each of the six simple machines. Identify simple machines used in more complex transportation machinery. Describe some practical applications of simple machines in transportation.	I. Mechanical Power A. Transmission 1. Lever a. First class b. Second class c. Third class 2. Inclined Plane 3. Screw 4. Wheel and Axle 5. Pulley 6. Wedge	Build, set-up, and test for actual mechanical advantages one of each of the simple machines. Calculate the ideal mechanical advantage of each of the above described set-ups. Calculate the efficiency of each of the above described set-ups. Use block and tackle (M.A. about 4) to lift a 200 pound weight. Use wedge and sledge hammer to split a piece of firewood. Use inclined plane to roll a 200 pound weight to a 1 ft. higher level. Use jenny winch boom to load and unload cargo in wheel barrow.		

UNIT IV Transmission and Control of Power

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, and given proper materials, the student will be able to: Identify the clutch system how it works, and its four main parts. Compare hydraulic brakes with disc brakes. Identify the advantages and disadvantages of the two systems. State the role bearings play in any moving part and where temperature is high. State the two types of lubricating systems. State the role lubricants play on moving parts.	I. Mechanical Power (cont'd) B. Control 1. Clutches 2. Brakes 3. Bearings 4. Friction and Lubrication			Harold T. Glenn. Auto Mechanics. p.361 Glenn, pp.484-487 Glenn, pp.127-128 Glenn, pp.80-81

UNIT IV Transmission and Control of Power

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, and given the proper materials, the student will be able to: Identify and give examples of various fluid transmission and control.	II. Fluid Power (hydraulic pneumatics) A. Transmission 1. Pipes 2. Tubes 3. Passageways B. Control 1. Pumps 2. Valves			

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UNIT IV Transmission and Control of Power

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, and given the proper materials, the student will be able to: Identify various electrical transmission and control devices.	III. Electrical A. Transmission - Wire B. Control 1. Manual switches 2. Solenoid and relays 3. Transformer	Launch rocket using electrical launch system.		

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CRAFTWORK

Grade Level:
6, 7, and 8

Prerequisites:
None

Course Goals:

1. To help each student develop skills in the safe use of basic hand tools.

2. To help each student express himself/herself creatively.

3. To provide the student with the basic information and knowledge with expectations of developing an understanding and appreciation of the tools, materials, and procedures necessary to make craftwork projects.

Crafts

I. Introduction to crafts

  A. Development of crafts

    1. Origin

    2. Types

  B. Marketing techniques

    1. Determining market demands

    2. Advertising

    3. Sales

  C. Classification of crafts

    1. Industrial

    2. Domestic

    3. Personal adornment

    4. Recreational

II. Planning and designing crafts

  A. Designing

  B. Sketching

  C. Measurement and layout

  D. Safety

III. Craft material areas

  A. Metal craftwork

  B. Ceramic craftwork

  C. Woodcraft

  D. Leather craftwork

  E. Plastic craftwork

Metal Craftwork

I. Understanding metal craftwork

- A. Origin
- B. Characteristics
- C. Properties
- D. Classification
  - 1. Ferrous
  - 2. Nonferrous

II. Scrollwork

- A. Designing the scroll
- B. Forming the scroll
- C. Bending and twisting
- D. Bending and forming metal on a machine
- E. Drilling
- F. Riveting and decorating
- G. Safety
- H. Projects

III. Metal spinning

- A. The spinning lathe
- B. Spinning tools
- C. Chucks for metal spinning
- D. Metals adaptable for spinning
- E. Metal spinning lubricants
- F. Fundamentals of metal spinning
- G. Soldering spun projects
- H. Polishing spun projects

