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ABSTRACT

This guide for aviation technician training begins with a course description, resource information, and a course outline. Tasks/competencies are categorized into 16 concept/duty areas: understanding technical symbols and abbreviations; understanding mathematical terms, symbols, and formulas; computing decimals; computing fractions; computing ratio and proportions; understanding how to extract square root; understanding how to compute powers of 10; using conversion tables; understanding physics terms, symbols, and formulas; understanding the densities of various solids, liquids, and gases; understanding the aircraft weighting procedure and computation of aircraft weight and balance; understanding the application of Newton's laws of motion; understanding the relationship between heat and energy, the concept of heat transference, and the four common temperature scales; understanding how Pascal's laws, Bernoulli's principle, and Boyle's law apply to aviation mechanics; understanding the fundamentals of reading and preparing technical publications and drawings; and understanding the causes and effects of corrosion. Three to 10 tasks are listed for each concept/duty. A performance objective, criterion-referenced measure, and enabling objective are provided for each task/competency. At the end of each concept/duty category, resources are listed by task. (YLB)

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Aviation Technician

Task Analysis
Year I Semester I

CE057550

AVIATION TECHNICIAN TRAINING I

TASK ANALYSES

Semester II

Prepared by

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In cooperation with

Virginia Vocational Curriculum and Resource Center

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PREFACE

The task analyses for Aviation Pilot Training I and II and Aviation Technician I and the flight syllabus were prepared by Colonel Richard Upchurch, USMC (Retired), Aviation Programs Supervisor for Henrico County Public Schools.

The curriculum will be field tested in the aviation programs at the Highland Springs Technical Center during the 1990-91 school year.

The guides were prepared for publication by the Virginia Vocational Curriculum and Resource Center, Vocational and Community Education, Henrico County Public Schools.

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COURSE DESCRIPTION AND RESOURCE INFORMATION

Course Description: **Aviation Technician Training I (Semester II)**

This course is the second level of the Aviation Mechanics curriculum. Students concentrate on the technical portion of aviation mechanics. The material includes the metric system, applied aviation mathematics, basic aviation physics, technical abbreviations, interpretation of technical drawings and publications, and advanced problems in weight and balance. The course is taught as a two-hour block at the Highland Springs Technical Center and is independent of the Aviation Pilot Training curriculum.

Resources:

Texts:

Applied Science for the Aviation Technician. Casper, Wyoming: IAP, Inc., 1989.

Aviation Fundamentals. 2nd ed. Englewood, Colorado: Jeppesen Sanderson, 1989.

Crane, Dale, ed. *ASA Aviation Mechanic Handbook.* 2nd ed. Seattle, Washington: ASA Publications, 1989.

Audiovisuals:

Jeppesen Sanderson transparencies and videotapes may be ordered from

Jeppesen Sanderson, Inc.
Englewood, Colorado.

Federal Aviation Administration films and videotapes may be acquired through

Virginia Department of Aviation
Virginia Aviation Museum
Richmond International Airport.

IAP videotapes may be ordered from

IAP, Inc.
Casper, Wyoming.

COURSE DESCRIPTION AND RESOURCE INFORMATION

(continued)

Resources (continued):

Equipment and Material:

- Periodic Table of the Elements
- Lycoming Cessna 150 aircraft engine on stand
- Static aircraft: Beech "Sundowner" (nonflyable)
- Civilian and military aircraft parts, instruments, and controls acquired from civilian and federal aircraft salvage units
- Civilian and military aircraft located at air transportation facilities in the Richmond metropolitan area

COURSE OUTLINE

Aviation Technician Training I (Semester II)

CONTENT	TASK NUMBER
I. TECHNICAL SYMBOLS AND ABBREVIATIONS	
A. Metric symbols and abbreviations	1.1
B. Electricity/electronics symbols and abbreviations	1.2
C. Phonetics and Morse Code	1.3
D. Aircraft systems symbols and abbreviations	1.4
E. Aircraft performance symbols and abbreviations	1.5
F. Radio symbols and abbreviations	1.6
G. Chemical elements symbols and abbreviations	1.7
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F. Division	4.7

COURSE OUTLINE (continued)

CONTENT	TASK NUMBER
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E. Thirteen common formulas	9.5

COURSE OUTLINE (continued)

CONTENT	TASK NUMBER
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COURSE OUTLINE (continued)

CONTENT	TASK NUMBER
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CONCEPT/DUTY AREAS

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS
2. UNDERSTANDING MATHEMATICAL TERMS, SYMBOLS, AND FORMULAS
3. COMPUTING DECIMALS
4. COMPUTING FRACTIONS
5. COMPUTING RATIO AND PROPORTIONS
6. UNDERSTANDING HOW TO EXTRACT SQUARE ROOT
7. UNDERSTANDING HOW TO COMPUTE POWERS OF 10
8. USING CONVERSION TABLES
9. UNDERSTANDING PHYSICS TERMS, SYMBOLS, AND FORMULAS
10. UNDERSTANDING THE DENSITIES OF VARIOUS SOLIDS, LIQUIDS, AND GASES
11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE
12. UNDERSTANDING APPLICATION OF NEWTON' THREE LAWS OF MOTION
13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES
14. UNDERSTANDING HOW PASCAL'S LAWS, BERNOULLI'S PRINCIPLE, AND BOYLE'S LAW APPLY TO AVIATION MECHANICS
15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS
16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

TASKS/COMPETENCIES

1.1 Explain metric symbols and abbreviations.

1.2 Explain symbols and abbreviations associated with electricity/electronics.

1.3 Explain the phonetics and Morse code for the alphabet.

1.4 Explain symbols and abbreviations associated with aircraft systems.

1.5 Explain the symbols and abbreviations for aircraft performance.

1.6 Explain the symbols and abbreviations for radio communications.

1.7 Explain the symbols for the chemical elements associated with aircraft mechanics.

1.8 Explain the abbreviations associated with the Federal Aviation Regulations (FARs).

1.9 Identify color codes used to designate fluids in the servicing and assembly of aircraft.

1.10 Explain the symbols of lines and materials used for technical drawings in aircraft mechanics.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.1 Explain metric symbols and abbreviations.

PERFORMANCE OBJECTIVE

P1.1 Given 20 abbreviations for metric measures, explain with 75% accuracy what each means.

CRITERION-REFERENCED MEASURE

C1.1 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use CROSSWORD MAGIC (Appleworks) program to create crossword puzzles with metric terms as answers.

2. Have students work in pairs and practice using metric terms and abbreviations.

3. Have students provide one common English word that has a metric reference, e.g., cent, decade, century, kilowatt, etc.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.2 Explain symbols and abbreviations associated with electricity/electronics.

PERFORMANCE OBJECTIVE

P1.2 Given 20 symbols and abbreviations associated with electricity and electronics, explain with 75% accuracy what each means.

CRITERION-REFERENCED MEASURE

C1.2 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Have students review electronics and electricity diagrams and interpret the symbols and abbreviations used in them.

2. Use IAP videos *Units of Electrical Measurement* and *Basic Electricity* to explain fundamentals of electricity.

3. Review the metric system and electricity and electronics abbreviations. Require class to use them in all related homework, class papers, board work, etc.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.3 Explain the phonetics and Morse code for the alphabet.

PERFORMANCE OBJECTIVE

P1.3 Given the alphabet, provide with 75% accuracy the phonetic word and Morse code for each letter.

CRITERION-REFERENCED MEASURE

C1.3 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Have students listen to FAA tapes of Morse code and practice writing the appropriate letters.

2. Have students practice spelling their names and addresses using the phonetic alphabet and Morse code.

3. Have students listen to taped code identification for radio navigation aids and practice writing the appropriate letters.

4. Review abbreviations for the metric system, electronics, and electricity. Use the abbreviations whenever the opportunity arises.

5. Have students write brief messages from one aircraft to another using the Morse code.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.4 Explain symbols and abbreviations associated with aircraft systems.

PERFORMANCE OBJECTIVE

P1.4 Given 20 symbols and abbreviations for aircraft systems, explain with 75% accuracy what each means.

CRITERION-REFERENCED MEASURE

C1.4 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Divide class into pairs. Give one member of each pair a list of symbols and abbreviations dealing with aircraft systems, including the engine, propeller, fuel, hydraulics, landing gear, controls, avionics, and ignition. Give the other member of the pair all the meanings. Have students quiz each other by matching abbreviation with the correct system. (Examples: CWS = control wheel steering; TDC = top dead center; AFCS = automatic flight control system.)

2. Continue to use and have students use abbreviations and symbols learned to date, include those for the metric system, electricity/electronics, Morse code, and phonetics.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.5 Explain the symbols and abbreviations for aircraft performance.

PERFORMANCE OBJECTIVE

P1.5 Given 25 symbols and abbreviations for aircraft performance, provide with 75% accuracy the meaning of each.

CRITERION-REFERENCED MEASURE

C1.5 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. List several aircraft instruments on the board or use overhead projector. Have students provide the abbreviation or symbol associated with each instrument. (Examples: CHT = cylinder head temperature gauge; RPM = revolutions per minute.)

2. List symbols or abbreviations for aircraft performance other than those associated with instruments. Have students provide the meanings. (Examples: RPS = rotations per second; CTM = centrifugal twisting moment; MSL = mean sea level; STOL = short takeoff and landing.)

