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ABSTRACT

Provided in this guide is an array of supplementary activities centered around the topic of aviation. Although the activities are designed for students in grades 2 to 6, teachers are encouraged to adapt them to other grade levels or to the individual abilities of students. The activities are presented in five parts by subject area and within these parts by recommended grade levels. These subject areas are: (1) communication arts (grades 2-6); (2) science (grades 2-6); (3) social studies (grades 2-6); (4) health (grades 5 and 6); and (5) careers in aviation (grades 5 and 6). The activities (written as performance objectives) are presented in chart format and include instructional procedures, student activities, and outcomes. Lists of resources and materials needed are included. (JN)

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

Aviation Education Programs

TEACHERS' GUIDE FOR AVIATION EDUCATION

For Use In Grades Two Through Six

COMMUNICATION ARTS

SCIENCE

SOCIAL STUDIES

HEALTH

CAREER EDUCATION

Department of Transportation
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

GA-300-135

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INTRODUCTION

The purpose of this unique guide is to provide an array of supplementary activities which may be used by teachers to enrich their regular programs. The activities are centered around the subject of aviation and are appropriate for grades 2 - 6. They are related to the curriculum areas of Communication Arts, Science and Social Studies. In addition, special activities are directed towards health and career awareness in the field of aviation.

All of the activities are written as performance objectives and are related to various grade levels and subject areas. However, those who use the materials should feel free to adapt them to other grade levels or to the individual abilities of students.

HOW TO USE THIS GUIDE

Teachers will find this guide organized by subject areas and suggested grade level. The guide basically covers grades two through six. Teachers are encouraged to review the guide's contents and to make adaptions if they wish to grade levels other than those designated.

Teachers will find it convenient to review and select those areas most appropriate for their grade levels. Having made selections of the material most appropriate and desirable for their students, teachers will want to make special note of materials needed for the selected units. The guide identifies agencies or sources from which the materials can be ordered. Planning and requesting, in advance of introducing the unit, will insure that it is available when needed.

This guide has been organized by:

Subject Areas

Grade Levels

Learner Objectives

Teacher Objectives

Learning Activities, and

Expected Outcomes.

These items have been found to be important features for good instructional planning. Teachers will find these helpful guides to use as they develop instructional units from the materials contained in this guide.

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TEACHERS' GUIDE FOR AVIATION EDUCATION

COMMUNICATION ARTS
Grades Two-Six

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
800 INDEPENDENCE AVENUE S.W.
WASHINGTON, D.C. 20591

RESOURCES AND MATERIALS

A Trip To The Airport, GA-300-120
English-Spanish Text
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

An Airport Trip, GA-300-94
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

Charts of airplane parts; use bulletin board or overhead projector

"Some Aviation Workers" ditto masters, A Trip To The Airport
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

Local airport; field trip, consultants

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will participate in oral discussion of the airport, answering with cognitive and evaluative answers. Students will write a four sentence paragraph describing how they felt about the trip to the airport and a minimum of three things they saw.	Introduce unit by asking: Cognitive Questions 1. "How many of you have been to an airport?" Record number of those who have and have not. 2. "What did you see at the airport?" Record information on chalkboard. 3. "Who did you see at the airport?" Again, record responses. It is suggested that teachers may want to file these materials in folders or boxes coded accordingly. The instructional objectives are developed for skills and information learners need at the various grade levels. Materials selected to motivate learners are aviation oriented. These selected materials are matched to each objective. The teacher will also find useful examples of questions to ask learners.	Students will relate any airport experience they may have had and orally describe what it looks like and the two most interesting experiences they had. These experiences can come from a small, local airport to a large metropolitan airport.	Overview of various student experiences. Awareness of airports and their functions. Opportunities to practice speaking skills.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	These questions are especially designed to elicit cognitive as well as evaluative answers from the students. 4. "If we were to visit the airport, what do you think we might see? Again, record responses. Affective Questions 1. "Why do you think we have airports?" Again, record responses. 2. "Are airports different or are they used for different things? What or how?" Again, record responses.		
	Introduce students to the booklet, A Trip To The Airport. Point out different language printed in the book; explain why this is important.		Awareness of different languages and their importance.
	Depending on the class' ability, have students listen as the story is read. Read the story orally in groups or read it individually.	Students are to respond to teacher's questions with answers required. Teachers may request that students identify where they visited an airport and if they were passengers. Simple factual answers are not acceptable for these questions. Students must answer with thoughtful evaluative replies. Students apply listening skills if teacher reads the story. Students take turns reading parts of the story if they are assigned to reading groups. Students should ask questions of the teacher as they come upon words and/or story parts.	Awareness of what an airplane is like. Evaluation of listening skills.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will arrange vocabulary word list in alphabetical order using first letter of each word.	Following the story, review the story's vocabulary. The teacher should review this vocabulary and select words from it that are most appropriate to the performance level of the class. Reference: A Trip To The Airport airport page 1 terminal page 2 passengers page 2 porters page 3 baggage page 3 airline workers page 4 observation deck page 5 insurance page 5 taxi page 6 taxiway page 6 hangars page 7 mechanics page 9 instruments pages 9-20 cargo page 10 pilot page 11 fuselage page 11 landing gear page 12 rudder page 14 elevator page 14 control page 14 ailerons page 14 propeller page 15 jets page 16 seatbelt page 18 stewardess page 19 steward page 19 co-pilot page 20 flight engineer page 20 weather maps page 22 flight plans page 22 flight dispatcher page 22 control tower pages 22-25 runway page 23 clear page 23 take-off page 23 air traffic controller page 24 radar page 24 The teacher can develop a word drill game from this vocabulary by copying it onto flashcards. Flash words to students asking them to spell them or define them.	Students will arrange words in alphabetical order either individually or by groups. Students may record words in a dictionary notebook with pages containing letters of the alphabet. Students may select words for writing a story about the airport. Teachers may require students to develop questions from the word list to ask on trip to the airport or to be asked of adults in their home. Teachers may assign art activities from the word list or ask students to illustrate some of the words.	List by alphabetical order Practice of ordering skills sequencing by alphabet. Illustrations of selected words from the list.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will record vocabulary list in alphabetical dictionary and copy definitions provided by teacher.	Have students record vocabulary list in dictionaries; provide them with either notebooks or paper stapled together. Have students label each page with a letter of the alphabet. Check to make sure students are recording words on correct pages; some teachers have found peer-to-peer checking a good technique.	Students may also draw cards and provide definitions or draw numbers of cards and write a story using words on drawn cards.	Development of vocabulary dictionary. Each student will write a paragraph using one of the vocabulary words.
Students working in small groups will develop stories about pilots, flight attendants, mechanics and air traffic controllers. (Teachers are to record the stories.)	Using chart paper, have students write group stories. Work with small groups and record the story for the students. Story subjects are: pilots flight attendants mechanics flight controllers	Students will create airport story by dictating to the teacher; the teacher will record story on chart paper. Students will illustrate chart story and post it on the bulletin board.	Dictating story to teacher. Illustrations to go with chart story.
Students will role play the take-off, flight and landing of an airliner, playing the parts of pilot, co-pilot, air traffic controller, flight attendant or passenger.	Teachers monitor students to make sure they are using basic procedures for simulated flight by students playing the parts of pilot, co-pilot, air traffic controller and flight attendant.	Students using chart, stories or the booklet, A Trip To The Airport, will meet in small groups and select one of the five parts to play. They will practice and then present simulation to the class. Classmates will question or discuss their presentation following the program.	Development of presentation to be given to class. Evaluation of each presentation.
Students will write single sentence stories using correct capitalization, punctuation, spelling and sentence structure about airport story or visit.	The teacher will review details of the airport visit and vocabulary for this objective. Students should be encouraged to use their own dictionaries. Encourage capable students to write longer stories. Successful completion of this objective will ready students for the lessons' program objective.	Students, individually, will write single sentence stories; they should use their student dictionaries. Those finishing first may want to illustrate their stories or find pictures from magazines to cut out and match to their stories.	Completion of single sentence stories using the airport theme and vocabulary words.

GRADE THREE

COMMUNICATION ARTS

RESOURCES AND MATERIALS

Commercial Airlines and Airports, GA-300-111
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

FAA Film Catalog
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

Cooke, David C., Behind The Scenes At An Airport
Jacobs, Lou, Airports USA
Shay, Arthur, What Happens When You Travel By Plane

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will describe the five basic types of airports for transportation in the United States.	Introduce students to the terms: airport airplanes flights transportation Seek explanations or definitions of these compound words: air - the earth's immediate atmosphere port - a seafaring term; a place where ships dock or tie up. airport - a place where crafts that fly through the air land. Introduce students to the words: landing strip commercial private helicopter military In five areas of the chalkboard, use the words for a heading. Ask: "How are all of these airports the same?" List likenesses such as place for airplanes to land. Ask students to then identify how each airport is different.	Students will organize an air transport dictionary; dictionary should be in three-ring binders to permit collection of pictures that help clarify terms to be recorded. Students are to identify other compound words affiliated with air transportation. aircraft runways flight line Students are to collect or draw pictures that best describe the five types of airports. Students will record words in their dictionaries. Students will copy lists from chalkboard that tell how airports are the same and different. Students will write short stories about airports; encourage creativity.	Students will be skilled in writing letters using simple business form to request information and will apply correct capitalization, spelling grammar and punctuation. Students will be skilled in making a business telephone call as part of a group or individually. Identification of compound words. Recording words in a student aviation dictionary. Compare and contrast airports or discuss similarities and differences.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will be able to identify a minimum of 10 things commonly found at a commercial airport.	Develop chart and flashcards with these vocabulary words: main terminal ticket and information counter concourse security station ramps boarding lounges service areas gates management office baggage claim control tower runways approach hangars parking lots	Students will arrange flashcards in alphabetical order, play spelling games, play definition games, draw five cards and write a story using airport terms. Students will draw what they think an airport looks like including as many of the items from the teacher's list as possible. Students individually will assume responsibility for asking questions and securing answers or information.	Vocabulary experience with aviation terms. Preparation of individual questions.
	If possible, the teacher should plan a field trip to a commercial airport. Before the trip, students should be prepared to ask questions. Some teachers assign questions to every student; the students are responsible for securing answers and reporting back to class. It is a good idea to secure questions for information from the class; find out what they want to know and list questions on chart paper. You will want to refer to these questions when you return from the airport. Make arrangements well ahead of time, secure safety rules and prepare your students to observe them; make sure someone will be available to answer class' questions; send questions ahead to person responsible for answering them. Prepare class in techniques for writing a business letter. The teacher may want to compare a composite letter or have each child write individual letters. Letters may contain request to visit, date, time and question or questions students want to ask.	Each student will write a business letter, with total class, in a small group, and individually. Students will report information to the class. Each student will write a thank-you letter using basic business letter form.	Business letter writing form and content. Airport field trip Speaking/reporting skills. Thank-you letter writing experience.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Following the field trip, using the chart of questions, have each child provide information secured at the airport.		
	Use an unanswered question as rationale for writing follow-up business letters seeking unknown answers. Letter should be written to the Federal Aviation Administration Regional Office; list of addresses can be found in the ~~FAA Film Catalog~~.		
	Teachers should have the class write thank-you letters.		

RESOURCES AND MATERIALS

Aerospace Personality Series
Amelia Earhart
General Daniel "Chappie" James, Jr.
Captain Eddie Rickenbacker
Wright Brothers
Others

ADDRESS:
Center for Aerospace Education Development
Civil Air Patrol, National Headquarters (ED)
Maxwell Air Force Base, Alabama 36112

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will develop a simple writing outline about one aerospace hero/heroine of their choice.	Introduce outline by explaining that it is a planned writing outline. Provide example: "Let's write a story about ourselves. Before starting, we should develop an outline." I. Important Facts About Yourself a. Your name b. Your age c. One thing you like to do II. Your Own History a. Where you were born b. Date of your birth c. Other places you have lived III. Introduce Your Family a. Give the names of your mother and father b. Tell the names of any sisters or brothers c. Mention other relatives or pets The teacher may want to introduce outlining by writing only the major topics on the board and have students, as a class, develop a list of other things under each.	Students will copy outline from the board. They will write simple sentences for each of the outline items. EXAMPLE: My name is Jose Sanchez. I am nine years old. I like to play games with my friends. Students will develop simple sentences about their friends, pets or a toy or bicycle that they like. Each outline must be broken out to at least the two items under each major outline heading. Students using aerospace personality series packets will develop a writing outline with at least three major headings and at least two subheadings under each.	Students will be able to write a short story about aviation heros or heroines requiring composing skills in outlining, paragraphing, with topic sentences and appropriate supportive sentences. Outlining skills will be developed.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Example: I. Important Facts About Myself A. _____ B. _____ C. _____ II. Your Own History A. _____ B. _____ C. _____		
	Provide students with packets about aerospace hero/heroines. Require that each develop an outline like the previous one about an aerospace hero/heroine.		Development of an outline about aerospace heros/ heroine.
Students will write topic sentences for paragraphs, each supported by two basic supportive sentences.	Introduce students to topic sentences by writing examples on the chalkboard. Ask students what they would like to know about the subject introduced by topic sentences. Example: "The roar of the red airplane's motor could be heard in the early morning." "The shock of the parachute opening signaled he was safe." What else would you like to know about these sentences? Have students randomly select paragraph topic sentences from their reading books. Ask students what they think might be added to support sentences after students read them. Require, after discussion, students to read the total paragraphs from which they selected topic paragraphs.	Students, when provided with topic sentences, will develop a completed paragraph by writing at least two supportive sentences. Topic sentences: "She felt a little nervous about her first solo flight." "The radio message warned of a storm in the plane's flight path." Students will critique each others paragraphs; they are to note topic sentences and determine if support sentences are good. Students may use aerospace personality series packets for this activity.	Topic sentence skills Critiquing experience is to identify topic sentences.

GRADE FIVE

COMMUNICATION ARTS

RESOURCES AND MATERIALS

Aerospace Personality Series

Amelia Earhart
General Daniel "Chappie" James, Jr.
Captain Eddie Rickenbacker
Wright Brothers

ADDRESS:
Center For Aerospace Education Development
Civil Air Patrol, National Headquarters (ED)
Maxwell Air Force Base, Alabama 36112

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students using the Aerospace Personality Series will write fiction stories about their experiences with these famous people.			Students will write fictional stories about aerospace heros/ heroines.
Students will identify one of three aerospace personalities and will write in five complete separate sentences about five factual personal items of that person.			Creative writing.
			Development of displays
			Recognition of equality in aerospace personalities.
	Using materials from the packets introduce unit by developing three individual displays on the bulletin board.		
	Use the displays for class discussion. Make sure the class recognizes that both men and women make up the displays as well as different races.		
	Provide students with biography information about each personality displayed on the board.	Students will select a personality they want to know more about	Biographical collection of information.
	Assign students to small reading groups for each personality. Require that they read as a group the vital information. Ask them to answer such questions as:	Students are to organize their groups by electing a: leader reporter recorder timer	Forming and organization of small groups for discussion.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	1. When was the personality born? 2. How old would this person be now? 3. Do you know anyone that old? 4. What did this person's parents do? 5. Do some of your parents do similar work? 6. Did this person's parents have an effect on his life? 7. How and where did this person learn to fly? 8. What great contribution did this person make to aviation?	Students will answer all questions in complete sentences by their groups. Students will prepare answers into a report for the class. Students will be encouraged to add material beyond the questions asked to build an interest.	
		Each student will write a short biography about him or herself. Each student will write an individual biography about one personality.	Writing a short biographical sketch of themselves.
	Beneath each bulletin board display provide students with a biography and reading task cards. The teacher should be prepared to discuss information on the task cards for:	Students will select one of the following task cards and complete it as required.	A biographical sketch of a selected air hero/heroine.
	AMELIA EARHART Task Card Three Task Card Four Task Card Seven Task Card Eight	AMELIA EARHART Task Card Three Task Card Four Task Card Seven Task Card Eight	
	GENERAL DANIEL JAMES, JR. Task Card Three Task Card Five Task Card Six Task Card Seven	GENERAL DANIEL JAMES, JR. Task Card Three Task Card Five Task Card Six Task Card Seven	
	EDDIE RICKENBACKER Task Card Four Task Card Five Task Card Nine Task Card Sixteen	EDDIE RICKENBACKER Task Card Four Task Card Five Task Card Nine Task Card Sixteen	
	WRIGHT BROTHERS		
	OTHERS	Student enrichment activity. Students will draw pictures of personalities, planes they flew and an important event in their lives.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Discuss with students the meaning of fiction and historical novels.	Each student will write a short five-sentence story mentioning five factual things about one of the three personalities studied.	Writing of a five sentence story.
	Ask students during oral discussion: 1. What would you have done on a raft lost at sea for 24 days with little food and water? (Rickenbacker) 2. How would you feel about being the first woman to fly around the world? (Earhart) 3. Describe how you might feel to graduate number one in your flight class? (James)	Students will respond orally to at least one of the questions during class.	Speaking experiences
	Assign students to write a fictional account about one of the three characters studied.	Each student will write a fictional account about being or being with one of these personalities.	Creative writing