I. Modern trends in metal spinning

J. Safety

K. Projects

IV. Working with metals

A. Tools used in forming and raising metals

B. Forming metals by beating down

C. Forming metals by raising

D. Decorating metals

V. Metal tooling

A. Metals and tools

B. Procedure for tooling metal foil

C. Safety

D. Projects

VI. Chasing

A. Procedure for chasing on a wood block

B. Chasing on pitch

C. Safety

D. Projects

VII. Etching metals

A. Styles of etching

B. Materials used in etching

C. Etching procedure

D. Mordants used for etching art metals

VIII. Metal enameling

A. Materials and tools

B. Procedure

IX. Cutting, finishing, and assembling metals

A. Coloring copper and brass

B. Sawing or piercing

C. Annealing and pickling metal

D. Soldering art metal projects

E. Projects

Ceramic Craftwork

I. Development of ceramics
   - A. Origin
   - B. Characteristics
   - C. Properties
   - D. Classification
     1. Glass
     2. Clay

II. Glass blowing
   - A. Tools
   - B. Basic operations
   - C. Flameworking
     1. Blowing
        a. Offhand
        b. Lampworking
     2. Rods
     3. Tubes
   - D. Safety
   - E. Projects

III. Glass staining
   - A. Types
     1. Opalescent
     2. Transparent
        a. Antique
        b. Cathedral
     3. Flashed
     4. Frosted

B. Tools

C. Operations

1. Designing

2. Patterns

3. Cutting

4. Assembling

5. Cleaning

D. Safety

E. Projects

IV. Glass etching

A. Materials and tools

B. Etching procedure

C. Projects

V. Mosaics

A. Styles of mosaics

B. Materials used to make mosaics

C. Procedures

D. Finishing

VI. Ceramic clay work

A. Materials used in clay work

B. Common methods

1. Cutting and modeling

2. Shaping pieces on forms

3. Building up and pinching

4. Casting

5. Potter's wheel

C. Applying glaze

D. Firing ceramics

E. Plaster molds

Plastic Craftwork

I. Understanding plastics craftwork

- A. Origin
- B. Properties and uses
- C. Types
- D. Classification
  - 1. Physical
  - 2. Chemical
- E. Processing
  - 1. Molders
  - 2. Extruders
  - 3. Film and sheeting
  - 4. Pressure laminators
  - 5. Reinforced plastic
  - 6. Coaters

II. Plastic materials area

- A. Plastic sculpture
  - 1. Materials
  - 2. Procedures
- B. Fiberglass laminating
  - 1. Materials
  - 2. Procedures
- C. Casting
  - 1. Materials
  - 2. Procedure
- D. Granule forming

1. Materials

2. Procedures

E. Decorative laminates

1. Materials

2. Procedure

3. Adhering the material

F. Sheet working

1. Cutting

2. Internal carving

3. Forming

4. Fastening

5. Safety

G. Polishing, buffing, and finishing

1. Polishing and buffing

2. Coloring

3. Glazing

I. Understanding leather
   - A. Origin and uses
   - B. Types of leather
   - C. Processing and sorting
   - D. Use of leathercraft kits
   - E. Other materials

II. Layout and cutting tools

III. Tooling designs on leather
   - A. Tools and materials
   - B. Methods

IV. Carving designs on leather
   - A. Tools and materials
   - B. Techniques

V. Decorating leather with stamped designs
   - A. Tools and materials
   - B. Planning stamping designs
   - C. Techniques for stamping

VI. Inverted silhouette carving on leather
   - A. Tools and materials
   - B. Methods

VII. Assembling the leather project
   - A. Tools and materials
   - B. Skiving
   - C. Edge creasing
   - D. Edge trimming
   - E. Making folded edges

F. Folding heavy leather

G. Cementing parts for assembly

VIII. Cleaning and applying finish to leather articles

A. Cleaning

B. Coloring

C. Applying an edge finish

D. Applying an antique finish

E. Applying outdoor finishes

F. Applying a protective finish

IX. Lacing leather materials

A. Purpose and uses

B. Types of lacing

C. Lacing tips

X. Attaching metal hardware

A. Types of hardware

B. Punching holes for metal

C. Setting eyelets

D. Setting snap fasteners

E. Setting rivets

Woodcraft

I. Understanding woods

- A. Origin
- B. Types of woods
  - 1. Characteristics
  - 2. Properties
- C. Classification
  - 1. Hardwood
  - 2. Softwood

II. Woodburning

- A. Tools used in woodburning
- B. Selecting the wood
- C. Creating the design
- D. Transferring the design
- E. Fundamentals of burning the design in wood
- F. Safety

