



# WASTEWATER TECHNOLOGY TRAINERS

*Transforming today's operators into tomorrow's water quality professionals*

---

## Grades IV&V Operator Certification and Math Review Table of Contents

About and Schedule.....	1
Course Outline and Study Guide.....	3
CHAPTER 1. Math Approach—The Solution Bridge.....	11
Area .....	11
Volume .....	14
Time (Flow and Volume).....	17
Pounds and Pounds-per-Day.....	18
Wahlbergisms.....	24
Practice Problem Set No. 1.....	25
CHAPTER 2. Work, Energy, Power and Pumping.....	31
Work, Energy, and Power .....	31
Power in Pumping Systems .....	31
Electrical Costs.....	34
Practice Problem Set No. 2.....	35
CHAPTER 3. Chemicals and Chemical Dosing .....	39
Polymers.....	39
Percent Solids Recovery (PSR).....	39
Other Chemicals.....	39
Chemically Enhanced Primary Treatment.....	40
Chemical Dosing .....	41
Practice Problem Set No. 3.....	44
CHAPTER 4. Essay Strategy.....	49
Homework Problem Set No. 1 .....	51
CHAPTER 5. Selected Topics .....	57
Developing a Study Plan.....	57
BOD, NOD (NBOD), and cBOD.....	61
Total and Fecal Coliform Tests .....	63
Industrial Wastes.....	66
Safety Data Sheets .....	68
Infiltration and Inflow .....	74
Oxidation Reduction Potential.....	75
Ultraviolet (UV) Disinfection .....	77
Practice Problem Set No. 4.....	79
CHAPTER 6. Primary Clarification.....	83
Solids.....	83
Organics .....	84

Performance.....	85
Practice Problem Set No. 5.....	89
Homework Problem Set No. 2.....	93
CHAPTER 7. Anaerobic Digestion and 503 Regs.....	97
Process Objective.....	97
Microbiology.....	98
Description.....	99
Safety and Other Equipment.....	101
Process Control and Performance.....	104
Importance of Solids Thickening and Dewatering.....	110
Volatile Acid Measurement.....	110
Alkalinity Measurement.....	111
Class B <i>versus</i> Class A: The “503 Regs”.....	112
Practice Problem Set No. 6.....	117
CHAPTER 8. Thickening and Dewatering.....	123
Gravity Thickener.....	124
Dissolved-air Flotation Thickener.....	127
Belt Filter Press (Dewatering).....	129
Dewatering Centrifuge.....	132
Practice Problem Set No. 7.....	135
Homework Problem Set No. 3.....	141
CHAPTER 9. Activated Sludge.....	145
Process Control.....	145
Nutrient Removal.....	153
Modifications.....	159
Operational Problems.....	163
Organic and Hydraulic Loading Comparisons.....	165
Practice Problem Set No. 8.....	167
CHAPTER 10. Exam Information and Test-taking Strategies.....	173
Exam Format.....	173
Exam Subject Matter.....	173
Math.....	173
Wahlberg’s Cheat Sheets.....	174
Exam-taking Strategy: Hints and Suggestions.....	175
Homework Problem Set No. 4.....	179
Math Solutions—Read Me.....	187
Solutions—Practice Problems	
Practice Problem Set No. 1.....	189
Practice Problem Set No. 2.....	197
Practice Problem Set No. 3.....	203
Practice Problem Set No. 4.....	209
Practice Problem Set No. 5.....	215
Practice Problem Set No. 6.....	221