3. Continue to use all abbreviations, symbols, and codes learned to date whenever possible.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.6 Explain the symbols and abbreviations for radio communications.

PERFORMANCE OBJECTIVE

P1.6 Given 20 symbols and abbreviations for radio communications, provide with 75% accuracy the meaning of each.

CRITERION-REFERENCED MEASURE

C1.6 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector or list on the chalkboard several abbreviations and symbols associated with aircraft radio navigation and communications. Have students match the abbreviation or symbol with the proper meaning. (Examples: FM = frequency modulation; VHF = very high frequency; TACAN = tactical air navigation; ELT = emergency locator transmitter; FCC = Federal Communications Commission.)

2. Continue to use all abbreviations, symbols and codes learned to date.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.7 Explain the symbols for the chemical elements associated with aircraft mechanics.

PERFORMANCE OBJECTIVE

P1.7 Given a list of 50 elements commonly associated with aircraft mechanics, provide with 75% accuracy the chemical symbol for each.

CRITERION-REFERENCED MEASURE

C1.7 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Review the Periodic Table of the Elements. Have students practice saying and writing the symbols for the elements, especially those used in aircraft mechanics.

2. Continue to use all abbreviations, symbols, and codes learned to date as often as possible.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.8 Explain the abbreviations associated with the Federal Aviation Regulations (FARs).

PERFORMANCE OBJECTIVE

P1.8 Given 20 abbreviations associated with the Federal Aviation Regulations (FARs), explain with 75% accuracy the meaning of each abbreviation.

CRITERION-REFERENCED MEASURE

C1.8 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the Federal Aviation Regulations supplement to the Jeppesen Sanderson text, and review with students the FARs, noting the abbreviations and their meanings.

2. Provide a short story concerning a routine maintenance task on an aircraft, and use 50 abbreviations and symbols in the story. Have students write out the meaning of each symbol or abbreviation.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.9 Identify color codes used to designate fluids in the servicing and assembly of aircraft.

PERFORMANCE OBJECTIVE

P1.9 Given a list of 15 fluids used in an aircraft, provide with 75% accuracy the color code or symbol that identifies each fluid.

CRITERION-REFERENCED MEASURE

C1.9 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide several photographs of aircraft engines and systems. Have students identify the fluid from the color code or symbol on lines, pipes, and tubes.

2. Have students examine the static aircraft and identify the systems and fluids from the color code and symbol.

3. Take a field trip to the Air National Guard. Have students observe jet engines with color codes identifying pipes and lines.

CONCEPT/DUTY AREA

1. UNDERSTANDING TECHNICAL SYMBOLS AND ABBREVIATIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

1.10 Explain the symbols of lines and materials used for technical drawings in aircraft mechanics.

PERFORMANCE OBJECTIVE

P1.10 Given 12 symbols for lines and 12 symbols for materials, explain with 75% accuracy what each symbol means.

CRITERION-REFERENCED MEASURE

C10.1 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Distribute to students several technical drawings, and have them identify the materials in each drawing by the symbol used.

2. Distribute technical drawings to students, and explain how the engineer or mechanic informs the reader by the use of line symbols and how items are connected, routed, bordered, located, and separated.

RESOURCES

TASK 1.1

Audiovisuals: CROSSWORD MAGIC (computer program). Appleworks.

TASK 1.2

Equipment and Material: Electronics and electricity diagrams

Audiovisuals: *Units of Electrical Measurement* (videotape). IAP.
Basic Electricity (videotape). IAP.

TASK 1.3

Audiovisuals: FAA tapes of Morse code
Taped code identifications

TASK 1.4

Equipment and Material: List of symbols and abbreviations for aircraft systems
Lists of meanings of symbols and abbreviations for aircraft systems

TASK 1.5

Equipment and Material: Overhead projector

TASK 1.6

Equipment and Material: Overhead projector

TASK 1.7

Equipment and Material: Periodic Table of the Elements

TASK 1.8

Equipment and Material: Short story

Reference: *Federal Aviation Regulations.* FAA.

CONCEPT/DUTY AREA

2. UNDERSTANDING MATHEMATICAL TERMS, SYMBOLS, AND FORMULAS

TASKS/COMPETENCIES

2.1 Explain the 25 common mathematical symbols used in aircraft mechanics.

2.2 Explain how the *Aviation Mechanic Handbook* is used as a reference in solving problems in aircraft mechanics.

2.3 Explain the 10 common mathematical terms used in aircraft mechanics.

2.4 Explain the 15 formulas for geometric figures used in computing aircraft mechanics problems.

CONCEPT/DUTY AREA

1. UNDERSTANDING MATHEMATICAL TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

2.1 Explain the 25 common mathematical symbols used in aircraft mechanics.

PERFORMANCE OBJECTIVE

P2.1 Given 25 common mathematical symbols used in aircraft mechanics, explain with 75% accuracy the meaning of each symbol.

CRITERION-REFERENCED MEASURE

C2.1 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide lists of the 25 mathematical symbols. Have students identify all they recognize and then write the meanings of the others as they are discussed in class.

2. Use Appleworks CROSSWORD MAGIC computer program to develop crossword puzzles using symbols as clues.

CONCEPT/DUTY AREA

1. UNDERSTANDING MATHEMATICAL TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

2.2 Explain how the *Aviation Mechanic Handbook* is used as a reference in solving problems in aircraft mechanics.

PERFORMANCE OBJECTIVE

P2.2 Given an overview of the *Aviation Mechanic Handbook*, provide four examples where the handbook can assist in computing mechanics problems. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C2.2 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Distribute copies of the *Aviation Mechanics Handbook* to students, and identify tables and lists that assist aircraft mechanics in computing mathematical problems.

2. Give students several simple problems that they can solve by referring to sections of the handbook.

CONCEPT/DUTY AREA

1. UNDERSTANDING MATHEMATICAL TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

2.3 Explain the 10 common mathematical terms used in aircraft mechanics.

PERFORMANCE OBJECTIVE

P2.3 Given a list of 10 mathematical terms used in aircraft mechanics, explain with 75% accuracy the meaning of each term.

CRITERION-REFERENCED MEASURE

C2.3 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Distribute lists of 10 mathematical terms used in aircraft mechanics, and have students write the meanings of the terms as they are discussed and examples given.

2. Use Appleworks CROSSWORD MAGIC computer program to develop crossword puzzles using math terms as clues.

CONCEPT/DUTY AREA

1. UNDERSTANDING MATHEMATICAL TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

2.4 Explain the 15 formulas for geometric figures used in computing aircraft mechanics problems.

PERFORMANCE OBJECTIVE

P2.4 Given 15 formulas and one sample problem involving geometric figures for each formula, explain each formula and solve the problem given. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C2.4 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to explain the geometric figures and associated formulas. Have students learn the formulas by learning the parts of the geometric figures.

2. Give students several problems requiring the use of formulas for geometric figures. Have students work in pairs to solve half the problems and then work individually to solve the remaining half.

RESOURCES

TASK 2.1

Equipment and Material: List of 25 mathematical symbols

Audiovisuals: CROSSWORD MAGIC (computer program). Appleworks.

TASK 2.2

Equipment and Material: *Aviation Mechanic Handbook* (multiple copies)
Sample mathematics problems

TASK 2.3

Equipment and Material: List of 10 mathematical terms

Audiovisuals: CROSSWORD MAGIC (computer program). Appleworks.

TASK 2.4

Equipment and Material: Overhead projector
Sample problems involving formulas for geometric figures

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

TASKS/COMPETENCIES

3.1 Determine multiples of 10 in a given decimal figure.

3.2 Explain the difference between a pure and a mixed decimal.

3.3 Add and subtract decimal numbers.

3.4 Multiply numbers with decimals.

3.5 Divide numbers with decimals.

3.6 Round off decimals.

3.7 Convert decimals to fractions.

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

3.1 Determine multiples of 10 in a given decimal figure.

PERFORMANCE OBJECTIVE

P3.1 Given 10 decimal figures, determine the multiples of 10 in each figure. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C3.1 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector or chalkboard to illustrate how decimals use the "a" reference (decimal point) to separate the whole and portions of the whole in a figure.

2. Distribute several figures less than one, and have students determine the multiples of 10 by the numbers other than zero to the right of the decimal point.

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

3.2 Explain the difference between a pure and a mixed decimal.

PERFORMANCE OBJECTIVE

P3.2 Given 10 decimal figures, determine which are mixed and which are whole numbers. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C3.2 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector or chalkboard, and list several decimal figures. Have students indicate which are mixed and which are whole numbers.

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

3.3 Add and subtract decimal numbers.

PERFORMANCE OBJECTIVE

P3.3 Given 20 problems requiring addition or subtraction of numbers with decimals, solve each of the problems. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C3.3 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to demonstrate adding and subtracting decimals.

2. Assign 50 problems for homework or classwork. Assist students as required.

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

3.4 Multiple numbers with decimals.

PERFORMANCE OBJECTIVE

P3.4 Given 20 problems requiring multiplication of decimals, solve each of the problems. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C3.4 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector or chalkboard to demonstrate multiplication of decimals.

