

## HVAC Program Standards Criticality Survey 2018

CONTENT STANDARD 1.0: TRADE MATH					
Performance Standard 1.1: Basic Math					
Answer Choices	Nice to Know	Need to Know	Critical to Know	Rating Average	
1.1.1	Perform addition, subtraction, multiplication, and division calculations of whole numbers.	9	34	48	2.43
1.1.2	Perform addition and subtraction calculations of common fractions.	19	39	33	2.15
1.1.3	Perform multiplication and division calculations of common fractions.	27	38	26	1.99
1.1.4	Perform addition, subtraction, multiplication, and division calculations of decimal fractions.	26	37	28	2.02
1.1.5	Perform ratio and proportion calculations.	33	37	20	1.86
1.1.6	Perform percent, percentage, and discount calculations.	26	42	23	1.97
1.1.7	Perform angular, length, and converted temperature measure calculations.	19	43	29	2.11
1.1.8	Perform area calculations.	19	41	31	2.13
1.1.9	Perform volume calculations.	22	41	25	2.03
1.1.10	Solve basic equations.	16	35	39	2.26
1.1.11	Demonstrate the use of order of operations.	22	34	35	2.14
<b>Answered</b>				<b>91</b>	
<b>Skipped</b>				<b>3</b>	

**CONTENT STANDARD 2.0: GENERAL SAFETY****Performance Standard 2.1: Workplace Safety**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
2.1.1	Describe potential excavation site hazards.	27	34	27	2.00
2.1.2	Explain proper personal protective equipment (PPE) use.	12	38	39	2.30
2.1.3	Describe proper material handling, storage, use, and disposal.	12	44	34	2.24
2.1.4	Describe ladder, stairway, and scaffold hazards and proper use.	4	43	43	2.43
2.1.5	Describe jobsite electrical hazards and proper lockout/tagout use.	7	22	61	2.60
2.1.6	Describe proper refrigerant and pressure vessel use and storage.	8	27	55	2.52
2.1.7	Identify safety data sheets (SDS) properties of chemicals specific to HVAC.	11	46	33	2.24
2.1.8	Identify and describe environmental hazards (e.g., lead, silica, asbestos, carbon monoxide).	12	35	43	2.34
2.1.9	Identify the hazards associated with confined spaces.	14	34	41	2.30
2.1.10	Use appropriate fire extinguishers and other safety devices.	13	31	46	2.37
2.1.11	Describe the importance of safety procedures for brazing and soldering.	6	32	52	2.51
<b>Answered</b>					<b>90</b>
<b>Skipped</b>					<b>4</b>

**CONTENT STANDARD 3.0: TOOLS AND MATERIALS****Performance Standard 3.1: Power and Hand Tool Use**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
3.1.1	Describe proper use of hand tools used in the HVAC Industry.	9	49	30	2.24
3.1.2	Describe proper use of power tools used in the HVAC Industry.	9	44	35	2.30
3.1.3	Describe proper use of various types of torches.	14	43	31	2.19
3.1.4	Describe proper use of piping and tubing fabrication tools.	12	49	26	2.16
<b>Answered</b>					<b>88</b>
<b>Skipped</b>					<b>6</b>

<b>Performance Standard 3.2: Tubing and Piping</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
3.2.1 Identify the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.	9	44	35	2.30
3.2.2 Identify appropriate brazing and soldering alloys and materials.	12	37	39	2.31
3.2.3 Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products from heat.	11	37	40	2.33
<b>Answered</b>				<b>88</b>
<b>Skipped</b>				<b>6</b>

