Steel Center for CTE
Course: HVAC Technology

Unit Name: PA100 - INTRODUCTION TO HVAC

Unit Number: PA100

Dates: Fall 2020 **Hours:** 24

Unit Description/Objectives:
Student will know and be able to complete the required entry class/school forms, identify job opportunities, review course competencies, and demonstrate the safe use of tools safety practices and SDS protocol.

Tasks:

PA101 - Identify HVAC systems.

PA102 - Describe career opportunities in the HVAC profession.

PA103 - Demonstrate awareness of the occupational requirements.

PA104 – Reserved

PA105 Use soft skills when interacting with customers

Standards / Assessment Anchors

Focus Standard

13.1.11.11.B Analyze career options based on personal interests, abilities, aptitudes, achievements and goals

Supporting Standard

CC.3.5.11-12.D. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

CC.3.5.11-12.G. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Connecting Standard

CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review career opportunities using the internet
Identify components by using drawings and schematics

Skill:

Follow task sheet instructions to complete practical projects
Explain the basic principles of heating, ventilating, and air conditioning
Identify career opportunities available to people in the HVAC trade
Explain the purpose and objectives of an apprentice training program
Describe how certified apprentice training can start in high school

Remediation:

Re-teach major concepts
Worksheets
Individual assistance
Peer Tutoring
Study Guides

Enrichment:

Conduct a shop safety audit using a JSA
Complete a safety review of the program
Assist another student

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations.
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Rubrics

Quizzes
Worksheets
Projects
Tests
Complete packet questions
Answer questions

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment

Laptops

Steel Center for CTE
Course: HVAC

Unit Name: PA200 - BASIC SAFETY

Unit Number: PA200

Dates: fall 2020 **Hours:** 116

Unit Description/Objectives:
Student will know and be able to complete and demonstrate the safe use of tools, safety practices, and SDS protocol.

Tasks:

PA201 –Reserved

PA202 - Reserved

PA203 - Identify and demonstrate the use of personal protection equipment.

PA204 – Apply OSHA regulations to identify hazards and measures to

prevent job site accidents from occurring

PA205 - Set up and use stepladders, extension ladders, and scaffold

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12. C. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text

Supporting Standard

CC.3.5.11-12.D. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

CC.3.5.11-12.G. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Connecting Standard

CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

Instructional Activities:

Knowledge:

Observe demonstrations
Participate in theory lesson
Take notes
Respond to questions
List safety practice for ladders
Describe the proper use of the different types of fire extinguishers
Explain the purpose of OSHA and how it promotes safety on the job
Explain safety issues concerning lockout/tagout procedures
Explain personal protection using fall protection systems
Explain the role that safety plays in the construction crafts
Describe what job-site safety means
Explain the appropriate safety precautions around common job-site hazards
Explain the importance of SDS formerly known as MSDS.

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Identify the responsibilities and personal characteristics of a professional crafts person
Explain the role that safety plays in the construction crafts
Describe what job-site safety means
Explain the appropriate safety precautions around common job-site hazards
Demonstrate the use and care of appropriate personal protective equipment
Follow safe procedures for lifting heavy objects
Describe safe behavior on and around ladders and scaffolds
Describe fire prevention and fire-fighting techniques
Define safe work procedures around electrical hazards
Demonstrate the use of ladders and scaffolding

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:

Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations.

Handle material in a safe and work like manner

Use protective clothing and equipment

Use hand tools in a safe manner

Use adequate ventilation when working in enclosed areas

Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work like manner according to OSHA standards

Know and follow the established safety rules at all times

Assessment:

Rubrics
Quizzes
Worksheets
Projects
Tests
Complete packet questions
Answer questions

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
PPE
Ladders (step and extension)
Scaffold

Steel Center for CTE
Course: HVAC Technology

Unit Name: PA300 - TOOLS FOR HVAC/R

Unit Number: PA300

Dates: Fall 2020 **Hours:** 40

Unit Description/Objectives:
Student will know and be able to safely use all tools in the HVAC/R trade.