2. Assign 50 problems for homework or classwork. Assist students as required.

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

3.5 Divide numbers with decimals.

PERFORMANCE OBJECTIVE

P3.5 Given 20 problems requiring division of decimals, solve each of the problems. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C3.5 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use chalkboard or overhead projector to demonstrate division of decimals.
2. Assign 50 problems for homework or classwork. Assist students as required.

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

3.6 Round off decimals.

PERFORMANCE OBJECTIVE

P3.6 Given 20 decimal numbers, round off each number to the nearest tenth. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C3.6 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to demonstrate rounding off decimals.

2. Divide students into pairs, and assign each pair 50 decimal figures to round off to the nearest hundredth and the nearest tenth. Assist students as required.

CONCEPT/DUTY AREA

3. COMPUTING DECIMALS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

3.7 Convert decimals to fractions.

PERFORMANCE OBJECTIVE

P3.7 Given 20 decimal numbers, convert each decimal to a fraction. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C3.7 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to demonstrate converting decimals to fractions.

2. Divide class into pairs, and have each pair convert 50 decimal numbers to fractions. Assist students as required.

RESOURCES

TASK 3.1

Equipment and Material:	Overhead projector List of decimal figures

TASK 3.2

Equipment and Material:	Overhead projector List of decimal figures

TASK 3.3

Equipment and Material:	Overhead projector 50 addition/subtraction problems

TASK 3.4

Equipment and Material:	Overhead projector 50 multiplication problems

TASK 3.5

Equipment and Material:	Overhead projector 50 division problems

TASK 3.6

Equipment and Material:	Overhead projector List of 50 decimal figures

TASK 3.7

Equipment and Material:	Overhead projector List of 50 decimal figures

CONCEPT/DUTY AREA

4. COMPUTING FRACTIONS

TASKS/COMPETENCIES

4.1 Identify and explain numerator and denominator.

4.2 Identify mixed and improper fractions.

4.3 Add and subtract fractions.

4.4 Add and subtract mixed numbers.

4.5 Identify the least common denominator (LCD) of a fraction.

4.6 Multiply fractions.

4.7 Divide fractions.

CONCEPT/DUTY AREA

4. COMPUTING FRACTIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

4.1 Identify and explain numerator and denominator.

PERFORMANCE OBJECTIVE

P4.1 Given a common fraction, identify the numerator and the denominator, and explain what each term means. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C4.1 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide students with a list of 25 fractions. Identify each numerator and denominator and explain the meaning of each term.

CONCEPT/DUTY AREA

4. COMPUTING FRACTIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

4.2 Identify mixed and improper fractions.

PERFORMANCE OBJECTIVE

P4.2 Given a list of 20 fractions, identify with 75% accuracy the mixed and improper fractions.

CRITERION-REFERENCED MEASURE

C4.2 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Define mixed and improper fractions.
2. Use the chalkboard or overhead projector to give examples of mixed and improper fractions.
3. Have students write examples of mixed and improper fractions on the chalkboard.

CONCEPT/DUTY AREA

4. COMPUTING FRACTIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

4.3 Add and subtract fractions.

PERFORMANCE OBJECTIVE

P4.3 Given 20 problems involving addition and subtraction of fractions, solve the problems with 75% accuracy.

CRITERION-REFERENCED MEASURE

C4.3 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Work several addition and subtraction problems on the chalkboard or with an overhead projector. Discuss the procedure for addition and subtraction of fractions while working the problems.

2. Have students work in pairs and solve several problems. Then have students work individually on additional problems.

CONCEPT/DUTY AREA

4. COMPUTING FRACTIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

4.4 Add and subtract mixed numbers.

PERFORMANCE OBJECTIVE

P4.4 Given 20 problems involving addition and subtraction of mixed numbers, solve the problems with 75% accuracy.

CRITERION-REFERENCED MEASURE

C4.4 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or an overhead projector to work several mixed number problems. Discuss the procedures while working the problems.

2. Have students work first in pairs, then individually, to solve mixed numbers problems.

COMPETENCY

4.5 Identify the least common denominator (LCD) of a fraction.

PERFORMANCE OBJECTIVE

P4.5 Given a list of 10 groups of fractions, identify with 75% accuracy the least common denominator in each group.

CRITERION-REFERENCED MEASURE

C4.5 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to explain the "continued division" method for finding the least common denominator.
2. Have students work in pairs, then individually, to solve several problems involving finding the least common denominator.

CONCEPT/DUTY AREA

4. COMPUTING FRACTIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

4.6 Multiple fractions.

PERFORMANCE OBJECTIVE

P4.6 Given 20 problems involving multiplication of fractions, solve the problems with 75% accuracy.

CRITERION-REFERENCED MEASURE

C4.6 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to explain the procedure for multiplying fractions.

2. Have students work in pairs, then individually, to solve problems involving multiplying fractions.

CONCEPT/DUTY AREA

4. COMPUTING FRACTIONS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

4.7 Divide fractions.

PERFORMANCE OBJECTIVE

P4.7 Given 20 problems involving division of fractions, solve the problems with 75% accuracy.

CRITERION-REFERENCED MEASURE

C4.7 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to explain the procedure for division of fractions.

2. Have students work in pairs, then individually, to solve problems involving the division of fractions.

3. Explain the cancellation procedure for multiplication and division of fractions, and then have students practice cancellation in multiplication and division problems.

RESOURCES

TASK 4.1

Equipment and Material: List of 25 fractions

TASK 4.2

Equipment and Material: Overhead projector

TASK 4.3

Equipment and Material:
Overhead projector
Addition and subtraction problems (fractions)

TASK 4.4

Equipment and Materials:
Overhead projector
Addition and subtraction problems (mixed numbers)

TASK 4.5

Equipment and Materials:
Overhead projector
List of fractions

TASK 4.6

Equipment and Materials:
Overhead projector
Multiplication problems (fractions)

TASK 4.7

Equipment and Materials:
Overhead projector
Division problems (fractions)

CONCEPT/DUTY AREA

5. COMPUTING RATIO AND PROPORTION

TASKS/COMPETENCIES

5.1 Explain the meaning of ratio and how it is used in aviation.

5.2 Find the ratio of two quantities.

5.3 Find the quantity of the first term.

5.4 Find the quantity of the second term.

5.5 Explain the meaning of proportion and how it is used in aviation.

5.6 Solve for the unknown in a proportion.

CONCEPT/DUTY AREA

5. COMPUTING RATIO AND PROPORTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

5.1 Explain the meaning of ratio and how it is used in aviation.

PERFORMANCE OBJECTIVE

P5.1 Given classroom instruction, explain the meaning of ratio and how it is used in aviation. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C5.1 Written or oral test, 75% accuracy.

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Define ratio.

2. Give several examples of how ratio is used in aircraft mechanics, such as aspect ratio, compression ratio, etc.

CONCEPT/DUTY AREA

5. COMPUTING RATIO AND PROPORTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

5.2 Find the ratio of two quantities.

PERFORMANCE OBJECTIVE

P5.2 Given two quantities of the same unit, find the ratio of the quantities. Answer must be 85% accurate.

CRITERION-REFERENCED MEASURE

C5.2 Written or oral test, 85% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to work several problems that involve finding the ratio of quantities with like units.

2. Assign students several aviation-related ratio problems to work in pairs during class and complete as homework. Assist as necessary.

CONCEPT/DUTY AREA

5. COMPUTING RATIO AND PROPORTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

5.3 Find the quantity of the first term.

PERFORMANCE OBJECTIVE

P5.3 Given the ratio and the quantity that corresponds to the second term, find the quantity of the first term. Answer must be 95% accurate.

CRITERION-REFERENCED MEASURE

C5.3 Written or oral test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to work several problems that involve finding the quantity of the first term.

2. Assign students several problems to work in pairs during class and complete as homework. Assist as necessary.

CONCEPT/DUTY AREA

5. COMPUTING RATIO AND PROPORTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

5.4 Find the quantity of the second term.

PERFORMANCE OBJECTIVE

P5.4 Given the ratio and the quantity that corresponds to the first term, find the quantity of the second term. Answer must be 95% accurate.

CRITERION-REFERENCED MEASURE

C5.4 Written or oral test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to demonstrate how to solve ratio problems that involve finding the quantity of the second term.

2. Assign students several problems to work in pairs during class and complete as homework. Assist as necessary.

CONCEPT/DUTY AREA

5. COMPUTING RATIO AND PROPORTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

5.5 Explain the meaning of proportion and how it is used in aviation.

PERFORMANCE OBJECTIVE

P5.5 Given classroom instruction, explain the meaning of proportion and how it is used in aviation. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C5.5 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Define proportion.

2. Provide examples of how proportions are used in aviation, such as fuel consumption, oil consumption, etc.

3. Have students suggest other examples of how proportion may be used in aircraft mechanics.

CONCEPT/DUTY AREA

5. COMPUTING RATIO AND PROPORTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

5.6 Solve for the unknown in a proportion.

PERFORMANCE OBJECTIVE

P5.6 Given one ratio and the first quantity of the second ratio, solve with 95% accuracy for the missing quantity.

CRITERION-REFERENCED MEASURE

C5.6 Written or oral test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to solve several proportion problems.

2. Have students work in pairs to solve aviation-related proportion problems and complete additional problems individually as homework. Assist as necessary.