GRADE SIX

COMMUNICATION ARTS

RESOURCES AND MATERIALS

Aerospace Personality Series
Amelia Earhart
General Daniel "Chappie" James, Jr.
Captain Eddie Rickenbacker
Wright Brothers

ADDRESS:
Center For Aerospace Education Development
Civil Air Patrol, National Headquarters (ED)
Maxwell Air Force Base, Alabama 36112

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students, through the use of Aerospace Personality Series, will acquire basic skills in oral and written activities that will increase their skills in: spelling punctuation capitalization grammar and composing	Introduce students to the following: Throughout the history of our country we have a list of personalities that have contributed to the advancement of our country. Some seventy years ago the first flight in a heavier-than-air machine was made. Since that date, the ranks of persons who have contributed to the use of aviation as an important invention in American history are long and interesting. As a class, let us explore the meaning of these terms: personalities inventors experimenters What is a personality? What is a famous personality?	Students will write a brief description of their own personality in terms of biography. The description is to include: place of birth special likes special skills physical description purposed future role	Defining various important terms and phrases

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		Students will meet in small groups and select most interesting personality description among those written. One person who has been selected will read his or her personality description to the class.	Small group discussions and selection of a "more interesting" personality.
	Inventor: What is an inventor? What is an invention? Make a list of things that have been invented.	Students will write a definition of an inventor. Students will look for names of persons who have made famous inventions. Example: telephone _____ radio _____ steam engine _____ cotton gin _____ airplane _____ hot air balloon _____	
	Instruct students in the use of outlining to organize their thoughts for writing. Example: A. Name of the invention B. Person who invented C. Why invention was made D. What the invention has contributed to better living and the world.	Students will be assigned to small groups to decide on at least three things that should be invented; these may be household goods, space machines, safety factors for airplanes, etc.	Predicting skills
	Experimenters: These are persons who conduct experiments or tests to determine how well something functions under specific conditions. Aviation has a long list of many persons who have conducted flight experiments. Example: speed test aerobatics safety long distance flights	Students will conduct experiments. Examples: Dropping of an egg from a building without damaging the egg. Using hot air to fly a paper balloon. Effects of wind on control surfaces.	Conducting experiments to illustrate various aerospace concepts.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	high altitude flights instrumentation flights cold weather flights	Students are to compile detailed notes on their experiments. Example: Experiment: _____ Date: _____ Time: ____ Description of the Experiment: _____ _____ Experiment Results: _____ _____ _____ Experimenter: _____ (student's name)	Conducting experiments to illustrate various aerospace concepts.
		Students will present experiments to class. Class will ask questions about each experiment reported.	Speaking Presenting results of experiments, orally.
	Introduce students to the Aerospace Personality Series. Select groups of students and have them make a bulletin board display for each personality. Invite students to become acquainted with each of the personalities displayed on the board. Introduce students to the writing of biographies: .story of a person .accurate account .important events .important dates .accomplishments	Students are to become acquainted with each personality on the bulletin board. Each student must know at least three things about each personality. These items will be reported when questions are directed to the students by the teacher.	

VES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Stress that a biography must be clearly written with an emphasis on: .good spelling .good sentence structure, and .good accurate punctuation .proper capitalization .good grammar		Essay writing skills and practice with mechanics of English
	Organize students into correcting teams. Each team is to have a single responsibility. Teams for: spelling sentence punctuation capitalization grammar	Students are to study each of the personalities and from memory write a biography about one of the personalities. Written reports are to be submitted to the correcting team. Biographies will be rewritten to correct any errors noted by the correction teams.	Writing experiences using biographies as topics.
	Organize students into teams for each personality. These teams will review biographies written by students to check their accuracy for details regarding each personality.	Students will submit their written biographies to the personality teams. Reports will be checked for accuracy and returned to students for correction. Students will read biographies to the class.	

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TEACHERS' GUIDE FOR AVIATION EDUCATION

SCIENCE
Grades Two-Six

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
800 INDEPENDENCE AVENUE S.W.
WASHINGTON, D.C. 20591

GRADE TWO

SCIENCE

RESOURCES AND MATERIALS

Overhead projector

"The Main Parts of an Airplane", Department of Transportation, Federal Aviation Administration, AGA-300, 800 Independence Avenue, S. W., Washington, D. C. 20591 — Diagram of an airplane with unlabeled parts GA-20-29

Corbett, Scott, What Makes a Plane Fly

McFarland, Kenton D., Airplanes, How They Work

Urquhart, David I., The Airplane and How It Works

"America's Wings", Educators' Guide to Free Films

"How An Airplane Flies", Educators' Guide to Free Films

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will explain the working functions of an airplane's basic seven parts when presented an unlabeled diagram of an airplane.	Present an unlabeled diagram to students of an airplane. Ask: (without reference to the diagram) Affective Questions 1. "How do you control a bicycle?" 2. "How do you control a wagon when you're pushed?" 3. "How does your mother/father control your car?" 4. "How many directions can you go on a bicycle? Right? Left? Forward? Backward? 5. "How many controls do you have on your bicycle?"	Students will demonstrate with hands turning directions of their bicycles or a car. Students, using hands, will follow teacher through examples of an airplane turning and going up and down.	
	Review students' answers to these questions, then ask: 1. "What do you know about airplanes?" 2. "How many directions can it go? The same as your bicycle?"	Ask students to compare with bicycle turning: one student playing the part of a bicycle; one an airplane.	Role playing by students
	List the directions on the board: forward left down right up	Students will copy parts named on the diagram furnished by the teacher. Peers and teachers will check for correct labeling and spelling.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Ask: "How can this happen?"		
	After students have had an opportunity to guess or provide answers introduce them to the following vocabulary: rudder elevator ailerons propeller	Students will draw diagram from memory and label parts. Students will organize in small groups and label themselves with parts; when the word rudder is flashed, student labeled "rudder" will pronounce the word and say something like, "I help the airplane turn".	Development of diagrams showing major parts of an airplane.
	Using diagram on the overhead projector, label each part; as each part is labeled write its function on the board. Require students to record these words and definitions in their dictionaries for later use. Have class, in unison, repeat parts of diagram as you point. Be alert for incorrect answers and non-participants. Encourage students to use flashcards with parts named on them; suggest punctuation, spelling by pointing to part on unlabeled diagram. Make sure students understand that the pilot controls the directional parts of the airplane.	The students could also respond to statements such as "I make the airplane go up and down". The response would be to flash the word elevator or the student labeled "elevator" could stand, pronounce the word and spell it.	Evaluate students to determine knowledge of airplane controls.
Students will orally identify the seven basic parts of an airplane when presented an unlabeled diagram.	Complete introduction of students to the remaining vocabulary words: propeller landing gear wing right wing aileron left wing aileron	Students will place words in their dictionary, draw illustrations of each part or make a total diagram of aircraft and its parts to be included in the dictionary.	Addition of words to student dictionary.

GRADE THREE

SCIENCE

RESOURCES AND MATERIALS

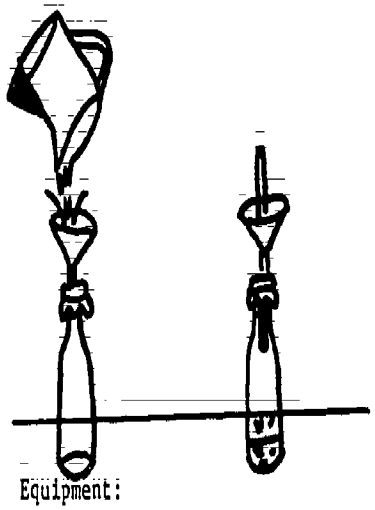
Demonstration Aids for Aviation Education, GA-26-30
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

"How An Airplane Flies", ditto masters
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

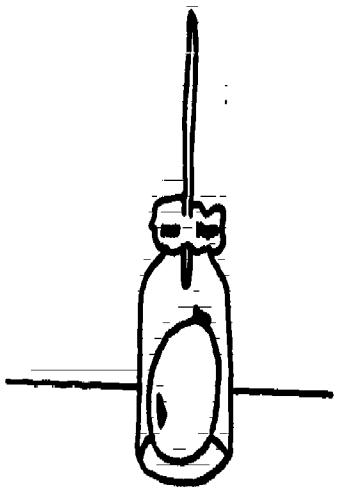
"How Airplanes Fly", FAA Film Catalog
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

Pilot's Handbook of Aeronautical Knowledge
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will conduct simple experiments to demonstrate the theory of flight.	Create an interest in the study of air by asking students questions that require thinking process.	Lead students to arrive at these answers:	Introduction to the theory of flight.
Students will conduct simple experiments to prove the properties of air.	1. "What do we use every day, but never see?" 2. "What is all around us but we cannot touch?" 3. "How do we know it is there?" 4. "How do we use it?" 5. "Do you know some ways that we can prove air is something real and valuable to our lives?"	Air, while invisible and can't be felt, is all around us. Have students demonstrate that air can be felt:	
	Show pictures of wind blowing flags, trees; pictures of people leaning into wind.	Blow breath on hands, fan air with stiff piece of paper on a classmate. Require students to further check that air exists by feeling wind when riding a bicycle; when safe, ask for adult's permission to hold hand outside of the car window to feel the air; have students construct a crude wind indicator with a stick and piece of ribbon to determine wind direction or movement of the air we cannot see.	Experiments regarding the properties of air.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	AIR TAKES UP ROOM		
	1. Equipment: Soda pop bottle Small funnel Soda straw Modeling clay Cupful of water	Students will start a book of experiments. Students will follow a format described by the teacher. Students will diagram experiments to be included in their books. Students will develop glossary of important terms for their books.	Students will know that air takes up space.
	Seal the funnel tightly into the neck of the bottle with modeling clay. Pour the cup of water into the funnel quickly. The water stays in the funnel because the air in the bottle cannot get out. Pass the straw through the funnel into the bottle. Suck out a mouthful of air. Some of the water goes down into the bottle, taking the place of the air sucked out.	Students will collect pictures from magazines or other places that add proof to experiments. Students will look for air working outside of school. They may see windmills, wind-waves, etc. These will be shared with class.	
			
	2. Equipment: Wide-necked bottle or jar with an air-tight lid Soda straw Modeling clay Small Balloon Thread	Students should be encouraged to conduct these experiments (as supplies are available) at home for their families or friends. In some cases, equipment may be loaned to a student by the school.	

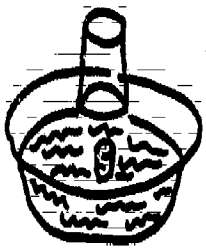
Blow the balloon up just enough to fit very loosely in the bottle. Tie a thread around the neck of the balloon so the air will not escape. Drop the balloon into the bottle. Punch a hole in the lid and insert the straw; seal it with modeling clay. Screw the lid on the bottle. Suck some of the air out of the bottle through the straw and clamp your finger over the top of the straw to prevent air from rushing back into the bottle. The balloon gets larger because the air inside the balloon expands as the air pressure decreases in the bottle.



3. Equipment:

Water glass
Cork
Large glass bowl
Facial tissue

Fill the bowl about three-fourths full of water. Drop the cork on top of the water. Invert the glass over the cork and push to the bottom of the bowl. The cork goes to the bottom of the bowl under the glass. Air in the glass keeps the water out.

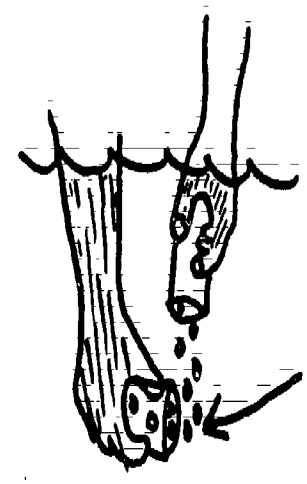


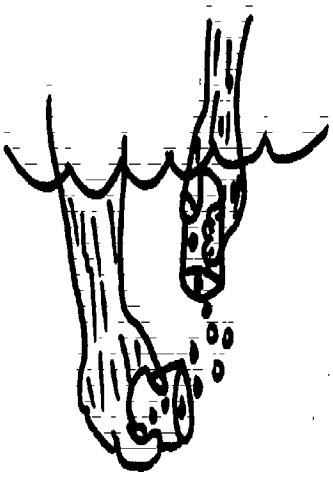
Remove the glass and the cork. Stuff facial tissue into the bottom of the glass. Invert the glass and push to the bottom of the bowl. The tissue does not get wet.

4. Equipment:

2 water glasses
Large dishpan or other container filled with water

Air, like water, is fluid--you can pour it. Place one glass into the container so that it fills with water. Place a second glass into the water upside down so that the air does not escape. Carefully tilt the air-filled glass under the water-filled glass. By doing this, you can pour the air up in bubbles. Each bubble is a little package of air made visible by being in the water. With a little practice you can keep pouring the air back and forth between the glasses without losing any of it.





5. Collect necessary materials and have students perform

   Experiment One
   Experiment Two
   Experiment Three
   Experiment Four

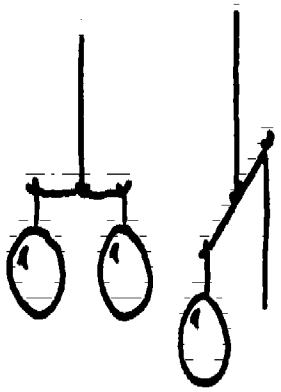
Each student will have the opportunity to conduct all four experiments.

ES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Keep in mind the ability level of your students. Teachers may want to conduct experiments as demonstrations; have students work in small groups conducting experiment; or allow students to experiment at learning stations individually. Prior to these experiments the teacher may want to instruct the class in techniques of keeping observation notes, students may keep a book of experiments and notes of observations. Example: Problem: Proving Air Has Body Date_____ Time _____ Materials Needed: bottle funnel straw modeling clay water Observation Notes: (what took place or happened?) 1. I put funnel into top of bottle and stuck it with clay. 2. I poured water in the funnel. 3. The water stayed in the funnel; it went down slowly, the teacher said my clay wasn't tight enough. or 4. I put the straw through the water into the bottle and the water went into the bottle. The completion of these experiments should lead students to conclude that air has body.		Development of scientific notebook. Writing observation notes.
l demon- gh experiments weight.	6. Using Demonstration Aids for Aviation Education either perform, have students perform, or experiment at learning station, the following experiments. (page 3) Experiment Seven Experiment Eight Experiment Nine	Students will record observations of experiments for air weight. While students work in small groups, or at learning stations, students are to report to the class their observations.	Students will know that air has weight.

AIR HAS WEIGHT

7. Equipment:

Wooden dowel stock or tinker toy stick about a foot long
String, 1 yard
2 balloons exactly alike



Blow up the balloons to the same size, and tie them at their necks with a piece of string. Tie one balloon to each end of the dowel stock. Attach another piece of string to the center of the dowel stock and suspend it from some convenient place. Balance the dowel stock. Prick one balloon with a pin. As the air rushes out, the pricked balloon shoots up and the heavier, air-filled one drops down.

8. Equipment:

Football or basketball
Good scale

Squeeze all the air possible out of the ball; then weigh the ball. Blow the ball up again and weigh it. The inflated ball should weigh a few ounces more.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

9. Equipment:

Wooden upright
Rod about 4 feet long
Pail
Sand or gravel
Deflated ball (basketball, volleyball, or soccerball)
Bicycle pump

Nail the rod at the center to the upright. Suspend deflated ball at one end and the pail at the other. Using the sand, balance the two. Inflate the ball, pumping as much air as the ball will take. Replace it.

The ball pulls down and unbalances the pail of sand, showing that air does have weight.

Students will demonstrate through experiments that air has pressure.