III. Whittling

- A. Definition of whittling
- B. Care and use of whittling tools
- C. How to whittle
- D. Selecting wood for whittling
- E. Safety

IV. Carving

- A. Types of wood carving
  - 1. Scratch or chasing
  - 2. Chip
  - 3. Low relief

4. Bas relief

B. Designing

C. Transferring the design

D. Selecting the wood

E. Care and use of tools

1. Hand tools

2. Power tools

F. Fundamentals of carving

1. Rough cutting

2. Gouging

3. Filing

4. Sanding

G. Projects

UNIT I Craftwork

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will: Define crafts. Give a written or oral report on the origin and types of crafts. Identify marketing techniques. Identify the classification of crafts. Identify design techniques. Make a sketch. Read a ruler. Use simple layout tools. Identify safety practices. Design, create, produce, or construct one or more projects in the areas taught.	I. Introduction to Crafts A. Development of Crafts 1. Origin 2. Types B. Marketing Techniques 1. Determining market 2. Advertising 3. Sales C. Classification of Crafts 1. Industrial 2. Domestic 3. Personal adornment 4. Recreational II. Planning and Designing Crafts A. Designing B. Sketching C. Measurement and Layout D. Safety III. Craft Materials Areas A. Metal Craftwork B. Ceramic Craftwork C. Woodcraft D. Leather Craftwork E. Plastic Craftwork	Read assignment. Research and make a report on the origin and types of crafts. Topics include: a feasibility study, sales advertisement, and commercial (in relation to marketing crafts). Work exercises on reading a ruler. Design and sketch a project to be constructed. Demonstrate ability to read a ruler. Measure, layout, and sketch a design. Construct projects in areas taught by the teacher.	Gather and distribute information and examples relative to the development of crafts. Demonstrate marketing techniques: feasibility study, adverstisement, and commercial. Exhibit a collection of types of crafts according to classification. Demonstrate design techniques. Prepare visual aids to assist students in reading a ruler. Demonstrate use of layout tools. Demonstrate and discuss materials, tools, and processes necessary to construct projects in one or more of these areas.	World Book Encyclopedia Lindbeck, et al. Basic Crafts. Second Edition. Chas. A. Bennet Co., Inc., pp.14, 40. Willoughby, et al. General Crafts. Chas. A. Bennet Co., Inc., pp.11-21. Willoughby, pp.22-36, 67-75, 76-86, 87-100, 101-111 Lindbeck, pp.44-90, 108-132, 136-199, 204-259, 264-287

UNIT II Metal Craftwork

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will: Define metals, metallurgy. Participate in a class discussion on the origin of metals. List the characteristics of metals. Classify metals into two (2) categories. Define scroll. Show the method of enlarging a pattern. Explain how to find the length of metal needed to form a scroll. Participate in a class discussion on the advantages of using metal in furniture construction as compared to wood and other materials.	I. Understanding Metal Craftwork A. Origin B. Characteristics of Metals C. Properties of Metals D. Classification of Metals 1. Ferrous 2. Nonferrous II. Scrollwork A. Designing the Scroll B. Forming the Scroll C. Bending and Twisting D. Bending and Forming Metal on Machine E. Drilling F. Riveting and Decorating G. Safety H. Projects	Define vocabulary words. Write answer to vocabulary activities as prepared by teacher. Bring to class as many different types of metals as you can find. Classify these metals into categories. View audiovisual material on metals. Enlarge a pattern to full-size. Layout a design on squared paper. Find the length of metal needed to form a scroll. Note: The metal has been bent and twisted for this activity. Using proper techniques and procedures, construct a simple scrollwork project.	Select important vocabulary words. Develop vocabulary activities for students. Prepare vocabulary handouts. Preview audiovisual materials and set up equipment. Select important vocabulary words. Develop activity to reinforce vocabulary. Discuss and demonstrate measuring, design, and layout techniques. Demonstrate techniques and procedures used to make a scrollwork project.	Lindbeck, et al. pp.44-45. Johnson, Harold V. Technical Metals. Chas. A. Bennet Co., pp.46-50 Feirer, John L. General Metals. McGraw-Hill Co., pp.1, 2. Willoughby, pp.92, 93 Lindbeck, pp.76-79 Johnson, pp.104-122 Feirer, pp.55-63 Lindbeck, pp.76-79