RESOURCES

TASK 5.2

Equipment and Material:	Overhead projector Aviation-related ratio problems

TASK 5.3

Equipment and Material:	Overhead projector Ratio problems

TASK 5.4

Equipment and Material:	Overhead projector Ratio problems

TASK 5.6

Equipment and Material:	Overhead projector Aviation-related proportion problems

CONCEPT/DUTY AREA

6. UNDERSTANDING HOW TO EXTRACT SQUARE ROOT

TASKS/COMPETENCIES

6.1 Explain the meaning of root, square root, and cube root.

6.2 Draw the radical sign for square and cube roots.

6.3 Extract the square root of a number.

CONCEPT/DUTY AREA

6. UNDERSTANDING HOW TO EXTRACT SQUARE ROOT

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

6.1 Explain the meaning of root, square root, and cube root.

PERFORMANCE OBJECTIVE

P6.1 Given classroom instruction, explain with 75% accuracy the meaning of root, square root, and cube root.

CRITERION-REFERENCED MEASURE

C6.1 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to explain the concept of roots and to demonstrate extracting the square and cube roots of a number.

2. Provide a list of numbers, and have the students work in pairs to extract the square and cube roots of the numbers.

CONCEPT/DUTY AREA

6. UNDERSTANDING HOW TO EXTRACT SQUARE ROOT

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

6.2 Draw the radical sign for square and cube roots.

PERFORMANCE OBJECTIVE

P6.2 Given a whole number, draw with 75% accuracy the radical sign for square and cube roots.

CRITERION-REFERENCED MEASURE

C6.2 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to demonstrate use of a radical sign to indicate square and cube root.

2. Give students 25 whole and decimal numbers, and have them write the symbols for solving square and cube roots of the given numbers.

CONCEPT/DUTY AREA

6. UNDERSTANDING HOW TO EXTRACT SQUARE ROOT

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

6.3 Extract the square root of a number.

PERFORMANCE OBJECTIVE

P6.3 Given a list of 10 numbers, extract with 75% accuracy the square root of each number.

CRITERION-REFERENCED MEASURE

C6.3 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to solve several square root problems. Explain and discuss each problem.

2. Have students work in pairs to solve several aviation-related square root problems. Assign additional homework problems to be completed individually.

RESOURCES

TASK 6.1

Equipment and Material:

- Overhead projector
- List of numbers

TASK 6.2

Equipment and Material:

- Overhead projector
- List of numbers

TASK 6.3

Equipment and Material:

- Overhead projector
- List of numbers
- Square root problems

CONCEPT/DUTY AREA

7. UNDERSTANDING HOW TO COMPUTE POWERS OF 10

TASKS/COMPETENCIES

7.1 Explain the principle of the exponent.

7.2 Explain the procedures for adding and subtracting powers of 10.

7.3 Explain the three-step procedure for multiplying and dividing powers of 10.

CONCEPT/DUTY AREA

7. UNDERSTANDING HOW TO COMPUTE POWERS OF 10

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

7.1 Explain the principle of the exponent.

PERFORMANCE OBJECTIVE

P7.1 Given a number, 10x10x10x10, define exponent, and explain how an exponent can be used to simplify the given number. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C7.1 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to explain the principle of an exponent.

2. Use the chalkboard or overhead projector to explain the steps in converting large numbers to numbers with exponents.

3. Provide several numbers and series of numbers where exponents simplify computation. Have students transpose series of numbers to numbers with exponents, e.g., 5x5x5x5 or 625 = 5 to the fourth power.

CONCEPT/DUTY AREA

7. UNDERSTANDING HOW TO COMPUTE POWERS OF 10

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

7.2 Explain the procedures for adding and subtracting powers of 10

PERFORMANCE OBJECTIVE

P7.2 Given two identical numbers with different exponents, provide with 100% accuracy the answers when the numbers are added or subtracted.

CRITERION-REFERENCED MEASURE

C7.2 Written test, 100% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to add and subtract numbers with exponents.

2. Have students work in pairs to solve addition and subtraction of numbers with exponents. Assign additional homework problems to be completed individually.

CONCEPT/DUTY AREA

7. UNDERSTANDING HOW TO COMPUTE POWERS OF 10

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

7.3 Explain the three-step procedure for multiplying and dividing powers of 10.

PERFORMANCE OBJECTIVE

P7.3 Given two identical numbers with different exponents, provide with 100% accuracy the product and quotient (number with larger exponent is the dividend) of the two numbers.

CRITERION-REFERENCED MEASURE

C7.3 Written test, 100% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to multiply and divide numbers with exponents.

2. Have students work in pairs to solve multiplication and division of numbers with exponents.

RESOURCES

TASK 7.1

Equipment and Material:

Overhead projector
List of numbers and series of numbers

TASK 7.2

Equipment and Material:

Overhead projector
Addition/subtraction problems

TASK 7.3

Equipment and Material:

Overhead projector
Multiplication/division problems

CONCEPT/DUTY AREA

8. USING CONVERSION TABLES

TASKS/COMPETENCIES

8.1 Convert conventional measurements using the Metric/Conventional conversion table.

8.2 Determine the square, square root, cube root, circumference, and area using the Function of Numbers conversion table.

8.3 Convert centigrade and Fahrenheit temperatures using the Temperature conversion table.

8.4 Extract square, square root, cube, and cube root using the Square/Square Root--Cube/Cube Root conversion table.

8.5 Extract circumference and area using the Diameter/Circumference/Area conversion table.

CONCEPT/DUTY AREA

8. USING CONVERSION TABLES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

8.1 Convert conventional measurements using the Metric/Conventional conversion table.

PERFORMANCE OBJECTIVE

P8.1 Given a list of 25 conventional measurements, convert each to a metric measurement using the Metric/Conventional conversion table. Answer must be 85% accurate.

CRITERION-REFERENCED MEASURE

C8.1 Written test, 85% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to explain use of the Metric/Conventional conversion table.

2. Provide several metric and conventional terms, and require students to convert them as appropriate.

CONCEPT/DUTY AREA

8. USING CONVERSION TABLES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

8.2 Determine the square, square root, cube root, circumference, and area using the Function of Numbers conversion table.

PERFORMANCE OBJECTIVE

P8.2 Given a list of 10 numbers, determine with 75% accuracy the square, square root, cube root, circumference, and area of each number using the Function of Numbers conversion table.

CRITERION-REFERENCED MEASURE

C8.2 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to explain use of the Function of Numbers conversion table.

2. Provide several numbers, and require students to extract various functions of each number using the Function of Numbers conversion table in the *Aviation Mechanic Handbook*.

CONCEPT/DUTY AREA

8. USING CONVERSION TABLES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

8.3 Convert centigrade and Fahrenheit temperatures using the Temperature conversion table.

PERFORMANCE OBJECTIVE

P8.3 Given 10 centigrade and 10 Fahrenheit temperatures, convert each to the other temperature scale using the Temperature conversion table. Answers must be 95% accurate.

CRITERION-REFERENCED MEASURE

C8.3 Written test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to explain use of the Temperature conversion table.

2. Have students practice centigrade and Fahrenheit conversions using the Temperature conversion table in the *Aviation Mechanic Handbook*.

CONCEPT/DUTY AREA

8. USING CONVERSION TABLES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

8.4 Extract square, square root, cube, and cube root using the Square/Square root--Cube/Cube Root conversion table.

PERFORMANCE OBJECTIVE

P8.4 Given a list of 20 numbers, extract with 95% accuracy the square, square root, cube, and cube root for each number using the Square/Square Root--Cube/Cube Root conversion table.

CRITERION-REFERENCED MEASURE

C8.4 Written test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide several numbers and copies of the Root conversion table. Have students practice extracting root data from the appropriate conversion table in the *Aviation Mechanic Handbook*.

CONCEPT/DUTY AREA

8. USING CONVERSION TABLES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

8.5 Extract circumference and area using the Diameter/Circumference/Area conversion table.

PERFORMANCE OBJECTIVE

P8.5 Given 10 diameter units, extract with 95% accuracy the circumference and area of each unit using the Diameter/Circumference/Area conversion table.

CRITERION-REFERENCED MEASURE

C8.5 Written test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide several diameter units and copies of the Circumference/Area conversion table. Have students practice extracting circumference and area from each diameter unit.

2. Provide list of diameter units, and ask students to use the circumference and area formulas for a circle to check the accuracy of the table in th *Aviation Mechanic Handbook.*

RESOURCES

TASK 8.1

Equipment and Material:	Overhead projector List of metric and conventional terms

TASK 8.2

Equipment and Material:	Overhead projector
Reference:	*Aviation Mechanic Handbook.* ASA.

TASK 8.3

Equipment and Material:	Overhead projector
Reference:	*Aviation Mechanic Handbook.* ASA.

TASK 8.4

Equipment and Material:	Copies of Root conversion table
Reference:	*Aviation Mechanic Handbook.* ASA.

TASK 8.5

Equipment and Material:	Copies of the Circumference/Area conversion table List of diameter units
Reference:	*Aviation Mechanic Handbook.* ASA.

