HVACR Technician

Addition and Subtraction

Objectives:

- Define the following terms: whole number, numeral, digit, decimal, place value, addend, sum, minuend, subtrahend, and difference
- Properly place commas in large numbers
- Explain the significance of the digit zero in a number
- Differentiate between concrete and abstract numbers
- Properly prepare numbers for addition and subtraction
- Perform addition and subtraction on numbers
- Check your answers to both addition and subtraction problems
- Use a calculator to add and subtract numbers

Multiplication and Division

Objectives:

- Define the following terms: factor, multiplicand, multiplier, partial product, product, dividend, divisor, quotient, and remainder
- Recognize the various signs used for multiplication and division
- Properly prepare numbers for multiplication and division
- Perform multiplication and division on whole numbers, decimal numbers, and mixed decimal numbers Check your answers to both multiplication and division problems
- Find the average of a group of numbers
- Use a calculator to multiply and divide numbers

Fractions, Percents, Proportions, and Angles

Objectives:

- Define the following terms: fraction, proper fraction, improper fraction, lowest common denominator, percent, ratio, and proportion
- Add, subtract, multiply, and divide fractions
- Change fractions to decimals and decimals to fractions
- Solve problems involving percent
- Work with ratios and equivalent ratios
- Solve proportion problems
- Use a protractor to measure angles
- Lay out templates for checking angles
- Use a calculator to solve percent problems, to convert fractions to decimals, and to calculate missing terms in proportions

Metric System

Objectives:

- Name the base units most commonly used in the metric system and identify what they're used to measure
- Identify metric prefixes and their values
- Apply conversion factors to create a unit that's larger or smaller than the base unit
- Estimate lengths in metric units
- Express temperature in degrees Celsius
- Define the terms mass, density, force, torque, and pressure, and identify the metric units used to measure each one
- Use a conversion table to convert metric units to English units and English units to metric units
- Use a calculator to perform metric conversions

Formulas

Objectives:

- Explain the use of variables in formulas
- Prepare and use formulas to solve problems
- Use formulas to calculate the perimeter of a triangle and a rectangle, and the area of a triangle, a rectangle, and a circle
- Use formulas to calculate distance, current in a circuit, and the volume of a pyramid and a sphere
- Use a calculator to find square roots and solve formulas
- Substitute given numerical values for letters in a formula and find the unknown quantity
- Transform and solve equations and formulas

Introduction to Algebra

Objectives:

- Explain the difference between positive and negative numbers and their uses
- Perform basic arithmetic operations with signed numbers
- Raise a number to any power
- Use the order of operations for solving problems involving multiple operations
- Define the following words: term, constant, coefficient, exponent, monomial, trinomial, and polynomial Identify and combine like terms in an expression
- Perform basic arithmetic operations with signed terms
- Multiply and divide terms containing exponents
- Remove parentheses from an expression and simplify the expression

Linear Distance and Measurement

Objectives:

- Measure using both English and metric (SI) units of length
- Calculate the perimeters of rectangles, squares, and triangles
- Calculate the areas of objects such as rooms or machine bases
- Calculate the circumference of circular objects such as pipes or tanks
- Measure distances using rigid and flexible rules, thickness gages, and screw pitch gages
- Make precise measurements using vernier calipers and micrometers

Bulk Measurement

Objectives:

- Measure an angle by degrees
- Find the areas of rectangles, triangles, and circles
- Find the volumes of prisms, cylinders, and cones
- Find the mass of material stored in a container
- Determine the amount of material that can be stored or handled
- Discuss the types and uses of conveyors and weighing systems

Temperature Measurement

Objectives:

- Change temperature units from one system to another
- Discuss the use of the various types of thermometers
- Select the type of thermometer to be used at certain temperatures

Energy, Force, and Power

Objectives:

- Distinguish among the concepts of energy, force, and power
- Explain what the term work means and how it's measured
- Know by sight the basic machines: lever, inclined plane, wedge, wheel and axle, and screw
- Solve simple problems that involve levers, mechanical advantage, and machine efficiency
- List the forms of energy that have important industrial applications and the instruments used for measuring energy

Fluid Measurement

Objectives:

- Understand the properties of fluids
- Determine the density, specific gravity, and viscosity of fluids
- Express pressure in three different units
- Measure the pressure of fluids using manometers and Bourdon tube pressure gages
- Measure the flow rate of fluids using different types of flowmeters