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Define metal spinning. Trace the origin and growth of metal spinning prior to and including its introduction into the U.S. Identify the types of metals adaptable to spinning. List the dangers involved in spinning metals. Identify methods of shaping, forming, and raising metals. Define metal tooling. Identify types of metals used in tooling procedures.	III. Metal Spinning A. The Spinning Lathe B. Spinning Tools C. Chucks for Metal Spinning D. Metals Adaptable for Spinning E. Metals Spinning Lubricant F. Fundamentals of Metal Spinning G. Soldering Spun Projects H. Polishing Spun Projects I. Modern Trends in Metal Spinning J. Safety K. Projects IV. Working with Metals A. Tools Used in Forming and Raising Metals B. Forming Metals by Beating Down C. Forming Metals by Raising D. Decorating Metals V. Metal Tooling A. Metals and Tools B. Procedures for Tooling Metal C. Foil D. Safety E. Projects	Define vocabulary words. Write answers to vocabulary activities as prepared by teacher. Observe audiovisual material on metal spinning. Design and display safety posters and slogans in laboratory. Practice metal spinning fundamentals in sequence to spin a simple bowl from a metal disc. Hammer and stretch a metal disc to the rough shape of a bowl. Demonstrate correct and safe use of tools. Tool a design on a small piece of copper by following proper tooling procedures.	Select vocabulary words. Prepare handout for vocabulary activities. Preview audiovisual material on metal spinning and set up equipment prior to class. Demonstrate fundamentals of metal spinning including safety aspects. Prepare and administer a shop safety test. Display, discuss, and demonstrate correct and safe use of tools. Demonstrate procedure for tooling metal foil. Show project in stages from start to finish.	Johnson, pp.123-144 Feirer, pp.142-145 Willoughby, pp.92-93 Johnson, pp.145-154 Feirer, pp.122-132 Willoughby, pp.91-92 Lindbeck, pp.62-65 Johnson, pp.155-165 Feirer, pp.118-119 Willoughby, pp.89-90, 96, 97 Lindbeck, pp.66-68

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Define chasing. Discuss the two (2) methods of chasing. Describe the process of etching a design on metal. Discuss the two (2) styles of etching amd the materials used in etching. Explain why an adhesive must be used in enameling. Describe two (2) types of adhesives and their characteristics. List and explain three (3) types of enamels.	VI. Chasing A. Procedure for Chasing on a Wood Block B. Chasing on Pitch C. Safety D. Projects VII. Etching Metals A. Styles of Etching B. Materials Used in Etching C. Etching Procedures D. Mordants Used for Etching Art Metals VIII. Metal Enameling A. Materials and Tools B. Enameling Procedures	Using the wood block procedure, chase a design on a practice piece of sheet metal. Define vocabulary words. Work the vocabulary activity. Study safety handout on handling acids. Etch a design on metal using proper procedures, materials, and safety precautions. Excercising proper procedures, materials and caution, apply enamel to small metal pieces.	Demonstrate procedure for chasing metal. Select vocabulary words. Prepare vocabulary activity. Prepare safety handout on working acids. Discuss and demonstrate materials and procedures for etching. Discuss and demonstrate materials and procedures for enameling metal.	Johnson, pp.156-157 Feirer, pp.116-117 Willoughby, pp.95-96 Johnson, pp.158-159 Feirer, pp.133-135 Lindbeck, pp.73-75 Johnson, pp.159-163 Lindbeck, pp.69-73