CONCEPT/DUTY AREA

9. UNDERSTANDING PHYSICS TERMS, SYMBOLS, AND FORMULAS

TASKS/COMPETENCIES

9.1 Explain the 30 basic physics terms associated with aviation mechanics.

9.2 Explain the concept of Mendeleev's Periodic Table of the Elements.

9.3 Explain the symbol and surrounding items in a typical space on the Periodic Table of the Elements.

9.4 Describe the symbol and chemical structure of the 25 elements commonly used in aviation mechanics.

9.5 Solve aviation-related problems using the most common 13 formulas used in aviation mechanics.

CONCEPT/DUTY AREA

9. UNDERSTANDING PHYSICS TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

9.1 Explain the 30 basic physics terms associated with aviation mechanics.

PERFORMANCE OBJECTIVE

P9.1 Given a list of 30 basic physics terms associated with aviation mechanics, explain each term with 75% accuracy.

CRITERION-REFERENCED MEASURE

C9.1 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard, overhead projector, and 35 mm slides to explain physics terms.

2. Use CROSSWORD MAGIC program to form crossword puzzles using physics terms for answers and clues.

3. Use the video *The Electron Theory* to illustrate the structure of atoms.

CONCEPT/DUTY AREA

9. UNDERSTANDING PHYSICS TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

9.2 Explain the concept of Mendeleev's Periodic Table of the Elements.

PERFORMANCE OBJECTIVE

P9.2 Given instruction concerning the Periodic Table of the Elements, explain with 75% accuracy Mendeleev's concept concerning the order of the elements in nature.

CRITERION-REFERENCED MEASURE

C9.2 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to explain the concept and structure of the Periodic Table of the Elements.

2. Distribute copies of the Periodic Table, and have students quiz each other on the various elements.

3. Use the CROSSWORD MAGIC program to form crossword puzzles using the various elements as clues and answers.

CONCEPT/DUTY AREA

9. UNDERSTANDING PHYSICS TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

9.3 Explain the symbol and surrounding items in a typical space on the Periodic Table of the Elements.

PERFORMANCE OBJECTIVE

P9.3 Given a block/space from the Periodic Table of the Elements, explain with 75%, accuracy each item within the space.

CRITERION-REFERENCED MEASURE

C9.3 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to demonstrate various elements on the Periodic Table, and explain the meaning of the items in each element's block.

2. Have students work in pairs and quiz each other on the information in the blocks of the Periodic Table.

CONCEPT/DUTY AREA

9. UNDERSTANDING PHYSICS TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

9.4 Describe the symbol and chemical structure of the 25 elements commonly used in aviation mechanics.

PERFORMANCE OBJECTIVE

P9.4 Given the Periodic Table of the Elements and a list of 25 elements used in aviation mechanics, describe with 75% accuracy the symbol and chemical structure of each element.

CRITERION-REFERENCED MEASURE

C9.4 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to describe the elements most often used in aviation mechanics.

2. Use matching exercises to reinforce students' knowledge of the symbols and atomic numbers of elements used in aviation mechanics.

3. Have students pair up and quiz each other on the symbols and atomic numbers of elements.

CONCEPT/DUTY AREA

9. UNDERSTANDING PHYSICS TERMS, SYMBOLS, AND FORMULAS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

9.5 Solve aviation-related problems using the most common 13 formulas used in aviation mechanics.

PERFORMANCE OBJECTIVE

P9.5 Given 13 aviation-related problems and the 13 formulas required to solve the problems, solve each problem with the appropriate formula. Answers must be 75% accurate.

CRITERION-REFERENCED MEASURE

C9.5 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to explain and work sample problems with all 13 aviation-related physics formulas.

2. Provide several problems using each of the 13 physics formulas. Have students pair up and work problems together. Assist as required.

3. As individual students become proficient in using the formulas, have them circulate among classmates and assist others.

RESOURCES

TASK 9.1

Audiovisuals:	35 mm slides showing physics terms
	CROSSWORD MAGIC (computer program). Appleworks.
	The Electron Theory (videotape).

TASK 9.2

Equipment and Material:	Overhead projector Copies of Periodic Table of the Elements
Audiovisuals:	CROSSWORD MAGIC (computer program). Appleworks.

TASK 9.3

Equipment and Material:	Overhead projector

TASK 9.4

Equipment and Material:	Overhead projector Matching exercises

TASK 9.5

Equipment and Material:	Overhead projector Sample problems requiring use of the 13 physics formulas

CONCEPT/DUTY AREA

10. UNDERSTANDING THE DENSITIES OF VARIOUS SOLIDS, LIQUIDS, AND GASES

TASKS/COMPETENCIES

10.1 Explain Archimedes' law and how it is used to determine the specific gravity of a substance.

10.2 Explain the procedure for determining the density of a substance in pounds per cubic foot and pounds per gallon.

10.3 Explain the relationship of weight to density.

10.4 Explain the relationship of subatomic particles, atoms, and molecules to density.

10.5 Describe the density in each of the 25 substances commonly used in aviation mechanics.

CONCEPT/DUTY AREA

10. UNDERSTANDING THE DENSITIES OF VARIOUS SOLIDS, LIQUIDS, AND GASES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

10.1 Explain Archimedes' law and how it is used to determine the specific gravity of a substance.

PERFORMANCE OBJECTIVE

P10.1 Given a solid mass and a volume of distilled water, explain with 80% accuracy Archimedes' law and how it is used to determine the specific gravity of a given mass.

CRITERION-REFERENCED MEASURE

C10.1 Demonstration, 80% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Demonstrate how the weight of a mass is compared to an equal weight of distilled water to arrive at specific gravity or density.

2. Illustrate on the chalkboard how the specific gravity is expressed following the weight comparison of water and the substance.

3. Give students several problems where the weight of a substance is compared to an equal weight of water, and have them work in pairs to arrive at the specific gravity of each substance.

CONCEPT/DUTY AREA

10. UNDERSTANDING THE DENSITIES OF VARIOUS SOLIDS, LIQUIDS, AND GASES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

10.2 Explain the procedure for determining the density of a substance in pounds per cubic foot and pounds per gallon.

PERFORMANCE OBJECTIVE

P10.2 Given a solid measuring 24"x24"x24", two gallons of water, and a scale, determine with 85% accuracy the density of the solid in pounds per cubic foot and the density of the liquid in pounds per gallon.

CRITERION-REFERENCED MEASURE

C10.2 Demonstration, 85% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use solids, liquids, a rule, and a scale to demonstrate how to determine density of substances.

2. Provide students with solids, liquids, rules, and scales, and have them work in pairs to determine density of the substances.

CONCEPT/DUTY AREA	COURSE
10. UNDERSTANDING THE DENSITIES OF VARIOUS SOLIDS, LIQUIDS, AND GASES	Aviation Technician I (Semester II)

TASK/COMPETENCY

10.3 Explain the relationship of weight to density.

PERFORMANCE OBJECTIVE

P10.3 Given a substance and a scale, explain with 75% accuracy the relationship of the density of the substance to its weight.

CRITERION-REFERENCED MEASURE

C10.3 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Select substances with various densities and note the difference in weight.
2. Discuss with students the difference between density and weight.
3. Demonstrate how weight differs in and out of water and the weight differences on moon and earth. Compare weight to specific gravity.

CONCEPT/DUTY AREA

10. UNDERSTANDING THE DENSITIES OF VARIOUS SOLIDS, LIQUIDS, AND GASES

COURSE

Aviation Technician I (Semester II)

TASK/CCMPETENCY

10.4 Explain the relationship of subatomic particles, atoms, and molecules to density.

PERFORMANCE OBJECTIVE

P10.4 Given a Periodic Table of the Elements, equal volumes of lead and aluminum, and a scale, explain with 75% accuracy the relationship of the concentration of subatomic particles, atoms, and molecules to density.

CRITERION-REFERENCED MEASURE

C10.4 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Review the Periodic Table of the Elements, and note differences in subatomic particles in the various elements. Relate the differences to density.

2. Discuss density of air and how it varies with temperature changes. Relate the differences in air density to lift produced by an airfoil.

CONCEPT/DUTY AREA

10. UNDERSTANDING THE DENSITIES OF VARIOUS SOLIDS, LIQUIDS, AND GASES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

10.5 Describe the density in each of the 25 substances commonly used in aviation mechanics.

PERFORMANCE OBJECTIVE

P10.5 Given a list of 25 substances commonly used in aviation mechanics, describe with 75% accuracy the density of each.

CRITERION-REFERENCED MEASURE

C10.5 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide students with a Periodic Table of the Elements, a scale, and a group of 25 elements of equal volume that are commonly used in aviation mechanics. Have students work in pairs to note the density of each substance and then arrange the substances in order from most dense to least dense.

2. Have students examine the characteristics of the 25 substances and suggest where each might be used on an aircraft and why.

RESOURCES

TASK 10.1

Equipment and Material:
- Solid mass
- Distilled water
- Weight/gravity problems

TASK 10.2

Equipment and Material:
- Solids
- Water
- Scales

TASK 10.3

Equipment and Material:
- Substances of various densities
- Scales

TASK 10.4

Equipment and Material:
- Periodic Table of the Elements
- Lead
- Aluminum
- Scales

TASK 10.5

Equipment and Material:
- Periodic Table of the Elements
- Scales
- List of 25 elements of equal volume

CONCEPT/DUTY AREA

11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE

TASKS/COMPETENCIES

11.1 Explain the 15 weight and balance terms.

11.2 Explain the aircraft weighing procedure.

11.3 Determine an aircraft's center of gravity (CG).

11.4 Determine extreme forward and extreme rearward centers of gravity.

11.5 Compute changes in empty weight and empty weight center of gravity.

11.6 Determine the weight of permanent ballast to be installed in an aircraft.

CONCEPT/DUTY AREA

11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

11.1 Explain the 15 weight and balance terms.

PERFORMANCE OBJECTIVE

P11.1 Given the 15 weight and balance terms commonly used in aviation, explain each term with 75% accuracy.

