



California Grade D2 Water System Operator License Upgrade Course Syllabus Includes Distribution System Basics and Distribution Exam Preparation Grade 2

Purpose

This Distribution System Basics course qualifies as specialized training for the CA Distribution Operator exams.

This Distribution Exam Preparation course is designed to prepare you for your Second Level Distribution System Operator exams.

Distribution System Basics

Distribution System Basics Topics

Basic Water Math_

Unit Conversions
Working with Formulas
Understanding Percentages
Calculating Area
Calculating Volume
Weight-Volume Relationships
Force-Pressure-Head
Velocity and Flow Rate
Pumps
The Metric System
Problem Solving

Distribution System Review

Flow Conversion Problems
Source Water Review
Volume Problems
System Design and Layout Review
Flow Rate Problems
Force-Pressure-Head Review
Water Wells Review
Distribution Disinfection Review
Distribution Disinfection Problems
Chemical Feed Problems
Safety Review
Distribution Laboratory Problems
Water Meters Review
Pumps and Motors Review
Piping Review
Hydrants and Valves Review
Cross-Connection Control Review
Water Storage Review
Water Quality Review
Distribution Corrosion Control Review
Management Principles Review
pH
Turbidity
Chlorine
Microbiology

Learning Objectives

Unit Conversions

Upon completion of this lesson the student will be able to:

- Define what a unit is
- Define what an equivalent is
- Demonstrate how units and equivalents are used to solve math problems

Working with Formulas

Upon completion of this lesson the student will be able to:

- Define what a formula is
- Demonstrate how a formula is used
- Demonstrate how formulas are rearranged
- Demonstrate how to solve math problems using formulas

Understanding Percentages

Upon completion of this lesson the student will be able to:

- Demonstrate how to convert between fractions and percentages
- Demonstrate how to convert between decimals and percentages

Calculating Area

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve for the area of a square
- Demonstrate how to solve for the area of a rectangle
- Demonstrate how to solve for the area of a circle
- Demonstrate how to solve for the area of a triangle

Calculating Volume

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve for the volume of a cube
- Demonstrate how to solve for the volume of a cylinder
- Demonstrate how to solve for the volume of a cone
- Demonstrate how to solve for the volume of a sphere

Weight/Volume Relationships

Upon completion of this lesson the student will be able to:

- Recall how many pounds one gallon of water weighs
- Recall how many gallons are in one cubic foot
- Recall how many pounds one cubic foot of water weighs
- Recall how many liters are in one gallon
- Recall how many pounds are in one kilogram
- Discuss and demonstrate how these weight and volume relationships are used to solve math problems

Force-Pressure-Head

Upon completion of this lesson the student will be able to:

- Define force
- Define pressure
- Define water head
- Recall how many psi (pounds per square inch) is one foot of water head
- Discuss and demonstrate how to solve math problems involving force-pressure-head calculations

Velocity and Flow Rate

Upon completion of this lesson the student will be able to:

- Define velocity
- Demonstrate how velocity is calculated
- Define flow rate
- Demonstrate how flow rate is calculated

Pumps

Upon completion of this lesson the student will be able to:

- Define horsepower
- Define water horsepower
- Define break horsepower
- Define motor horsepower
- Discuss and demonstrate how to solve pump math problems involving horsepower

The Metric System

Upon completion of this lesson the student will be able to:

- Define what metric system units
- Demonstrate how to convert between weight and volume measurements in the metric system
- Demonstrate how to convert between metric units and standard units

Problem Solving

Upon completion of this lesson the student will be able to:

- Define the five steps to problem solving
- Determine if all five steps are needed to solve a specific problem
- Explain how the five steps work
- Apply the five step problem solving method to water math problems

Flow Conversion Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to convert between MGD and gpm
- Demonstrate how to convert between MGD and CFS

Source Water Review

Upon completion of this lesson the student will be able to:

- Define source water vocabulary
- Discuss proper water source evaluation
- Recall the different types of source water contaminants
- Explain the hydrologic cycle
- Distinguish the different types of public water systems
- Describe the main objectives of water treatment
- Formulate solutions to water quality problems

