HVAC NATE

Free Practice Test — 30 Real Exam-Style Questions

with full answer key & explanations

Unlock the full bank of 1623 questions
+ unlimited timed mock exams + mistake book

Practice on the web: https://certs.theorypractice.app/hvac-nate
$2.99 / week · $6.99 / month · cancel anytime

What you unlock: all 1623 questions • unlimited timed mock exams • mistake book • instant explanations

Also on iOS & Android — and watch the full Q&A walkthrough on YouTube @CertsQuizPrep

Practice Questions

Try all 30 first, then check the answer key at the back.

1. What is the primary purpose of a supply duct in an HVAC system?

A. Deliver conditioned air from the air handler to the occupied space
B. Return room air back to the air handler for reconditioning
C. Exhaust stale air to the outdoors
D. Provide fresh outdoor makeup air to the system

2. What are the three essential elements required for combustion to occur?

A. Fuel, oxygen, and carbon dioxide
B. Fuel, nitrogen, and heat
C. Fuel, oxygen, and heat
D. Oxygen, carbon monoxide, and ignition

3. On a standard 24 V heating thermostat, which terminal is the common (return) leg of the control circuit?

A. C
B. R
C. W
D. G

4. What is the unit of electrical resistance?

A. Ohm
B. Volt
C. Ampere
D. Watt

5. In a heat pump operating in heating mode, which component absorbs heat from the outdoor air?

A. Outdoor coil (evaporator)
B. Indoor coil (condenser)
C. Compressor
D. Reversing valve

6. Which federal regulation prohibits the knowing venting of refrigerants that contain CFCs or HCFCs during maintenance, service, repair, or disposal of refrigeration equipment?

A. Section 608 of the Clean Air Act
B. Section 609 of the Clean Air Act
C. Title IV of the Resource Conservation and Recovery Act
D. ASHRAE Standard 34

7. What are the four basic components of a vapor-compression refrigeration cycle?

A. Compressor, condenser, metering device, evaporator
B. Compressor, condenser, receiver, evaporator
C. Compressor, condenser, filter-drier, evaporator
D. Compressor, accumulator, metering device, evaporator

8. A technician finds the suction pressure is lower than normal and the discharge pressure is normal on a residential AC system. What is the most likely cause?

A. Low refrigerant charge
B. Overcharged refrigerant system
C. Faulty condenser fan motor
D. Restricted discharge line

9. Units with the maximum Annual Fuel Utilization Efficiency (AFUE) available fall just below _____ efficiency.

A. 92%
B. 90%
C. 99.5%
D. 97%

10. Which unit is used to express airflow volume in HVAC ductwork?

A. Pounds per square inch (PSI)
B. Feet per minute (FPM)
C. Cubic feet per minute (CFM)
D. Inches of water column (in. w.c.)

11. What is the primary combustible component of natural gas?

A. Methane (CH4)
B. Propane (C3H8)
C. Butane (C4H10)
D. Ethane (C2H6)

12. What thermostat terminal energizes the indoor fan in continuous-fan (ON) mode?

A. W
B. G
C. Y
D. C

13. Ohm's Law states that voltage equals current multiplied by which quantity?

A. Power
B. Resistance
C. Frequency
D. Capacitance

14. What is the primary purpose of the reversing valve in a heat pump system?

A. Regulate refrigerant superheat
B. Change the direction of refrigerant flow to switch between heating and cooling modes
C. Control compressor speed
D. Measure refrigerant pressure

15. Under Section 608, technician certification is required to purchase which type of refrigerant in containers larger than 2 pounds?

A. HFCs such as R-410A
B. Natural refrigerants such as CO2
C. CFCs and HCFCs
D. All refrigerants without exception

16. In what state does refrigerant leave the evaporator under normal operating conditions?

A. High-pressure liquid
B. Low-pressure superheated vapor
C. Low-pressure saturated liquid
D. High-pressure superheated vapor

17. What instrument is used to measure both the high-side and low-side pressures of a refrigeration system simultaneously?

A. Manometer
B. Manifold gauge set
C. Digital multimeter
D. Anemometer

18. Which of the following has the ability to hinder the reversing valve from undergoing position changes?

A. Overcharge of refrigerant.
B. Air in the system.
C. Low indoor airflow due to a dirty air filter.
D. Low refrigerant charge.