Tasks:
PA301 – Use and maintain basic hand tools used in the trade

PA302 – Use and maintain basic power tools used in the trade

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12. A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:

Study glossary of terms
Complete projects
Participate in theory lesson, take notes, and respond to questions
Complete individual and group projects
Memorize essential vocabulary
Identify common hand tools and their uses in the HVAC trade
Identify common power tools and their uses in the HVAC trade

Skill:

Recognize and identify some of the basic hand tools used in the construction trade
Use tools in a safe manner
Describe the basic procedures for taking care of these tools
Identify commonly used power tools of the construction trade
Use of power tools in a safe manner
Explain how to maintain power tools properly

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Hone competition skills
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

- Worksheets
- Quizzes
- Pre/Post Test
- Rubrics
- Group Projects

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic handtools
Battery tools
Power tools
Torches
HVAC specific hand tools

Steel Center for CTE
Course: HVAC

Unit Name: PA400 - BLUEPRINT READING

Unit Number: PA400

Dates: Fall: 2020 **Hours:** 16

Unit Description/Objectives:
Student will know and be able to recognize and identify basic blueprint terms, components, and symbols and related information on blueprints to actual locations on the print; recognize different classifications of drawings; and interpret and use drawing dimensions.

Tasks:
PA401 – Compare types of blueprints

PA402 – Read and interpret blueprint

plans

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standards/Anchors

C.3.5.11-12. D Determine the meaning of symbols, key terms, and other domain specific words

CC.3.5.11-12. E Analyze the structure of the relationships among concepts in a text

Connecting Standard

CC.3.6.11-12. H. Draw evidence from informational texts to support analysis, reflection, and research.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Recognize and identify basic blueprint terms, components, and symbols
Relate information on blueprints to actual locations on the print
Recognize different classifications of drawings
Interpret and use drawing dimensions

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks L
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Pre/Post Test
Rubrics
Group Projects

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Blue prints
Tape measure
calculator

Steel Center for CTE
Course: HVAC Technology

Unit Name: PA500 - PIPING PRACTICES

Unit Number: PA500

Dates: Fall 2020 **Hours:** 145

Unit Description/Objectives:

Student will know and be able to identify, assemble and install copper, plastic, and steel piping.

Tasks:

PA501 - Identify piping materials.

PA502 - Select, measure, cut, and ream piping and tubing.

PA503 – Cut, ream, thread and assemble steel piping projects and pressure test

PA504 – Assemble non-metallic pipe and fittings and pressure test

PA505 - Assemble copper tubing projects and pressure test according to trade standards.

PA506 - Solder copper tubing.

PA507 - Braze ACR tubing.

PA508 - Identify and use fittings and tools for steel (black) pipe. PA509 - Cut, ream,

thread and assemble steel (black) pipe.

PA509- Reserved

PA510 - Assemble corrugated stainless steel gas tubing (CSST) projects.

PA511 - Reserved

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Assemble and operate the tools used for connection of piping material
Prepare tubing and fittings for assembly
Use appropriate method for assembly
Identify the purposes and uses of piping material
Identify inert gases needed to purge tubing for proper assembly

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Copper pipe and fittings
Steel pipe and fittings
CSST pipe
Acetylene tank
Torch assembly
Solder
Flux

Brazing rods
Nitrogen
Gauges
Pipe dope
Threader
Oil bucket
Vise
Pipewrenches
cutters

Steel Center for CTE
Course: HVAC

Unit Name: PA600 - BASIC ELECTRICITY

Unit Number: PA600

Dates: Fall 2020 **Hours:** 160

Unit Description/Objectives:

Student will know and be able to state how electrical power is generated and distributed and describe how voltage, current, resistance, and power are related. Student will also know and be able to use Ohm's law to calculate the current, voltage, and resistance in a circuit and use the power formula to calculate how much power is consumed by a circuit. Finally, the student will know and be able to describe the differences between series and parallel circuits.

Tasks:

PA601 – Compare and analyze methods of producing electricity using appropriate terms

PA602 - Calculate basic electrical quantities using Ohm's law.

PA603 - Explain how magnetism is used in different HVAC components.

PA604 - Implement safe electrical practices.

PA605 - Interpret and draw various types of electrical schematics and symbols.

PA606 - Apply proper wiring techniques.

PA607 - Perform electrical testing to include mechanical/electronic relays.

PA608 - Wire series circuit, parallel circuit, and series / parallel circuit.

PA609 - Install and size electric disconnects, circuit breakers and fuses.

PA610 – classify and test various types of capacitors

PA611 - Identify electrical motors and their applications.