CRITERION-REFERENCED MEASURE

C11.1 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use JS transparencies and aircraft drawings to explain weight and balance terms.
2. Use matching exercises to reinforce students' knowledge of weight and balance terms.
3. Use CROSSWORD MAGIC program to develop crossword puzzles with weight and balance terms as clues and answers.

CONCEPT/DUTY AREA

11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

11.2 Explain the aircraft weighing procedure.

PERFORMANCE OBJECTIVE

P11.2 Given access to the static aircraft in the Aviation Technology Lab, explain with 75% accuracy the procedure for weighing the aircraft.

CRITERION-REFERENCED MEASURE

C11.2 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the static aircraft to demonstate the procedure for weighing an aircraft.
2. Have students develop a checklist for weighing an aircraft.
3. Have students visit a local airport when an aircraft is being weighed.
4. Use the IAP video *Importance and Principles of Aircraft Weight and Balance* to illustrate the procedures in determining weight and balance.

CONCEPT/DUTY AREA	COURSE
11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE	Aviation Technician I (Semester II)

TASK/COMPETENCY

11.3 Determine an aircraft's center of gravity (CG).

PERFORMANCE OBJECTIVE

P11.3 Given data on the total weight of an aircraft, the distance from the datum line to the main gear, the weight of the nosewheel, and the distance from the nosewheel to the main gear, determine the center of gravity with 95% accuracy.

CRITERION-REFERENCED MEASURE

C11.3 Written test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to demonstrate the procedure for working center of gravity problems.

2. Distribute to students several center of gravity problems, and have them work in pairs to solve the problems. Assist as required.

3. Use the IAP video *Center of Gravity and Loading Computations* to illustrate the procedure for computing center of gravity.

CONCEPT/DUTY AREA	COURSE
11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE	Aviation Technician I (Semester II)

TASK/COMPETENCY

11.4 Determine extreme forward and extreme rearward centers of gravity.

PERFORMANCE OBJECTIVE

P11.4 Given two diagrams of a light aircraft's cockpit/cabin with loading forward (Diagram 1) and rearward (Diagram 2), the total aircraft weight, and the total moments of both diagrams, determine with 95% accuracy the extreme forward (1) and extreme rearward (2) centers of gravity.

CRITERION-REFERENCED MEASURE

C11.4 Written test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the static aircraft, the chalkboard, and overhead projector with JS transparencies to demonstrate the procedures for determining the extreme forward and rearward centers of gravity.

2. Have students work in pairs to solve various extreme centers of gravity problems. Assist as required.

CONCEPT/DUTY AREA

11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

11.5 Compute changes in empty weight and empty weight center of gravity.

PERFORMANCE OBJECTIVE

P11.5 Given data on an aircraft's original empty weight plus an additional weight with its additional moment arm, determine with 95% accuracy the new empty weight and center of gravity.

CRITERION-REFERENCED MEASURE

C11.5 Written test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to demonstrate how to change the aircraft's center of gravity when additional weights and moment arms are added or subtracted.

2. Distribute to students several problems in changing the center of gravity of an aircraft, and have them work in pairs to solve the problems. Assist as required.

3. Assign an additional center of gravity problem as homework.

CONCEPT/DUTY AREA

11. UNDERSTANDING THE AIRCRAFT WEIGHING PROCEDURE AND COMPUTATION OF AIRCRAFT WEIGHT AND BALANCE

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

11.6 Determine the weight of permanent ballast to be installed in an aircraft.

PERFORMANCE OBJECTIVE

P11.6 Given data on the weight of an aircraft, distances (inches) desired to move the center of gravity, and arm of the ballast to be installed, determine with 95% accuracy the weight of the ballast to be installed.

CRITERION-REFERENCED MEASURE

C11.6 Written test, 95% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard and overhead projector to demonstrate the procedure and formula for determining the weight of permanent ballast.

2. Have students work in pairs to solve several problems in the installation of permanent ballast. Assist as required.

RESOURCES

TASK 11.1

Equipment and Material:	Aircraft drawings Matching exercises
Audiovisuals:	Transparencies (weight and balance). Jeppesen Sanderson.
	CROSSWORD MAGIC (computer program). Appleworks.

TASK 11.2

Equipment and Material:	Static aircraft
Audiovisuals:	*Importance and Principles of Aircraft Weight and Balance* (videotape). IAP.

TASK 11.3

Equipment and Material:	Overhead projector Center of gravity problems
Audiovisuals:	*Center of Gravity and Loading Computations* (videotape). IAP.

TASK 11.4

Equipment and Material:	Cockpit/cabin diagrams Static aircraft Overhead projector Extreme centers of gravity problems
Audiovisuals:	Transparencies (extreme centers of gravity). Jeppesen Sanderson.

TASK 11.5

Equipment and Material:	Overhead projector Center of gravity problems

TASK 11.6

Equipment and Material:	Overhead projector Ballast problems

CONCEPT/DUTY AREA

12. UNDERSTANDING APPLICATION OF NEWTON'S THREE LAWS OF MOTION

TASKS/COMPETENCIES

12.1 Explain Newton's first law of motion as it affects aircraft performance.

12.2 Explain Newton's second law of motion as it affects aircraft performance.

12.3 Explain Newton's third law of motion as it affects aircraft performance.

CONCEPT/DUTY AREA

12. UNDERSTANDING APPLICATION OF NEWTON'S THREE LAWS OF MOTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

12.1 Explain Newton's first law of motion as it affects aircraft performance.

PERFORMANCE OBJECTIVE

P12.1 Given a simulation of an airplane in flight, explain with 85% accuracy how Newton's first law of motion affects the performance of the airplane.

CRITERION-REFERENCED MEASURE

C12.1 Demonstration, 85% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use an aircraft model to demonstrate how Newton's first law applies in the flight of airplanes.

2. Have students write examples of how Newton's first law affects an aircraft or its systems.

3. Use IAP video *Newton's Laws of Motion* to introduce Newton's three laws of motion and how they apply to aviation.

CONCEPT/DUTY AREA

12. UNDERSTANDING APPLICATION OF NEWTON'S THREE LAWS OF MOTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

12.2 Explain Newton's second law of motion as it affects aircraft performance.

PERFORMANCE OBJECTIVE

P12.2 Given a simulation of an airplane in flight, explain with 85% accuracy how Newton's second law of motion affects the performance of the airplane.

CRITERION-REFERENCED MEASURE

C12.2 Demonstration, 85% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use an aircraft model to demonstrate how Newton's second law applies in the flight of airplanes.

2. Have students give examples of how Newton's second law affects an aircraft or its systems.

CONCEPT/DUTY AREA

12. UNDERSTANDING APPLICATION OF NEWTON'S THREE LAWS OF MOTION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

12.3 Explain Newton's third law of motion as it affects aircraft performance.

PERFORMANCE OBJECTIVE

P12.3 Given a simulation of an airplane in flight, explain with 85% accuracy how Newton's third law of motion affects the performance of the airplane.

CRITERION-REFERENCED MEASURE

C12.3 Demonstration, 85% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use an aircraft model to demonstrate how Newton's third law applies in the flight of airplanes.

2. Have students write examples of how Newton's third law of motion affects an aircraft or its systems.

3. Review IAP video *Newton's Laws of Motion* to summarize Newton's three laws of motion and how they apply to aviation.

RESOURCES

TASK 12.1

Equipment and Material:	Model aircraft
Audiovisuals:	*Newton's Laws of Motion* (videotape). IAP.

TASK 12.2

Equipment and Material:	Model aircraft

TASK 12.3

Equipment and Material:	Model aircraft
Audiovisuals:	*Newton's Laws of Motion* (videotape). IAP.

CONCEPT/DUTY AREA

13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES

TASKS/COMPETENCIES

13.1 Explain how mechanical, electrical, chemical, radiant, and nuclear energy are transformed into heat energy.

13.2 Explain how conduction, convection, and radiation can transfer heat from one location to another.

13.3 Explain the concept of specific heat and how it varies in different substances.

13.4 Explain thermal expansion and how it affects aircraft components.

13.5 Determine the amount of expansion in designated substances.

13.6 Explain the four common temperature scales.

CONCEPT/DUTY AREA	COURSE
13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES	Aviation Technician I (Semester II)

TASK/COMPETENCY

13.1 Explain how mechanical, electrical, chemical, radiant, and nuclear energy are transformed into heat energy.

PERFORMANCE OBJECTIVE

P13.1 Given a defined unit of heat energy, explain with 75% accuracy how the unit can be obtained from each of five other forms of energy: mechanical, electrical, chemical, radiant, and nuclear.

CRITERION-REFERENCED MEASURE

C13.1 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Demonstrate how various forms of energy can produce heat, and relate this information to aircraft in flight.

2. Have students work in pairs and produce two examples showing where each of the forms of energy produce heat, especially in aircraft. Have students compare lists.