Reference: Demonstration Aids for Aviation Education

Have students perform:

Experiment Ten
Experiment Eleven
Experiment Twelve
Experiment Twenty-three

Students will record results of experiments in their science notebooks.

Students will know that air has pressure and moves.

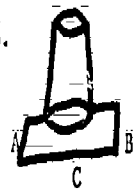
10. Equipment:

Water glass
Piece of thin, flat cardboard

Fill glass to the top with water. Place the cardboard over the glass. Carefully turn the glass upside down, holding cardboard tightly to the glass. Take your hand away from the cardboard. The cardboard stays in place against the glass. Tilt the glass or hold it sideways, and the cardboard still remains in place.

1.

2.



At A and B the upward and downward pressures balance, but at C the upward pressure of air is greater than the downward pressure of water and holds the cardboard in place.

11. Equipment:

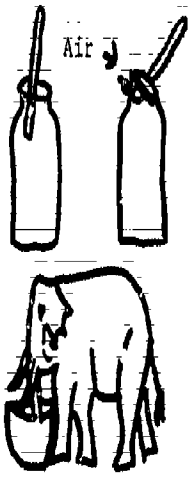
Soda straw or glass tube

Put your finger over the top of a soda straw filled with water. Lift or tilt it. The water will not run out because your finger cuts off the air pressure on top, but air still presses up against the water at the bottom of the straw. Take your finger away, and the water runs out the straw.

12. Equipment:

Bottle or jar with a tight cap
Soda straw
Modeling clay

Fill the jar up to the cap with water. Punch a hole in the cap and insert the soda straw. Seal tightly around the straw with clay. Put the cap on tightly so that no air can get into the bottle. Now try to suck the water out of the bottle. No matter how hard you suck, the water will not flow through the straw. Release the cap on the bottle just enough to let in some air, and try to suck the water through the straw. Now as you suck through the straw, the air pressure is lowered inside the straw. Air pressing on the surface of the water in the bottle pushes it up through the straw as you suck through it.

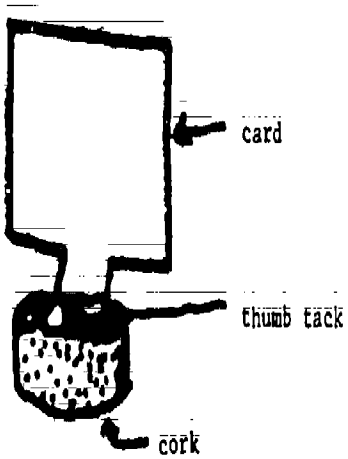


An elephant has a built-in straw, and he puts air pressure to work every time he takes a drink. He puts his trunk in water and breathes in to draw the air out of his trunk. As he does this the water fills his trunk.

13. Equipment:

Card	Fan	Soda straw
Cork	Thumb tack	Pan of water

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Make a toy sailboat out of a card, cork and a thumb tack. Put in the sink or in a pan of water. Blow on it. Blow on it through a straw. Fan it with a fan.		
Students will explain the functions of an airplane to make it fly using basic vocabulary.	Introduce the term wings. Using an unlabeled diagram of an airplane drawn on a wall chart; label only the wings.	Students will draw simple diagram: lift gravity thrust drag	



GRADE FOUR

SCIENCE

RESOURCES AND MATERIALS

Teaching Science Through Discovery
Arthur Carin and Robert E. Sund
Charles E. Merrill Books, Inc.
Columbus, Ohio

"Operation Survival",
"Packing and Maintenance of Parachutes"

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will demonstrate through experiments that they understand the concept of air resistance and ways it can be used. Students will demonstrate that the size and payload of a parachute determine its descent rate.	Introduce the concept of air resistance to students through the following actions: 1 Can we feel the air? Ask students to swing their hands rapidly from right to left. 2. What are some other ways we can feel the air? What happens when you ride your bicycle? What happens when you run? What happens when you hold your hand out the car window when taking a trip? 3. Can you see the air move? What are some ways we can see the air: .wind moving trees, .wind blowing leaves across the ground, .flags being moved by the wind Is wind air? 4. How does the air help us? .necessary for living	Students will perform experiments to demonstrate ways air can be felt. Example: .make flags wave .kick up dust during windy day .hold streamers of paper and run; note what happens .tie cloth streamers to bicycle and note what happens .observe flags, leaves falling from trees Students will collect pictures of wind action and/or working. Students will perform one or all of these experiments: make a simple windmill make a simple sailboat	Students will review air and know that it moves and as it moves causes reactions. Participate in a series of wind experiments.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	What are some other ways? .windmills to pump water .wind pushes sailboats for recreation .riding bicycles with the wind or air pushing us .air helps fires burn that keep us warm	place a jar over a burning candle and observe what happens make a list of things fire is used to help manufacture Example: cars, airplanes, tractors, Steel bicycles, ships, tools	
	5. Prepare the class to conduct parachute experiments. Gather cloth for parachute canopies, string for parachute risers, objects of equal weights for payloads. Assign students in groups of three to make parachutes. The teacher will expect students to make these observations: .air fills the canopy .air slows the descent by filling the canopy .air as wind makes the parachute drift; .bigger parachutes slow descent by holding more air	Students working in groups will construct parachutes in the following sizes; each group should make a parachute of different sizes: 12" x 12" 15" x 15" 18" x 18" each group will provide for sections of string 15" in length Students will throw parachutes in the air and observe what happens when the same amount of weight is tied to each parachute.	
	Conduct class discussion on how parachutes use the air to help mankind do different things important to our world.	Students will compile lists of ways parachutes are used: .military .cargo .mail .safety .brakes .weather study .rocket recovery Students will collect and/or draw pictures of parachutes using the air.	Vocabulary study

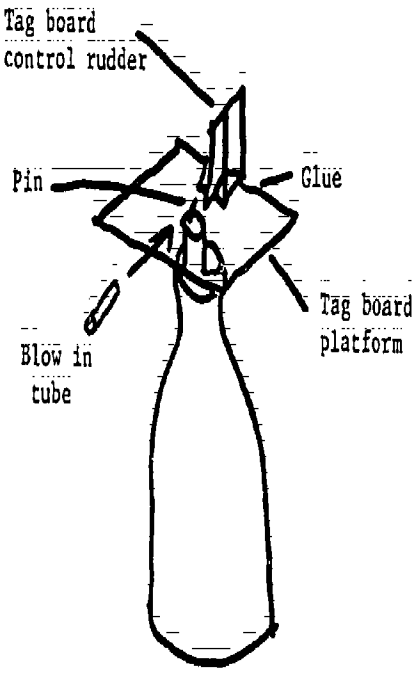
RESOURCES AND MATERIALS

Teaching Science Through Discovery
Arthur Carin and Robert E. Sund
Charles E. Merrill Books, Inc.
Columbus, Ohio

Zaffo, George J., The Book of Airplanes

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Fifth grade students will demonstrate through science experiments that they can identify how airplane control surfaces work.	Students should master the following terminology: controls control stick control column control cable elevator rudder rudder pedal aileron wing landing gear trim tab Print these terms on flashcards and have students learn to spell them when they are flashed; alphabetize card deck; define the term when it is flashed.	Students will develop diagrams labeling these parts on the diagram: fuselage landing gear propeller rudder elevator aileron cockpit or cabin wings motor Students will define what functions each of these parts perform while the airplane is flying: elevator aileron rudder Students will perform from the following experiments a demonstration of the function of the rudder. Materials needed: bottle cork stopper tag board pin glue glass tube or straw	Addition of aerospace words to dictionary Definitions of functions of airplane parts Conduct rudder experiments

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES



Students will adjust the control rudder and note in which direction the platform turns when air is blown through the glass or plastic tube.

Introduce students to the terms:

tail spin
loop, inside
loop, outside
barrel roll
dive
climb
bank
drift

Students will draw sequenced diagrams that illustrate these maneuvers:

bank
dive
climb
loop
barrel roll

Students will draw diagrams of airplane maneuvers and give illustrations of controls used.

Illustrations must include set of controls to perform these functions.

The teacher should make an exploratory trip to the airport to identify experiences and resources that will prove valuable to the student.

Students will prepare questions they want to ask of airport guide. Each student will take pencil and paper to the airport to make a report when returning to the class. Students should also be prepared to ask for literature about airplanes and other materials they may find of interest at the airport.

Following field trip to airport, hold a "debriefing" session with the students about what they learned. List details on the board.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Provide time for students to write reports about their experience at the airport.	Each student will prepare a written report about what she/he found out about airplane controls during the airport visit. Every student will be prepared to read his/her report to the class if called upon to do so. Students will work in small groups to develop thank-you letters to persons at the airport who helped them.	Development of reports Report reading

RESOURCES AND MATERIALS

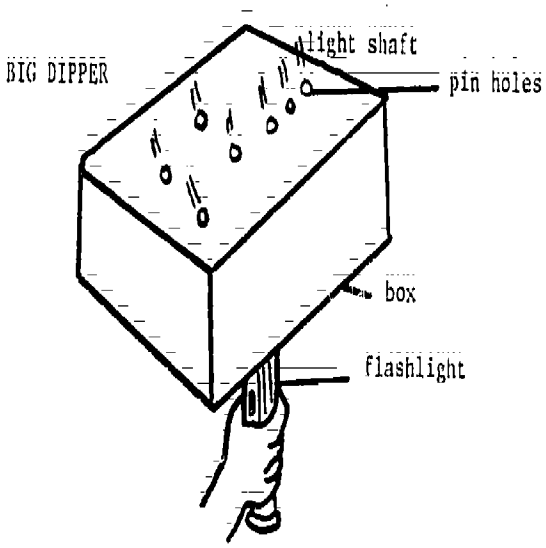
FAA Film Catalog
"The Atmosphere"
"Weather to Fly"
"Air Masses and Fronts"
"The Cold Front"
"The Warm Front"
"Thunderstorms and Turbulence"
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

"Lifestyles of the Stars"; (pennyfolder)
National Aeronautics and Space Administration
Washington, D. C.
"Earth Resources Technology Satellite"
"Hurricane Below"
"Tornado Below"
"Pollution Below"
"Earthquake Below"
"Flood Below"
Film Catalog
National Aeronautics and Space Administration
Washington, D. C.

Miniature Star Box Construction;
Ames Research Center
National Aeronautics and Space Administration
Mountain View, California

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will explain how weather and astronomy are important to flight.	Students will define a minimum of five basic weather terms.		Learning about five basic weather terms
	Check and assure yourself that students thoroughly understand the term weather. To do this assign students to work in small groups to develop a definition of weather. Have students compare definitions and select the most appropriate definition.	Students will work in small groups, defining the term weather.	
	Introduce students to these terms:	Follow up for students will be the collection of pictures about weather that will be selected for display on the bulletin board.	
	typhoon hurricane artic weather tropical weather cloud formation thunder heads wind conditions temperature low pressure high pressure fog visibility limited weather conditions ceiling ground level unlimited	Students will alphabetize the word list. Students will seek definitions of each term and relate it to flight. Students will answer the question: "Why do pilots want to know the weather when flying?" Students will make up weather reports and give reports as if they were reporting weather conditions. Students will answer these questions: "What happens to a flight schedule when head winds increase? When tail winds decrease? Increase?	Knowing weather is important to air travel

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Call the local weather station and alert them to student calls. Check on the kinds of questions students should ask. Include: .proposed flight time .proposed destination .proposed route	Students working in small groups will organize questions about weather. One student will be selected from the group to call the local weather station to get current weather report. Each group will be scheduled to make one call during the week. Example: Monday - Group One Tuesday - Group Two Wednesday - Group Three Thursday - Group Four Friday - Group Five	Development of weather reports
	Make up a flight from your school to a destination approximately 500 miles from your school. Students should understand that weather conditions can affect flight plans. Example: .increase flight time .decrease flight time .cancel flights .increase fuel needs .cancel landings .alter flight plans	At the conclusion of each, students making calls will report weather to the class. Students will write simulated flight plans for a proposed five hundred mile flight. .take-off has limited ground visibility of one mile .head winds of 20 knots will be encountered .heavy thunder storms block the direct route to destination	
	Students will define a maximum of five astronomy terms and relate each to navigation purposes for flight.	Students will define the term astronomy using dictionaries and encyclopedias.	Awareness information on astronomy
	Introduce students to these astronomy vocabulary terms: constellations big dipper little dipper North Star Milky Way moon sun stars planets	Students will write and draw appropriate pictures that describe and define: planets stars moon sun constellations North Star big dipper little dipper	Addition of words to aerospace dictionary

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	As students become familiar with these terms introduce the word navigation.	Students will write definitions of navigation and give example for the definition.	
	Following understanding of navigation present how the heavens have helped the world's people to navigate with special instruments.	Using shoe boxes and flashlights, students will make projections of various astronomy formations on the classroom ceiling. Example:  	
	Students should understand that navigation by heavenly bodies is an ancient science and while still used, instruments and radio have replaced them.	Students will learn how to locate the North Star using the Big Dipper's outer bowl lip.  Ask students to find the North Star at home, at night and draw their own diagram.	Ability to find North Star

TEACHERS' GUIDE FOR AVIATION EDUCATION

SOCIAL STUDIES
Grades Two-Six

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
800 INDEPENDENCE AVENUE S.W.
WASHINGTON, D.C 20591

GRADE TWO

SOCIAL STUDIES

RESOURCES AND MATERIALS

Classroom map or airmap
Overhead projector and transparency of classroom, school and playground map
School and playground map
"The Compass Rose Game", GA-20-50
"Some Aviation Workers", ditto masters
Department of Transportation
Federal Aviation Administration, AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will explain the purpose of a map, follow directions on a simple school map; provide rationale for making maps to scale; read simple legends and directions.	Introduce students to map unit by displaying simple map of the classroom; use an overhead projection or wall map. Your map should include: directions: north, south, east, west room doors and windows teacher and student desks tables -- don't be overly detailed Ask students if they recognize the diagram; ask: "What is this?" "Could it be useful?" "Useful to whom?" "Why?" Ask students to name other diagrams with which they may be familiar, such as model cars, airplanes, dress patterns.	All students are required to participate. Students may bring samples of diagrams and maps. Those who do should explain the purpose of the diagram or map.	Map reading, map making.
Students will, in their own words, explain the basis for a map; give at least one example. When given simple directions, students will find their way on a simple school and playground map	Start by giving students only simple direct route directions. Example: From your desk, go to the pencil sharpener, turn right and go to teacher's desk. Have students first trace the route on their maps, then have one student follow the route given while others observe.	Students working in groups will devise answer to, "Why do we have maps?" Students will make up simple directions for their peers to follow. This can be a group or individual exercise.	Student will know the usefulness of maps.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Make directions increasingly more difficult; never out-pace the ability of your students. Make sure they firmly understand what they are to do.		
Students will read simple legends on map and be able to locate items legend represents when given a school and playground map containing legends.	Introduce simple legends to students: .shaded area for grass .house or buildings .road or paths .bicycle rack .playing fields .water area The teacher should make as many legends as can be managed by the learning level of the class. Put legends on flashcards and have students name them as they are flashed.	Students will bring and share examples of map legends. Have students create an imaginary map; have them place secret hiding places, dangerous areas, safe areas, sad areas, happy areas. Require that they use legends to note these areas.	Learning the use and being able to read legends on a map.
	Post directions on the walls of classroom; north, south, east, west. Review earlier introduction of directions. Have all students stand; as you give directions, have them face in that direction. Some directions can include such things as turn to the direction in which the sun rises, sets, or if you have prevailing winds, ask them to face that direction.		Learning the cardinal points of north, south, east, west and why they are used.
Students will draw simple maps of their homerooms using simple legends and putting directions on map.	Assign students to draw maps of their homerooms. More accomplished students could be required to draw all rooms or their yard. Encourage students to label directions and use legends. Culminate this activity by asking students why maps are smaller than the real thing they show.	Students will draw maps and share them with the class. Students will again create imaginary maps. This time require rivers, lakes, mountains and oceans. Have students tell a story of how their map could be used.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will be able to describe the tasks required of people who work as pilots, flight attendants, air traffic controllers, ticket salespeople, mechanics and baggage handlers.	Start discussion of this objective by what is meant by the term "work" and "pay" or "reward". Follow with: Affective Questions 1. "Why do people work?" 2. "How does work help us?" 3. "How do workers help us?" 4. "Why don't people all work at the same jobs?" Place workers on the board. Pilot - What does the pilot do? Why is the pilot's work important? What things do you think the pilot should know? Flight Attendant - similar questions to those above for following workers. Air Traffic Controller Ticket Salesperson Mechanic Baggage Handler Provide students with d... workers from packet "Some ...ation Workers". Use information from this packet cover to provide students with information and answer their questions. Cover materials are not readable for students at this grade level.	Students may describe work their parents perform; they should try to compare it to workers in this objective: .skills needed .services provided .working with people or the public Students may collect pictures of workers. Students will describe to class why services provided by various workers are important.	Awareness of variety of airport occupations Students will, orally, describe jobs of three airport employees.

CTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

Students are to draw pilot, flight attendant, air traffic controller, ticket salesperson, mechanic, baggage handler doing their jobs. Encourage them to show the various things each does.

Example: Pilot - checks airplane's safety
flys the airplane
talks on the airplane radio
Flight Attendant - explains safe procedures to passengers
helps with seating
takes tickets
cares for passengers' needs

GRADE THREE

SOCIAL STUDIES

RESOURCES AND MATERIALS

An Airport Trip, AGA-300-94
Department of Transportation
Federal Aviation Administration, AGA-300
800 Independence Ave., S. W.
Washington, D. C. 20591

Aircraft and Environment, AGA-300-104
Department of Transportation
Federal Aviation Administration, AGA-300
800 Independence Ave., S. W.
Washington, D. C. 20591

Allward, Maurice, All Kinds of Airplanes
Ahnstrom, D. M., The Complete Book of Helicopters
Bushy, Walter, Freight Trains of the Sky
Coombs, Charles, Skyhooks; the Story of Helicopters

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will describe how airplanes reduce the time of travel when compared to ground travel.	Introduce students to travel methods by presenting such questions as: "How many ways can we think of to travel?" The list will most likely include: bus — airplanes cars — horses walking — rockets bicycles — motorcycles trucks — elevator Ask students to discard any of those that are not used for service to people. Then have them ranked from slowest to the fastest. Discuss with class ways of traveling that are best for: going short distances such as to the store or barn going distances greater than a half mile, across town, to a nearby town going longer distances such as fifty to 200 miles going long distances such as 1,000 miles or further.	Students will collect pictures of the many different ways people travel. These pictures are to be shared with class and displayed on bulletin board. Students will arrange ways of travel from the slowest to the fastest. Students will collect pictures of: helicopters agriplanes medical airlift airplanes pleasure airplanes passenger airplanes freighters Students will ask questions of visitors to the classroom about how they use airplanes in their businesses.	Students will describe how airplanes have brought people of the world together and how this has helped people. Identifying methods of travel, why some are best. Begin picture file Discussion of travel costs.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	When students are to associate methods to distance, introduce time. If you had only five minutes to go to the store, would you walk or ride a bicycle? If you had three hours to travel 100 miles and return home, would you use a car or an airplane? At this point, discuss type of airplane - the most likely for the 100 mile trip. Discuss costs of traveling by: light aircraft jet aircraft helicopter Ask students the fastest way to travel from their homes to a distant city over 1,000 miles away. Ask students why people would want to travel faster; direct questions to: illness, fires, crop dusting Have students collect pictures of airplanes used for many different purposes. Invite to the class people who use airplanes in many different ways.	List student methods of travel. Tell the teacher ways you have traveled and why you used that method.	How many different ways various students have traveled.
	Prepare class to interview persons invited to class. Students will tell all the ways they have traveled; in cases of airplane flights, why? Students will time how long it takes to walk a block as compared to riding a bicycle the same distance.		

GRADE FOUR

SOCIAL STUDIES

RESOURCES AND MATERIALS

Maps and Globes
Aerospace Personality Series
Amelia Earhart
General Daniel "Chappie" James, Jr.
Captain Eddie Rickenbacker
Wright Brothers
Other

ADDRESS:
Center for Aerospace Education Development
Civil Air Patrol, National Headquarters (ED)
Maxwell Air Force Base, Alabama 36112

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will define a minimum of five geographical terms and use them in a simple story about flying around the world.	Introduce students to the following vocabulary: flight map — atmosphere international — oxygen mask world flights — sub-sonic transcontinental — jet-streams transoceanic — foreign storm front — capitols cross-country — radio message continents — borders mountains — oceans supersonic — altitude These items may be placed on flash-cards. Encourage teams of students to challenge others to dictionary games. Have each group select three to five flashcards; first team that finds an aviation definition for all their terms wins the game. Organize students into two groups for a spelling bee. Flash cards to students for spelling. The team wins that has the most players standing at the end of the game. Flash cards to students and have them write a definition for each. Call on various students to read their definitions.	Students will reorganize list into alphabetical order. Students will draw three cards and write a short one-paragraph story using the three words. Students will develop topic sentence and write two supportive sentences. Students will participate on various game teams organized by the teacher. Students will participate in class; they will assist in developing chalkboard list of ways to travel.	Students will be able to write a short story that explains how the world has been brought closer together by airflights. Aerospace vocabulary development

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will explain why flying around the world is faster than traveling by land and sea.	Open discussion with how we travel as the topic. Make a list on the board. Example: walking, running, trains, automobiles, rockets; bicycles, boats, balloons, airplanes Assign students to teams and have them reorganize list in order of slowest travel to fastest travel. Ask students to time themselves: .walking to school .riding bicycle to school .riding the bus or automobile to school Have students compare travel time by the Pilgrims' first trip to America and a modern airflight time. Have students find out how long it took man to first sail around the earth and how long it takes a modern jet airplane to make the same trip. Have students study air travel maps in Aerospace Personality Series packets.	Students participating as team members will reorganize chalkboard list as required by teacher assignment. Students will compare various travel times in getting to school. Students will develop bar graph comparing times. Example: Minutes: 15 30 45 60 Walking _____ Bicycle _____ Bus _____ Auto _____ Students will compute sailing time in months and weeks for Pilgrims to sail to America. Students will use encyclopedia to discover who first sailed around the world and how long it took.	Students will explore modes of travel Development of various graphs bar circle line Compare and contrast results and evaluate travel methods.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will explain how land forms help or hinder travel.		Some students may want to compute the time in months or weeks. Students will write a short story explaining why air travel is faster than any other method man has for world travel.	Development of a short story giving reasons for popularity of air travel.

RESOURCES AND MATERIALS

Aerospace Personality Series
Charles Lindbergh
Books: (see Appendix)
DeLeeuw, Adele, Lindbergh; Lone Eagle
Fisk, Nicholas, Lindbergh, the Lone Flier
Foster, John T., The Flight of the Lone Eagle;
Charles Lindbergh Flies Non-Stop From New York to Paris
Film: "In Celebration of Flight", FAA Film Catalog
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

ADDRESS:
Center for Aerospace Education Development
Civil Air Patrol, National Headquarters (ED)
Maxwell Air Force Base, Alabama 36112

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will trace the history of the air mail services in the United States and match historical events to development of air mail.	Introduce students to this unit through discussion of the importance for rapid mail service. Discuss with students how mail services historically have been provided in the United States. Areas to be covered: .first parcel post .transcontinental mail .stage coach delivery .pony express .railroad service .mail services by ship .mail by truck	Students will draw pictures of various ways mail has been delivered in the United States.	
	Concept of time in getting letter delivered should be emphasized.	Students will develop chart illustrating how long it took and takes to deliver a letter: Example: foot delivery (1790) stage coach (1850) pony express (1860)	Chart or graph development to make comparisons

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		railroad (1900) ship (1920) truck (1970) airplane (1975)	
	Discuss with students why some mail needs to be delivered quickly. Discuss with students air mail.	Important family events; births, deaths, weddings, illness, loans of money, community disasters.	
	1. What is the fastest way to have a letter delivered? 2. When was the first air mail flight made? What was the distance traveled? What was the length of time? 3. When was the first transcontinental mail delivered? How long did it take? What was the distance?	Students will draw and/or collect pictures of air mail carriers.	Each student will collect pictures.
	Show film to students of the history of air mail.		
	1. How were the planes different? 2. How were conditions different for the pilots? 3. What dangers did these early air mail carrier pioneers face?	Each student will write a short story telling how it would feel to fly the first air mail.	
	Discuss Lindbergh's experiences as an air mail pilot.	Students will trace on outline maps early air mail routes. They will make special note of flights by Charles Lindbergh.	Class development of early mail route map
	Introduce class to significant events that effected air mail services and match these to historical events in United States history: .first airplane flight .construction of the Panama Canal .airplanes for watching military movements and carrying messages .World War I .first mail flights .End of World War I	Students are to use reference and library resources to identify: 1. Dates of messages first carried by airplanes and an historical event in United States history that matches that date. 2. The place and date of the first air mail service and a matching historical event in American history.	Learning important mail flight milestones

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

.first combined mail and passenger service flights
.Franklin Roosevelt's Second Term
.first transcontinental mail service
.Coolidge becomes President after Taft assination

3. First transcontinental mail flight services and a matching American history event.

Each student will write a short report using the data identified.

Students will use task cards from the Aerospace Personality Series to match learning experiences:

Amelia Earhart Task Card Three Geography

General Daniel James, Jr. Task Card Sixteen
Social Studies
Task Card Fourteen
Social Studies

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GRADE SIX

SOCIAL STUDIES

RESOURCES AND MATERIALS

Aerospace Personality Series
Amelia Earhart
Charles Lindbergh
Billy Mitchell
Captain Eddie Rickenbacker
Wright Brothers
Others

ADDRESS:
Center for Aerospace Education Development
Civil Air Patrol, National Headquarters (ED)
Maxwell Air Force Base, Alabama 36112

Books: Bishop, Richard, ~~From Kite to Kitty Hawk~~
Settle, Mary Lee, The Story of Flight
Wallhouser, H. T., Pioneers of Flight
McCague, James, ~~When Men First Flew~~
Fisher, Marguita O., Jacqueline Cochran; First Lady of Flight
Davis, Burke, Amelia Earhart
Dalgliesh, Alice, Ride on the Wind
Glines, Carroll V., ~~The Wright Brothers, Pioneers of Power Flight~~
Deleeuw, Adele, Lindbergh; Lone Eagle

Films: FAA Film Catalog
"In Celebration of Flight"
"Kites to Capsules"
"History of Flight - The Wright Brothers, Parts I-V"
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Sixth grade students will match important international flights to world historical events.	Using appropriate materials from the ~~Aerospace Personality Series~~ packets develop a bulletin board interest center. Feature maps of flights made by the various personalities that have international implications. Students of this age level are interested in exploration and adventuresome accomplishments by courageous persons. Using the bulletin board as an interest center pose the probelms to the class.	Students are to record the assigned problems. For each problem students will record:	Knowledge of flight pioneers and accomplishments

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		.the flight .person(s) involved .dates .distances .problems	
	1. By whom was the first around the world flight made? When? 2. What were the important stops made by the flyers of this mission? 3. Who first flew to South America? 4. Who first flew over the North Pole? South Pole? 5. Who made the first flight across the Atlantic? Pacific? 6. Who first flew to Hawaii from the United States?	Students should be encouraged to collect supportive pictures or draw pictures themselves. Pictures should feature: .aircraft design .weather conditions .dress of the crews .instruments .incidents in the flight .special honors or medals of award Each picture must feature a caption by the student.	
	Arrange bulletin board display space to feature student developed reports and materials.	Students will develop reports to be written and given orally to the class related to these subjects:	Oral reports on selected topics
	Using the information derived from the exploratory flights see, with the class, how these international flying ventures relate to solving world problems. Establish contrast of how these problems were met 100 years ago as to how they are presently dealt with. Example: 100 years ago to travel from the United States to India with food would require how much travel time? Today how long would it take? Do you feel early flights by aviation pioneers helped us to solve distance problems? How?	.World Food Problems .International Disasters (floods, earthquakes, hurricanes) .International Tensions (war and conflicts) .World Health .World Communications .Recreation (Travel) .Historical Information Exchange (displays) .Information Exchange (storm warnings, etc.)	
		Students will be assigned to small groups for the purpose of selecting best written reports for bulletin board display. Students will apply a basic selection criteria:	Development of written reports

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		.neatness .accuracy of data .grammar .accompanying materials, such as pictures, maps, etc.	
	Use similar examples for health, shelter, clothing and education. List on the chalkboard these events for oral discussion: .Berlin Crisis .Shut Down of Suez Canal .Food Shortages .Cuban Missile Crisis .Earthquakes in Asia .Earthquakes in South America		
	Discuss what briefly was involved regarding each of these events. Where in our world did these events occur? Did they occur close to our country? How could we help relieve these situations? What role did the airplane play in these events?	Students will select one world topic and prepare an oral report to the class. Subject topics: How the Airplane was Used During the Berlin Crisis How the Airplane Meets World Food Needs Why the Airplane is Important During a Major Disaster (floods, earthquakes, volcanic eruptions) Students should plan to use maps, charts, and pictures with their reports. Students will use task cards from the Aerospace Personality Series for enrichment activities: Eddie Rickenbacker Task Card Seven Geography General Daniel James, Jr. Task Card Seventeen Geography Task Card Fifteen Social Studies	Development of oral reports

TEACHERS' GUIDE FOR AVIATION EDUCATION

HEALTH
Grades Five-Six

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
800 INDEPENDENCE AVENUE S.W.
WASHINGTON, D.C. 20591

RESOURCES AND MATERIALS

FAA Film Catalog
"Medical Facts for Pilots"
"Charlie"
"Eagle Eyed Pilot"
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

Books: Richter, Ed, The Making of an Airline Pilot
Shay, Arthur, What's It Like to be a Pilot
Stanek, Muriel, I Know an Airline Pilot

Medical Facts About Pilots
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

Medical Benefits from Space Research
National Aeronautics and Space Administration
Washington, D. C.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

This unit has been designed to bring information to the fifth and sixth grade student that will create an awareness of the various factors that can affect the health conditions of individuals. The material selected is basic; the terminology used is medical and teachers will find it desirable in some instances to spend time discussing each carefully. Each is followed by an activity; teachers and students may find value in learning about these basic medical factors.

Through discussion with the class, determine why it is important that healthy persons, in good condition, fly aircraft. Make sure the class is aware of some limiting factors that do not prevent people from flying.

Show the film, "Medical Facts for Pilots", FAA Film Catalog. Prior to film viewing, review its contents. Ask the students to look for these factors; following film

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	discuss each factor previously designated. Reshow film if necessary.		
	List the following factors on the board: fatigue hypoxia alcohol drugs vertigo carbon monoxide vision middle ear panic scuba diving	Materials for student reading and review:	
	Explain to the class that the students and yourself will determine how each of these factors are important to safe flying. Encourage students to keep notebooks.	FATIGUE Fatigue generally slows reaction times and causes foolish errors due to inattention. In addition to the most common cause of fatigue, insufficient rest and loss of sleep, the pressures of business, financial worries and family problems, can be important contributing factors. If your fatigue is marked prior to a given flight, don't fly. To prevent fatigue effects during long flights, keep active with respect to making ground checks, radio-navigation position plotting, and remaining mentally active. Experiment: Reaction Test Using a yardstick have students drop it between the thumb and forefinger of a classmate; note the inch mark at which it is grasped. Do this three times to get an average.	Discussion with class to determine factors important to flying Notebooks on safe flying factors

$\frac{(13" + 12" + 11")}{3}$ = 12" average

Now require students to exercise vigorously (push-ups, run). Immediately retest for reaction time. Do not allow subject to rest.

$\frac{(14" + 14" + 12")}{3}$ = 13 1/3" average

Did fatigue affect reaction time?

HYPOXIA

Hypoxia in simple terms is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. Wide individual variation occurs with respect to susceptibility to hypoxia. In addition to progressively insufficient oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (anemias, carbon monoxide, and certain drugs). Also, alcohol and various drugs decrease the brain's tolerance to hypoxia.

Your body has no built-in alarm system to let you know when you are not getting enough oxygen. It is impossible to predict when or where hypoxia will occur during a given flight, or how it will manifest itself.

A major early symptom of hypoxia is an increased sense of well-being (referred to as euphoria). This progresses to slowed reactions, impaired thinking ability, unusual fatigue, and a dull headache feeling.

The symptoms are slow but progressive, insidious in onset, and are most marked at altitudes

Have students describe symptoms or explain the following terms associated with hypoxia. Encourage use of diagrams.

euphoria
drugs
alcohol
tobacco
altitude

starting above ten thousand feet. Night vision, however, can be impaired starting at altitudes lower than ten thousand feet. Heavy smokers may also experience early symptoms of hypoxia at altitudes lower than is so with non-smokers.