<b>CONTENT STANDARD 4.0: FUEL GAS PIPING AND VENTING</b>				
<b>Performance Standard 4.1: Fuel Gas Piping and Venting</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
4.1.1 Identify HVAC Idaho Administrative Procedures Act (IDAPA) rules and statutes.	20	44	20	2.00
4.1.2 Define key terms as applied to the International Fuel Gas Code (IFGC).	22	38	24	2.02
4.1.3 Describe the building structural safety requirements for fuel gas equipment installation.	14	36	34	2.24
4.1.4 Determine proper fuel gas equipment combustion, ventilation, and dilution air requirements.	7	29	48	2.49
4.1.5 Identify the requirements for installation of fuel gas fired equipment in a masonry chimney.	10	37	37	2.32
4.1.6 Identify fuel gas equipment location, access, and service space requirements.	7	39	38	2.37
4.1.7 Describe proper appliance condensate disposal and clearance reduction methods.	9	52	23	2.17
4.1.8 Perform gas pipe sizing exercises.	9	42	33	2.29
4.1.9 Identify proper gas pipe installation methods.	8	39	37	2.35
4.1.10 Describe proper gas pipe inspection, testing, and purging procedures.	7	38	39	2.38
4.1.11 Describe chimney and vent types and construction.	11	48	25	2.17

4.1.12	Determine chimney installation requirements.	13	45	26	2.15
4.1.13	Determine gas vent installation requirements.	6	44	33	2.33
4.1.14	Describe gas appliance category I, II, III, and IV characteristics.	16	41	27	2.13
4.1.15	Identify proper gas vent connector installation requirements.	7	47	30	2.27
4.1.16	Describe category I venting principles.	13	44	27	2.17
4.1.17	Perform single appliance category I vent sizing exercises.	10	49	25	2.18
4.1.18	Perform multiple appliance category I vent sizing exercises.	11	47	26	2.18
4.1.19	Determine capacity penalties for offsets in common vent and vent connectors.	15	44	25	2.12
4.1.20	Determine specific fuel gas appliance installation requirements.	12	36	36	2.29
4.1.21	Determine mechanical equipment location, access, and service space requirements.	8	44	32	2.29
4.1.22	Determine combustion air location and sizing requirements.	5	28	50	2.54
				<b>Answered</b>	<b>84</b>
				<b>Skipped</b>	<b>10</b>

<b>CONTENT STANDARD 5.0: ENERGY SOURCES</b>					
<b>Performance Standard 5.1: Energy Sources</b>					
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>	
5.1.1	Explain natural, LP gas, and fuel oil combustion characteristics.	22	37	23	2.01
5.1.2	Describe the application of geothermal systems.	47	28	5	1.48
5.1.3	Describe the application of renewable energy systems.	49	26	6	1.47
5.1.4	Describe the application of electric production systems.	46	27	8	1.53
				<b>Answered</b>	<b>82</b>
				<b>Skipped</b>	<b>12</b>

<b>CONTENT STANDARD 6.0: BASIC SYSTEMS OVERVIEW</b>				
<b>Performance Standard 6.1: Basic Systems Overview</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
6.1.1 Describe fossil-fuel and electrical furnace operations.	16	45	20	2.05
6.1.2 Describe the typical configuration of residential split air conditioning systems.	11	5	20	2.11
6.1.3 List various types of commercial air conditioning systems and their application.	26	41	14	1.85
6.1.4 Describe the configuration of common duct systems.	13	51	17	2.05
<b>Answered</b>				<b>81</b>
<b>Skipped</b>				<b>13</b>

<b>CONTENT STANDARD 7.0: INTRO TO APPLIED SCIENCE</b>				
<b>Performance Standard 7.1: Intro to Applied Science</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
7.1.1 Perform energy conversion calculations.	43	31	7	1.56
7.1.2 Perform sensible, latent, and total heat calculations.	33	32	16	1.79
7.1.3 Differentiate between saturated, superheated, and subcooled refrigerant.	17	34	30	2.16
7.1.4 Explain atmospheric, absolute, and gauge pressure relationship.	25	40	16	1.89
7.1.5 Convert gauge pressure, absolute pressure, and vacuum.	28	34	19	1.89
7.1.6 Diagram a basic refrigeration cycle identifying pressure, temperature, and state of refrigerant.	18	36	27	2.11
7.1.7 List the type and function of the four major refrigeration components.	13	42	25	2.15
7.1.8 Describe the methods of heat transfer.	18	41	22	2.05
<b>Answered</b>				<b>81</b>
<b>Skipped</b>				<b>13</b>