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Explain why and how copper and brass are colored. Discuss the procedures and tools used to saw and pierce metal. Explain the necessity for annealing and pickling metal. Participate in a discussion on types of metals to be soldered as well as types of solder to be used.	IX. Cutting, Assembling, and Finishing Metals A. Coloring Copper and Brass 1. Coloring copper 2. Coloring brass B. Sawing or Piercing C. Annealing and Pickling Metal 1. Metal annealing temperature 2. Annealing procedure 3. Pickling procedure D. Soldering Art Metal Projects	Observe demonstrations on cutting, assembling, and finishing metals. Practice procedures necessary to complete a metal project. Design, lay out, and construct a metal project which incorporates a variety of metal craftwood procedures.	Discuss terminology and demonstrate procedures in cutting, assembling, and finishing metals. Purchase and prepare materials and supplies needed to make a metal-craft project.	Johnson, pp.163-170 Feirer, pp.119-122, 137-142 Lindbeck, pp.83-90

UNIT III Ceramic Craftwork

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will: Define ceramics. Participate in a discussion on the origin of ceramics. List and identify classification of ceramics. List some characteristics of ceramics. Define glassblowing. Identify tools used in glassblowing. Identify and explain types of flameworking. List several safety precautions to be taken in glassblowing. Identify types of stained glass. Trace the origin of glass staining. List and identify tools used in glass staining.	I. Understanding Ceramics A. Origin B. Characteristics C. Properties D. Classification 1. Glass 2. Clay II. Glassblowing A. Tools B. Basic Operations C. Flameworking 1. Blowing a. Offhand b. Lampworking 2. Rods 3. Tubes D. Safety E. Projects III. Glass Staining A. Types 1. Opalescent 2. Transparent a. Antique b. Cathedral 3. Flashed 4. Frosted	Define vocabulary words. Write answers to vocabulary activities as prepared by teacher. Bring to class as many different types of ceramics as you can find. Classify them into two (2) categories. View audiovisual material on ceramics. Define vocabulary words. Demonstrate correct and safe use of tools. Observe demonstrations and practice those procedures needed to complete a glassblowing project. Design and display safety posters. Design and construct a glassblowing project. Demonstrate correct and safe use of tools. Observe demonstration and practice cutting glass. Design and make a full-sized pattern. Observe demonstrations and practice those procedures needed to make a stained glass project.	Select important vocabulary words. Develop vocabulary activities for students. Prepare handouts. Preview audiovisual material on ceramics and set up equipment. Prepare ceramic display and classify each piece into a category. Purchase and prepare material and supplies needed for ceramic projects. Select vocabulary words. Demonstrate and discuss fundamentals of glassblowing including safety aspects. Demonstrate correct and safe use of tools. Prepare a display of several types of glass. Demonstrate fundamentals of cutting glass. Demonstrate how to enlarge a design to a full-sized pattern.	Willoughby, pp.67-68 Lindbeck, pp.264-265 Carberry, Edward. Glassblowing. MGLS Pub. Co., 1977. Shand, E.B. Glass Engineering Handbook. Second Edition. McGraw-Hill Co., 1958 by Corning Glass Works. Lindbeck, pp.268-271

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Explain the operations used to stain glass. List several safety precautions to take when handling and working with stained glass. Participate in a class discussion on the purpose and process of etching glass. Discuss the materials needed to etch glass and tell how each is used. Define mosaics. Explain why mosaics are more durable than paintings. Participate in a class discussion on the different types of materials which can be used to make mosaic designs. Define ceramic projects. Participate in a class discussion on where clay is found and discuss how it may be purchased.	B. Tools C. Operations 1. Designing 2. Patterns 3. Cutting 4. Assembling 5. Cleaning D. Safety IV. Glass Etching A. Materials and Tools Used in Etching B. Etching Procedure C. Etching Processes 1. Etching Cream 2. Sand Blasting D. Projects V. Mosaics A. Styles of Mosaics B. Materials Used to Make Mosaics C. Procedures Used in Mosaics D. Finishing Mosaics VI. Ceramic Clay Work A. Materials Used in Clay Work B. Common Methods in Clay Work 1. Cutting 2. Modeling	Make a stained glass project. Etch a design on glass using proper materials, procedures, and caution. Define vocabulary words. Write answers to vocabulary activities. Read information handout. Arrange and set up a display of the different types, colors, and shapes of tiles. Design and make a mosaic using clay or glass tiles. Use proper procedures, materials, tools, and caution. Define vocabulary words. Name at least ten (10) ceramic articles found in your home. Visit a pottery shop if one is located in your area.	Demonstrate techniques in making a stained glass project. Demonstrate the correct procedure, materials, and caution necessary to etch a design on an ordinary glass tumbler. Select important vocabulary words. Prepare vocabulary activity and informational handout. Prepare materials for students to set up a display on different types, colors, and shapes of tiles. Demonstrate the correct way to make a mosaic. Select vocabulary words. Prepare vocabulary activities. Gather information on location of area pottery shops.	Lindbeck, pp.266-267 Lindbeck, pp.273-277 Lindbeck, pp.277-287 Willoughby, pp.68-73

