

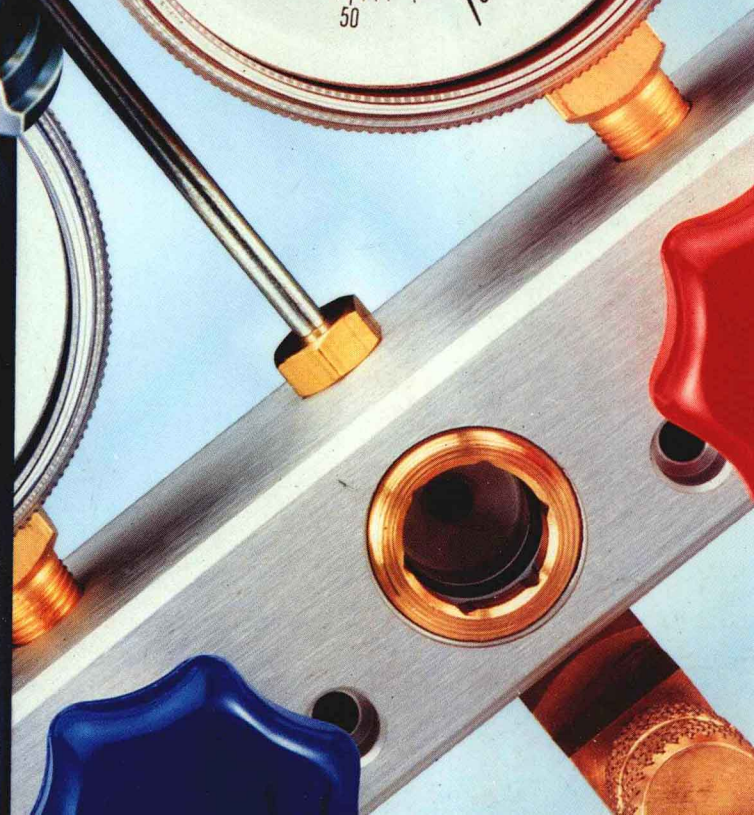
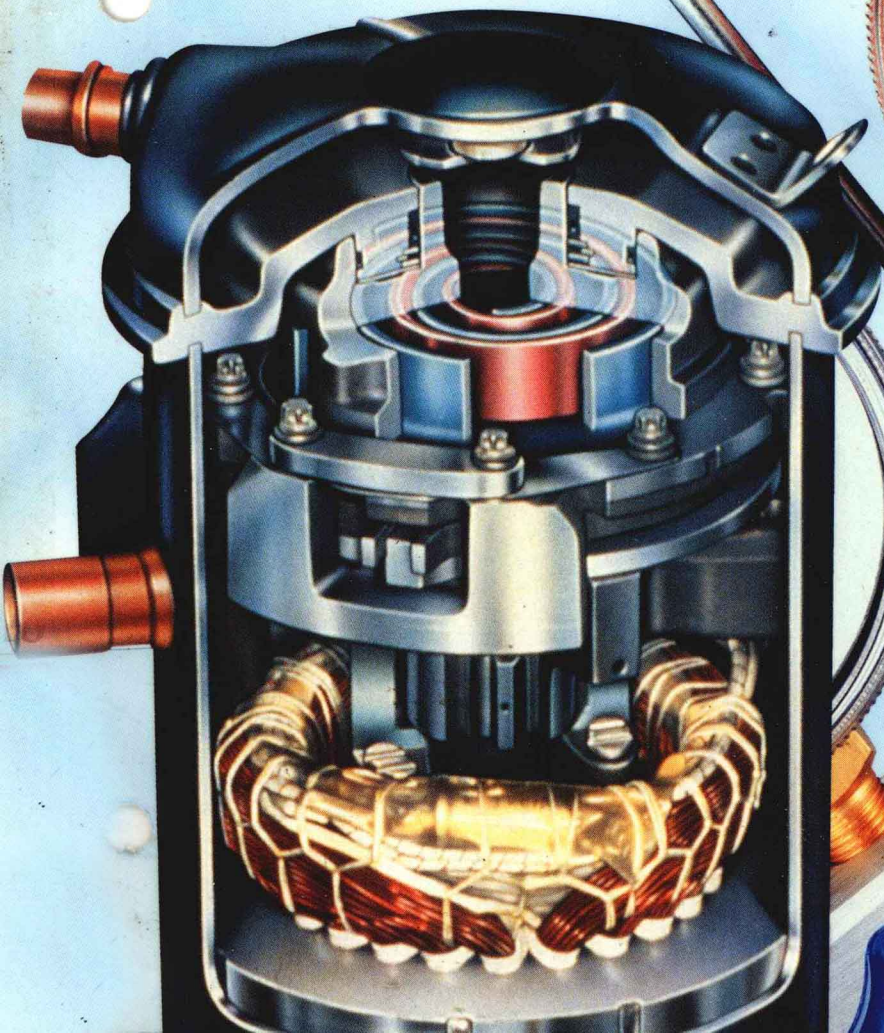
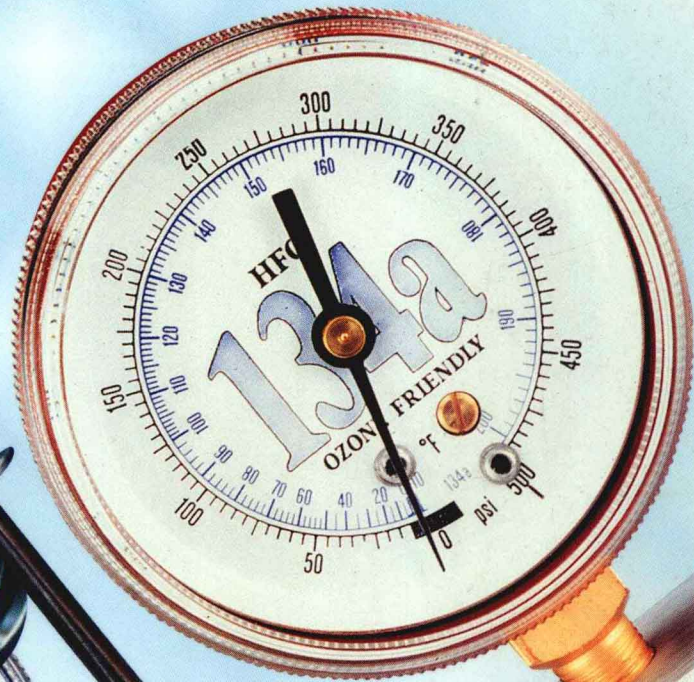
Study Guide