PA612 – Differentiate motor control protection and start devices

PA613 – Apply electrical codes.

PA614 – Determine transformers and their applications

PA615- Size, apply and ground electrical circuits and raceways

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12.B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:

Complete time cards describing daily work completed
Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
State how electrical power is generated and distributed
Describe how voltage, current, resistance, and power are related
Use Ohm's law to calculate the current, voltage, and resistance in a circuit
Use the power formula to calculate how much power is consumed by a circuit
Describe the differences between series and parallel circuits
Recognize and describe the purpose and operation of the various electrical components used in HVAC equipment
State and demonstrate the safety precautions that must be followed when working on electrical equipment
Make voltage, current, and resistance measurements using electrical test equipment

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic hand tools
Romex wire
Motors
Transformers
Relays
Capacitors
Volt meter
Calculator

Steel Center for CTE
Course: HVAC

Unit Name: PA700 - INTRODUCTION TO COOLING

Unit Number: PA700

Dates: Fall 2020 **Hours:** 160

Unit Description/Objectives:
Student will know and be able to explain how heat transfer occurs in a cooling system and demonstrate an understanding of the terms and concepts used in the refrigeration cycle.

Tasks:

PA701 - Measure temperature and pressure of a cooling system.

PA702 - Calculate superheat and sub cooling.

PA703 - Locate and describe components of the basic refrigeration cycle.

PA704 – Evaluate refrigerants using temperature and pressure charts for various refrigerants

PA705 – Analyze and test the operations various compressors.

PA706 – Analyze and test the operations of various condensers.

PA707 – Analyze and test the operations of various evaporators.

PA708 – Analyze, test and adjust the operations of various metering devices.

PA709 - Identify secondary components used in the air conditioning and refrigeration industry.

PA710 - Evaluate effects of airflow on cooling system performance.

PA711- Categorize and manipulate service valves

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:

Complete time cards describing daily work completed
Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Explain how heat transfer occurs in a cooling system, demonstrating an understanding of the terms and concepts used in the refrigeration cycle
Calculate the temperature and pressure relationships at key points in the refrigeration cycle
Under supervision, use temperature- and pressure-measuring instruments to make readings at key points in the refrigeration cycle
Identify commonly used refrigerants and demonstrate the procedures for handling these refrigerants.
Identify the major components of a cooling system and explain how each type works
Identify the major accessories available for cooling systems and explain how each works
Identify the control devices used in cooling systems and explain how each works
State the correct methods to be used when piping a refrigeration system

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic handtools
Refrigerant
Gauges
Nitrogen
410a
Service wrench
Metering devices
Service valves
Temp/pressure charts

Steel Center for CTE
Course: HVAC

Unit Name: PA800 - INTRODUCTION TO HEATING

Unit Number: PA800

Dates: Fall 2020 **Hours:** 199

Unit Description/Objectives:

Student will know and be able to explain the three methods by which heat is transferred and give an example of each, describe how combustion occurs and identify the by-products of combustion, and identify the various types of fuels used in heating.

Tasks:

PA801 - Describe the principles of combustion.

PA802 - Evaluate temperatures and pressures of various heating

systems

PA803 - Identify components and fuel properties of various

heating systems

PA804 - Perform maintenance on a gas furnace.

PA805 – Reserved

PA806 - Identify oil heating equipment.

PA807 - Install and adjust oil, gas (condensing & non-condensing), and electric heating equipment

PA808 - Perform annual preventive maintenance on oil fired equipment.

PA809 - Reserved

PA810 - Identify and size electric heating equipment.

PA811 - Install heating/air conditioning thermostats

PA812 - RESERVED

PA813 - Perform combustion analysis on oil and gas fired equipment

PA814- Identify the sequence of operations of various warm air furnaces

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Explain the three methods by which heat is transferred and give an example of each
Describe how combustion occurs and identify the byproducts of combustion
Identify the various types of fuels used in heating
Identify the major components and accessories of an induced draft and condensing gas furnace and explain the function of each component
State the factors that must be considered when installing a furnace
Identify the major components of a gas furnace and describe how each works
With supervision, use a manometer to measure and adjust manifold pressure on a gas furnace
Identify the major components of an oil furnace and describe how each works.
Describe how an electric furnace works
With supervision, perform basic furnace preventive maintenance procedures such as cleaning and filter replacement