Volume Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve trench volume problems
- Demonstrate how to solve tank volume problems

System Design and Layout

Upon completion of this lesson the student will be able to:

- Define system design and layout vocabulary
- Identify what makes a water system “public”
- Identify the different types of public water systems
- Describe distribution system design considerations
- Describe different system layout designs

Flow Rate Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve math problems relating flow rate through a pipe
- Demonstrate how to solve math problems relating flow into a storage tank

Force-Pressure-Head Review

Upon completion of this lesson the student will be able to:

- Demonstrate how to calculate feet of water head
- Demonstrate how to calculate pressure due to head
- Demonstrate how to calculate force on a tank due to head

Water Wells Review

Upon completion of this lesson the student will be able to:

- Define well vocabulary
- Describe well construction
- Describe well protection
- Describe well level measurements

Distribution Disinfection Review

Upon completion of this lesson the student will be able to:

- Define distribution disinfection vocabulary
- Describe the different characteristics of disinfecting agents
- Identify the different disinfection methods for water mains
- Identify different disinfection methods for water storage facilities

Distribution Disinfection Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve math problems relating to mixing chlorine solutions
- Demonstrate how to solve math problems relating to chlorine dosing
- Demonstrate how to solve math problems relating to chlorine demand

Safety Review

Upon completion of this lesson the student will be able to:

- Define safety vocabulary
- Describe trenching safety requirements
- Describe confined space safety requirements
- Describe how to set up a traffic diversion

Distribution Laboratory Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve math problems relating to running averages
- Demonstrate how to solve math problems relating to meter accuracy

Water Meters Review

Upon completion of this lesson the student will be able to:

- Define water meters vocabulary
- Describe the construction and operation of the different types of water meters
- Describe the normal application of the various water meters

Pumps and Motors Review

Upon completion of this lesson the student will be able to:

- Define pumps and motors vocabulary
- Describe the construction and operation of velocity type pumps
- Describe the functions of the main components of a centrifugal pump
- Describe the theory of operation and common uses of positive displacement pumps
- Describe the differences between the various types of single and three-phase motors

Piping Review

Upon completion of this lesson the student will be able to:

- Define piping vocabulary
- Identify the four main pipe selection considerations
- Describe the construction material and construction characteristics of common pipe
- Describe different pipe joints and their applications

Hydrants and Valves Review

Upon completion of this lesson the student will be able to:

- Define hydrants and valves vocabulary
- Identify the four main types of hydrants
- Describe gate valve construction and use
- Describe globe valve construction and uses
- Describe ball valve construction and use
- Describe butterfly valve construction and uses
- Describe relief valve construction and uses
- Describe pressure regulating valve construction and uses
- Describe air and vacuum relief valve construction and uses
- Describe altitude valve construction and uses

Cross-Connection Control Review

Upon completion of this lesson the student will be able to:

- Define cross-connection control vocabulary
- Describe the purpose of cross-connection control
- Describe potential cross-connections
- Describe backflow control devices

Water Storage Review

Upon completion of this lesson the student will be able to:

- Define water storage vocabulary
- Identify the purpose of water storage
- Describe the differences between various types of storage facilities
- Describe how storage facilities are constructed

Water Quality Review

Upon completion of this lesson the student will be able to:

- Define water quality vocabulary
- Identify types of samples collected
- Identify sample custody requirements
- Describe which water quality parameters are monitored
- Describe what different water quality parameters indicate
- Describe the different public notification requirements

Corrosion Control Review

Upon completion of this lesson the student will be able to:

- Define corrosion control vocabulary
- Recall the factors affecting corrosion
- Describe the tools used to control corrosion
- Identify the LCR (Lead and Copper Rule) requirements

Management Principles Review

Upon completion of this lesson the student will be able to:

- Define management vocabulary
- Describe management principles
- Describe safety program management

pH

Upon completion of this lesson the student will be able to:

- Perform a pH analysis
- Identify what equipment is used
- Describe the sampling and storage procedure
- Understand the pH scale