Modern

Refrigeration and

Air Conditioning

Althouse / Turnquist / Bracciano



Study Guide

for

Modern Refrigeration and Air Conditioning

by

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The technological changes in the refrigeration and air conditioning industry in recent years have been very extensive. The accuracy, reliability, clarity, and reading level of this Study Guide have been achieved through the assistance of the following individuals:

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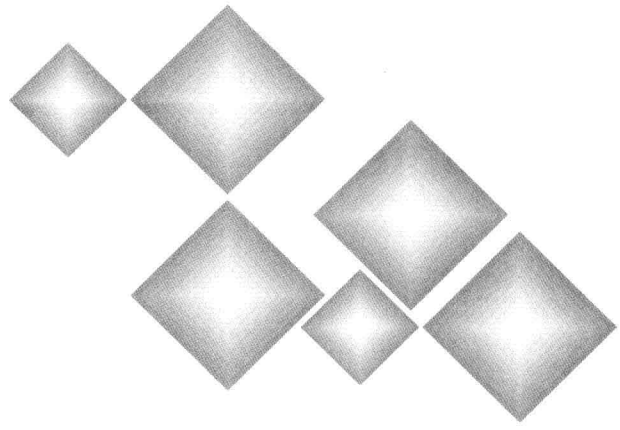
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INTRODUCTION



This Study Guide is to be used with the textbook **Modern Refrigeration and Air Conditioning**. Its intent is to provide you with a thorough background in all aspects of refrigeration and air conditioning. The type of questions used will be valuable in further education in the refrigeration and air conditioning field or for state, local, or federal licensing approval.

Each lesson has been formulated to assist in mastering the textbook information on a chapter-by-chapter basis. Each chapter number is the same as the textbook chapter that it reviews.

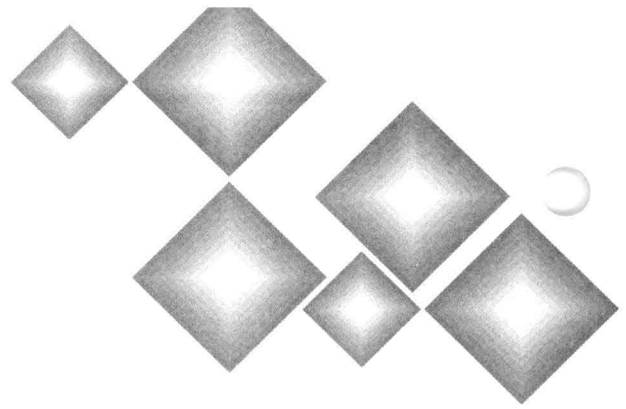
The Study Guide serves as an open book quiz on the contents of the textbook. Each Study Guide unit has an identifying objective, which will be met upon completion of the unit.