19. What does 'static pressure' represent in a duct system?

A. The velocity of air moving through the duct
B. The pressure exerted equally in all directions on the duct walls
C. The total volume of air in the duct at a given moment
D. The temperature differential between supply and return air

20. What is the approximate stoichiometric air-to-fuel ratio for natural gas combustion?

A. 5:1
B. 10:1
C. 15:1
D. 20:1

21. Which thermostat terminal initiates a first-stage cooling call in a conventional split system?

A. W1
B. G
C. Y1
D. O

22. What happens to total current in a series circuit when resistance is added?

A. Current increases
B. Current remains unchanged
C. Current decreases
D. Current immediately drops to zero

23. Which refrigerant cycle component raises the pressure and temperature of the refrigerant vapor?

A. Expansion valve
B. Condenser
C. Compressor
D. Accumulator

24. Which EPA Section 608 certification type authorizes a technician to service small appliances containing 5 lbs or less of refrigerant?

A. Type II
B. Type I
C. Type III
D. Universal

25. In what state does refrigerant typically leave the condenser in a properly operating system?

A. Superheated vapor
B. Saturated mixture
C. Subcooled liquid
D. Flash gas

26. A single-phase compressor hums but does not start. Which component is most likely the first to check?

A. Contactor coil
B. Run capacitor
C. Start capacitor
D. Overload protector

27. Which of the following systems has a lower cost of maintenance and installation?

A. Chilled water system.
B. DX system.

28. Velocity pressure in a duct is best described as:

A. The pressure loss caused by duct friction
B. The static pressure measured at the fan outlet
C. The difference between total pressure and dynamic pressure
D. The pressure component due to the kinetic energy of moving air

29. During perfect (stoichiometric) combustion of natural gas, what are the primary products?

A. Carbon monoxide and water vapor
B. Carbon monoxide and nitrogen
C. Carbon dioxide and carbon monoxide
D. Carbon dioxide and water vapor

30. A heat pump thermostat has an 'O' and a 'B' terminal. Which statement correctly describes their functions?

A. O energizes the reversing valve in heating; B energizes it in cooling
B. O and B are interchangeable labels for the same function
C. B energizes the reversing valve in heating; O energizes it in heating
D. O energizes the reversing valve in cooling; B energizes it in heating

Answer Key & Explanations

1. A — Deliver conditioned air from the air handler to the occupied space
Supply ducts carry conditioned (heated or cooled) air from the air-handling unit to registers in the occupied space. Return ducts perform the reverse function, pulling room air back to be reconditioned.

2. C — Fuel, oxygen, and heat
Combustion requires the 'fire triangle': fuel, oxygen (oxidizer), and heat (ignition energy). Remove any one element and combustion cannot be sustained.

3. A — C
The 'C' terminal is the common (negative) side of the 24 V transformer secondary. R carries the 24 V hot leg, W calls for heat, and G calls for the fan.

4. A — Ohm
Resistance is measured in Ohms (Ω), as defined by Ohm's Law. Volts measure voltage, Amperes measure current, and Watts measure power.

5. A — Outdoor coil (evaporator)
In heating mode the outdoor coil acts as an evaporator, absorbing heat energy from the outdoor air and transferring it to the refrigerant. The indoor coil then acts as a condenser, releasing that heat into the building.

6. A — Section 608 of the Clean Air Act
Section 608 of the Clean Air Act establishes the requirements for technician certification, refrigerant recovery, and prohibition of venting for stationary refrigeration and air-conditioning equipment. Section 609 applies specifically to motor vehicle air conditioning.

7. A — Compressor, condenser, metering device, evaporator
The standard vapor-compression cycle consists of a compressor, condenser, metering (expansion) device, and evaporator. These four components complete the refrigerant loop and allow heat transfer from the low-pressure to the high-pressure side.

8. A — Low refrigerant charge
Low suction pressure with normal discharge pressure is a classic indicator of undercharge (refrigerant leak). With too little refrigerant, the evaporator cannot absorb enough heat, causing suction pressure to drop while discharge pressure remains relatively unaffected.

9. D — 97%
A furnace with an AFUE of 97% will convert 97% of the fuel it consumes into useable warmth. The remaining 3% of the fuel energy is lost to the environment through various factors, such as heat loss through the flue pipe and heat loss through the furnace casing. There are a number of factors that can affect the AFUE of a furnace, including the type of fuel used, the design of the furnace, and the age of the furnace. Newer furnaces are generally more efficient than older furnaces, and furnaces that use natural gas are generally more efficient than furnaces that use oil. When choosing a new furnace, it is important to consider the AFUE rating. A

high-efficiency furnace will cost more upfront, but it can save you money on your energy bills in the long run.

10. C — Cubic feet per minute (CFM)
Airflow volume is measured in cubic feet per minute (CFM). FPM measures velocity, and in. w.c. measures static pressure — both related but distinct from volume.

11. A — Methane (CH4)
Natural gas is composed primarily of methane (CH4), typically 87–97% by volume. Methane is the lightest hydrocarbon and has a specific gravity less than air.

12. B — G
The G terminal energizes the indoor fan relay. Setting the fan switch to ON holds G energized continuously regardless of heating or cooling demand.