If you observe the general rule of not flying above ten thousand feet without supplemental oxygen, you will not get into trouble.

ALCOHOL

Do you fly or drive while under the influence of alcohol? An excellent rule is to allow twenty-four hours between the last drink and take-off time. Even small amounts of alcohol in the system can adversely affect judgment and decision making abilities.

Remember that your body metabolizes alcohol at a fixed rate, and no amount of coffee or medication will alter this rate.

By all means, do not fly or drive with a hangover, or a "masked hangover" (symptoms supressed by aspirin or other medication).

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Have small groups read and discuss this section. After a short period, conduct total-class questions and answer period. Have students write answers to these questions: 1. How long should a person wait after drinking alcohol before flying? Why? 2. What is a "masked hangover"? 3. Will the drinking of coffee reduce the effect of alcohol on the body? Why?		Students will prepare written answers and note new vocabulary words in their notebooks.
	Show film "Charlie", FAA Film Catalog, as a summary.		
	Organize small group reading and discussion groups. Have each group develop a statement regarding safe flying and the use of drugs.	DRUGS Self-medication or taking medicine in any form when you are flying can be extremely hazardous. Even simple home or over-the-counter remedies and drugs such as aspirin, laxatives, tranquilizers and appetite suppressors, may seriously impair the judgment and coordination needed while flying. The safest rule is to take no medication while flying, except on the advice of your Aviation Medical Examiner. It should also be remembered that the condition for which the drug is required, may of itself be very hazardous to flying, even when the symptoms are suppressed by the drug. Certain specific drugs which have been associated with aircraft accidents in the recent past are: Antihistamines (widely prescribed for hayfever and other allergies);	Small groups will prepare written reports about flying and drugs.

Tranquilizers (prescribed for nervous conditions, hypertension, and other conditions);
Reducing drugs (amphetamines and other appetite suppressing drugs can produce adverse effect on well-being which have an adverse effect on judgment);
Barbiturates, nerve tonics or pills (prescribed for digestive and other disorders, barbiturates produce a marked suppression of mental alterness).

VERTIGO

The word itself is hard to define. To earth-bound individuals it usually means dizziness or swimming of the head. To a pilot it means, in simple terms, that he doesn't know which end is up. In fact, vertigo during flight can have fatal consequences.

On the ground we know which way is up by the combined use of three senses:
1. Vision -- We can see where we are in relation to fixed objects.
2. Pressure -- Gravitational pull on muscles and joints tells us which way is down.
3. Special Parts In Our Inner Ear -- The otoliths tell us which way is down by gravitational pull.

It should be noted that accelerations of the body are detected by the fluid in the semicircular canals of the inner ear, and this tells us when we change position. However, in the absence of a visual reference, such as flying into a cloud or overcast, the accelerations

can be confusing, especially since their forces can be misinterpreted as gravitational pulls on the muscles and otoliths. The result is often disorientation and vertigo (or dizziness).

All pilots should have an instructor pilot produce maneuvers which will produce the sensation of vertigo. Once experienced, later unanticipated incidents of vertigo can be overcome. Closing the eyes for a second or two may help, as will watching the flight instruments, believing them, and controlling the airplane in accordance with the information presented on the instruments. All pilots should obtain the minimum training recommended by the FAA for altitude control of aircraft solely by reference to the syroscopic instruments.

Pilots are susceptible to experiencing vertigo at night, and in any flight condition when outside visibility is reduced to the point that the horizon is obscured. An additional type of vertigo is known as flicker vertigo. Light, flickering at certain frequencies, from four to twenty times per second, can produce unpleasant and dangerous reactions in some persons. These reactions may include nausea, dizziness, unconsciousness or even reactions similar to an epileptic fit. In a single engine propeller airplane, heading into the sun, the propeller may cut the sun to give this flashing effect, particularly during landings when the engine is throttled back. These undesirable effects may be avoided by not staring directly through the prop for more than a moment, and by making frequent but small changes in RPM. The

flickering light traversing helicopter blades has been known to cause this difficulty, as has the bounce-back from rotating beacons on aircraft which have penetrated clouds. If the beacon is bothersome, shut it off during these periods.

Experiment:

Vertigo

Using an office-type swivel chair have one student sit in the chair. Use two students to turn the chair; speed is not important. Have seated student place head on shoulder during spinning. At command "stop" have student in chair attempt to focus eyes on moving object; ruler, watch, etc. Have all students carefully note what takes place. Use care that the student does not fall from chair. Students may also want to use the dropping yard stick to test the subject, or ask the subject to touch his nose with finger, or touch forefingers together when hands are held about a foot from his face. Ask the subject how he felt after the experiment.

Using a health chart of the ear, explain to students what has occurred during this experiment.

CARBON MONOXIDE

Carbon monoxide is a colorless, odorless, tasteless product of an internal combustion engine and is always present in exhaust fumes. Even minute quantities of carbon monoxide breathed over a long period of time, may lead to dire consequences.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

For biochemical reasons, carbon monoxide has a greater ability to combine with the hemoglobin of the blood than oxygen. Furthermore, once carbon monoxide is absorbed in the blood, it sticks "like glue" to the hemoglobin and actually prevents the oxygen from attaching to the hemoglobin.

Most heaters in light aircraft work on air flowing over the manifold. So if you have to use the heater, be wary if you smell exhaust fumes. The onset of symptoms is insidious with "blurred thinking", a possible feeling of uneasiness and subsequent dizziness.

Later, headache occurs. Immediately shut off the heater, open the air ventilators, descend to lower altitudes, and land at the nearest airfield. Consult an Aviation Medical Examiner. It may take several days to fully recover and clear the body of the carbon monoxide.

Have students describe the symptoms of carbon monoxide poisoning, how it can be prevented.

Introduce the subject of vision with the film "Eagle Eyed Pilot", FAA Film Catalog.

VISION

Have students read this next and look up terms they don't understand. Be prepared to discuss in class contents of this section.

On the ground, reduced or impaired vision can sometimes be dangerous depending on where you are and what you are doing. In flying it is always dangerous.

On the ground or in the air, a number of factors such as hypoxia, carbon monoxide, alcohol, drugs, fatiuge, or even bright sunlight can affect your vision. In the air these effects are critical.

Some good specific rules are: Make use of sunglasses on bright days to avoid eye fatigue; during night flights, use red covers on the flashlights to avoid destroying any dark adaptations; remember that drugs, alcohol, heavy smoking and the other factors mentioned above, have early effects on visual acuity.

MIDDLE EAR DISCOMFORT OR PAIN

Have students read and discuss factors that may result when ear discomfort or pain are present.

Certain persons (whether pilots or passengers) have difficulty balancing the air loads on the ear drum while descending. This is particularly troublesome if a head cold or throat inflammation keeps the eustachian tube from opening properly. If this trouble occurs during descent, try swallowing, yawning, or holding the nose and mouth shut, forcibly exhaling. If no relief occurs, climb back up a few thousand feet to relieve the pressure on the outer drum. Then descend again, using these measures. A more gradual descent may be tried, and it may be necessary to go through several climbs and descents to "stair-step" down. If a nasal inhaler is available, it may afford relief. If trouble persists several hours after landing, consult your Aviation Medical Examiner.

Note: If you find yourself airborne with a head cold, you may possibly avoid trouble by using an inhaler kept as part of the flight kit.

PANIC

The development of panic in inexperienced pilots is a process which can get into a vicious circle with itself and lead to unwise and precipitous actions. If lost, or in some other predicament, forcibly take stock of yourself, and do not allow panic to mushroom. Panic can be controlled. Remember, Prevent Panic to Think Straight. Fear is a normal protective reaction, and occurs in normal individuals. Fear progression to panic, is an abnormal development.

SCUBA DIVING

You may use your plane to fly to a sea resort or lake for a day's scuba diving, and then fly home, all within a few hours time. This can be dangerous, particularly if you have been diving to depths for any length of time.

Under the increased pressure of the water, excess nitrogen is absorbed into your system. If sufficient time has not lapsed prior to take-off for your system to rid itself of this excess gas, you may experience the bends at altitudes under 10,000 feet where most light planes fly.

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TEACHERS' GUIDE FOR AVIATION EDUCATION

CAREERS IN AVIATION

Grades Five-Six

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
800 INDEPENDENCE AVENUE S.W.
WASHINGTON, D.C. 20591

GRADES FIVE AND SIX

CAREERS IN AVIATION

RESOURCES AND MATERIALS

Aviation Careers Series:
"Career Pilots and Flight Engineers", GA-300-122
"Aviation Maintenance", GA-300-123
"Airport Careers", GA-300-124
"Aircraft Manufacturing Occupations", GA-300-125
"Airline Careers", GA-300-126
"Flight Attendants", GA-300-127
"Government Careers", GA-300-128
"Agricultural Aviation", GA-300-129
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

"The John Glenn Story"
Film Catalog
National Aeronautics and Space Administration
Washington, D. C.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

Teachers using this section of the handbook will find it useful in aerospace activities for fifth and sixth grade students. The unit is designed with objectives for the students and learning and instructional activities. This unit covers each of the following areas:

Airport Careers
Pilots and Flight Engineers
Airline Careers
Agricultural Aviation
Aviation Maintenance
Aircraft Manufacturing Occupations

Students in grades five and six, upon completion of this unit will be able to identify a minimum of five aerospace occupations and list a minimum of five required work skills for each when asked to write a descriptive paragraph of the job.

An airport can be a cleared grassy strip of level land or an elaborate complex of thousands of ground, runways, roadways, buildings, parking lots, equipment; and services with the number of employees equal to that of a small city. Several thousand of the nation's approximately 13,000 airports are attended (that is, they offer at least a minimum of daylight service) and they range in service from one providing just aviation gasoline and a coke vending machine to one offering thousands of items and by the airlines and operators of general aviation aircraft.

Students will list five aerospace occupations

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Airports may be privately owned by a single operator who carries on all the functions of the airport with or without assistants, or by a group of private investors. Or an airport may be owned or operated by a city, county, regional or inter-state governmental authority.		
Students will be able to identify from a list of 20 careers those that are airport careers with 100% accuracy.	Review with students the functions of an airport: .take-offs .landings .housing .fuel .food .sending freight/mail .receiving freight/mail .passenger service .recreational .business .military .training .air traffic control .aircraft maintenance Interest students in polling others to determine the knowledge level about airport activities. From this base of knowledge about airport functions, introduce students to airport workers.	Students are to engage in brainstorming type session to identify many purposes and/or functions of an airport. Students may start scrapbooks to collect pictures of various airport activities and functions, pictures should be captioned and classified by students. Students, under the direction of teacher, should develop a series of questions regarding the airport -- these questions are to be organized into a series for polling others (students and adults) to determine the level of knowledge people have about airports. Students will brainstorm types of workers to be found at the airport.	Development of career scrapbooks
	Assign students to complete the list by researching through the encyclopedia or other sources the types of workers employed at the airport.	Students will research and identify types of workers found at the airport. Under the direction of the teacher, students will verify their list, remove and/or add names of workers.	
Students will be able to list five functions performed by the airport director.	Students may associate the position of airport direction with something familiar such as the school principal -- someone who is in charge and has decision-making responsibilities. Start with school principal's position.	A small group of students may interview principal and report back to class on the types of responsibilities a school principal has.	Interview of school principal

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	"What does our school principal do?" "Can we make a list of the principal's responsibilities?" Record student responses, cue them to additional responsibilities they may not perceive. Introduce the airport manager as a person with somewhat similiar responsibilities. A good technique to use is to have two columns on the board, under principal list his responsibilities, in the second column under airport director list responsibilities for airport manager. Encourage students to compare lists.	Students will write letters to directors of large and small airports. Each letter selected for sending should contain specifically the kinds of information students or class expects. Students could include class list of brainstorming functions they think the airport manager performs; ask the manager to verify these as his/her responsibilities by return mail or telephone. Students should review business letter writing procedures, correct grammar, punctuation and spelling.	Letter writing skills Students will understand the concept of supervision and authority.
	AIRPORT DIRECTOR Airports are usually operated by a director or manager responsible either to the owners of the airport or to the local government authorities. The Airport Director has been described as a "mixture of aviation expert, real estate operator, construction engineer, electronics wizard, management genius, and politician." The director is involved in such activities as the following: 1. Making and enforcing airport rules and regulations. 2. Planning and supervising maintenance programs. 3. Negotiating leases with airport tenants, such as airport repair stations, terminal concessionaires, and airlines. 4. Surveying future needs of the airport and making recommendations. 5. Keeping records and making required reports. 6. Setting up the airport budget. 7. Promoting the use of the airport. 8. Training and supervising employees responsible to the Airport Director.	Students will answer questions either during class discussion, in small groups, or as individuals. Answers may be written or provided as an oral exercise. 1. Why is it necessary that someone make and enforce rules and regulations? Students should thoroughly understand what a rule and regulation is, what is meant by enforcement.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Depending upon the size of the airport, the director may or may not have one or more assistants such as an assistant director, engineer, controller, personnel officer, maintenance superintendent, and supporting office workers, such as secretaries, typists, and clerks.	2. Why is it important that someone plan and supervise maintenance programs? Students should know what is meant by supervise and maintenance. Try to use functions they are familiar with but may not recognize as supervision and maintenance. Principal - supervisor Janitorial and Repair Services - maintenance	
		3. How does an airport cover operating costs? How might it make money for operational programs and new programs? Why must someone or agencies be charged for services? What does the term "negotiating" mean? What is a lease? What is a tenant? Explain what a concessionaire is. Do you have them serving our school? What is a terminal? Use examples to cue students to answers to each of the above questions. Example: How many of you live in a rental house? In a sense you lease the house. What do you get under terms of the lease? house/apartment? water? gas? electricity?	Students will know how an airport is financially supported
		4. Why must someone survey future needs and make recommendations? What is a survey? What do we mean by future? What is a need? What is a recommendation?	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		Have students write answers to each question and site an example. The examples may be in terms of what the local community needs in terms of airport services. Encourage students to seek answers from people with aviation backgrounds.	
	5. Why is it a good idea to keep reports and make reports?		Students will have opportunities to learn various record keeping skills
		Explain what the term "keeping records" means. Have you ever kept records? What was their value? What is a report?	
	6. Explain why using a budget is important.		
		What is a budget? Does your family use a budget? Why?	
		Encourage students, if they receive an allowance or earn money, to plan the spending of their money by using a budget.	
	7. Is it important that someone promote the use of the airport?		
		What is meant by promote? How might you promote the use of the local airport? What things would be important to know about for using the airport?	
		Have students make up a promotion brochure; this would be a good group activity.	
		Have students plan radio and television commercials; present them to the class.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		8. Why would an airport conduct an employee training program? Can you think of a reason why employees need supervision? Students must first understand that skilled people work at airports; many secure jobs that require training. Students should explore the meaning of supervision. Students should model for the class good techniques to use in supervision; how to get people to work effectively in their jobs, such as: .Compliments, recognizing good work .Providing advise in a constructive way .Recognizing employees, greeting them by first name	
Students will accurately describe the working conditions of a large and small airport director by writing five descriptive sentences of his/her working conditions.	The director works in an office usually in the terminal building at the airport, has regular office hours except in times of emergencies, and may be required to travel to settle agreements with airline tenants or to confer with state and federal officials. If she or he operates a very small airport, this person may work long hours in the aircraft repair station, giving flying lessons, and making charter flights. In such cases, much of the time is spent outdoors. In many cases, the Airport Director is a part of the local government and would be involved in official meetings and community projects, especially those concerned with aviation.	Students, in brainstorming sessions, will list what they feel are the conditions under which an airport director works. Have students write letters to both small and large airport directors seeking additional information. Have students read "Airport Careers", Aviation Careers Series, Department of Transportation, Federal Aviation Administration, AGA-300, 800 Independence Avenue, S. W., Washington, D. C. 20591. Have students develop flyers advertising for airport directors. Have student write a letter of application, individually. Appoint a student screening committee and select best letters of application; have students review 8 factors that describe nature of work before screening letters. Require students to develop a list of criteria that they will use to screen applicants.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will identify from a list of twenty states the ten having the most opportunities to work as an airport director. Students will be able to trace progressive steps that lead to the position of director by developing a chart or diagram.	Unless the operator is a private owner and is self-employed, the job of an airport director is not an entry level job, but is open to those with experience and training. An Airport Director may progress by moving to an assistant director's job or director's job at a larger airport and/or may also move upward to a commissioner of airports or a state-level job concerned with state regulation of airports. Job opportunities are often involved in political activities and appointments frequently are made on that basis, especially if the job does not come under civil service regulations.	Students will study the following vocabulary: opportunities advancement entry level job experience training progress assistant director commissions political appointments civil service regulations Students, through class discussion, will evolve definitions of the above list. First, refer to dictionaries; second, have students orally express definitions in class discussion. Evolve appropriate definition associated with aviation. Students will develop progression line for becoming airport director. 1. Training - what, how much 2. Experiences - what, where 3. Assistant positions - doing what 4. Director	