**CONTENT STANDARD 8.0: APPLIANCE INSTALLATION****Performance Standard 8.1: Appliance Installation**

<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
8.1.1 Apply National Electric Code (NEC) standards to HVAC electrical circuit installations.	18	41	21	2.04
8.1.2 Interpret HVAC manufacturer electrical name plate data.	17	29	33	2.20
8.1.3 Apply appropriate code standards to appliance installation.	8	32	40	2.40
8.1.4 Describe gas, oil, and electrical appliance installation, start-up, and checkout procedures.	10	36	34	2.30
8.1.5 Describe sheet metal, fiberglass, and flex duct installation procedures.	17	47	16	1.99
8.1.6 Describe split and packaged air conditioning system installation, start-up, and checkout procedures.	9	51	19	2.13
<b>Answered</b>				<b>80</b>
<b>Skipped</b>				<b>14</b>

**CONTENT STANDARD 9.0: INTRODUCTION TO CONSTRUCTION DRAWINGS AND SPECIFICATIONS**

**Performance Standard 9.1: Introduction to Construction Drawings and Specifications**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
9.1.1	Describe the application of architectural plans and specifications.	33	34	10	1.70
9.1.2	Interpret mechanical, plumbing, and electrical drawing symbols.	20	39	18	1.97
9.1.3	Interpret specification documents and apply to plans.	29	31	18	1.86
9.1.4	Interpret shop drawings and apply to plans and specifications.	25	34	19	1.92
9.1.5	Describe a submittal and its derivation, routing, and makeup.	40	30	8	1.59
9.1.6	Develop cut lists for duct runs from shop drawings.	35	31	12	1.71
9.1.7	Interpret as-built modifications on HVAC mechanical plans.	31	32	15	1.79
9.1.8	Perform HVAC equipment and material takeoff.	35	31	12	1.71
				<b>Answered</b>	<b>78</b>
				<b>Skipped</b>	<b>16</b>

**CONTENT STANDARD 10.0: BASIC ELECTRICITY****Performance Standard 10.1: Basic Electricity**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
10.1.1	Describe basic electrical theory.	18	34	25	2.09
10.1.2	Describe series, parallel, and combination circuit characteristics.	24	31	22	1.97
10.1.3	Calculate electrical circuit values.	33	31	13	1.74
10.1.4	Describe electrical meter functions.	22	37	18	1.95
10.1.5	Measure electrical circuit values.	20	35	22	2.03
10.1.6	Identify electrical symbols.	21	34	22	2.01
10.1.7	Draw basic HVAC electrical circuit diagrams.	25	33	19	1.92
10.1.8	Interpret basic residential HVAC schematic diagrams.	15	33	29	2.18
10.1.9	Interpret basic commercial HVAC schematic diagrams.	22	31	24	2.03
10.1.10	Explain AC circuit characteristics.	18	42	17	1.99
10.1.11	Describe power distribution transformer systems.	33	35	8	1.67
10.1.12	Calculate HVAC branch circuit conductor, breaker, and disconnect sizes.	29	31	17	1.84
10.1.13	Describe basic motor theory.	24	41	11	1.83
10.1.14	Describe the five single-phase motor types.	35	35	7	1.64
10.1.15	Identify single-phase motor diagrams.	26	36	15	1.86
10.1.16	Explain single-phase motor starting relay operation.	29	39	9	1.74
10.1.17	Calculate motor capacitor replacement values.	26	40	11	1.81
10.1.18	Explain three-phase motor operation.	25	41	11	1.82
10.1.19	Explain ECM motor operation.	28	36	12	1.79
10.1.20	Perform Ohm's law calculations to series, parallel, and combination circuits.	25	33	18	1.91
				<b>Answered</b>	<b>77</b>
				<b>Skipped</b>	<b>17</b>



**CONTENT STANDARD 11.0: INDOOR AIR QUALITY****Performance Standard 11.1: Indoor Air Quality**

<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
11.1.1 Describe indoor air quality (IAQ) factors as related to HVAC.	26	41	9	1.78
11.1.2 Identify various indoor air quality pollutant and pollutant pathways.	34	34	8	1.66
11.1.3 Describe indoor air quality evaluation and measurement tools.	36	34	6	1.61
11.1.4 Explain appropriate prevention, control, and resolution strategies for IAQ issues.	35	33	8	1.64
11.1.5 Identify when to involve IAQ professionals as necessary.	28	39	8	1.73
			<b>Answered</b>	<b>76</b>
			<b>Skipped</b>	<b>18</b>