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Compare the differences between clay and glass with reference to ingredients. Explain how a hollow ceramic project is made.	3. Shaping pieces on forms 4. Building up and pinching 5. Casting 6. Potter's wheel C. Applying Glaze D. Firing Ceramics E. Plaster Molds	Observe audiovisual material. Form a clay project with a glass tumbler or a bottle. Shape a dish or tray by hand. Produce, decorate, and fire a hollow object by following proper methods for doing clay work. Mix, pour, and decorate a plaster mold.	Preview audiovisual material and set up equipment. Demonstrate common methods used in clay work. Demonstrate the use of the potter's wheel, the kiln, and the procedure for mixing and pouring slip. Demonstrate procedures for making a plaster project.	

UNIT IV Plastic Craftwork

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will: Write definitions to terminology relating to plastic craftwork. Classify plastics into categories according to properties. Discuss the six (6) classifications of plastic processors. Define styrofoam. Identify and discuss materials and procedures used to sculpture styrofoam. Describe the fiberglass laminating process. Describe how plastic casting is done.	I. Understanding Plastic Craftwork A. Origin B. Properties and Uses C. Types D. Classification 1. Physical 2. Chemical E. Processing 1. Molders 2. Extruders 3. Film and Sheeting 4. Pressure Laminators 5. Reinforced Plastic 6. Coaters II. Plastic Materials Area A. Plastic Sculpture 1. Materials 2. Procedures B. Fiberglass Laminating 1. Materials 2. Procedures C. Casting 1. Materials 2. Procedure	Define vocabulary words. Write answers to vocabulary activity. View audiovisual material and discuss. Make a list of items found in the home and try to classify them into categories. Define styrofoam. Creat a plastic sculpture project by using proper equipment and techniques. Form a fiberglass tray by laminating.	Select important vocabulary words and prepare vocabulary activity. Preview audiovisual material. Set up equipment before class. Define styrofoam. Demonstrate and discuss techniques used to carve plastic foam. Demonstrate and discuss materials and procedures to make a fiberglass laminating project.	Cherry, Raymond. General Plastics and Procedures. McKnight Pub. Co., pp.17-34. Edwards, Lauton. Industrial Arts Plastics. Second Edition. Chas. Bennett Co., pp.17-34 Lindbeck, pp.108-109, 110-114 Edwards, pp.134-151 Lindbeck, pp.114-117 Edwards, pp.238-239

UNIT IV Plastic Craftwork (Laminates)

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Define how plastic granules are used to form plastics. Discuss what plastic laminates are and how they are made. Participate in a class discussion and be prepared for cutting plexiglas, explain how plexiglas is formed, and discuss some methods of fastening plastics sheets. Describe some methods used to polish plastics. Describe some methods used to buff plastics. Explain how plastics can be cleaned and colored.	D. Granule Forming 1. Materials 2. Procedures E. Decorative Laminates 1. Materials 2. Procedure 3. Adhering the material F. Sheet Working 1. Cutting 2. Internal carving 3. Forming 4. Fastening 5. Safety G. Polishing, Buffing and Finishing 1. Polishing and Buffing 2. Coloring 3. Glazing	Create a granule forming project by using one or both procedures. Adhere plastic laminate to a cutting board that was made in the woodcraft area. Make a simple sheet plastic project using sheet working procedures and safety practices. Use proper tools. Use one or several of the finishing procedures to complete your plastic project.	Demonstrate and discuss procedures and techniques to make a granule forming project. Demonstrate the procedure for adhering plastic laminate to wooden base materials. Demonstrate and discuss sheet working procedures, tools, and safety practices. Demonstrate and discuss safe use of machine and equipment needed to finish projects. Demonstrate and discuss finishing procedures.	Lindbeck, pp.117-119, 119-122 Lindbeck, pp.122-128 Edwards, pp.48-52, 71-77, 93-97 Lindbeck, pp.129-132 Edwards, pp.60-66