The instructor may assign an entire unit or only lessons that pertain to a specific area. Assignments may be completed in class or as homework.

The Study Guide uses various learning activities. In some instances, you will be required to complete wiring diagrams or electrical circuits. At other times, a complete refrigeration system must be labeled, observing proper color and part identification. Numerous types of questions have been used: sentence completion (fill-in), listing, multiple choice, matching, part identification, illustration completion, short answers, definitions, and sketching assignments.

Through the use of this Study Guide, you will acquire a working knowledge of the principles of refrigeration and air conditioning and their application.

Contents



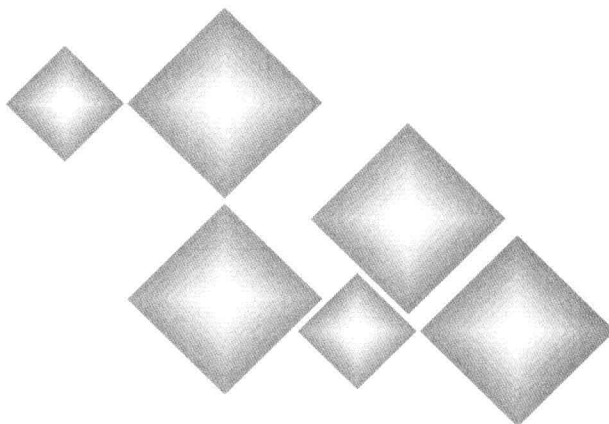
	Study Guide Page	Corresponding Textbook Page
Introduction	3	
1 Fundamentals of Refrigeration	7	25
1.1 Physical Properties of Refrigeration and Air Conditioning.....	7	
1.2 Thermodynamics of Refrigeration and Air Conditioning	11	
2 Refrigeration Tools and Materials	15	61
2.1 Flaring, Soldering, and Brazing Tubing	15	
2.2 Hand Tools	19	
2.3 Service Valves, Instruments, and Gauges.....	21	
3 Basic Refrigeration Systems	23	103
3.1 Basic Refrigeration Systems	23	
4 Compression Systems and Compressors	29	131
4.1 Compression System Components and Compressors	29	
4.2 Compressors	31	
5 Refrigerant Controls	35	177
5.1 Expansion Valves	35	
5.2 Float Valves, Capillary Tubes, Check Valves, and Suction Pressure Valves	39	
6 Electrical-Magnetic Fundamentals	41	207
6.1 Electricity and Circuit Fundamentals	41	
6.2 Magnetism and Electrical Components.....	45	
6.3 Transformers and Motor Circuits.....	47	
6.4 Electronic Components and Computer Fundamentals.....	49	
7 Electric Motors.....	51	257
7.1 Types of Electric Motors.....	51	
7.2 Motor Protection	53	
7.3 Servicing Motors.....	55	

8	Electric Circuits and Controls	59	295
8.1	Fundamentals of Circuits and Controls	59	
8.2	Operating Controls	61	
8.3	Defrosting and Pressure Controls.....	63	
8.4	Relays and Safety Controls	65	
9	Refrigerants	67	335
9.1	Types of Refrigerants.....	67	
9.2	Refrigerant Safety.....	71	
10	Refrigerant Recovery/Recycling/Reclaiming	73	381
10.1	Ozone Layer and EPA Rulings	73	
10.2	Recovery, Recycling, Reclaiming.....	75	
11	Domestic Refrigerators and Freezers	77	381
11.1	Refrigerator-Freezers, Manual Defrost.....	77	
11.2	Refrigerator-Freezers, Automatic Defrost.....	81	
11.3	Freezers	85	
12	Servicing and Installing Small Hermetic Systems.....	87	417
12.1	Installing Refrigerators and Freezers	87	
12.2	Diagnosing External Problems	89	
12.3	Diagnosing Internal Problems.....	91	
13	Commercial Systems	95	473
13.1	Compressors, Condensers, and Evaporators.....	95	
13.2	Control Components	99	
14	Commercial Systems—Applications.....	101	547
14.1	Commercial Systems Applications	101	
15	Servicing and Installing Commercial Systems	105	571
15.1	Noncode Installations.....	105	
15.2	Code Installations	109	
15.3	Servicing Commercial Systems.....	111	
16	Commercial Systems—Heat Loads and Piping.....	113	633
16.1	Determining Heat Loads	113	
16.2	System Capacity.....	115	
16.3	Line Capacity and Energy Efficiency	117	
17	Absorption Systems—Principles and Applications	119	685
17.1	Absorption System Principles.....	119	
18	Special Refrigeration Systems and Applications.....	123	709
18.1	Special Refrigeration Systems	123	
19	Fundamentals of Air Conditioning	127	727
19.1	Humidity and Psychrometric Charts	127	
19.2	Air Movement, Temperature, and Contaminants.....	131	