**CONTENT STANDARD 12.0: RESIDENTIAL LOAD CALCULATIONS****Performance Standard 12.1: Residential Load Calculations**

<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
12.1.1 Identify the importance of heat load calculation in building design.	24	34	18	1.92
12.1.2 Differentiate sensible, latent, and total heat gain/loss.	30	30	16	1.82
12.1.3 Determine U values and R values for various building construction components.	39	24	13	1.66
12.1.4 Calculate Btu gain/loss values using HTM and temperature difference factors.	40	23	13	1.64
12.1.5 Determine heating and cooling load temperature difference and daily range values.	40	22	14	1.66
12.1.6 Explain the relationship between house orientation and solar heat gain.	43	20	12	1.59
12.1.7 Conduct building component area and volume calculations from construction drawings.	47	18	11	1.53
12.1.8 Conduct winter/summer infiltration calculations using Manual J procedures.	42	23	11	1.59
12.1.9 Conduct heat gain calculations using Manual J procedures.	37	26	13	1.68
12.1.10 Conduct heat loss calculations using Manual J procedures.	37	26	13	1.68
12.1.11 Determine sensible, latent, and total heat for house block and room values.	43	21	12	1.59
<b>Answered</b>				<b>76</b>
<b>Skipped</b>				<b>18</b>

**CONTENT STANDARD 13.0: BASIC CONTROLS****Performance Standard 13.1: Basic Controls**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
13.1.1	Differentiate between operating and safety controls.	10	33	31	2.28
13.1.2	Describe the sequence of operation of standing pilot, intermittent, and direct ignition control systems.	11	32	30	2.26
13.1.3	Interpret basic gas furnace wiring diagrams.	7	35	30	2.32
13.1.4	Explain oil furnace primary control operation.	22	38	13	1.88
13.1.5	Describe electric furnace operating sequence.	12	38	23	2.15
13.1.6	Describe hydronic heating system controls.	27	33	13	1.81
13.1.7	Describe basic motor circuit troubleshooting procedures.	14	37	21	2.10
13.1.8	Interpret packaged and split air conditioning systems and wiring diagrams.	15	36	22	2.10
13.1.9	Identify commercial and industrial air conditioning system control methods.	25	28	19	1.92
13.1.10	Describe basic electronic control system troubleshooting procedures.	16	29	28	2.16
				<b>Answered</b>	<b>74</b>
				<b>Skipped</b>	<b>20</b>

**CONTENT STANDARD 14.0: SYSTEM AIR FLOW AND DUCT SIZING****Performance Standard 14.1: System Air Flow and Duct Sizing**

<b>Answer Choices</b>		<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
14.1.1	Describe basic air flow characteristics.	12	44	17	2.07
14.1.2	Explain duct system pressures.	18	38	16	1.97
14.1.3	Calculate duct system air flow.	18	37	17	1.99
14.1.4	Determine proper air flow requirements.	12	43	17	2.07
14.1.5	Describe air distribution system configurations.	22	36	14	1.89
14.1.6	Select primary heating/cooling equipment using nationally recognized standards.	25	33	14	1.85
14.1.7	Determine air-side component pressure drops from manufacturer tables.	29	31	12	1.76
14.1.8	Sketch a residential duct system layout using nationally recognized standards.	29	33	10	1.74
14.1.9	Determine duct size based on nationally recognized standards.	19	34	19	2.00
				<b>Answered</b>	<b>73</b>
				<b>Skipped</b>	<b>21</b>