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations.
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book).
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015
Various HVAC equipment
Various hand tools

Manometer
Volt meter
Manometer
Thermostats
Oil nozzles
Oil filters
Ductwork
A coil
Pvc pipe
Steel pipe
Threading machine
Brazing equipment

Steel Center for CTE
Course: HVAC

Unit Name: PA900 - AIR DISTRIBUTION SYSTEMS

Unit Number: PA900

Dates: Fall 2020 **Hours:** 60

Unit Description/Objectives:

Student will know and be able to describe the airflow and pressures in a basic forced air distribution system, explain the differences between propeller and centrifugal fans and blowers, and identify the various types of duct systems and explain why and where each type is used. Student will also know and be able to demonstrate and explain the installation of metal, fiberboard, and flexible duct and demonstrate and explain the installation of fittings and transitions used in duct systems.

Tasks:

PA901 - Identify and design different types of duct systems.

PA902 - Identify and describe the different types of duct system components.

PA903 - Test velocity, static pressure, temperature, humidity, and volume

PA904 - RESERVED

PA905 - RESERVED

PA906 – compare, identify and fabricate using various duct materials

PA907- Perform basic installation practices including duct sealing and leak testing

PA908- Identify and compare the application air distribution secondary accessories to increase air quality and comfort

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Describe the airflow and pressures in a basic forced-air distribution system
Explain the differences between propeller and centrifugal fans and blowers
Identify the various types of duct systems and explain why and where each type is used
Demonstrate or explain the installation of:
metal
flexible duct
Demonstrate or explain the installation of fittings and transitions used in duct systems
Demonstrate or explain the use and installation of:
Diffusers used in duct systems
Registers used in duct systems
Grilles used in duct systems
Demonstrate or explain the use and installation of dampers used in duct systems

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic sheet metal tools

Sheetmetal
Lockformer
Rollers
Foot sheer
Brake
Various ductwork fittings

Steel Center for CTE
Course: HVAC

Unit Name: PA1000 - INTRODUCTION TO HYDRONIC SYSTEMS

Unit Number: PA1000

Dates: Fall 2020 **Hours:** 60

Unit Description/Objectives:

Student will know and be able to describe hot-water heating system components.

Tasks:

PA1001 – identify and compare various hot water heating system components, piping schemes, and their application

PA1002 – service and maintain hydronic systems

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12 B Determine the central ideas or conclusions of a text

Connecting Standard

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures,

and practices
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Review career opportunities using the internet
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Expansion tank
Pumps
Copper pipe
Water fill valve
Relief valve
Low water cutoff switch

Steel Center for CTE
Course: HVAC Technology

Unit Name: PA1100 - LEAK DETECTION, EVACUATION, RECOVERY AND CHARGING

Unit Number: PA1100

Dates: Fall 2020 **Hours:** 78

Unit Description/Objectives:
Student will know and be able to identify the common types of leak detectors and explain how each is used. Students will also be able to recover refrigerant and charge units with refrigerants while adhering to EPA 608 standards.

Tasks:

PA1101 - Locate refrigerant leaks using common types of leak detectors.

PA1102 - Perform refrigerant recovery.

PA1103 - Perform system evacuation and dehydration.

PA1104 - Determine when to charge with liquid versus vapor.

PA1105 - Weigh in correct system charge (when appropriate).

PA1106 - Charge systems using superheat method when appropriate (e.g., fixed restriction).

PA1107 - Charge systems using sub cooling method when appropriate (e.g., TXV, AXV).

PA1108 - Apply knowledge of EPA Section 608.

PA1109 – Identify pump down applications and perform system pump down operations

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Identify the common types of leak detectors and explain how each is used
Demonstrate skill in performing leak detection tests
Identify the service equipment used for evacuating a system and explain why each item of equipment is used
Demonstrate skill in performing system evacuation and dehydration
Identify the service equipment used for recovering refrigerant from a system and for recycling the recovered refrigerant, and explain why each item of equipment is used
Demonstrate skill in charging refrigerant into a system

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic handtools
Recovery machine
Gauges
Recovery cylinder
Refrigeration wrench
Scale
Temp/pressure charts
Refrigerant
Vacuum pump
Thermistor
Leak detector

Steel Center for CTE
Course: HVAC

Unit Name: PA1200 - TROUBLESHOOTING HEATING

Unit Number: PA1200

Dates: Fall 2020 **Hours:** 50

Unit Description/Objectives:
Student will know and be able to identify the major components of fuel systems and describe the function of each component including natural gas, LP gas, and fuel oil.