20	Basic Heating and Air Conditioning Systems	135	761
20.1	Heating Systems	135	
20.2	Air Conditioning Systems.....	139	
20.3	Air Conditioning Applications	143	
21	Heating and Humidification Systems	145	789
21.1	Heating and Humidifying Principles.....	145	
22	Cooling and Dehumidifying Systems.....	151	853
22.1	Comfort Cooling Systems.....	151	
22.2	Installing and Servicing Comfort Cooling Systems ...	153	
23	Air Distribution, Measurement, and Cleaning.....	155	873
23.1	Air Ducts	155	
23.2	Fans and Airflow Devices.....	159	
23.3	Air Cleaning and Combustion Efficiency	163	
24	Heat Pumps and Complete Air Conditioning Systems.....	165	915
24.1	Heat Pumps	165	
24.2	Complete Air Conditioning Systems	169	
24.3	Commercial Systems.....	171	
25	Solar Energy	173	969
25.1	Solar Energy Principles	173	
26	Air Conditioning and Heating Control Systems	177	983
26.1	Control Principles and Thermostats	177	
26.2	Specific Controls	181	
26.3	Energy Management	183	
27	Air Conditioning Systems—Heat Loads.....	185	1033
27.1	Heat Loads	185	
28	Automotive Air Conditioning.....	189	1057
28.1	Automotive Air Conditioning.....	189	
29	Servicing and Troubleshooting Simplified	193	1085
29.1	Servicing/Troubleshooting.....	193	
29.2	Maintenance Service Contracts	195	
30	Passing EPA Exams.....	197	1105
30.1	Exam Preparation	197	

Chapter 1

FUNDAMENTALS OF REFRIGERATION



Name _____

Date _____ Class _____

Instructor _____

OBJECTIVE: After studying Chapter 1 of the text and completing these lessons, you will be able to explain the physical, mechanical, and chemical principles of refrigeration and air conditioning.

INSTRUCTIONS: Read Chapter 1 of the text, then complete Lessons 1.1 and 1.2.

	Grade
Lesson 1.1	
Lesson 1.2	
Total	

Lesson 1.1

Grade:

Physical Properties of Refrigeration and Air Conditioning

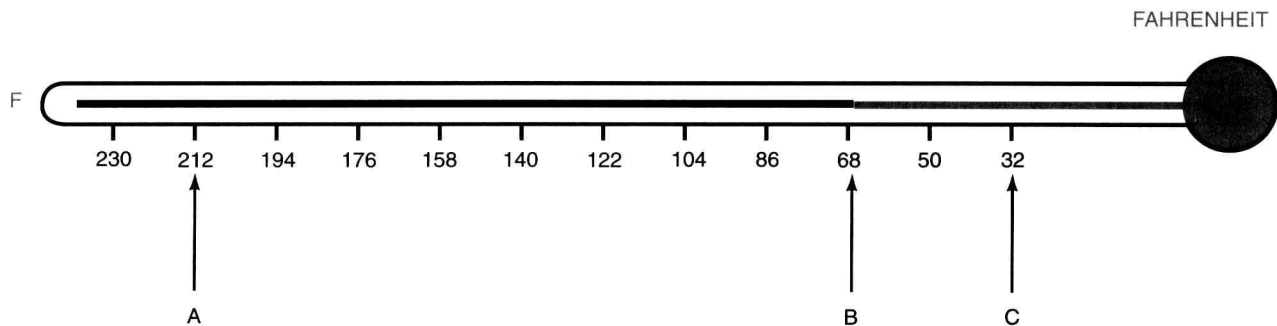


HISTORY AND FUNDAMENTALS OF REFRIGERATION MODULE

1. Identify the temperature on the thermometer associated with the condition below:

- A. Freezing point of water
- B. Standard temperature
- C. Boiling point of water

- 1. A. _____
- B. _____
- C. _____



2. Heat always flows from a _____ to a _____ substance.

- 2. _____
- _____

3. The color code used in the text indicates the state the refrigerant is in. Indicate the proper state next to each color.