**CONTENT STANDARD 15.0: BASIC AIR CONDITIONING AND REFRIGERATION****Performance Standard 15.1: Basic Air Conditioning and Refrigeration**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
15.1.1	Explain latent, sensible, and total heat differences.	21	35	15	1.92
15.1.2	Diagram refrigeration cycle conditions and components.	20	33	16	1.94
15.1.3	Explain pressure-enthalpy diagrams.	35	21	14	1.70
15.1.4	Describe compressor design differences, efficiencies, and applications.	30	27	13	1.76
15.1.5	Explain water/air-cooled condenser operation and performance.	29	29	12	1.76
15.1.6	Describe metering device design and operation.	18	35	17	1.99
15.1.7	Describe refrigeration accessory components and operation.	23	31	16	1.90
15.1.8	Describe evaporator types.	23	34	13	1.86
15.1.9	Identify proper refrigerant line sizing and installation practices.	14	32	24	2.14
15.1.10	Explain various refrigerant physical and chemical properties.	32	24	14	1.74
15.1.11	Explain refrigerant oil properties and application.	27	28	15	1.83
15.1.12	Describe proper refrigeration system access procedures.	20	30	20	2.00
15.1.13	Differentiate between recovered, recycled, and reclaimed refrigerant.	12	36	22	2.14
15.1.14	Describe proper refrigerant recovery, evacuation, and charging procedures.	9	32	29	2.29
15.1.15	Describe the operation of a variable refrigerant flow system.	24	30	16	1.89
<b>Answered</b>					<b>71</b>
<b>Skipped</b>					<b>23</b>

**CONTENT STANDARD 16.0: INTRODUCTION TO HYDRONIC SYSTEMS****Performance Standard 16.1: Introduction to Hydronic Systems**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
16.1.1	Identify hydronic piping system configurations.	39	23	9	1.58
16.1.2	Describe hydronic system components.	36	26	8	1.60
16.1.3	Explain hydronic systems drain and fill procedures.	37	25	8	1.59
16.1.4	Diagram basic hydronic system control circuits.	40	21	8	1.54
<b>Answered</b>					<b>71</b>
<b>Skipped</b>					<b>23</b>

**CONTENT STANDARD 17.0: BASIC SHEET METAL****Performance Standard 17.1: Basic Sheet Metal**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
17.1.1	Define sheet metal layout terms.	33	28	10	1.68
17.1.2	Explain parallel line development procedures.	42	19	9	1.53
17.1.3	Layout and fabricate the following sheet metal fitting: Pittsburgh seam and square elbow.	30	29	11	1.73
17.1.4	Layout and fabricate the following sheet metal fitting: 90 degree elbow and transition.	32	27	11	1.70
17.1.5	Explain radial line development procedures.	43	18	9	1.51
17.1.6	Layout and fabricate the following sheet metal fitting: symmetrical tapered duct.	36	22	12	1.66
17.1.7	Layout and fabricate the following sheet metal fitting: square to square tapered duct.	33	26	11	1.69
17.1.8	Layout and fabricate the following sheet metal fitting: two-way offset transition.	36	24	10	1.63
17.1.9	Layout and fabricate the following sheet metal fitting: tapered duct section.	35	25	10	1.64
17.1.10	Explain triangulation development procedures.	36	25	9	1.61
<b>Answered</b>					<b>71</b>
<b>Skipped</b>					<b>23</b>

<b>CONTENT STANDARD 18.0: INTRODUCTION TO SERVICE</b>				
<b>Performance Standard 18.1: Introduction to Service</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
18.1.1 Identify air conditioning system problems.	11	33	27	2.23
18.1.2 Prescribe air conditioning system problem solutions.	12	32	26	2.20
18.1.3 Identify gas heating system problems.	9	32	28	2.28
18.1.4 Prescribe gas heating system problem solutions.	11	32	26	2.22
18.1.5 Identify oil heating system problems.	21	33	16	1.93
18.1.6 Prescribe oil heating system problem solutions.	25	31	14	1.84
18.1.7 Identify electric heating system problems.	11	35	24	2.19
18.1.8 Prescribe electric heating system problem solutions.	14	32	23	2.13
18.1.9 List gas, oil, and electric heating and air conditioning maintenance procedures.	13	36	21	2.11
<b>Answered</b>				<b>71</b>
<b>Skipped</b>				<b>23</b>