Trades Safety: Getting Started

Objectives:

- List the physical hazards associated with chemicals and describe how to avoid them
- Name several electrical shock hazards and the techniques used to prevent shocks
- List the steps in a lockout/tagout procedure
- Explain the importance of machine guarding, and name several types of machine guards
- Name the five classes of fire and how to extinguish each of them
- Describe the proper technique used to manually lift a heavy load
- Explain how to avoid hand injuries when using hand and power tools
- List some of the hazards involved in welding and hot cutting operations and how to prevent them
- Explain how job analysis and ergonomics are used to improve the workplace
- Explain the importance of using personal protective equipment (PPE)
- Name the agencies and organizations that make and enforce safety regulations, and explain an employee's responsibilities under those regulations

Working Safely with Chemicals

Objectives:

- Recognize the different ways in which a chemical can cause you physical injury
- Name the paths of entry along which chemicals enter your body
- Describe the basic types of injuries caused by chemicals
- Identify potential chemical hazards in the workplace
- Describe how to identify, store, and label hazardous chemicals
- List several methods used to prevent chemical accidents
- Explain why proper training is important to chemical handling
- Describe the types of personal protective equipment used when handling chemicals
- Explain the role of government agencies in enforcing chemical regulations

Fire Safety

Objectives:

- Describe the types of property losses and injuries associated with fires
- Explain how fires are ignited
- Identify the five classes of fire
- Describe the primary fire hazards found in the workplace
- Explain the various ways in which fires can be prevented
- Describe the operation of several different fixed fire protection systems
- Identify the proper type of portable fire extinguisher to use on a fire
- Describe the operation of several different types of fire extinguishers
- Explain how to defend yourself and others in a fire situation
- Describe how to evacuate a burning building in a safe manner

Safe Handling of Pressurized Gases and Welding

Objectives:

- Identify common welding gases and the hazards associated with each of them
- Safely handle and store different types of gas cylinders
- Recognize the safety considerations involved in the setup and operation of electric arc-welding equipment
- Explain how to safely set up and operate a basic gas welding rig
- Identify welding equipment malfunctions and take corrective action
- Utilize fire prevention and protection methods specific to welding operations
- Discuss the importance of the hot-work-permit program in your facility
- Explain the correct use of protective clothing and equipment for welding
- Understand the importance of proper ventilation when welding
- Describe how to effectively deal with confined spaces when performing welding operations

Advanced Electrical Safety

Objectives:

- Explain how electricity can harm you and property
- Discuss the importance of using quality electrical components
- Describe why it's important to properly ground electrical installations
- Understand the type of equipment used in hazardous locations
- List the safety practices required when performing electrical work
- Discuss the importance of workspace clearance around electrical enclosures

Material-Handling Safety

Objectives:

- Recognize the hazards associated with handling materials
- Know the types of injuries that can be caused by these hazards
- Understand how to effectively use safe material-handling practices
- Know how to avoid physical injury when handling loads
- Identify the parts of a powered lift truck and similar mechanized material-handling equipment
- Explain how to operate various types of mechanized material-handling equipment safely
- Know and follow the rules for safe operation of powered industrial material-handling equipment
- Understand and respect the limits and restrictions placed on powered material handling mechanisms

Machine Safety

Objectives:

- Recognize the basic machine motions that can present a hazard to you
- Recognize the types of machinery most likely to be hazardous to you
- Understand the types of injuries caused by accidents commonly associated with unsafe machine-operating procedures
- Discuss the importance of machine guarding and how to incorporate methods of guarding to avoid physical injury
- Recognize the types of machine guards commonly used in industry
- Control various forms of hazardous machine energy through the use of lockout/ tagout procedures Understand how and why to properly use personal protective equipment for added protection when operating industrial equipment

Jobs, Companies, and the Economy—Basic Concepts for the Employee

Objectives:

- Conclude how the economy will affect you as a consumer and as an employee
- Explain the concept of competition and how a business must react to market demands
- Evaluate how government policies affect the amount of saving and investing within an economy
- Defend the use of a flexible and empowered workforce in making a business more competitive
- Explain various economic measuring tools such as the inflation rate, the unemployment rate, and the GDP
- Appraise the current status of American labor in general and the status of American labor unions in particular
- Recognize how you as an employee or as an employer must compete in an increasingly international marketplace