Tasks:

PA1201 - Perform gas burner flame proving tests according to trade standards.

PA1202 – troubleshoot and service gas heating equipment.

PA1203 – Troubleshoot oil fired equipment

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12 B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:
Knowledge:
Participate in co-operative group discussions

Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Review career opportunities using the internet
Identify components by using drawings and schematics

Skill:

Complete time cards describing daily work completed
Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Identify the major components of the following fuel systems and describe the function of each component:
- Natural gas
- LP gas
- Fuel oil

Identify the physical properties of each type of fuel
Identify the safety precautions and potential hazards associated with each type of fuel and system

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic handtools
Combustion analyzer
Manometer
Amp meter
Shop vac
Oil nozzle
Oil filter
Oil nozzle wrench
nitrogen

Steel Center for CTE
Course: HVAC

Unit Name: PA1300 – TROUBLESHOOTING COOLING

Unit Number: PA1300

Dates: Fall 2020 **Hours:** 48

Unit Description/Objectives:

Student will know and be able to explain the basic principles applicable to all control systems.

Tasks:

PA1301 - Identify control system components.

PA1302 - Install, trouble shoot, and service cooling equipment.

PA1303 - Install electrical components.

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects

Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Review career opportunities using the internet
Identify components by using drawings and schematics
Take notes regarding safety procedures explained in safety DVD's

Skill:

Complete time cards describing daily work completed
Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Explain the basic principles applicable to all control systems
Identify the various types of electromechanical, electronic, and pneumatic HVAC controls
Explain the function of the various types of electromechanical, electronic, and pneumatic HVAC controls
Explain the operation of the various types of electromechanical, electronic, and pneumatic HVAC controls
Identify the service instruments needed to troubleshoot HVAC components

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic hand tools
Vacuum pump
Thermistor
Gauges
Refrigeration wrench
Nitrogen
Amp meter
Temp/pressure charts
Various electrical components related to HVAC

Steel Center for CTE
Course: HVAC

Unit Name: PA1400 - HEAT PUMPS

Unit Number: PA1400

Dates: Fall 2020 **Hours:** 41

Unit Description/Objectives:

Student will know and be able to describe the principles of reverse-cycle heating.

Tasks:

PA1401 - Explain heat pump modes of operation.

PA1402 - Identify and describe heat pump components.

PA1403 – Install comfort cooling systems

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion

Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Describe the principles of reverse-cycle heating
Identify heat pumps by type and general classification
List the components of heat pump systems

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:

Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations

Handle material in a safe and work like manner

Use protective clothing and equipment

Use hand tools in a safe manner

Use adequate ventilation when working in enclosed areas

Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work like manner according to OSHA standards

Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.

Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)

Practical tasks include related theory testing applicable to the task and will be graded

Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic hand tools
Vacuum pump
Thermistor
Refrigeration wrench
Nitrogen
Gauges
Temp/pressure charts

Steel Center for CTE
Course: HVAC

Unit Name: PA1500 - COMPUTER FUNDAMENTALS

Unit Number: PA1500

Dates: Fall 2020 **Hours:** 24

Unit Description/Objectives:
Student will know and be able to complete PDP Internet research requirements set by Monroe Career & Technical Institute and demonstrate skills with computer software relating to HVAC.

Tasks:

PA1501 - RESERVED

PA1502 - Utilize the Internet for research.

PA1503 – Use HVAC computer software.

Standards / Assessment Anchors

Focus Standard

CC.3.6.11-12. G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Supporting Standard

CC.3.5.11-12. B Determine the central ideas or conclusions of a text
CC.3.6.11-12. F Conduct short and more sustained research to answer a question or solve a problem.

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:

Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Review career opportunities using the internet
Identify components by using drawings and schematics

Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable. Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book) Practical tasks include related theory testing applicable to the task and will be graded Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

Residential Construction academy: HVAC 2nd ed. Clifton Park, NY: Thompson/Delmar Learning, 2012

NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Laptop