<b>CONTENT STANDARD 19.0: FUNDAMENTALS OF PSYCHOMETRICS</b>				
<b>Performance Standard 19.1: Fundamentals of Psychometrics</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
19.1.1 Explain psychometric properties.	45	21	4	1.41
19.1.2 Diagram psychometric conditions.	48	17	4	1.36
19.1.3 Describe comfort conditions as applied to psychometric properties.	47	18	4	1.38
19.1.4 Use the psychometric chart to measure enthalpy.	46	19	4	1.39
<b>Answered</b>				<b>70</b>
<b>Skipped</b>				<b>24</b>

**CONTENT STANDARD 20.0: TESTING AND BALANCING****Performance Standard 20.1: Testing and Balancing**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
20.1.1	Describe air flow and water flow measuring devices.	32	30	8	1.66
20.1.2	Explain basic air flow and water flow balancing procedures.	31	30	8	1.67
<b>Answered</b>					<b>70</b>
<b>Skipped</b>					<b>24</b>

**CONTENT STANDARD 21.0: INTRODUCTION TO HVAC CONTROL STRATEGIES****Performance Standard 21.1: Introduction to HVAC Control Strategies**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
21.1.1	Describe basic HVAC control principles.	14	42	14	2.00
21.1.2	Interpret basic HVAC pneumatic control diagrams.	38	23	8	1.57
21.1.3	Explain DDC control system basic operation.	38	26	5	1.52
<b>Answered</b>					<b>70</b>
<b>Skipped</b>					<b>24</b>

**CONTENT STANDARD 22.0: ADVANCED HVAC SYSTEMS****Performance Standard 22.1: HVAC Systems**

	<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
22.1.1	Explain commercial fan coil unit operation.	31	27	11	1.71
22.1.2	Explain package unit building system configurations.	32	27	10	1.68
22.1.3	Describe building chilled water system operation.	42	21	6	1.48
22.1.4	Describe induced and forced draft cooling tower operation.	44	18	6	1.44
<b>Answered</b>					<b>70</b>
<b>Skipped</b>					<b>24</b>



<b>Performance Standard 22.2: Heat Pump Systems</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
22.2.1 Explain heat pump heating and cooling cycles.	12	35	23	2.16
22.2.2 Describe the purpose and operation of various heat pump components.	11	37	21	2.14
22.2.3 Prescribe heat pump charging procedures.	10	34	25	2.22
22.2.4 Differentiate heat pump time/temperature and demand defrost control systems.	16	31	22	2.09
22.2.5 Explain geothermal heat pump system applications.	31	26	12	1.72
22.2.6 Describe water-to-air and air-to-water heat pump operation.	26	31	12	1.80
<b>Answered</b>				<b>70</b>
<b>Skipped</b>				<b>24</b>

<b>CONTENT STANDARD 23.0: ADVANCED TROUBLESHOOTING</b>				
<b>Performance Standard 23.1: Advanced Troubleshooting</b>				
<b>Answer Choices</b>	<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
23.1.1 Describe air flow troubleshooting procedures.	16	36	17	2.01
23.1.2 Determine operating conditions at variable loads.	27	29	13	1.80
23.1.3 Describe refrigeration side troubleshooting procedures.	16	32	21	2.07
23.1.4 Troubleshoot residential and commercial control systems.	14	36	19	2.07
23.1.5 Interpret manufacturer schematics.	10	35	23	2.19
23.1.6 Analyze furnace troubleshooting values.	11	41	17	2.09
23.1.7 Apply furnace troubleshooting values.	12	38	19	2.10
<b>Answered</b>				<b>69</b>
<b>Skipped</b>				<b>25</b>

**CONTENT STANDARD 24.0: CODE REVIEW****Performance Standard 24.1: Code Review**

<b>Answer Choices</b>		<b>Nice to Know</b>	<b>Need to Know</b>	<b>Critical to Know</b>	<b>Rating Average</b>
24.1.1	Apply international fuel gas code standards.	11	31	27	2.23
24.1.2	Apply international mechanical code standards.	12	31	26	2.20
24.1.3	Apply HVAC rules and statutes as it pertains to the IDAPA administrative code.	14	29	26	2.17
				<b>Answered</b>	<b>69</b>
				<b>Skipped</b>	<b>25</b>