Quality Concepts: Terminology

Objectives:

- Define quality and total quality management, using examples
- Describe how quality has evolved to where it is today
- Explain several motivations for quality improvement
- Describe how quality-conscious organizations have changed for the better
- Assess quality-consciousness in individuals and organizations
- Explain how some familiar business practices have led to TQM and how certain other common practices have gotten in the way of TQM
- Name some successful results of TQM programs

Common Hand Tools, Part 1

Objectives:

- Identify common hand tools and their function
- Explain how to safely use common hand tools
- Maintain most types of hand tools
- Describe the benefits of several special features available for some hand tools

Common Hand Tools Part 2

Objectives:

- Identify and use various chisels and punches safely
- Use and care for cutting tools
- Understand the need for specialized maintenance tools
- Correctly use threading and other precision tools

Precision Measuring Instruments Part 1

Objectives:

- Explain the difference between accuracy and precision
- Define standard, the Rule of 10, and traceability
- Describe Abbe's error
- Describe how to use a number of tools for measuring dimensions
- Read a vernier scale
- Demonstrate the skill to work with both English and metric dimensions and with their abbreviations
- Convert between millimeters and inches

Electric Drilling and Grinding Tools

Objectives:

- Safely set up and operate a portable electric drill, drill press, and electric hammer
- Choose the proper drill bit for many drilling applications
- Select the proper drilling tool for an application
- Set up and use a variety of hand and bench grinders
- Safely use the proper grinder for various jobs
- Follow the necessary steps for proper tool maintenance

Power Cutting Tools

Objectives:

- Identify the most common portable and stationary power saws
- Identify the various parts of a saw and explain how they work
- Discuss the types of cuts made by each type of saw
- List the various safety precautions you should follow when using power saws
- Choose the most appropriate saw and blade for the type of work being done

Pneumatic Tools

Objectives:

- Describe the various pneumatic tools used for plant maintenance
- Identify and describe the safe use of impact, cutting, and grinding tools
- Explain how pneumatic hammers, nailers, and staplers are selected and used in a safe manner
- Describe the use of pneumatic assembly tools such as grinders, sanders, screwdrivers, and drills and how other types of production tools are selected and used
- Identify the proper procedures for pneumatic tool and system care
- List procedures for safely using pneumatic tools
- Understand how vibration and excess noise can cause bodily injury

Preventive Maintenance

Objectives:

- Describe the function of inspection and scheduled maintenance as the basis of preventive maintenance
- Explain why preventive maintenance is performed and how it’s scheduled
- Identify those within industry who should be part of preventive maintenance planning and execution
- Discuss the causes, effects, and goals of a successful preventive maintenance program
- Explain how a computerized preventive maintenance program can be developed and implemented

Preventive Maintenance Techniques

Objectives:

- Explain how to inspect and properly maintain a belt, chain, and gearbox power transmission system
- Discuss why proper alignment is necessary when operating a power transmission system
- List the steps needed to properly maintain an AC or DC motor
- Explain how to perform a start-up or bump test of a motor
- Describe how to perform PM tasks on pneumatic systems
- Describe how to maintain both floor and elevated conveyor systems
- Identify the types of elevators and vertical lifts in your plant and the proper PM procedures for this equipment
- Explain how to maintain liquid and vacuum pump systems
- Describe how to perform a basic alignment of in-line shafts
- List the proper PM procedures for electronic controllers and robot systems Preview

Introduction to Print Reading

Objectives:

- Describe the basic format for conveying technical information in a drawing
- Identify and interpret the various drawing views used in technical drawings
- Understand how information is organized in notes and title blocks
- Interpret the different line types used in drawings
- Understand the concept of the drawing scale and how it affects information shown in the drawing

Print-Reading Symbols and Abbreviations

Objectives:

- Interpret the most common abbreviations used on drawings
- Understand and interpret the various symbols and notations used on drawings for electrical, architectural, mechanical, and other types of applications
- Recognize how symbols are used to show standard materials, parts, and assemblies
- Interpret thread specifications
- Understand some common symbols used in machining prints
- Recognize common symbols found on hydraulic and pneumatic prints

Dimensioning and Tolerancing

Objectives:

- Know the international standards and conventions that apply to drawings
- Understand how different numbering systems were developed and how they're applied to prints and drawings
- Understand dimensions and tolerances on drawings that describe geometries of parts and assemblies Recognize and interpret common symbols and nomenclature used in geometric dimensioning and tolerancing (GD&T)
- Understand how GD&T uses symbols to explain and describe the designer's intent, and eliminate misinterpretation of the print

Print Reading Applications

Objectives:

- Understand standard drawing formats that give information about part titles, part numbers, dimensional standards, revisions, and materials
- Explain how various components shown on prints are connected or related to each other
- Obtain important information from a drawing about quantities, materials, assembly processes, or dimensions
- Visualize the three-dimensional parts and assemblies represented by two-dimensional drawings

Building Drawings

Objectives:

- Identify the various kinds of building drawings
- Compare elevations, plans, and sections
- Match the symbols used on drawings with the various building materials they stand for
- Interpret the explanations and abbreviations used on building drawing
- Read steel and concrete structural drawings

Electrical Drawings and Circuits

Objectives:

- Identify electrical construction drawings, schematics, and wiring diagrams
- Interpret various electrical symbols
- Read standard abbreviations used in electrical diagrams
- Tell if a diagram is a block diagram, a schematic diagram, or a wiring diagram
- Compare closed circuits, open circuits, grounded circuits, and short circuits

Electronics Drawings

Objectives:

- The various electronics symbols used on drawings
- The various types of drawings used in the electronics field

Hydraulic and Pneumatic Drawings

Objectives:

- Graphic symbols for lines, flows, and reservoirs
- Pump and valve symbols
- Fluid circuit and air circuit components
- Graphical, circuit, cutaway, pictorial, and combined diagrams

Piping: Drawings, Materials, and Parts

Objectives:

- Define the term ‘’piping drawings”
- Recognize on sight plans, elevations, and sectional views
- Identify a view by its placement on a drawing
- List what working drawings include
- Evaluate whether or not a freehand sketch serves its intended purpose
- Interpret the standard symbols and abbreviations used on piping drawings and diagrams
- “Read” the color coding on piping in industrial and power plants
- Interpret dimensions marked on piping drawings
- Define piping plans, diagrams, plot plans, general arrangements, and details, and state the use of each • List the various materials used for pipe and give the characteristics of pipe of each material
- Classify pipe by material, construction, end condition, strength, and size
- Recognize the various types of valves and identify their use and construction
- List and identify various kinds of pipe hangers and supports and other piping accessories

Welding Symbols

Objectives:

- Identify by name the welding processes commonly used in plant maintenance work
- Name the best welding processes for a given welding job
- Identify by sight the basic joint and groove designs used in welding
- Identify by sight the basic types of welds, and describe their uses
- Interpret the weld symbols most often found in the drawings used in plant maintenance work

Sheet Metal Basics

Objectives:

- Identify sheet metal of known material and thickness by gage and weight
- Figure allowances for bends, circumferences, seams, locks, and edges
- Know when and where to cut relief radii
- Catalog and identify by sight the various seams, locks, and edges
- Name and describe the major tools and machines used in sheet metal working
- Explain how large fittings can be constructed
- List the characteristics of PVC and PVF sheet and laminates

Sketching

Objectives:

- Use the right techniques for sketching straight and curved lines, and circles and arcs
- Make, with practice, multiview sketches of simple objects that accurately show all the details of the objects
- Dimension sketches of simple machine parts with enough detail that parts can be made
- Draw, with practice, realistic picturelike sketches of objects that have simple rectangular and circular shapes

Properties of Materials

Objectives:

- Describe the types and effects of stress on a body
- Identify the characteristics of cohesive properties in materials
- Describe the relationships of working stress on different materials
- Explain and calculate safe load
- Identify the types of fasteners used with structural steel
- Describe how stress impacts rope, wire, and chains
- Identify the properties of metals

Elements of Chemistry

Objectives:

- Identify chemistry and classifications of matter
- Identify atoms and molecules
- Identify fundamental laws, valence, formulas, and equations
- Identify solutions, metals, acids, bases, and salts
- Identify ions and the theory of ionization
- Identify periodic grouping of the elements
- Identify nonmetallic elements and their compounds
- Identify metallic elements and their compounds
- Identify nuclear energy
- Describe organic chemistry

Principles of Mechanics Part 1

Objectives:

- Identify the scope of the sh1dy of mechanics
- Define the forms of energy and the physical properties of bodies
- Explain the motion of bodies
- Define the terms acceleration, retardation, and mass and weight
- Explain the center of gravity, and the effect of work and energy
- Apply the principles of mechanical advantage and the coordinate of systems
- Describe computation, measurements, and Newton's Laws of Motion
- Apply the principles of uniform motion
- Calculate problems using graphic and analytic methods
- Describe the concepts of variable motion and falling bodies
- Identify the nature of simple harmonic motion
- Describe the nature of centrifugal force

Specification Writing Part 1

Objectives:

- Identify specifications and other contract documents
- Identify aims and dangers
- Identify knowledge required for writing specifications
- Identify specification language
- Identify outline specifications
- Identify preliminary writing procedures
- Identify the technical section
- Identify specifying materials
- Identify miscellaneous paragraphs
- Identify more about less
- Identify general conditions
- Identify supplementary genera l conditions
- Identify general arrangements

Specification Writing Part 2

Objectives:

- Describe instructions to bidders
- Describe general conditions, modifications and supplementary general conditions
- Describe form of proposal
- Describe excavating and grading
- Describe concrete
- Describe masonry
- Describe miscellaneous ironwork
- Describe rough carpentry
- Describe finish carpentry
- Describe roofing and sheet metal work
- Describe metal windows
- Describe glass and glazing
- Describe caulking
- Describe plastering
- Describe structural glass
- Describe marble and ceramic tile
- Describe vinyl tile
- Describe painting
- Describe finishing hardware

Principles of Heating, Ventilating, and Air Conditioning, Part 1

Objectives:

- Identify basic principles and matter
- Identify sources of heat and measurement of temperature
- Identify heat transmission and measurement
- Identify effects of heat
- Identify heat and properties of mixtures
- Describe heat and work
- Describe combustion and heat
- Familiarize yourself with steam

Principles of Heating, Ventilating, and Air Conditioning, Part 2

Objectives:

- Identify weight and pressure of gases
- Identify energy, motion, and air velocities
- Identify aid and air mixtures
- Identify air movements and ventilation
- Identify air conditions and air conditioning

Reading Piping Prints

Objectives:

- Describe basic drawing information
- Describe kinds of drawings
- Describe dimensions, symbols, and abbreviations
- Identify descriptions of piping drawings
- Identify pipe materials and methods of manufacture
- Identify valves
- Identify piping accessories
- Identify piping assembly
- Identify fluid-power diagrams
- Identify examples of piping drawings

Air-Conditioning Systems, Part 1

Objectives:

- Describe comfort air conditioning
- Describe heat transmissions through buildings

Air-Conditioning Systems, Part 2

Objectives:

- Describe types of air-conditioning equipment
- Describe air-distribution systems
- Describe automatic controls and cooling systems
- Describe noise elimination, zoning, and special conditions
- Describe heat pumps

Principles of Mechanics Part 2

Objectives:

- Explain concurrent and parallel forces
- Identify the nature of friction and sliding friction
- Apply machine elements such as levers
- Identify the advantages of levers and actions of an inclined plane
- Explain wedges and screw threads
- Describe the general principles of wheels, axles, and tackle
- Calculate friction in a tackle and differential chain hoist
- Define the functions of pulleys, belts, and gears
- Explain spur, bevel, and helical gears
- Describe worm and skew gears and sprockets
- Identify gear trains and change gears
- Explain belts, chains, and keys

Electric Heating

Objectives:

- Compare heating sources and list some of the benefits of electric heating
- Define the basic terms used in electric heating
- Describe the basics of heat loss and how insulation, ventilation, and other factors affect heat loss calculations
- Understand how heating requirements for buildings are estimated using the degree day method of calculation
- Identify and compare the major selections of heating equipment
- Discuss the relationship of heat, current, resistance, and voltage
- Describe the main types of electric thermal-storage systems available, including the advantages of each
- Identify and describe the various heating controls available
- Compare and select electric-heating systems for residential applications

Servicing of Gas Appliances Part 2

Objectives:

- Describe types of heating systems
- Describe sufficient air supply
- Describe automatic controls
- Describe flue gas analysis
- Describe three basic cooling systems
- Describe cooling and heating cycles of two different types of units
- Describe control systems and their purposes
- Describe service problems
- Describe high-pressure units

The Trades of Plumbing and Pipe Fitting

Objectives:

- Explain the difference between plumbing and pipe fitting
- Explain the differences between codes, regulations, basic principles, and the different types of standards
- Locate the basic plumbing principles
- Explain the difference between licensing and certification
- Identify who would be responsible for developing the construction drawings and specifications
- Identify the various types of construction drawings and their uses
- Determine what scale was used to make a drawing
- Use a measuring scale
- Identify symbols and abbreviations used on working drawings
- Locate specifications pertaining to a particular material or system
- Explain how the different types of plumbing and piping systems are categorized

Pipes, Fittings, and Valves

Objectives:

- Identify and classify the different types of material used to manufacture pipes, fittings, and valves
- List the characteristics of the various types of pipes, fittings, and valves available
- Classify and identify pipe “markings”
- Know how to “read” a fitting for ordering purposes
- Identify the various types of valves and know their components
- Perform basic valve maintenance and know proper installation techniques
- Select and specify pipes, fittings, and valves for a particular application

Plumbing and Pipe-Fitting Tools

Objectives:

- Explain the importance of safety on the job
- Identify the rules of job safety and tool safety
- Apply the rules of job safety and tool safety to workplace situations
- Identify the various tools available to perform layout, cutting, and boring tasks
- Determine when and how to use layout, cutting, and boring tools
- Identify the tools available to join and assemble pipes of various materials
- Determine when and how to use pipe-joint assembly tools
- Identify the tools needed for testing and maintaining piping systems
- Determine when and how to use finishing, testing, and maintenance tools for piping systems

Joining and Assembling Pipes

Objectives:

- List necessary precautions to be taken when working with specific materials or procedures to join pipes
- Cut pipe lengths manufactured from the various pipe materials, as required by a piping system layout
- Prepare and assemble the various pipe joints you learned earlier
- Identify the materials, tools, and equipment needed for pipe welding
- Perform basic pipe-welding tasks

Supporting, Installing, and Testing Pipes

Objectives:

- Lay out, install, and align a piping system either inside a building or underground
- Properly support a piping system using the various available methods, taking into account thermal expansion and contraction
- Identify methods and materials used to protect piping installations
- Calculate pipe offsets to avoid obstructions when laying out and installing a piping system
- Test different types of piping systems for defective materials or faulty workmanship

Plumbing Fixtures and Appliances

Objectives:

- Recognize trade terms used to categorize and describe plumbing components
- Identify the different types of plumbing fixtures, trim, appliances, and appurtenances
- Explain the procedures used for installing plumbing fixtures and trim
- Discuss common maintenance problems and corrective actions for plumbing components

Tanks, Pumps, and Boilers

Objectives:

- Identify and classify various tanks
- Specify and size both round and rectangular tanks and sumps, for particular applications
- Identify different pumps, and understand pump principles
- Discuss pump installation, start-up, and maintenance procedures
- List the characteristics of boilers, and discuss boiler classifications
- Identify the various boiler accessories, and understand basic boiler maintenance

Insulation for Piping and Ducting

Objectives:

- Identify and understand the functions and types of different piping and ducting insulation materials
- Select the proper insulation type, material, and thickness for a given piping system
- Properly cut, form, and install insulation and shielding in piping and ducting

Predictive Maintenance

Objectives:

- Define what PDM is and how it can be used in industry
- Identify the various types of technologies used in PDM
- Explain what goals should be considered for a new and a maturing PDM program
- Discuss the scope of basic mechanical PDM
- Explain how a time waveform and a frequency spectrum can be used to identify machine faults

Predictive Maintenance: Vibration Analysis

Objectives:

- Explain how vibration measurements are taken and the systems used to identify measurement points
- Identify balance, looseness, and misalignment problems
- Discuss the techniques used to diagnose rolling-element bearing faults
- Explain how journal bearing condition monitoring and fault analysis is performed
- Identify speed reducer faults that occur in the gear sets or the internal bearings
- Describe how resonance can affect the operation of equipment

Predictive Maintenance— Advanced Topics

Objectives:

- Explain the steps involved in performing balance and alignment on industrial machines
- Discuss the use and operation of ultrasonic equipment to find problems such as electrical arcing, bearing faults, and internal and external air leaks in pneumatic systems
- Describe the procedures used in electrical signature analysis (ESA) and how this inspection system can find motor problems
- Explain how oil analysis can detect lubricant problems and contamination
- Describe how thermography is used in a PDM program