

Name: _____

Date: _____

Heating & Air Conditioning Work Example 1

WorkKey Level: 3

NATEF Automotive Tasks: VII.A

According to the following refrigerant oil capacities chart, how much oil should be added when you replace the accumulator and the evaporator?

Component	ml	fl. oz.
A/C system	240	8.1
Accumulator	120	4
Condenser	30	1
Evaporator	60	2

Heating & Air Conditioning Work Example 2

WorkKey Level: 3

NATEF Automotive Tasks: VII.C.2

For every pound per square inch of pressure (psi), the boiling point rises three-Fahrenheit degrees. What is the boiling point of a system with a 16-pound cap assuming the boiling point of the coolant is 228 degrees.

Heating & Air Conditioning Work Example 3

WorkKey Level: 4

NATEF Automotive Tasks: VII.C.5

When filling a 15-quart system with a solution that is 40% water and 60% coolant, how many quarts of coolant would be required?

Heating & Air Conditioning Work Example 4

WorkKey Level: 3

NATEF Automotive Tasks: VII.C.6

According to the following chart, if I have a 14-quart capacity cooling system and I want to obtain protection against freezing down to about -54 degrees Fahrenheit, how many quarts of antifreeze should I add to the system?

Antifreeze and Coolant Means Maximum Severe Conditions Protection

Cooling system capacity in quarts	3	4	5	6	7	8	9	10	11
8	-7	-34	-69						
9	0	21	-50	-70					
10	4	-12	-34	-62					
11	8	-6	-23	-47	-65				
12	10	0	-15	-34	-57				
13		3	-9	-25	-45	-64			
14		6	-5	-18	-34	-54	-68		
15		8	0	-12	-26	-43	-62		
16		10	2	-8	-19	-34	-52	-64	
17			5	-4	-14	-27	-42	-58	-69
18			7	0	-10	-21	-34	-58	-62
19			9	2	-7	-16	-28	-42	-56
20			10	4	-3	-12	-22	-34	-48

Heating & Air Conditioning Work Example 5

WorkKey Level: 4

NATEF Automotive Tasks: VII.C.5

You have 12 quarts of antifreeze in a 20-quart system.

1. What would the boiling point be?

2. What would the freezing point be?

Freeze/Boil Protection Chart
 * Using a 15-PSI Pressure Cap

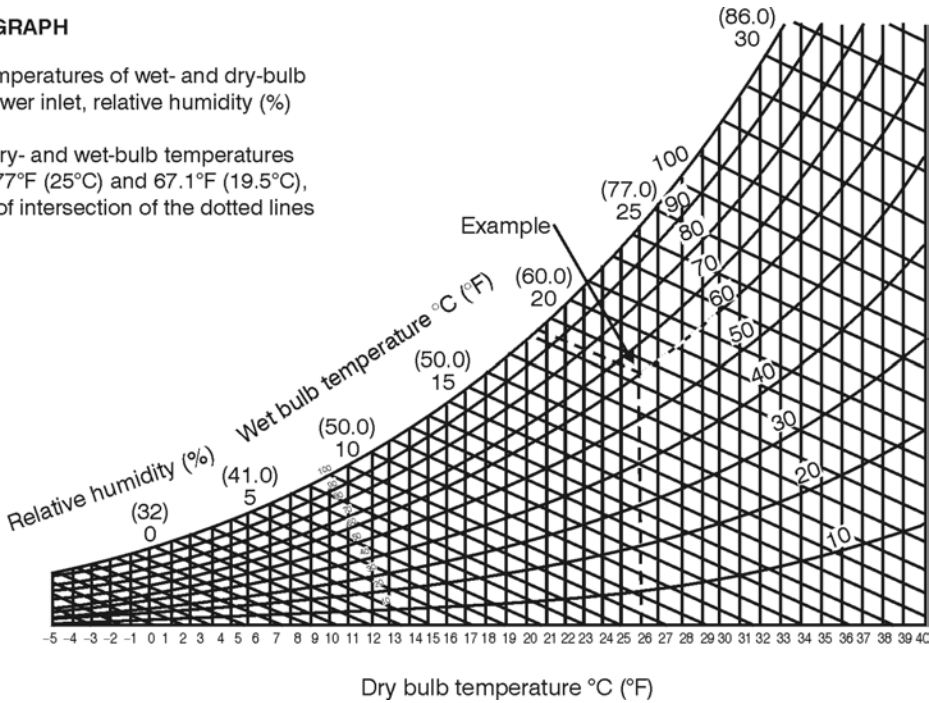
% of cooling system capacity	Protects from freezing down to	Protects from boiling up to*
50	-34° F	265° F
60	-62° F	270° F
70	-84° F	276° F