UNIT V Leather Craftwork

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will: Discuss the origin, terminology and importance of leather in the U.S. Explain the difference between steerhide, cowhide, and calfskin. Identify and discuss uses of layout tools. Define tooling leather and stippling. Describe the method given for transferring a pattern. Explain the difference between tooling leather and carving leather. Explain the procedure for stamping petals around flower centers. Explain two (2) different ideas for inverted silhouette carving.	I. Understanding Leather Material A. Origin and Uses B. Types of Leather C. Processing and Sorting D. Use of Leathercraft Kits E. Other Materials II. Layout and Cutting Tools III. Tooling Designs on Leather A. Tools and Materials B. Methods IV. Carving Designs on Leather A. Tools and Materials B. Techniques V. Decorating Leather with Stamped Designs A. Tools and Materials B. Planning Stamping Designs C. Techniques for Stamping VI. Inverted Silhouette Carving on Leather A. Tools and Materials B. Methods	Define vocabulary terminology. Write a list of as many leather products as you can. Write answers to vocabulary activity. Read handouts. Make a list of the types of leather and write a characteristic and use description of each. Make a leather tool booklet on layout and cutting tools, include name of tool, description, use, and photo. Practice use and safe handling of tools. Prepare a piece of leather to be tooled and transfer the pattern on to leather. Define leather carving. Demonstrate proper technique in use of carving tools. Create a stamping design pattern by combining the various stamp imprints together to make a total design. Practice stamping on heavy cardboard to achieve proper spacing of imprints. Design and produce an inverted silhouette carving, exercising proper methods, tools, and procedures.	Select important vocabulary terms. Prepare vocabulary activity and topic handouts. Discuss the types, characteristics and uses of leather. Show a sample of each. Provide information and photographs or catalogs for student activity. Demonstrate and discuss methods of tooling designs on to leather. Define leather carving. Demonstrate and discuss proper and safe techniques in use of carving tools. Provide materials needed for student activities. Make available an assortment of saddle stamps and mallets. Demonstrate use of stamps. Demonstrate proper methods and tools necessary to carve an inverted silhouette.	Cherry, pp.15-20 Lindbeck, pp.204-207 Cherry, pp.22-31 Lindbeck, p.208 Lindbeck, pp.211-216 Cherry, pp.33-38, 39-45 Lindbeck, pp.216-225, 226-231 Cherry, pp.38-39 Lindbeck, pp.232-237

UNIT V Leather Craftwork

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Participate in a class discussion on the tools and techniques used in inverted silhouette carvings. List some operation in assembling a leather project. Describe how to crease and trim leather edges. Describe the process of cleaning leather. Participate in a class discussion on various types of finishing methods and when they are used. Discuss the purpose and uses of lacing. Identify and discuss the types of lacing stitches. Identify the types of metal hardware attached to leather and tell how each is used.	VII. Assembling a Leather Project A. Tools and Materials B. Skiving C. Edge Creasing D. Edge Trimming E. Making Folded Edges F. Folding Heavy Leather G. Cementing Parts for Assembly VIII. Cleaning and Applying Finish to Leather Articles A. Cleaning B. Coloring C. Applying an Edge Finish D. Applying Door Finish E. Applying an Antique Finish F. Applying a Protective Finish IX. Lacing Leather Materials A. Purpose and Uses B. Types of Lacing C. Lacing Tips X. Attaching Metal Hardware A. Types of Hardware B. Punching Holes for Metal C. Setting Eyelets D. Setting Rivets	Practice all operations necessary to assemble a project. Clean leather project. Apply one or several types of finishes to project. Practice the types of lacing stitches that have been discussed and demonstrated. Select the type of hardware needed to complete your project. Using proper fastening procedures attach the selected hardware to your leather project.	Display finished projects. Demonstrate use of tools and materials necessary to assemble a leather project. Demonstrate cleaning and finishing procedures. Demonstrate and discuss types of lacing stitches. Assist students in selection of lacing stitches. Demonstrate and discuss the method of attaching metal hardware to leather. Assist students in selecting proper hardware.	Cherry, pp.72-74 Lindbeck, pp.237-242 Lindbeck, pp.243-248 Cherry, pp.74-77 Lindbeck, pp.248-255 Cherry, pp.50-64 Cherry, pp.65-72 Lindbeck, pp.256-259