13. B — Resistance
Ohm's Law: V = I × R. Voltage (V) equals current (I) times resistance (R). This fundamental relationship is used in all electrical circuit analysis.

14. B — Change the direction of refrigerant flow to switch between heating and cooling modes
The reversing (four-way) valve redirects refrigerant flow so that the indoor and outdoor coils swap their roles as evaporator and condenser, allowing the same system to provide both heating and cooling.

15. C — CFCs and HCFCs
Section 608 requires certification to purchase class I (CFCs) and class II (HCFCs) refrigerants in containers exceeding 2 lbs. The rule was later extended to include HFCs, but the original certification requirement specifically targeted ozone-depleting substances.

16. B — Low-pressure superheated vapor
Refrigerant absorbs heat in the evaporator, boiling from a liquid to a vapor. By the time it exits the evaporator, it has picked up additional heat (superheat), so it leaves as a low-pressure superheated vapor before entering the compressor.

17. B — Manifold gauge set
A manifold gauge set has two gauges—a blue low-side gauge and a red high-side gauge—connected through a manifold with service valves, allowing both pressures to be read at the same time and refrigerant to be added or recovered.

18. D — Low refrigerant charge.
The reversing valve is a solenoid valve that changes the direction of the refrigerant flow in a heat pump. This allows the heat pump to operate in both heating and cooling mode. When the refrigerant charge is low, the pressure in the system is also low. This can cause the reversing valve to stick and not change positions. This will prevent the heat pump from operating in either heating or cooling mode.

19. B — The pressure exerted equally in all directions on the duct walls
Static pressure acts outward in all directions on duct walls and is what drives leakage through seams and holes. It is distinct from velocity pressure, which acts only in the direction of airflow.

20. B — 10:1
Natural gas (primarily methane) requires approximately 10 cubic feet of air per 1 cubic foot of gas for stoichiometric (perfect) combustion. This equates to roughly a 10:1 air-to-fuel ratio by volume.

21. C — Y1
Y1 energizes the compressor contactor for first-stage cooling. W1 is first-stage heat, G is the fan, and O is the reversing valve on heat pumps.

22. C — Current decreases
In a series circuit, adding resistance increases total resistance. By Ohm's Law (I = V/R), higher resistance with the same supply voltage results in lower current.

23. C — Compressor
The compressor draws in low-pressure refrigerant vapor and compresses it, raising both its pressure and temperature before sending it to the condenser coil.

24. B — Type I
Type I certification covers small appliances manufactured, charged, and hermetically sealed at the factory with 5 lbs or less of refrigerant. Type II covers high-pressure appliances and Type III covers low-pressure appliances.

25. C — Subcooled liquid
After the condenser rejects heat to the outdoor air, the refrigerant condenses from vapor to liquid and then cools further below its saturation point, leaving as a subcooled liquid. Subcooling ensures no flash gas enters the metering device.

26. C — Start capacitor
A humming but non-starting compressor indicates the motor is energized but cannot develop enough starting torque. The start capacitor provides the phase shift for starting torque; a failed start capacitor is the most common cause of this symptom.

27. B — DX system.
Here are some of the reasons why DX systems have lower installation and maintenance costs: - Simpler design and installation: DX systems have a simpler design and installation than other types of refrigeration systems, such as chilled water systems. For example, DX systems do not require a separate chiller or cooling tower. This can save a significant amount of money on upfront installation costs. - Fewer components to maintain: DX systems have fewer components to maintain than other types of refrigeration systems. This reduces the cost of routine maintenance and repairs. - Direct cooling: DX systems use direct cooling, which means that the refrigerant circulates directly through the cooling coils. This eliminates the need for a secondary cooling fluid, such as chilled water. This can reduce the cost of maintenance and repairs, and it can also improve energy efficiency.

28. D — The pressure component due to the kinetic energy of moving air
Velocity pressure (VP) results from the kinetic energy of air in motion. It acts only in the direction of airflow and equals $(V/4005)^2$ in. w.c., where V is velocity in FPM at standard air density.

29. D — Carbon dioxide and water vapor
Perfect combustion of methane produces only carbon dioxide (CO2) and water vapor (H2O). The balanced equation is: $CH4 + 2O2 \rightarrow CO2 + 2H2O$.

30. D — O energizes the reversing valve in cooling; B energizes it in heating
Most heat pumps (Carrier/Bryant/Trane) use O, which energizes the reversing valve in cooling mode. Some older systems (Rheem/Ruud/York) use B, which energizes the valve in heating mode. The wiring must match

the equipment.

Ready to pass?

Unlock the full HVAC NATE bank, every explanation, and unlimited timed mock exams.

Scan to start practising
https://certs.theorypractice.app/hvac-nate

Watch the full video walkthrough on YouTube @CertsQuizPrep