Turbidity

Upon completion of this lesson the student will be able to:

- Perform a Turbidity analysis
- Describe what Turbidity is

- Identify what equipment is used
- Describe the sampling and storage procedure

Chlorine

Upon completion of this lesson the student will be able to:

- Perform a Chlorine analysis
- Describe the different methods of analysis
- Identify what equipment is used
- Describe the sampling and storage procedure

Microbiology

Upon completion of this lesson the student will be able to:

- Perform the Coliform Analysis
- Identify the chemicals used in the Coliform analysis
- Identify positive and negative test results
- Describe the different analysis methods

Distribution Exam Preparation Grade 2

Distribution Exam Preparation Topics

Basic Water Math

Unit Conversions
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Understanding Percentages
Calculating Area
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Weight Volume Relationships
Force-Pressure-Head
Velocity and Flow Rate
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The Metric System
Problem Solving

Math and Distribution System Review

Flow Conversion Problems
System Design and Layout
Flow Rate Problems
Volume Problems
Distribution Piping
Water Storage
Fire Hydrants and Valves
Water Meters
Pumps and Motors
Cross-Connection Control
Disinfection
Distribution Disinfection Problems
Chemical Feed Problems
Corrosion Control
Water Quality
Distribution Laboratory Problems
Water Main Installation and Backfilling
Safety
Regulations
Instrumentation and Information and Technology
Hydraulics

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Chemical Feed Problems

Upon completion of this lesson the student will be able to:

- Calculate Chemical Feed rates
- Solve Chemical Feed Problems

Corrosion Control

Upon completion of this lesson the student will be able to:

- Define corrosion control vocabulary
- Recall the factors affecting corrosion
- Describe the tools used to control corrosion
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Distribution Laboratory Problems

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- Demonstrate how to solve math problems relating to meter accuracy

Water Main Installation and Backfilling

Upon completion of this lesson the student will be able to:

- Define water main installation vocabulary
- Define backfilling vocabulary

Safety

Upon completion of this lesson the student will be able to:

- Define safety vocabulary
- Describe trenching safety requirements
- Describe confined space safety requirements
- Describe how to set up a traffic diversion

Regulations

Upon completion of this lesson the student will be able to:

- Define regulation vocabulary
- Describe and identify each of the following rules/regulations
 - Safe Drinking Water Act (SDWA)
 - Surface Water Treatment Rule (SWTR)
 - Total Coliform Rule (TCR)
 - Lead and Copper Rule (LCR)
 - Stage 1 Disinfection by Product Rule (DBP)
 - Interim Enhanced Surface Water Treatment Rule (IESWTR)
 - Long Term 2 Surface Water Treatment Rule (LT2SWTR)
 - Stage 2 Disinfection by Products Rule (DBP)

Instrumentation and Information and Technology

Upon completion of this lesson the student will be able to:

- Define Instrumentation and Information and Technology vocabulary
- Identify Primary and Secondary Instrumentation and Telemetry
- Define and classify Equipment Control Systems
- Define SCADA
- Define System Mapping and identify different types of system maps and symbols

Hydraulics

Upon completion of this lesson the student will be able to:

- Define Hydraulics vocabulary
- Perform calculations using force, pressure, and head

CEUs (Contact Hours)

Upon completion of this Distribution System Basics course, you will receive a certificate for 3.6 CEUs (36 contact hours).

Upon completion of this Distribution Exam Preparation course, you will receive a certificate for 2.9 CEUs (29 contact hours).

Completion Requirements

In order to receive [IACET CEU](#) credit for this course, you must complete the following:

- Complete each individual lesson module by watching the video lecture, completing the lesson handout, and passing the lesson quiz.

Once you have completed all of these elements, your course completion certificate will be automatically placed into your learning account for printing/downloading. It will remain in your learning account even after your course access has expired.

Support

Students can contact our student support staff with any course-related, content-related, or technology- related inquiries.

Our office hours are Monday-Thursday, 9-5 CT, and Friday 9-12 CT.

Contact Info

Phone Number: (661) 874-1655

General Course Inquiries: Info@americanwatercollege.org