UNIT VI Woodcraft

OBJECTIVES/TIME ALLOTMENT	TOPICS	STUDENT ACTIVITIES	TEACHER ACTIVITIES	RESOURCES
Upon completion of this unit, the student will: Trace the origin of woods and discuss how other products are obtained from woods. Identify on sight the types of wood according to characteristics, properties, and classifications. Participate in a class discussion on the fundamentals of burning a design in wood. Using prior knowledge of wood types, select proper wood burning design. Explain safety precautions to be taken while using whittling tools. Select proper wood for whittling.	I. Understanding Woods A. Origin B. Types of Woods C. 1. Characteristics 2. Properties C. Classification 1. Hardwood 2. Softwood II. Woodburning A. Tools Used in Woodburning B. Selecting the Wood C. Creating the Design D. Transferring the Design E. Fundamentals of Burning the Designs in Wood F. Safety III. Whittling A. Definition of Whittling B. Care and Use of Whittling tools C. How to Whittle D. Selecting Wood for Whittling E. Safety	Prepare an individual notebook listing the types of woods, characteristics, classification, and properties of each. Make a poster display on types of wood and include a specimen of each. You are allowed a minimum of 10 types. After studying wood types, see if you can classify the trees on the school grounds into categories of hardwood or softwood. Practice using a woodburning pencil on a scrap of wood. Design and produce a simple woodburning project using proper procedures and techniques. Define vocabulary words. Read information handouts. View audiovisual on whittling. Practice safe use of tools on scrap material. Design, transfer design, and produce a whittled figure.	Prepare handouts on different wood types. Gather specimens of types of woods to be used in student activity. Check to see how many different wood types can be found on the school grounds. Demonstrate and discuss safe handling of tools. Demonstrate techniques used for success in woodburning. Select vocabulary words. Prepare handouts. Show audiovisual on whittling techniques. Show whittled pieces in pictorial views.	Willoughby, pp.84-86 Lindbeck, pp.136-139 Willoughby. p.76 Willoughby, pp.81-83 Lindbeck. pp.154-160

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Name at least three (3) types of work with woods that help one to develop craftsmanship and make attractive things. Discuss what special precautions should be taken when carving a. Self-protection b To avoid ruining the project Name at least five (5) woods especially good for carving. Explain why it is necessary for the beginning woodcarver to understand the characteristics of various woods.	IV. Carving A. Types of Wood Carving 1. Scratch or chasing 2. Chip 3. Low relief 4. Bas relief B. Designing C. Transferring the Design D. Selecting the Wood E. Care and Use of Tools 1. Hand tools 2. Power tools F. Fundamentals of Carving 1. Rough cutting 2. Gouging 3. Filing 4. Sanding G. Projects	Define vocabulary words. Write answers to vocabulary activity as prepared by teacher. Using your woods notebook, discuss five (5) woods good for carving and tell why. Demonstrate your knowledge and technique in the fundamentals of carving on a small practice piece. Design and produce a wood carving project which will include all fundamentals of carving.	Select important vocabulary words. Prepare and handout vocabulary activity and information. Demonstrate safe handling of tools. Demonstrate and discuss the fundamentals of carving. Prepare and distribute materials and tools necessary to successfully complete a wood carving project.	Lindbeck, pp.147-153 Willoughby, pp.83-84

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