A. _____



C. _____



B. _____



D. _____

4. What part of a basic refrigerator absorbs heat?

4. _____



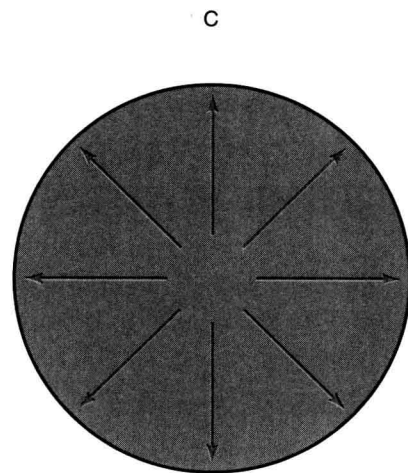
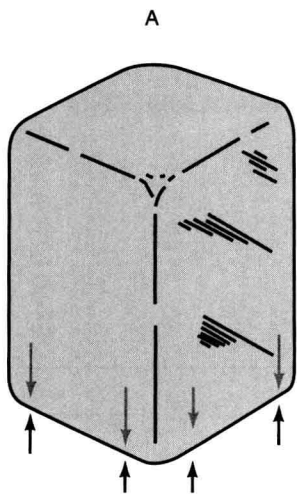
TEMPERATURE, PRESSURE, AND MEASUREMENT MODULE

5. Identify the state of each substance shown:

5. A. _____

B. _____

C. _____



6. The absolute scale that uses the same divisions as the Fahrenheit scale is called the _____ scale.

6. _____

A. Rankine

B. Kelvin

C. Celsius

D. None of the above.

7. Absolute pressure is gauge pressure plus _____ pressure.

7. _____

8. Name the three physical states of a substance.

8. _____

9. Identify the type of energy that is obtained by using each of the formulas below:

A. $\frac{\text{Force} \times \text{Distance}}{\text{Time}}$

9. A. _____

B. $\text{Pressure} \times \text{Area}$

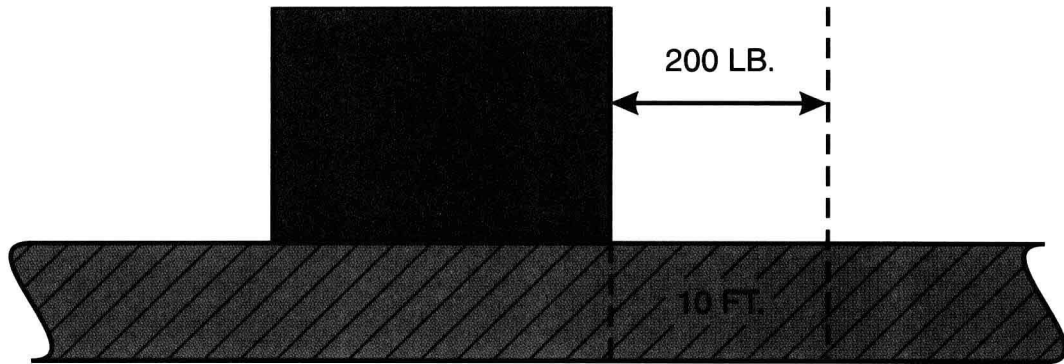
B. _____

C. $\text{Force} \times \text{Distance}$

C. _____

10. How much work, in foot pounds, is required to move the block below 10 feet if the forward force is 200 lb.?

10. _____



11. What is the formula used to convert temperature from degrees Fahrenheit to degrees Celsius?

11. _____

12. Identify the U.S. conventional measurement, in inches, for each metric unit below:

Metric

U.S. Conventional

A. 10 mm

12. A. _____

B. 1 m

B. _____

C. 2.54 cm

C. _____

D. 10 cm

D. _____

E. 1 mm

E. _____

13. Convert 3°F to Celsius. (Show your calculations in the space provided.) 13. _____

14. Convert 10°C to Fahrenheit. (Show your computations in the space provided.) 14. _____

Name _____

Date _____ Class _____

Instructor _____

Lesson 1.2

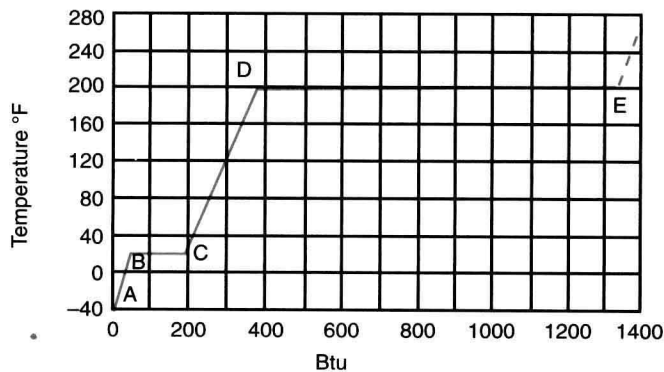
Grade: _____

Thermodynamics of Refrigeration and Air Conditioning



TEMPERATURE, PRESSURE, AND MEASUREMENTS MODULE

1. A Btu is the amount of ____ required to raise the temperature of one pound of water one degree Fahrenheit. 1. _____
2. How many Btu per hour is equivalent to one ton of refrigeration? 2. _____
 - A. 554
 - B. 200
 - C. 12,000
 - D. 15,000
3. The temperature at which a liquid boils depends on its pressure. (True or False?) 3. _____
4. Identify the type of heat in the pressure-enthalpy diagram shown below:
 - A. The heat added from B to C is called _____. 4. A. _____
 - B. The heat added from D to E is called _____. B. _____
 - C. The heat added from C to D is called ____ heat. C. _____