GRADES FIVE AND SIX

AIRLINE CAREERS

RESOURCES AND MATERIALS

Aviation Careers Series:
"Airline Careers", GA-300-126
Department of Transportation
Federal Aviation Administration
AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

"Take the High Road"
National Career Information Center
of the American Personnel and Guidance
Center, and the National Aeronautics
and Space Administration
Washington, D. C. 20546

Airflight Occupations
San Diego City Schools
San Diego, California

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students in grades five and six will identify a minimum of five airline careers, describe the nature of the work, job entry requirements and the approximate beginning salary without error.	The teacher will introduce this career awareness unit by using the following list of careers other than pilots, co-pilots, flight engineers, flight attendants, and mechanics that are available through airlines and airports. Students will find this list of twenty-six careers interesting as well as informative regarding airline and airport operations. Flight Dispatcher Meteorologist Schedule Coordinator Station Manager or Agent Teletypist Reservation Agent Ticket Agent Ground Attendant Skycap Air Freight, Cargo Agent Passenger Service Agent Sales Representative District Sales Manager Ramp Service Person (Interior) Ramp Service Person (Exterior) Ramp Service Person (Cargo) Ramp Service Person (Fueler) Ramp Service Person (Driver) Food Service Employee Cabin Maintenance Mechanic	Students will develop a notebook for recording special types of information about airline careers. The notebook should be well organized for quick reference purposes. name of student notebook title (Careers I Know About..., etc.) list of airline careers glossary of terms salary chart Show the filmstrip and use cassette for "Take the High Road", National Career Information Center of the American Personnel and Guidance Association in cooperation with the National Aeronautics and Space Administration.	Identification of an array of air related careers. Development of notebook of careers

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Ramp Planner Auto Mechanic Engineer Airline Training (Instructor) Professional Airline Personnel Administrative Personnel	The notebook may contain additional data students feel will be helpful, they may collect pictures of occupations, file letters of information or application in the notebook.	Students will list data they feel is important and should be included in a notebook.
	Prior to starting this unit introduce students to the following vocabulary. This is a general or basic vocabulary common to each of the twenty-six careers. education achivement level skills personal characteristics salaries working conditions opportunities for advancement nature of the job requirements airline industry shift work high school diploma	Students will record basic vocabulary and write definitions in their career notebooks.	
	Students should be familiar with this basic working vocabulary prior to introduction to the individual airline careers.		
	Provide students with the names and addresses of airlines; have each write a business letter to the airline of their choice seeking the types of jobs available to them through airlines, requirements, working conditions, salary and where most of these jobs are available. Encourage good letter writing techniques, tell students future employers are interested in neatness, correct spelling and good grammar.		Each student will write a letter.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will identify from five job descriptions the one of the flight dispatcher.	Don't wait for answers to letters; continue with this career awareness unit.		
	Ask: What do you think a Flight Dispatcher does? Is this an important job?	Students will be prepared to compare information they get back from letters with that given to them in class through this unit.	
	Make sure students know the meaning of the word: dispatcher.		
	Introduce students to the following vocabulary before proceeding further: cooperation — operation cost flight plan — enroute destination — destination weather schedule — winds aloft maximum — alternate destinations payload — fuel required traffic flow — altitude go-between — aircraft characteristics	Students will start notebook section labeled "Flight Dispatcher". Students will include the following basic information under the headings of: Nature of Work Working Conditions Approximate Salary Opportunities for Advancement Job Entry Requirements	
	Have students read and be prepared to discuss: FLIGHT DISPATCHER Nature of Work In cooperation with the pilot, the Flight Dispatcher furnishes a flight plan that enables the aircraft to arrive at its destination on schedule with the maximum payload and the least operating cost. The Flight Dispatcher considers enroute and destination weather, winds aloft, and alternate destinations, fuel required, altitudes, and traffic flow. The Dispatcher's signature, along with that of the pilot, releases the aircraft for flight. He or she maintains constant watch on all flights dispatched and is the go-between for the pilot and ground service personnel.	Prior to class discussion small student groups may want to meet and discuss: What kind of a person would make a good Flight Dispatcher? Each group could develop a list from this question of personal characteristics for the job. Students will respond to these problems by making a decision as a Flight Dispatcher would. A cargo of cattle have been dispatched	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	She or he keeps all personnel concerned with the flight informed as to the status of the flight, and must be familiar with navigation facilities over airline routes and at airports and with take-off, cruising, and landing characteristics of all types of aircraft operated by the airline. Flight Dispatchers must also take periodic flights to observe flight routes, conditions, and airports, riding in the cockpit with the flight crew.	from New York to San Francisco, the plane has ample fuel aboard for the flight. The flight is to pass by Chicago on its way to the West Coast.	
		Problem: Heavy thunderstorms and winds surround the Chicago and Great Lakes area -- this will delay the flight to San Francisco; weather to the south appears normal, but will take a little longer. What do you advise?	Role playing of various people in occupations
	Review the term Working Conditions, then assign:	San Francisco has heavy rains and erratic winds. Sacramento weather is moderate rains, 15 mile per hour south winds. What do you advise?	
	Working Conditions	Students should consider a number of factors in making these decisions.	
	He or she works indoors at the airport in the airline operations office. She or he uses slide rules, weather charts and information, loading reports, and hand computers. A forty-hour week with shift work is normal. The Flight Dispatcher frequently works under pressure, especially when flying weather is bad. He or she must make many rapid decisions concerning safety, flight regulations, and the economy of operations. This employee is surrounded by teletype machines, telephones, and intercom systems in a noisy, busy atmosphere. If the Flight Dispatcher works for a small airline, she or he also carries on the duties of a meteorologist and schedule coordinator.	ground shipping arrangements clients' ground schedule feed and water for cattle safety above all else	
	Working Conditions will be read by the students. This would be a good small group's activity. Have each group develop a list of conditions. Have them rank their list in order of importance.	Encourage students to add to this list. Lists should be recorded in career notebooks.	
	Check students to verify that they comprehend these terms:		

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

slide rule
weather chart
loading report
hand computers
shift work
pressure
rapid decisions
meteorologist
schedule coordinator

Introduce: Wages

Wages

Wages are from $16,000 to $24,000 per year, depending upon the size of the airline.

Students are to compute salaries by:

month
week
day
hour

$\left(\frac{\$16,000}{12} = \text{or} \cdot \frac{24,000}{12}\right)$

Assign the following for reading:

Opportunities for Advancement

Flight dispatchers have moved up into this position from jobs as former dispatch clerks, junior flight dispatchers, radio operators, meteorologists, or station managers. Large airlines employ senior dispatchers who specialize in coordinating the economic factors of every flight. Promotion is from within. Experience as an airline dispatcher may be used in qualifying for a job as an air traffic controller with the Federal Aviation Administration or as an airport director.

Students to answer:

Why do people want job advancement? Compile a list of these reasons. Encourage all students to participate. Record information in student notebook.

Introduce:

Requirements to Enter the Job

A college degree with a major in air transportation or meteorology is acceptable preparation. One must have good vision, hearing, enunciation, and an FAA dispatcher's license. He or she must know thoroughly the Civil Air Regulations and airline operations based on years of experience in airline communications or meteorology.

Have small groups of students work together to compile requirements for getting a flight dispatcher job. Would any of the following be important?

personality
physical conditions
good reader
good listener
speaks well, clearly
likes geography
likes math

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Ask: Why do jobs have requirements? Do all jobs have the same requirements? How are many the same? How are many different?	What else?	
	What school subjects would help you get a job as flight dispatcher?	Make sure this information is recorded in the notebook.	
Student will describe two basic things that the meteorologist does to the satisfaction of the teacher.	Introduce the following vocabulary: weather analyzes reports operations office weather facsimile machines teletype weather charts meteorological data	Some students may want to establish a weather station; if so, have them keep records of: daily wind direction wind speed; fast, moderate, low daily weather conditions; cloudy, rain, snow	Development of a weather station
	Attempt to secure a weather report, teletype print-out and weather charts. Display these things on a portion of the bulletin board.	Students will listen to morning radio weather reports and decide if it's a good day to fly to: Memphis New York Miami Chicago Washington, D. C. San Francisco Los Angeles Kansas City Seattle	
	Assign the following for reading and discussion: METEOROLOGIST The Meteorologist analyzes weather data and prepares weather reports for the flight dispatcher, pilots, and other airline personnel concerned with weather information. The meteorologist assists the flight dispatcher in preparing flight plans.	Students will plan flight a day ahead of weather report; listen to report and decide if it's safe to make the flight.	
	Working Conditions The meteorologist works indoors at the airport in the airline operations office, uses weather facsimile machines, teletype machine, weather charts, and other meteorological data. Shift work is required and the normal work week consists of forty hours.	Students will compare working conditions and salary to flight dispatcher. They will note the likenesses and differences. Students will compute wages on a monthly, weekly, basis for both low and high salary. Students will compare job entry requirements with flight dispatcher and note any differences.	Describe advantages and disadvantages of Meteorologist's job.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Wages Wages are from $14,000 to $22,000 per year, depending upon the size of the airline.	Students will note any differences in this job as presented and the one they may receive from the airline in answer to their earlier letter.	
	Requirements for the Job A college degree with a major in meteorology is required. Meteorology training can be obtained with the military services, especially as a meteorological technician.		
Students will identify a minimum of five job responsibilities of the schedule coordinator.	Require students to read: SCHEDULE COORDINATOR Nature of the Work The Schedule Coordinator keeps track of the whereabouts of aircraft and crews; receives and relays reports of delays due to weather and mechanical problems; notifies all concerned regarding delays or changes; and gives orders for substitution of aircraft when required. He or she works with diversions of flights to alternate airports, weather factors affecting air traffic, seating arrangements of planes, turn-arounds, estimated time of arrival, and unscheduled stops. She or he also works out aircraft availability, taking into consideration servicing and maintenance requirements with time frequencies varying from 24 to 48,000 hours. The Schedule Coordinator handles crew scheduling considering sick calls, vacations, days off, used-up flight hours, "dead-heading", types of aircraft for which crew is trained, and seniority bids or choices of flights selected by crew members. All this work is in the interest of maintaining on-time, efficient service for passengers and shippers of air freight.	Students, having read "Nature of Work" for the schedule coordinator will list questions they have about this job. Students are to record vocabulary in their notebooks, they should now have a section entitled "Schedule Coordinator".	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Be sure students know the meaning of: receives and relays delays notifies substitution diversions alternate turn-arounds estimated time unscheduled stops "dead-heading"	Students will role play the role of schedule coordinator and respond to: bad weather report, pilot calls in sick, unscheduled stop must be made	Role playing of selected job.
	Have students read: Working Conditions The employee works indoors at the airport in the airline operations office. He or she is in a busy atmosphere, surrounded by banks of phones, teletype machines, computers, and charts, at times working under pressure. She or he works cooperatively with colleagues. A forty-hour work week, with shift work, is normal. Wages Annual wages are from $14,000 to $18,000, depending upon the size of the airline. Opportunities for Advancement The Schedule Coordinator starts as a clerk with responsibilities in one or two areas but may advance to assistant, senior, and then chief of schedule control. He or she may also work up to position in dispatcher's office as general dispatch clerk or an operators planner.	Have students add to the above list that which might create problems for the schedule coordinator. Students will answer in their notebooks (individual work) Why would you like/dislike these working conditions? Explain why the salary is good/poor for this job? Do you feel advancement opportunities are something you would like? Do you have any of the requirements for this job? Explain your answer. Students will discuss their answers in class -- encourage students to change answers if they feel differently after the class discussion.	Students will analyze working conditions

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

Requirements to Enter the Job

A college degree with a major in air transport operations is acceptable preparation.

Assign students to the reading of Station Manager or Agent.

Students are to record all vocabulary terms they do not know the definitions of; these words or terms are to be recorded in their notebooks.

Nature of the Work

The Station Manager or Agent is responsible for all flight and ground operations for the airline at a particular airport -- aircraft handling, passenger services, and air cargo operations. At a small station she or he may perform many of these services himself such as selling tickets, making public announcement, checking the baggage, moving portable stairs, preparing passenger and air cargo manifests, operating teletype machine, etc.

Students are to answer:

"How does this job pay compared to each of the others we have studied so far? How much? "

Flight Dispatcher?
Meteorologist?
Schedule Coordinator?

Students will make a table for thier notebooks.

Working Conditions

He or she works in an office at the airport, and may sometimes work outdoors depending upon the size of the airport and the staff. Shift work is required during a forty-hour week.

Station Manager	Flight Dispatcher	Meteor-ologist	Schedule Coordinator
$18,000	$16,000	$14,000	$14,000
	-2,000	-4,000	-4,000

Students are to write a short paper describing why they feel salaries are different.

Wages

Annual wages are from $18,000 to $30,000 depending upon the size of the airline.

How would you prepare yourself for this job?

The student will describe tasks that the teletypist must perform.

Student should know these terms:

teletypist
teletype machine
send/receiving
relaying
filing

Student will record terms for teletypist in his notebook and note definitions as related to this job.

Students will write a brief story about the teletypist using the five vocabulary words associated with the job. Story should include type of messages received and where they are sent, how they are filed.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Have students read and discuss teletypist.		
	Nature of Work The teletypist operates teletype machines, sending messages, receiving them, and relaying them to proper departments and to other stations on the airline's routes, and files messages as required.	What is an average salary for a teletypist by the month? $\frac{(\$7,000)}{12} =$	
	Working Conditions This employee works indoors at the airport in the airline's operations office or in other offices where teletype machines are used. Shift work is required during a forty-hour work week.		
	Wages Wages are from $7,000 to $11,000 per year, depending upon the size of the airline.		
	Opportunities for Advancement She or he may advance to a supervisory position.		
	Requirements to Enter the Job A high school graduate is preferred. Additional training in teletype operations and procedures at schools offering such courses is preferred. The minimum typing speed is 40 words per minute. The teletypist needs to know codes and symbols used in airline communications.		
Students will describe at least three tasks the reservation agent provides for potential passengers.	Have students read: RESERVATION AGENT Nature of the Work The Reservations Agent handles telephone inquiries about complex flight schedules,	Students will start notebook section for Reservation Agent. Have students identify vocabulary list for their notebooks; each definition should be accompanied by an example.	

fares, and connecting flights, and reserves seats and cargo space for customers. He or she operates computerized reservations equipment, keeps records of reservations, and must be able to recommend services which fit customer's requirements and be familiar with routes and schedules of other airlines.

Working Conditions

She or he works indoors at the airport in the airline operations office. Shift work is required during a forty-hour work week. Work is interesting as no two calls are the same and many challenges occur as the employee works out the passengers travel requirements.

Wages

Wages are from $822 to $1,124 per month, depending upon the size of the airline.

Have students compute salary for the year.

($822 x 12 =)

Opportunities for Advancement

He or she may advance to supervisor, monitoring employees' handling of inquiries, or to training positions. She or he may also be assigned to handle "executive accounts" or firms with special "vacation packages" offered by the airline -- jobs reserved for the more experienced and higher paid agents. The employee may transfer to a job of ticket agent. Reservations work is a principal route to a management position for the persistent worker, as turnover due to shift work, is high and promotion opportunities are frequently available.