CONCEPT/DUTY AREA	COURSE
13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES	Aviation Technician I (Semester II)

TASK/COMPETENCY

13.2 Explain how conduction, convection, and radiation can transfer heat from one location to another.

PERFORMANCE OBJECTIVE

P13.2 Given a defined mass of air, explain with 75% accuracy how heat can be transferred to the mass by conduction, convection, and radiation.

CRITERION-REFERENCED MEASURE

C13.2 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use JS transparencies 7096 and 7098 to illustrate how convection and radiation affect weather.

2. Use the overhead projector and aircraft diagrams to discuss how heat is transferred throughout the aircraft.

3. Demonstrate how various substances conduct heat at different rates, e.g., heat hub of wheel with "spokes" made of different metals. Point out the different rate that heat reaches the rim depending on the composition of the spokes.

CONCEPT/DUTY AREA

13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

13.3 Explain the concept of specific heat and how it varies in different substances.

PERFORMANCE OBJECTIVE

P13.3 Given information on "specific heat," explain with 75% accuracy the meaning of the term and how it varies in different substances.

CRITERION-REFERENCED MEASURE

C13.3 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Distribute to students a list of 25 substances and their specific heat values. Discuss how the differences in specific heat can affect an aircraft's engine and airframe performance.

CONCEPT/DUTY AREA	COURSE
13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES	Aviation Technician I (Semester II)

TASK/COMPETENCY

13.4 Explain thermal expansion and how it affects aircraft components.

PERFORMANCE OBJECTIVE

P13.4 Given access to an aircraft radio, explain with 75% accuracy how thermal expansion must be taken into consideration when constructing the radio's electronic tubes.

CRITERION-REFERENCED MEASURE

C13.4 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Demonstrate with the ball and ring how thermal expansion can affect an engine or any metal part of an airplane.

2. Explain how aircraft accidents have been caused simply by thermal expansion.

CONCEPT/DUTY AREA

13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

13.5 Determine the amount of expansion in designated substances.

PERFORMANCE OBJECTIVE

P13.5 Given information on five substances, including their lengths, the rise in temperature to which they are subjected, and their coefficients of expansion, determine with 75% accuracy the amount of expansion of each substance.

CRITERION-REFERENCED MEASURE

C13.5 Written test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the chalkboard or overhead projector to demonstrate the formula and procedure for determining the expansion of a substance.

2. Have students work in pairs and solve several expansion problems. Assist as required.

CONCEPT/DUTY AREA	COURSE
13. UNDERSTANDING THE RELATIONSHIP BETWEEN HEAT AND ENERGY, THE CONCEPT OF HEAT TRANSFERENCE, AND THE FOUR COMMON TEMPERATURE SCALES	Aviation Technician I (Semester II)

TASK/COMPETENCY

13.6 Explain the four common temperature scales.

PERFORMANCE OBJECTIVE

P13.6 Given information on centigrade, Fahrenheit, Kelvin, and Rankine temperature scales, explain with 75% accuracy the characteristics of each scale.

CRITERION-REFERENCED MEASURE

C13.6 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide students with diagrams of the four temperature scales. Identify the boiling and freezing points of each scale, and discuss specific areas where each is most often used.

2. Explain how one scale is converted to another.

3. Assign students several problems requiring them to convert one temperature scale to another. Assist as required.

RESOURCES

TASK 13.2

Equipment and Material: Overhead projector
Aircraft diagrams

Audiovisuals: Transparencies 7096 and 7098.
Jeppesen Sanderson.

TASK 13.3

Equipment and Material: List of 25 substances and their specific heat values

TASK 13.4

Equipment and Material: Aircraft radio
Ball and ring

TASK 13.5

Equipment and Material: Overhead projector
Expansion problems

TASK 13.6

Equipment and Material: Diagrams of the four temperature scales
Scale conversion problems

CONCEPT/DUTY AREA

14. UNDERSTANDING HOW PASCAL'S LAW, BERNOULLI'S PRINCIPLE, AND BOYLE'S LAW APPLY TO AVIATION MECHANICS

TASKS/COMPETENCIES

14.1 Explain Pascal's law.

14.2 Explain how Pascal's law applies to aircraft hydraulics.

14.3 Explain how Bernoulli's principle applies to liquids in venturi tubes as well as to gases over airfoils.

14.4 Explain Boyle's law and how it applies to compressed air systems on an aircraft.

CONCEPT/DUTY AREA

14. UNDERSTANDING HOW PASCAL'S LAW, BERNOULLI'S PRINCIPLE, AND BOYLE'S LAW APPLY TO AVIATION MECHANICS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

14.1 Explain Pascal's law.

PERFORMANCE OBJECTIVE

P14.1 Given a unit of fluid in a container, explain Pascal's law and how it applies to the amount of pressure throughout the container. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C14.1 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use IAP video *Temperature, Pressure, and Fluids* to illustrate Pascal's law.
2. Compare hydraulic systems in airplanes and automobiles.

CONCEPT/DUTY AREA

14. UNDERSTANDING HOW PASCAL'S LAW, BERNOULLI'S PRINCIPLE, AND BOYLE'S LAW APPLY TO AVIATION MECHANICS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

14.2 Explain how Pascal's law applies to aircraft hydraulics.

PERFORMANCE OBJECTIVE

P14.2 Given an explanation of Pascal's law, explain with 75% accuracy how pressure applied by one small pump causes three heavy wheels of the aircraft's landing gear to rise into the fuselage.

CRITERION-REFERENCED MEASURE

C14.2 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Demonstrate the operation of a hydraulic jack used in a gas station.
2. Review Pascal's law and how it applies to a common hydraulic jack and to the hydraulic systems in larger aircraft.

CONCEPT/DUTY AREA	COURSE
14. UNDERSTANDING HOW PASCAL'S LAW, BERNOULLI'S PRINCIPLE, AND BOYLE'S LAW APPLY TO AVIATION MECHANICS	Aviation Technician I (Semester II)

TASK/COMPETENCY

14.3 Explain how Bernoulli's principle applies to liquids in venturi tubes as well as to gases over airfoils.

PERFORMANCE OBJECTIVE

P14.3 Given an explanation of Bernoulli's principle, compare with 75% accuracy the liquid flowing in a venturi tube to gas flowing over an airfoil.

CRITERION-REFERENCED MEASURE

C14.3 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Review JS transparencies 7054 (airfoil) and 7079 (venturi) to illustrate the application of Bernoulli's principle to liquids and gases.

2. Discuss how venturi tubes can reduce pressure in a hydraulic system.

CONCEPT/DUTY AREA

14. UNDERSTANDING HOW PASCAL'S LAW, BERNOULLI'S PRINCIPLE, AND BOYLE'S LAW APPLY TO AVIATION MECHANICS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

14.4 Explain Boyle's law and how it applies to compressed air systems on an aircraft.

PERFORMANCE OBJECTIVE

P14.4 Given a diagram of the compressed air shock absorber system on an aircraft, explain Boyle's law and how it applies in the function of the air shock absorber system. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C14.4 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use a diagram of an aircraft to identify the locations where Boyle's law is applied in compressed air systems and emergency equipment.

RESOURCES

TASK 14.1

Equipment and Material: Unit of fluid in container

Audiovisuals: *Temperature, Pressure, and Fluids* (videotape). IAP.

TASK 14.2

Equipment and Material: Hydraulic jack

TASK 14.3

Audiovisuals: Transparencies 7054 (airfoil) and 7079 (venturi). Jeppesen Sanderson.

TASK 14.4

Equipment and Material: Aircraft diagrams showing compressed air systems.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

TASKS/COMPETENCIES

15.1 Identify the class and purpose of working drawings.

15.2 Identify 10 types of lines used in working drawings.

15.3 Distinguish between drawings and diagrams.

15.4 Identify eight shape symbols and eight material symbols used in aviation drawings.

15.5 Identify 25 electrical symbols used in aviation diagrams and drawings.

15.6 Explain the procedure for completing a simple technical drawing or diagram of an aircraft component.

15.7 Identify and explain the purpose of technical publications.

15.8 Convert Technical Manual English (TME) to instructional language, and explain the difference.

15.9 Prepare a simple outline for a technical report, and identify the appropriate publication for dissemination of the information.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.1 Identify the class and purpose of working drawings.

PERFORMANCE OBJECTIVE

P15.1 Given three different drawings, identify with 85% accuracy the class and purpose of each drawing.

CRITERION-REFERENCED MEASURE

C15.1 Written or oral test, 85% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Show different drawings on the overhead projector, and have students identify the class and general purpose of each drawing.

2. Have students make simple sketches of each of the three classes of drawings.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.2 Identify 10 types of lines used in working drawings.

PERFORMANCE OBJECTIVE

P15.2 Given 10 lines used in working drawings, identify each line by type with 75% accuracy.

CRITERION-REFERENCED MEASURE

C15.2 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Show different lines on the overhead projector, and have students identify the name and general purpose of each line.

2. Have students make simple sketches using each of the 10 lines found in aviation drawings.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.3 Distinguish between drawings and diagrams.

PERFORMANCE OBJECTIVE

P15.3 Given an aviation drawing and a diagram, identify each and explain its function, with 75% accuracy

CRITERION-REFERENCED MEASURE

C15.3 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Show samples of both diagrams and drawings, and explain how each is used in aviation.