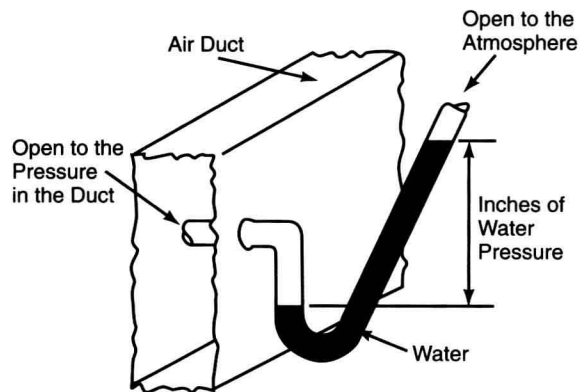


5. Ambient temperature is the temperature of the air _____ a motor, a control mechanism, or any other device. 5. _____

6. What is sensible heat?

7. What is latent heat?

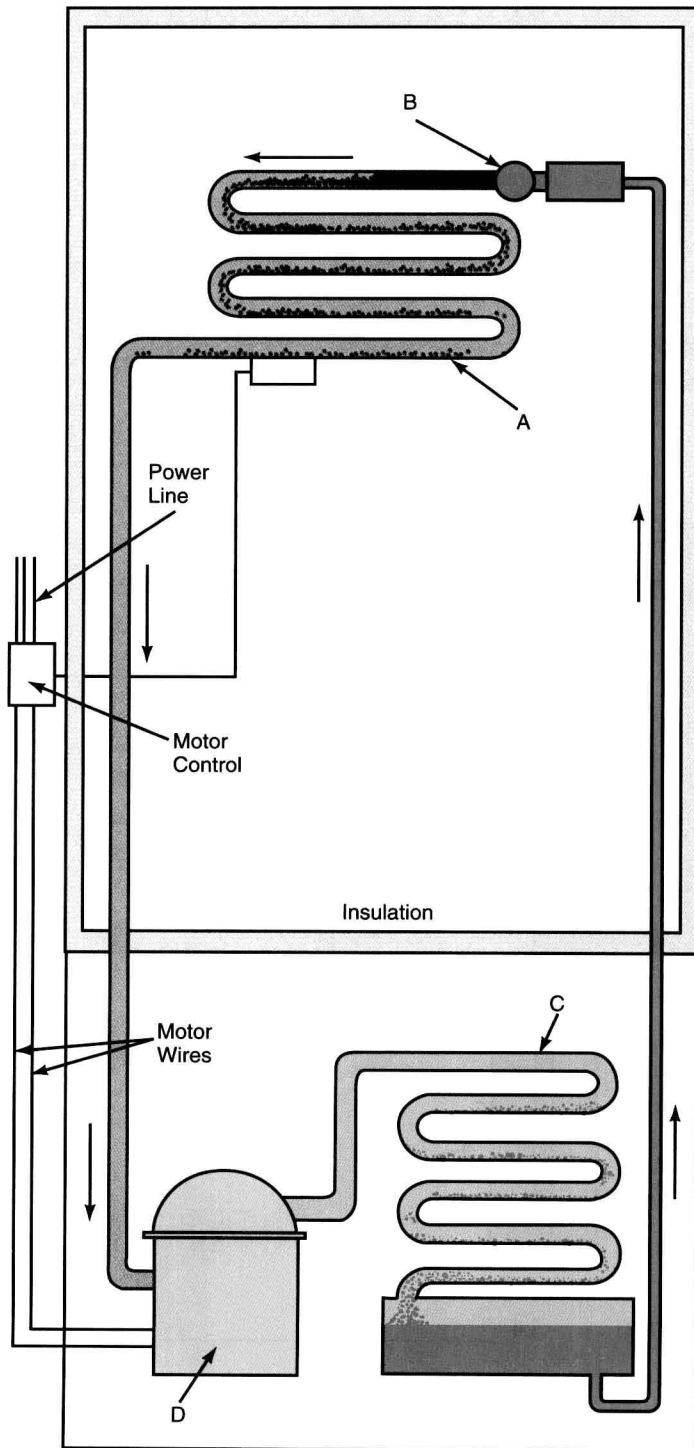
8. What is the basic use for a manometer?





