



**Correlation of  
Modern Refrigeration and Air Conditioning, by Althouse, Turnquist, Bracciano  
(Goodheart-Willcox Publisher ©2021)**

to

**HVAC Excellence Competencies Task List: General Studies**

The following chart correlates the *Modern Refrigeration and Air Conditioning* textbook (©2021) to an area of the HVAC Excellence Competencies Task List.

The chart lists individual competency and task standards, and the corresponding chapter numbers from *Modern Refrigeration and Air Conditioning*.

For more information on HVAC Excellence and related certifications, please visit: [www.hvacexcellence.org](http://www.hvacexcellence.org).



Mathematics for HVACR	
Competency / Task	Textbook Chapter(s)
<b>Students should have knowledge of and be able to demonstrate proficiency in the following:</b>	
Extending the properties of exponents to rational exponents	
Adding, subtracting, multiplying, and dividing decimal numbers including negative numbers	Chapters 4, 5, 50
Adding, subtracting, multiplying, and dividing fractions	Chapters 4, 50
Adding, subtracting, multiplying, and dividing whole numbers including negative numbers	Chapters 4, 5, 50
Calculating $\Delta T$	Chapters 16, 50, 51
Calculating squares, cubes, and roots for area and volume	Chapters 37, 50
Converting English measurements to metric measurements and metric to English	Chapters 4, 5, Appendices

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<b>Mathematics for HVACR (continued)</b>	
<b>Competency / Task</b>	<b>Textbook Chapter(s)</b>
Converting fractions to decimals and decimals to fractions	Appendix
Measuring length, area, and volume using both inch pound (English) and SI (metric) measurements	Chapter 50
Solving basic equations	Chapters 4, 5, 8, 12, 13, 15, 37, 50
Manipulating ratios and proportions as they relate to various equipment and components, such as compressors, pumps, drive systems, and fans	Chapters 12, 13, 15, 16, 18, 19, 31, 52
<b>HVACR General Studies</b>	
<b>Competency / Task</b>	<b>Textbook Chapter(s)</b>
<b>Students should have knowledge of and be able to demonstrate proficiency in:</b>	
HVACR industry organizations	Chapter 1, Appendices
Energy resources	Chapters 13, 41, 42, 44, 45, 46
Energy efficiency ratings	Chapters 40, 41, 46
Defining and differentiating between renewable and sustainable energy	Chapter 46
Life cycle cost analysis	Chapter 32
The meaning of the following acronyms: BIM, CBECS, ECM, EIA, EER, SEER, AFUE, HSPF, COP, ECM	Chapters 15, 18, 36, 37, 40, 46, 54
Energy auditing	Chapters 1, 30, 45, 46
The thermodynamics of air and water vapor	Chapters 4, 5, 27, 35, 36, 37, 50
The water vapor cycle in the earth's atmosphere	Chapters 27, 28, 35
Standard air volume and density	Chapter 27
Psychrometrics	Chapters 27, 35
The properties of each line on a psychrometric chart	Chapter 27
Plotting any two basic points on the psychrometric chart and evaluating the data	Chapter 27
Describing the eight processes of air conditioning and how to plot each on a psychrometric chart	Chapter 27
Defining and using the process triangle on the psychrometric chart to calculate sensible heat, latent heat, and total heat	Chapters 27, 36
Explaining the comfort zone and the different temperatures and relative humidity's effect on human comfort	Chapter 27

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<b>HVACR General Studies (continued)</b>	
<b>Competency / Task</b>	<b>Textbook Chapter(s)</b>
Explaining sensible heat ratio	Chapter 27
Calculating mixed air problems for infiltration and ventilation	Chapters 27, 28, 29
Calculating residential structure heat loss and gain	Chapters 29, 37, Appendices
Calculating duct sizing, using duct sizing formulas	Chapter 29
Developing critical-thinking skills including analysis, evaluation, calculations, and the use of computer technology	Chapters 4, 5, 17, 30, 32, 33, 36, 37, 41, 42, 43, 45, 53, 54