Requirements to Enter the Job

Requirements include: high school graduation, 18 to 20 minimum years of age, with additional one or two year's training in airline operations at schools offering such courses, or experience in public telephone contact work preferred. Airlines offer on-the-job training. Accuracy and speed on the job are essential. A good telephone voice, English usage, and the ability to "project" oneself over the phone are necessary. Air cargo reservations agents may be required to have some experience in shipping operations.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Check and make sure students can explain meanings of: reservation inquiries complex schedules fares connecting flights requirements computerized recommend routes	Students will describe what is expected of a reservation agent when promoted to supervisor; they should tell how this is different from the reservation agent. Have students collect airline schedules and plan a cross country flight. Plans should include departure time, lay overs, arrival time.	
	Teach students to use airline schedules.		
Students will describe the role of a ticket agent in terms of what she or he does.	Have students first discuss what they think a ticket agent does. List these things on the chalkboard. Assign students to read: TICKET AGENT Nature of the Work The Ticket Agent answers inquiries about flight schedules and fares, verifies reservations by phone, figures fares, writes tickets, handles cash payments or credit card sales. The Ticket Agent may check in passenger's baggage, if the agent works at the air terminal ticket counter. She or he uses telephone and reservations computer equipment. Working Conditions He or she works at downtown or hotel airline ticket offices during business hours. Shift work is necessary, if employed at airport counters. The employee must wear a uniform.	Students will start a notebook section for Ticket Agent. Students will read Ticket Agent and compare chalkboard list to terms contained in narrative. Students will compare yearly salary for this position. Students will list advancement opportunities for this position.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

Wages

Wages are from $822 t .124 per month, plus additional pay fo ate shift work.

Opportunities for Advancement

She or he may advance to the job of passenger service agent or station agent, chief of the ticket office, or to a job on the instructional staff. He or she may also join the staff as Sales Representative. Superior employees are often considered for junior management training.

Requirements to Enter the Job

The minimum age varies from 18 to 20 years. Graduation from high school is a minimum requirement; however, two years of college is preferred, or the equivalent experience in dealing with the public. On-the-job trainin is offered. Good grooming, respect for accuracy, pleasant, courteous manner, and legible handwriting, are important. Foreign language ability may be required by an international airline.

At this point have students organize into small groups; each group is to identify requirements for job entrance in terms of education, age, exper nce, and the things they feel would be required. (English, math, geography, science) for each of these positions.

Flight Dispatcher
Meteorologist
Schedule Coordinator
Station Manager or Agent
Teletypist
Reservation Agent
Ticket Agent

Have each student write a brief report about the position they feel they would best qualify for when they leave school in terms of how well they are doing in school and things they like to do.

Students, when provided with job descriptions for ground attendant, skycap, air freight/cargo agent, passenger service agent, sales representative and district manage will correctly match the position to the description.

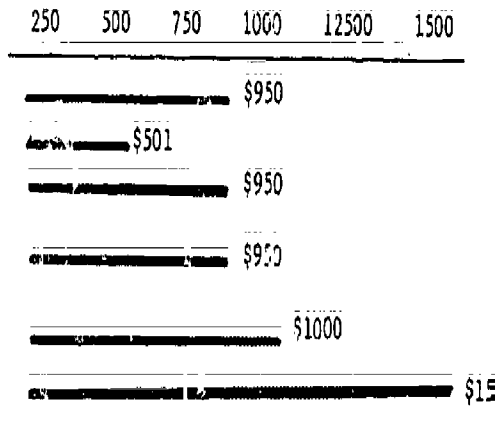
Prepare flashcards for the following titles:

ground attendant
skycap
air freight/cargo agent
passenger service agent
sales representative
district sales manager

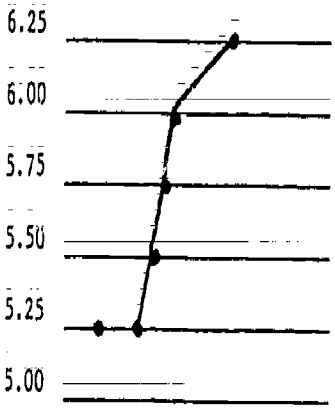
As the cards are flashed to students, require responses to all, some or one of the following:

Students will construct bar graph to compare monthly wages for each job position.

Example:



OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	spell the job title tell what this person does tell requirements for the job tell the basic salary where does the person work (airport, city office)? spell training for the job why are some jobs listed by monthly salary, by yearly salary?	Students will report on other ways airlines use charts to operate their business. Put name of the five positions on the board -- pass out to students, broken into groups, single copy of the positions. Do a class analysis. Compare the positions under each listed on the chalkboard by:	
Students with 100% accuracy will identify the duties and responsibilities of these ramp personnel. Interior of the aircraft Exterior of the aircraft Baggage and cargo handlers Aircraft fueler Driver	Prior to making assignments or carrying out instructional activities, review the following terms: ramp service person interior exterior baggage/cargo fuel	Nature of Work Working Conditions Wages Opportunities for Advancement Job Entrance Requirements	
	On the chalkboard under the headings of "Ramp Servicepersons" and subheadings of aircraft interior, aircraft exterior, baggage/cargo handlers, aircraft fueler, dirver, brainstorm with class as to what duties might be listed with each of these categories.	Students are to start a section for each of these positions in their notebooks and record vocabulary in the glossary.	
	Have students modify each list after reading: RAMP SERVICEPERSON, INTERIOR	Students will develop charts for each position that include education requirements, age, salary, experience.	
	Nature of the Work The Ramp Serviceperson (Interior of the Aircraft) cleans the cabins between trips. He or she vacuums the floor, picks up trash, washes lavatories and buffets, replaces headrests and pillow covers, folds blankets, refills seat packets, refills drinking water supply and cleans the cockpit windows.	Students will compute average daily, weekly, monthly and yearly salary for each position; use 8 hours for a day, 40 hours for a week, 20 days for a month. Students will develop a line graph comparing hourly salaries.	



Working Conditions

She or he works at a fast pace with cleaning equipment and supplies in cramped space with a team of workers. He or she must complete the job often within 10 or 15 minutes allowed before the plane must be ready to load passengers. This is shift work. Worker must wear a uniform.

Wages

Wages currently are $5.25 per hour, with extra pay for late afternoon and night shifts.

RAMP SERVICEPERSON, EXTERIOR

Nature of the Work

The Ramp Serviceperson (Exterior of the Aircraft) works on the exterior surfaces of the aircraft. He or she washes, polishes, touches up paint, and de-ices surfaces. She or he also works with chemicals to prevent corrosion of surfaces.

Working Conditions

He or she uses sponges, brushes, mops, and hoses. Employee works on scaffolding or in special lift equipment to reach high places. The worker usually works in a hangar but may sometimes be required to work outdoors. The heaviest work schedules occur during night hours when most aircraft are not in service. Shift work is required and work is done frequently under pressure of time. Worker must wear a uniform.

Wages

Wages currently are $5.25 per hour, with extra pay for late afternoon and night shifts.

RAMP SERVICEPERSON, BAGGAGE/CARGO

Nature of the Work

The Baggage and Air Cargo Handler loads and unloads baggage, air mail, air express, and air cargo shipments. He or she drives baggage tow-carts, operates conveyors, fork lifts, fork trucks, and other baggage and air freight handling equipment. She or he operates machinery to sort and route baggage and air cargo to and from various flights.

Working Conditions

Ramp Serviceperson works outdoors on noisy, crowded ramps, in all kinds of weather, and does much lifting and moving of baggage, mail sacks, and air express shipments and pushing and positioning of air cargo. Shift work is required and one must wear a uniform.

Wages

Wages start at $5.93 per hour and after six months could increase to up to $6.20 per hour.

RAMP SERVICEPERSON, AIRCRAFT FUELER

Nature of the Work

The Aircraft Fueler operates the fueling equipment. This employee may drive a fuel truck, filling the truck with aviation fuel and delivering it to the aircraft. The Aircraft Fueler operates fuel hose and pumps.

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Working Conditions

Employee works outdoors with potentially hazardous aviation gasoline and kerosene in all kinds of weather. Shift work is required and one must wear a uniform. Employee may be required to climb and walk on wings of aircraft to reach fuel tank openings. Aircraft fuelers must observe strict safety rules.

RAMP SERVICEPERSON, DRIVER

Nature of the Work

Includes drivers of food trucks, mobile stairs, employees' buses, messenger cars, conveyors, cleaning equipment, aircraft air conditioning and power carts, etc.

These employees drive equipment to the aircraft and operate machinery, loading and off-loading food containers, galley units, and other kinds of equipment. They attach and detach ground air conditioning and power carts, move stairs, or drive employees' buses between airline facilities at the airport. They are usually on a regular work schedule.

Working Conditions

They wear uniforms and shift work is required. They work outdoors on noisy ramps in all weather conditions. They must use extreme care in positioning equipment near aircraft.

Opportunities for Advancement - For Ramp Servicepersons

Depending upon the size of the airline and agreements with employees' unions, ramp servicepersons may become leaders and

Each student will write a letter to their local airlines seeking salaries for one of the five positions. Students will develop charts that list job as one of indoors, out-of-doors, shift work, dangerous, and special skills.

Students will include all information in their notebooks. Each student will write a brief report telling why each of these positions is important to comfort and safe travel.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

supervisors of crews in their own work areas -- fuelers, cleaners, baggage and air cargo handlers, etc. Or they may start at the lowest paying job such as cleaners, and work up to higher paying jobs, such as baggage handlers, drivers and aircraft fuelers. With experience at a variety of ramp service jobs, workers with administrative abilities may be promoted to the job of a ramp planner.

Requirements to Enter the Job - For Ramp Servicepersons

High school diploma is required, and a minimum age of 18 to 21 years. Employees who drive trucks, buses, fork trucks, towing tractors, and similar equipment must have a driver's license and often a chauffeur's license as well. Good physical health and strength are required for baggage and air cargo handlers. On-the-job training is given when new equipment is put into service or when better methods of accomplishing a job are developed.

Teach students how to footnote reference materials; encourage use of printed materials for their report.

The student will write a brief report that includes these characteristics of a cabin maintenance mechanic, food service employee and auto mechanic.

Assign students to read:

CABIN MAINTENANCE MECHANIC

Nature of the Work

The Cabin Maintenance Mechanic cleans and paints interiors of aircraft during periodic major overhaul; removes and installs carpets, seats, curtains, and bulkheads; and re-upholsters seats. He or she overhauls and cleans electrical equipment in cabins, such as lights, buffets, and coffeemakers.

Working Conditions

She or he works in hangar shops using sewing machines for stitching upholstery and curtains. Worker uses tools associated with upholstery, rug laying, installation of seats, electrical maintenance of cabin service equipment, and sheet metal work. He or she works under pressure of time. Shift work is necessary and uniforms may be required.

Wages

Wages start at $7.11 per hour and after eighteen months could go up to $7.64 per hour.

Opportunities for Advancement

Employee may advance to leader, assistant supervisor or cabin maintenance, and then to supervisor.

Requirements to Enter the Job

High school graduation is required. Work is often upholstery shops, sewing seat covers and curtains. Technical or vocational school training in the various mechanical skills is usually required. Worker may specialize in one kind of job.

FOOD SERVICE EMPLOYEES

Nature of the Work

The Food Service Employees prepare and cook food, following set recipes. They arrange silverware and dishes on serving trays and food items on serving dishes. They place food in either hot or refrigerated containers for pick up and delivery to the aircraft. They receive and clean soiled dishes.

Working Conditions

They work in a flight kitchen at the airport. Work must be completed according to flight

Students will determine how these jobs prevent accidents, provide comfort. Tell why they are important to airlines and passengers.

Notebooks should include a description of these jobs. Students will list all vocabulary they do not understand and write questions for things that are not clear to them.

Students will compare these jobs and classify them by salary, indoor-outdoor, skills needed.

Students should answer the question, "Where can you get skills to qualify for one of these jobs?"

schedules. The kitchen is a busy, noisy place. Shift work is required and uniforms must be worn.

Wages

Wages are from $3.93 per hour, plus extra pay for late afternoon and night shifts. For example: Food Service Porters start at $3.93 per hour, Food Service Assistants at $4.87 per hour, Entry Level Cooks at $5.82 and within 18 months could be increased to $6.13 per hour; and Bakers start at $5.59 per hour and after six months could be increased to $5.81 per hour.

Opportunities for Advancement

They may advance to position of pantry worker, steward chef, supervisor, chief chef, assistant buyer, or commissary chief, depending upon the type of beginning job.

Requirements to Enter the Job

High school graduation is required. Minimum age of 18 to 20 years. All workers must have health certificates and respect for cleanliness and good housekeeping procedures. Chefs and cooks must have previous experience in food preparation. On-the-job training is given for all other kitchen workers.

AUTO MECHANIC

Nature of the Work

The Auto Mechanic services and repairs ground service equipment, such as portable stairs, fuel and food trucks, towing tractors and employee buses.

Working Conditions

He or she works indoors in a garage or outdoors on the ramp, when required. She or he performs the duties usually associated with an auto mechanic. The normal work week is forty hours.

RAMP PLANNER

Nature of the Work

The Ramp Planner keeps track of arriving aircraft and dispatches service units -- cleaners, fuelers, baggage handlers, food service trucks, etc. They must know flight schedules.

Working Conditions

He or she works indoors at the airport. She or he uses charts, telephones, and teletype machines. Shift work is necessary. They work with a team of planners.

Wages

Wages are from $9,000 to $14,000 per year.

Opportunities for Advancement

Workers may advance to junior positions on the flight operations management staff or on the administration staff of an airport director.

Requirements to Enter the Job

High school diploma is required. Minimum age is 20 to 25 years. Experience as a ramp serviceperson is usually required. This is not an entrance level job.

Check students comprehension of vocabulary terms found in these three sections:

maintenance*
periodic
overhaul
under pressure
set recipes
flight schedules*
flight kitchen
portable
planner
dispatcher*

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OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will match from a mixed list of 10 skills each to the correct position of engineer and/or airline instructor.	*Words used prior to this section. Develop flashcards with the following skills listed on each. designing drawing reading blue prints or plans decorating equipment design maintain talk clearly plan lessons curriculum developer use training aids Flash these cards to students seeking correct response as to their definitions. Classify cards by positions: Airline Engineer Airline Instructor Have students read: AIRLINE ENGINEER Nature of the Work In line with the engineering specialty, the engineer works closely with aircraft manufacturers during the development of new models of airliners, to make sure the requirements of the airline are met to performance, cabin plan, interior decorations, extra equipment, etc. He or she also designs improvements to aircraft and to methods of servicing and overhauling them.	Students are to record these two positions in notebooks. Following drill, students are to record terms in sections of notebooks reserved for Airline Engineer and Airline Instructor.	

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

Working Conditions

She or he works mainly indoors in an office, but duties often take him or her to hangars and maintenance shops for consultations and inspections. Engineers may travel frequently to aircraft manufacturing plants for consultation. They may be required to live in the area where the aircraft are being constructed; then they would travel to the airline headquarters.

Wages

Starting wages are from $12,000 to $15,000 per year.

Opportunities for Advancement

He or she may be advanced to a job directing the work of junior engineers or might work up to a top job of Vice President for Engineering or Maintenance.

Requirements to Enter the Job

A college degree with a major in an engineering field related to air transportation is required. Previous experience and a graduate degree are preferred.

AIRLINE TRAINING (INSTRUCTORS)

Nature of the Work

An important factor in maintaining the airlines' excellent safety record is their considerable training effort. Several thousand people are employed to help keep the proficiency of flight crews and ground personnel engaged in direct contact with the airplane, powerplants, and flight techniques.

Students will compare two highest salaries to determine who earns the highest pay.

Airline Engineer	$21,500 each year
Airline Instructor	$2,500 x 12 = ? each year

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Typical training jobs are Ground School Instructor, Flight Attendant Instructor, and Flight Simulator/Duplicator Operator. The instructors direct the pre-service and in-service training programs of the airline. For example, they make certain that the pilots keep up their instrument flying proficiency rating. Flight simulators or duplicators must be supervised by an instructor. Educators are also employed as curriculum/program developers. Technical support is provided by crafts-workers who develop training aids for use by the instructors in the airlines' classrooms.		
	Wages Starting salaries are from about $900 to $2,500 per month, depending upon the task performed.		
	Opportunities for Advancement Instructors may become supervisors of instructors and may advance to executive positions in the training department.		
	Requirements to Enter the Job Instructors can qualify, in some instances, on the basis of two years of airline employment, plus supervised teaching experiences in a specialty. Those who instruct by means of a simulated training device are required to understand how to maintain and repair the device used. Orally discuss value of each of the jobs to the people using airlines.		Students will select three jobs they are interested in and write the advantages and disadvantages of each.
Students will identify from a list of jobs those that classify as administrative personnel and those as professional airline personnel.	Have students read: ADMINISTRATIVE PERSONNEL In addition to the jobs described in the foregoing, airlines employ thousands of receptionists, typists, secretaries, stenographers, mail and file clerks, and computer personnel, as well as people in managerial	Students will record in notebooks positions under Administrative Personnel and Professional Airline Personnel. Students will list names of people they know who do similar jobs found under Professional Airline Personnel: like teachers.	

positions such as training, public relations, publications, finance, personnel, and other kinds of work associated with business and industry. Salaries paid are generally above the average paid by industry and business.