REFRIGERATION SYSTEMS AND TERMS MODULE

9. Identify the parts of the basic refrigerator.



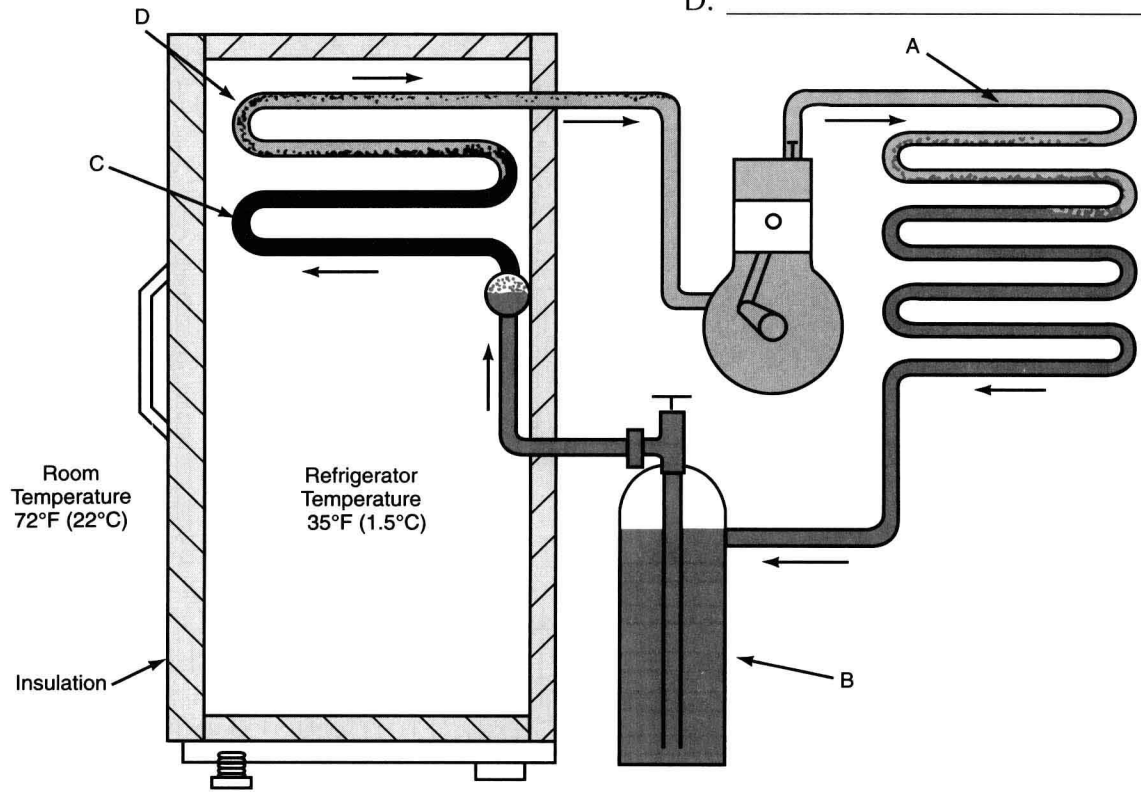
- 9. A. _____
- B. _____
- C. _____
- D. _____

10. Name the three methods of heat transfer.

- 10. _____
- _____
- _____

11. Poor conductors of heat are also known as _____. 11. _____
12. Give the proper abbreviations for each unit listed: 12. A. _____
 A. British thermal unit. B. _____
 B. Fahrenheit. C. _____
 C. Degrees Celsius. D. _____
 D. Pound. E. _____
 E. Pounds per square inch gauge. F. _____
 F. Pounds per square inch absolute. G. _____
 G. Watt. H. _____
 H. Inches of mercury vacuum. I. _____
 I. Joule.

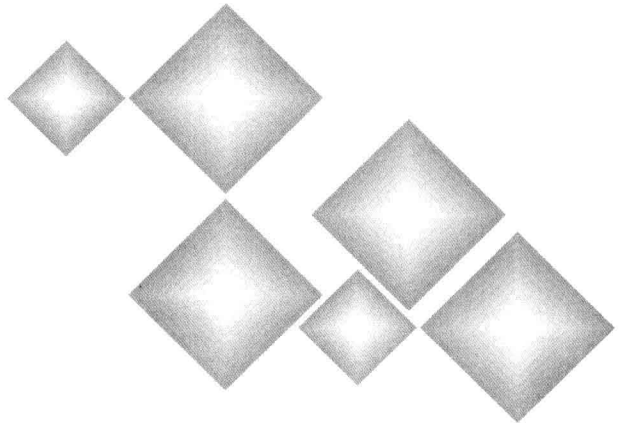
13. In the elementary mechanical refrigerator shown below, identify the state of the refrigerant where shown: 13. A. _____
 B. _____
 C. _____
 D. _____



14. Fluids that boil and absorb heat are called refrigerants. (True or False?) 14. _____
15. The recommended maximum weight that a service technician should lift is ____ lb. or ____ kg. 15. _____
16. When working on electrical circuits, *always* be sure that the circuit is ____ at the ____ source. 16. _____
17. Always wear safety ____ when working with refrigerants 17. _____

Chapter 2

REFRIGERATION TOOLS AND MATERIALS



Name _____

Date _____ Class _____

Instructor _____

OBJECTIVE: After studying Chapter 2 of the text and completing these lessons, you will be able to select and use the tools and materials used in the refrigeration and air conditioning industry.