2. Have students go through a maintenance manual and identify which illustrations are diagrams and which are drawings.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.4 Identify eight shape symbols and eight material symbols used in aviation drawings.

PERFORMANCE OBJECTIVE

P15.4 Given 16 symbols for shapes and materials used in aviation, identify each symbol. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C15.4 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Show samples of the 16 shape and material symbols on the overhead projector. Have students identify each symbol.

2. Have students practice making simple diagrams using shape and material symbols.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.5 Identify 25 electrical symbols used in aviation diagrams and drawings.

PERFORMANCE OBJECTIVE

P15.5 Given 25 electrical symbols used in aviation diagrams and drawings, identify each symbol. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C15.5 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use IAP video *Basic Electricity* to explain the use of electrical symbols in aviation technical publications.
2. Show various electrical symbols on the overhead projector, and have students identify each symbol.
3. Have students divide into pairs and quiz each other on electrical symbols.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.6 Explain the procedure for completing a simple technical drawing or diagram of an aircraft component.

PERFORMANCE OBJECTIVE

P15.3 Given an assortment of material, shape, and electrical symbols, complete with 75% accuracy a simple and logical technical drawing using samples of all symbols given.

CRITERION-REFERENCED MEASURE

C15.6 Completed technical drawing, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to demonstrate how to make a simple diagram using symbols.

2. Have students work in pairs and make several simple aviation diagrams using as many symbols as possible.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.7 Identify and explain the purpose of technical publications.

PERFORMANCE OBJECTIVE

P15.7 Given a list of six technical publications, identify and explain the purpose of each with 75% accuracy.

CRITERION-REFERENCED MEASURE

C15.7 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Pass out copies of the following kinds of technical publications: bulletins, manuals, catalogs, advisory circulars, directives, and component specifications. Have students examine the publications and identify the content, purpose, and originator of each publication.

2. Give students different kinds of technical information, and have them indicate the publication from which the information can be most likely extracted.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.8 Convert Technical Manual English (TME) to instructional language, and explain the difference.

PERFORMANCE OBJECTIVE

P15.8 Given a simple instruction written in TME, rewrite the instruction in instructional language, and explain the reasons for the changes. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C15.8 Written assignment and explanation, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use the overhead projector to show excerpts from technical publications written in TME. Have students suggest changes in the wording to make the language more instructional.

2. Provide students with five examples of TME, and have them rewrite the material in simple instructional language.

CONCEPT/DUTY AREA

15. UNDERSTANDING THE FUNDAMENTALS OF READING AND PREPARING TECHNICAL PUBLICATIONS AND DRAWINGS

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

15.9 Prepare a simple outline for a technical report, and identify the appropriate publication for dissemination of the information.

PERFORMANCE OBJECTIVE

P15.9 Given a topic suitable for a technical report, the general scope of the information, and its purpose, identify the appropriate publication for the report, and write a simple outline of the information. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C15.9 Completed outline and appropriately identified publication, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Provide students with a list of technical publications and the purpose for which each is written. Provide sample technical information, giving the purpose of the information. Ask students to suggest which publication would be most appropriate for each sample of information.

2. Have students practice writing outlines for various technical publications.

RESOURCES

TASK 15.1

Equipment and Material:
- Overhead projector
- Working drawings

TASK 15.2

Equipment and Material:
- Overhead projector
- Working drawings

TASK 15.3

Equipment and Material:
- Aviation drawings and diagram
- Aviation maintenance manuals

TASK 15.4

Equipment and Material:
- Overhead projector
- Examples of shape and material symbols

TASK 15.5

Equipment and Material:
- Overhead projector
- Diagrams and drawings using electrical symbols

Audiovisuals:
- *Basic Electricity* (videotape). IAP.

TASK 15.6

Equipment and Material:
- Overhead projector
- Assortment of material, shape, and electrical symbols

TASK 15.7

Equipment and Material:
- Assortment of technical publications, including bulletins, manuals, catalogs, advisory circulars, directives, and component specifications

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

TASKS/COMPETENCIES

16.1 Explain the process of corrosion and its critical importance in aviation.

16.2 Explain direct chemical attack corrosion.

16.3 Explain electrochemical attack corrosion.

16.4 Explain how and where each of the five common types of corrosion occurs on airplanes.

16.5 Explain how climate, size and type of metal, and foreign material affect the type, rate, cause, and seriousness of metal corrosion.

16.6 Explain the nine maintenance functions that may prevent or inhibit corrosion.

16.7 Identify the eight areas on an aircraft that are most susceptible to corrosion.

16.8 Identify ferrous and nonferrous metals, and explain the process of removing corrosion from each.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.1 Explain the process of corrosion and its critical importance in aviation.

PERFORMANCE OBJECTIVE

P16.1 Given a diagram of an aircraft, explain with 75% accuracy the process of corrosion and its critical importance in aviation.

CRITERION-REFERENCED MEASURE

C16.1 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use IAP video *Aircraft Corrosion Control* to explain the importance of preventing and removing corrosion from aircraft.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.2 Explain direct chemical attack corrosion.

PERFORMANCE OBJECTIVE

P16.2 Given the condition of an aircraft with spilled chemicals on a control surface, explain with 75% accuracy how the chemicals can cause serious damage to the structure of the aircraft.

CRITERION-REFERENCED MEASURE

C16.2 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use chemically corroded parts of salvaged aircraft to demonstrate the results of direct chemical attack.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.3 Explain electrochemical attack corrosion.

PERFORMANCE OBJECTIVE

P16.3 Given the condition of an aircraft having a joint with two dissimilar metals and spilled salt water, explain with 75% accuracy how the given conditions can cause corrosion.

CRITERION-REFERENCED MEASURE

C16.3 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use electrochemically corroded parts of salvaged aircraft to demonstrate the results of electrochemical attack.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.4 Explain how and where each of the five common forms of corrosion occurs on airplanes.

PERFORMANCE OBJECTIVE

P16.4 Given a diagram of an aircraft, explain with 75% accuracy how and where each of the five common forms of corrosion occurs.

CRITERION-REFERENCED MEASURE

C16.4 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use corroded aircraft parts to explain the various forms of corrosion and how each developed.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.5 Explain how climate, size and type of metal, and foreign material affect the type, rate, cause, and seriousness of metal corrosion.

PERFORMANCE OBJECTIVE

P16.5 Given information on climate, size and type of metal, and foreign material, explain with 75% accuracy how each may affect the type, rate, cause, and seriousness of metal corrosion.

CRITERION-REFERENCED MEASURE

C16.5 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Identify corroded areas on the static aircraft and on salvaged aircraft parts, and discuss how various factors affect corrosion, especially under certain climatic conditions.

2. Discuss how metal and the introduction of foreign matter to the aircraft components can contribute to corrosion.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.6 Explain the nine maintenance functions that may prevent or inhibit corrosion.

PERFORMANCE OBJECTIVE

P16.6 Given a list of nine maintenance functions, explain with 75% accuracy how each may prevent or inhibit corrosion.

CRITERION-REFERENCED MEASURE

C16.6 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Use salvaged parts of aircraft to demonstrate methods of corrosion-preventive maintenance.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.7 Identify the eight areas on an aircraft that are most susceptible to corrosion.

PERFORMANCE OBJECTIVE

P16.7 Given access to the static aircraft, identify with 75% accuracy the eight areas that are most susceptible to corrosion.

CRITERION-REFERENCED MEASURE

C16.7 Demonstration, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Review the previous lessons and summarize the eight trouble spots for corrosion.

2. Distribute aircraft diagrams, and have students identify the trouble spots and indicate what can be done to protect the vulnerable areas.

CONCEPT/DUTY AREA

16. UNDERSTANDING THE CAUSES AND EFFECTS OF CORROSION

COURSE

Aviation Technician I (Semester II)

TASK/COMPETENCY

16.8 Identify ferrous and nonferrous metals, and explain the process for removing corrosion from each.

PERFORMANCE OBJECTIVE

P16.8 Given five metals, identify which metals are ferrous and which are nonferrous, and explain how corrosion can be removed from each. Answer must be 75% accurate.

CRITERION-REFERENCED MEASURE

C16.8 Written or oral test, 75% accuracy

ENABLING OBJECTIVES/LEARNING ACTIVITIES

1. Place 25 aircraft parts and components on a table. Demonstrate methods of identifying the ferrous and nonferrous metals by (a) their characteristics and (b) the type or form of corrosion, if present.

2. Have students work in pairs to (a) practice identifying metals, (b) locate corrosion, and (c) determine how the corrosion could be safely removed.

RESOURCES

TASK 16.1

Equipment and Material:	Aircraft diagrams
Audiovisuals:	*Aircraft Corrosion Control* (videotape). IAP.

TASK 16.2

Equipment and Material:	Corroded aircraft parts

TASK 16.3

Equipment and Material:	Electrochemically corroded aircraft parts

TASK 16.4

Equipment and Material:	Aircraft diagrams Corroded aircraft parts

TASK 16.5

Equipment and Material:	Static aircraft Corroded aircraft parts

TASK 16.6

Equipment and Material:	Salvaged aircraft parts

TASK 16.7

Equipment and Material:	Aircraft diagrams

TASK 16.8

Equipment and Material:	Ferrous and nonferrous metals Aircraft parts and components

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