Then assign them to make a list of employers under this classification, at least seven.

GRADES FIVE AND SIX

AGRICULTURAL AVIATION CAREERS

RESOURCES AND MATERIALS

"Agricultural Aviation," GA-300-129
Department of Transportation
Federal Aviation Administration, AGA-300
800 Independence Avenue, S. W.
Washington, D. C. 20591

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will describe the importance of agricultural aviation to the farming industry of the United States in terms of saving time, money and overcoming adverse insects and weather conditions.			Students will know the importance of aviation to agriculture and list five advantages of using airplanes in agriculture.
Students will identify from a list of ten career tasks, five that directly relate to the agriculture pilot.	Students need to be introduced to special terms associated with agriculture aviation. agriculture herbicides insecticides aerial surveys retardant solo obstacles toil-wheel aircraft operator defoliants	Students will collect pictures of farming operations that relate to the introductory vocabulary list. Emphasis should be on agricultural aviation activities. Students are to caption pictures using the vocabulary list.	
	Assign students to small reading teams, have them read: Nature of the Work.	NATURE OF THE WORK The agricultural pilot flies, specially designed aircraft (including helicopters) to apply herbicides, insecticides, seeds and fertilizers on crops, orchards, forests, fields and swamps. He or she may also make aerial surveys of cattle and crops or fight forest fires by dumping fire retardant materials. The agricultural pilot usually flies solo, accurately	Participation in reading teams

dispensing materials with a fully loaded aircraft approximately three to five feet off the ground, zooming in on a field close to farm buildings, with trees and electrical lines as obstacles in his path and landing aircraft heavily loaded.

Agricultural aviation requires good flying ability in a tail-wheel type aircraft the type most used by the agricultural aviation industry. This type of flying can be rough work with long hours and seasons lasting from about a five-month period to all year. This is not a "nine-to-five" type of job.

One agricultural operator (Belle Glade, Florida) operates seven days a week, twelve months a year. He explains that he operates in an area of Florida which readily breeds a number of pests that are detrimental to the vegetables grown there. "Down here, when something has to be sprayed, it must be done immediately. Hours can be critical. We have a unique situation with very high stresses on our vegetable crops from a disease point of view." He does what he calls "conventional type agricultural work" on winter vegetables throughout the everglades area beginning in August and running through the following June. His second business area is mosquito work which begins in April and runs through December. In this field, there is no slack period.

Another agricultural operator, in Arvin, California, indicates: "I run five aircraft (450 h.p. Stearmans) and my business provides service to approximately 100,000 acres of California farmland each year. The main work centers on cotton, potatoes, carrots, tomatoes, onions, and

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES

garlic. Like most operators in my area, I seed and fertilize as well as apply insecticides, herbicides and defoliants. I also run a couple of ground rigs for some herbicide work in early winter and spring on cotton and potatoes. I guess you could call me an average size California operator."

A Colorado agricultural operation logs 500 to 600 flying hours annually and covers anywhere from 50,000 to 125,000 acres per year. Jobs range from little four to five acre patches to one-mile square fields.

An agricultural aviation operation in Georgia starts fertilizing and applying herbicides early in the spring and works steadily until the first frost defoliating cotton. Most of his work is of a preventive nature done on a regular schedule of every five days on cotton and every ten to fourteen days on peanuts.

Another agricultural operator points out that the success of his business is, in large measure, attributed to the diversified farming done in his area (East Prairie, Missouri). His flying starts in mid-February and continues as late as Thanksgiving, seeding wheat. In addition to wheat, he services cotton, sorghum, corn, alfalfa, and beans.

Students are to participate in small reading teams. Their task is to make a list of questions about things they did not understand in the narrative given them; make a group report about the things agricultural pilots do and conclude with why they feel this is to be valuable to all people.

Students will identify these as aviation agricultural tasks:

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		flying specially designed aircraft, low level flying, surveying livestock and crops, fighting forest fires, apply special chemicals from the air, planting crops from the air or make a VTR of agricultural flying in a local area	
	Upon completion of the reading assignment, let students use the narrative material for reference. Ask them to define these terms during class discussion: low level regular pattern obstacles still air take-offs seasonal southern areas northern areas operator application favorable locations poisonous liquids toxic materials exposure indigestion applicator novice		
	Assign students to write a short story about the agricultural pilot. Ask them to write a story in first person narrative. Encourage the use of descriptive and colorful words. Have students contribute to list of words on the board before starting. Example: roar of the engine zoomed over the trees banked tightly climbed steeply held the plane steady or level	Students will write first person stories about flying and working as an agricultrual pilot. Students working in groups will screen their stories and select the best for display on the bulletin board. Criteria for selection: interesting, well written, accurate regarding pilot's tasks	Creative writing Students will develop narrative stories of agricultural pilots

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
Students will be able to list three factors that are indicators of a promising future for agriculture aviation.	Introduce students to these concepts. trends predictions forecasting In explaining how these terms are used by people to look at the future, relate to those things students are familiar with such as: physical growth rates increasing school population decreasing school population smaller automobiles increasing gas mileage	Student will site data from: OUTLOOK FOR THE FUTURE According to production experts, the cost of food would be two or three times higher without the use of pesticides. W. C. Shaw of the U.S. Department of Agriculture indicates that if pesticides use was withdrawn "instead of spending 17 percent of family income on food, we would be forced to devote 30 to 40 percent of our income, and perhaps even more, to provide current food needs." Dr. Fred Whittemore of the Environmental Protection Agency stated: "Pesticides are going to be required for more crops and most purposes in the foreseeable future. There is no economically possible substitute for them in many instances. And they are required as long as you and I are around. But we've got to use them in such a manner that we will not cause adverse environmental effects." In July of 1974, F. Farrell Higbee, Executive Director of the National Agricultural Aviation Association, indicated that "many operations report a 250 percent increase in dollar volume. This is partly due to inflation, scarcity, and other increased operating costs. But with over 40 million new acres in production, it is no wonder we are seeing rapid growth." About 5,000 agricultural aircraft logged 1,038,570 flight hours in 1967 seeding, sowing, dusting, or spraying one acre out of every six under cultivation. The hourly figure had risen to 1,869,000 by 1973.	Students will study trends and make predictions

Many agricultural aviation operators now have from $20,000 to $75,000 invested in each aircraft. They need pilots who can handle agricultural aircraft. A national survey of the industry showed a need of over 400 new agricultural pilots yearly. Currently, finding professional agricultural pilots is a problem, particularly for a small operator. It will be a bigger problem in the future because many agricultural pilots have been military-trained pilots from the World War II era and they are retiring.

Agricultural aviation has a great future. Each year more farmers are realizing that the agricultural aircraft can do the job more quickly, just as effectively, and at less cost than they can with their own ground rigs. This is especially true when they consider the initial cost and maintenance of equipment which has limited use.

Among the factors spurring on increase in aerial application are:

1. A diminishing supply of farm labor.
2. Farms are getting bigger and few farmers have all their land in one place. They own a block of land here and rent an acreage there. That fact makes it hard to cover crops efficiently with group equipment.
3. Better aircraft and better pilots are producing better results than in past years.
4. Effective crop protection materials have been developed that were unheard of several years ago. For example, "benlate" (benomyl fungicide) has been the biggest peanut yield booster ever developed. It just about eliminates leafspot, a foliage disease that has plagued peanut growers for years.

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OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
		A career in agricultural aviation is available to young pilots who have the initiative to take advantage of the situation. The opportunity is present to grow as a pilot and a business person in an industry that is a cornerstone of an efficient and effective U.S. agriculture.	
		Example: Agricultural aviation is a growing industry as 400 new pilots are trained every year for this purpose. If the trend continues for ten years some 4,000 pilots will be flying agricultural planes. As older pilots retire from flying, agricultural airplanes it can be predicted that new pilots must be trained for this purpose.	Students will list advantages and disadvantages of being an agricultural pilot.
		If aviation flying hours continue to grow every six years at a rate of 830,430 it can be forecast that six years from now the hours will raise from a rate of 1,869,000 to 2,699,430 hours.	
		By studying: Outlook for the Future and General Information have each student make one trend statement, one prediction and one projection. Students will support each with data from provided materials.	
		GENERAL INFORMATION	
		American agriculture is the most productive in the world. It has reached a productivity level where one farm worker is producing food for 54 other persons. While comprising only five percent of the total population, farmers produce enough food for all Americans and many people in other countries as well.	

Agricultural aviation started in 1911 in Germany and was first practiced in the United States in 1921. In 1941 the Entomological Society of America listed 11 airplane dusting and spraying companies in the United States. In 194[illegible], 48 companies were listed. In 1947, 306 businesses were operating airplane and autogiro dusting and spraying services in 32 states and the District of Columbia. In 1974, the number of agricultural operators in the U.S. had grown to 3,300.

In the U.S. there are now more than 25,000 people employed in the agricultural flying industry, which operates 8,000 aircraft. Agricultural operators fertilize and apply pesticides to more than 150 cultural million acres of farmland each year. Ninety percent of the U.S. rice crop is seeded by air. For example, in some southern areas the major crop is rice, a crop that is almost totally dependent on agricultural aviation for its production. Rice cultivation requires several applications by agricultural aircraft. Not only are planes used to plant the crop, but they also are used to fertilize and to apply herbicides. In addition, two or three insecticide applications must be made, depending on whatever insect problems develop.

Agricultural aviation is an indispensable tool in farming operations, covering more and more acreage effectively and at lower cost. It provides seeding, fertilizing, fungicide, herbicide, and insecticide functions to help the farmer. The flexibility of aerial application includes coverage of rugged terrain at an affordable price, reclaiming grazing land from sagebrush, and avoiding grain shatter and soil compaction losses. Aerial application can

accomplish more in one hour than a tractor can in a day, while consuming one-third the fuel. It is more efficient because it provides greater penetration and coverage while requiring less chemical per acre. It provides service when fields are too wet and crops too large for ground equipment to function. When flown by a careful and experienced pilot, the mechanical distribution of the material and the plant coverage are excelled by no other machine.

Women play an important role in this industry. Women in agricultural aviation participate in everything from flying to operating radios, to teaching courses in agricultural aviation, and to public relations activities.

The agricultural aviation industry has grown swiftly. Special aircraft and equipment have been built just for aerial application. The agricultural operator can easily have $300,000 tied up in an operation.

Chemicals have been produced in such varieties and numbers that the operator has to be an agricultural expert just to know how to use each one correctly.

For many years there was little cooperation between one aerial application company and another. The competition was keen and often not of the highest order. Soon state associations were formed to bring professionals into the industry and then, on a national level, the National Agricultural Aviation Association (NAAA) was formed. Today, the NAAA represents all agricultural aviation operators and all agricultural pilots.

The Federal Aviation Administration (Aviation Toxicology Laboratory of the Civil Aeromedical Institute, Oklahoma City, Oklahoma) provides emergency advice to agricultural aviators concerning pesticide poisoning, diagnosis and treatment.

During a ten-year period from the early 1960s to the early 1970s, use of persistent insecticides in the malaria eradication program in India reduced the number of deaths each year from malaria from 750,000 to 1,500. In Ceylon a similar program reduced the death figure from 2.8 million in 1946 to 110 in 1961.

Some years ago, a German author wrote a book on crop protection and said that the annual world crop loss due to insect pests and diseased wheat totaled $70,347,000,000 or 33.8 percent of the total value of the crop. Agricultural aviation is a tool to help reduce such losses. Control of pests for a viable agriculture and the environment is mandatory. Both for the present and the foreseeable future, pesticides properly managed and used for this purpose are essential.

World-wide, during recent years the number of agricultural aircraft increased to 21,000, treating an area of 372 million acres annually. In most countries in the western world and the communist world, agricultural and forestry aviation have become a national practice.

OBJECTIVES	INSTRUCTIONAL PROCEDURES	STUDENT ACTIVITIES	OUTCOMES
	Share trends, predictions and forecasts by dittoing into a classroom booklet. You may want to title the book something like this: Window on the Future Instruct students on how to write a business letter. Provide list of agencies for students to write to: 1. McCarty Flying Service, Inc. P. O. Box 2492 West Helena, Arkansas 72390 2. California Agricultural Aeronautics, Inc. P. O. Box 749 Hanford, California 93230 3. Emery Aviation Route 4 Box 173 Greeley, Colorado 80631 4. B & M Flyers, Inc. Box 395AA, RD #4 Dover, Delaware 19901 5. Indian River Flying Service P. O. Box 772 Vero Beach, Florida 32960 6. Ayres Ag Pilot Training P. O. Box 3090 Albany, Georgia 31706 7. Commander Air Service P. O. Box 3090 Albany, Georgia 30706 8. Glynnaire Aviation, Inc. P. O. Box 177 Stateesboro, Georgia 30458	Students should emphasize how the world populations will benefit from these trends, predictions and forecasts. Students will write business letters to selected agricultural aviation agencies.	Formulation of questions for flying agencies

9. Idaho Falls Aviation, Inc.
Red Baron Flying Service
P. O. Box 497
Idaho Falls, Odaho 83401

10. Solomon Valley Air Service
Hill City, Kansas 67642

11. Mayfield Skyways
P. O. Box 199
Mayfield, Kentucky 42066

12. Opelousas Flying Service of
Louisiana, Inc.
P. O. Box 83
Opelousas, Louisiana 70570

13. Flight Training Center, Inc.
10100 Flying Cloud Drive
Eden Prairie, Minnesota 55343
(Rotorcraft)

14. Lake Line Helicopters, Inc.
13601 Pioneer Trail
Eden Prairie, Minnesota 55343
(Rotorcraft)

15. Merigold Flying Service
School of Aeronautics
P. O. Box 307
Merigold, Mississippi 38759

16. Crown Executive Aviation
Crown International
Box 19090
Eppley Airfield
Omaha, Nebraska 68119
(Rotorcraft)

17. Don Bair Flying School
Box 214
York Airport
York, Nebraska 68467

18. Don Bair Flying School
Municipal Airport
Aurora, Nebraska 68818

19. Ronson Aviation
Ronson Helicopters, Inc.
Mercer County Airport
Trenton, New Jersey 08628
(Rotorcraft)

20. Jamestown Aviation, Inc.
Municipal Airport
Box 1128
Jamestown, North Dakota 58401

21. Allied Helicopter Service, Inc.
Tulsa Downtown Airpark
P. O. Box 6216
Tulsa, Oklahoma 74106
(Rotorcraft)

22. Spartan School of Aeronautics
Route 5
Riverside Airport
Tulsa, Oklahoma 74132
(Rotorcraft)

23. Corvallis Aero Service
P. O. Box 606
Corvallis, Oregon 57330

24. Agrotors, Inc.
Box 578
Gettysburg, Pennsylvania 17325

25. Battig Aviation, Inc.
RR #2
Brookings, South Dakota 57006

26. North Carolina Helicopters, Inc.
P. O. Box 636
Saluda, South Carolina 29138
(Rotorcraft)

27. Zimmer Aviation
Municipal Airport
Brookings, South Dakota 27006

28. Airway Enterprises
Flying Incorporated
1110 99th Avenue
San Antonio, Texas 78214

29. Benger Air Park
P. O. Box 326
Benger Air Park
Eriona, Texas 70935

30. Hargus Aviation, Inc.
P. O. Box 730
Pecos County Airport
Ft. Stockton, Texas 79735

31. Muleshoe Flying Service, Inc.
Box 526
Muleshoe, Texas 79347

32. Slaton Flying Service
Plains Helicopter, Inc.
P. O. Box 487
Slaton, Texas 79364
(Airplanes and Rotorcraft)

33. Colonial Helicopters, Inc.
310 W. Indian River Road
Norfolk, Virginia 23523
(Rotorcraft)

34. Alpine Helicopters, Inc.
17235 Cedar Grove Road
Maple Valley, Washington 98038

35. Cascade Helicopters, Inc.
407 N. Division
P. O. Box 354
Cashmere, Washington 98815
(Rotorcraft)

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