INSTRUCTIONS: Read Chapter 2 of the text. Then complete Lessons 2.1, 2.2, and 2.3.

	Grade
Lesson 2.1	
Lesson 2.2	
Lesson 2.3	
Total	

Lesson 2.1

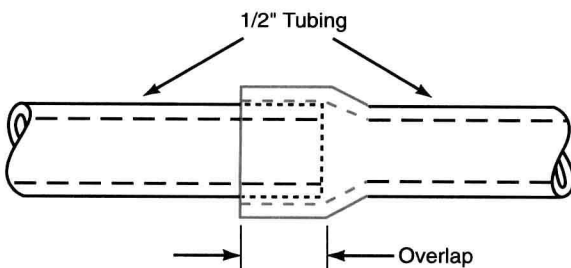
Grade:

Flaring, Soldering, and Brazing Tubing



TUBING AND FITTINGS MODULE

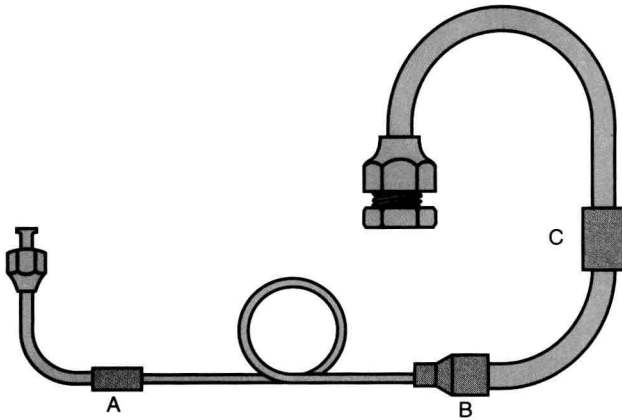
- What is the meaning of ACR as applied to tubing?
 - It is cold rolled.
 - It is suitable for air conditioning and refrigeration applications.
 - It is intended for air-cooled applications only.
 - It is a certain manufacturer's brand symbol.
 - It is air-cooled rolled.
- When swaging 1/2" OD copper tubing, as shown in illustration below, indicate the length of overlap.



1. _____

2. _____

3. Identify the soldered joint fittings in this illustration.

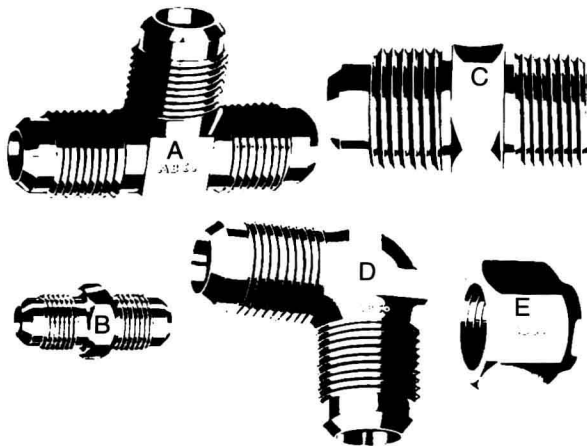


3. A. _____
 B. _____
 C. _____

4. The basic difference between soldering and brazing is the _____ at which molten solder flows.

4. _____

5. Identify the flare fittings shown below:

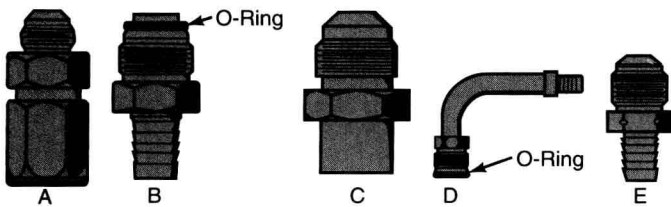


5. A. _____
 B. _____
 C. _____
 D. _____
 E. _____

6. List three types of bending tools.

6. _____

7. Name the flexible hose fittings shown below:



7. A. _____
 B. _____
 C. _____
 D. _____
 E. _____

8. Name three common methods of joining tubing to tubing and tubing to fittings.

8. _____