Heating & Air Conditioning Work Example 6

WorkKey Level: 5
NATEF Automotive Tasks: VII.A.6

HOW TO READ THE GRAPH

After measuring the temperatures of wet- and dry-bulb thermometer at the blower inlet, relative humidity (%) can be obtained.
 Example: Supposing dry- and wet-bulb temperatures at the blower inlet are 77°F (25°C) and 67.1°F (19.5°C), respectively, the point of intersection of the dotted lines in the graph is 60%.



Humidity plays a role in air conditioning. It is not just the outlet temperature that cools. Many customers will measure the outlet temperature on a 90% humidity day and complain that the system will not get cold enough.

If you tried a (23°C) wet Bulb and (25°C) dry bulb, the relative humidity would be _____%.

Heating & Air Conditioning Work Example 7

WorkKey Level: 4

NATEF Automotive Tasks: VII.C.5, VII.C.6

Use the chart below to answer the following question. How many quarts of antifreeze coolant are needed for a 4-gallon system to -34°F? (1 gallon = 4 quarts)

Quarts of Antifreeze Required for Protection to Temperatures (°F) Shown

Cooling system capacity in quarts	2	3	4	5	6	7	8	9	10	11
5	-12	-62								
6	0	-34								
7	6	-17	-54							
8		-7	-34	-69						
9		0	-21	-50	-70					
10		4	-12	-34	-62					
11		8	-6	-23	-47	-65				
12		10	0	-15	-34	-57				
13			3	-9	-25	-45	-64			
14			6	-5	-18	-34	-54	-68		
15			8	0	-12	-26	-43	-62		
16			10	2	-8	-19	-34	-52	-64	
17				5	-4	-14	-27	-42	-58	-69
18				7	0	-10	-21	-34	-50	-62
19				9	2	-7	-16	-28	-42	-56
20				10	4	-3	-12	-22	-34	-48
21					6	0	-9	-17	-28	-41
22					3	2	-5	-14	-23	-34

Heating & Air Conditioning Work Example 8

WorkKey Level: 7

NATEF Automotive Tasks: VII.C.5, VII.C.6

The chart below shows the relationship between the boiling point of coolant and the percent antifreeze coolant content of the coolant.

Percent antifreeze in coolant	Boiling point of coolant (°F)
0	212
10	213
20	214
30	217
40	223
50	228
60	236
70	245
80	258
90	270
100	330

You have tested a car's coolant system and found that the coolant is 20% antifreeze. The car will hold 12 liters of antifreeze when full.

- What is the boiling point of the coolant in the car with coolant containing 20% antifreeze?
- If you want the boiling point to increase to 245°F, what percent antifreeze should the coolant be?
- How many liters of coolant should you remove from the system so that replacing by 100% antifreeze will raise the boiling point to 245°F?

Heating & Air Conditioning Work Example 9

WorkKey Level: 3

NATEF Automotive Tasks:

A coolant system has a capacity of 7 1/2 quarts. If the ratio of antifreeze to water is 50:50, how much of each must be added after the system has been drained and cleaned?