
Passwell

TEST PREP

CALIFORNIA

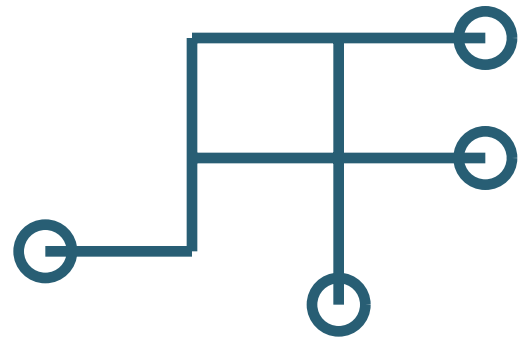
WATER DISTRIBUTION

California Water Distribution D1 / D2

STUDY GUIDE

A clear rule. A worked example. A reason behind every answer.

D1/D2



OCTOBER 2026 / EXPANDED EDITION

Independent study material. Original lessons and practice.

Build understanding before speed

Independent original expanded edition. No State Water Board, testing-provider or standards-body affiliation or approval is claimed.

Shared foundations and labeled D2 extensions cover the published grade-specific topics. Each grade practice has distinct questions and the official topic allocation.

Forms A and B each provide a separate 100-question D1 test and D2 test: four grade practices in total. Choose your grade; do not combine them into a 200-question exam.

This guide grants no qualifying course credit, certification, employment authority or guaranteed pass. Current California requirements and approved operating procedures control field work.

Chapter 8 explains source-labeled main, well and tank disinfection criteria, edition differences and original calculations. Actual work follows the applicable standard, permit and approved procedure.

The exam at a glance

Official grade exams. D1 and D2 are separate 100-question examinations. The current linked Expected Range of Knowledge identifies grade-specific scope and allocations.

D1 domain allocation. Disinfection 15; hydraulics/design 20; equipment 20; regulations/management/safety 15; mains/piping 20; quality/source 10.

D2 domain allocation. Disinfection 20; hydraulics/design 20; equipment 20; regulations/management/safety 10; mains/piping 20; quality/source 10.

D1 education. High-school diploma, GED or an accepted equivalent under the current qualification document.

D2 education. D1-level general education plus one qualifying specialized course in water supply principles: 36 contact hours, 3.6 CEUs or 3 semester units, subject to the State Water Board requirements.

Grade progression. The current D1/D2 qualification table does not require holding D1 before applying for D2, and does not list an operator-experience prerequisite for those grades. Verify individual eligibility and documentation with the Board.

Timing and passing. This edition does not assert an unverified official duration or passing percentage. Each grade practice uses 180-minute publisher pacing; confirm official appointment and scoring requirements directly.

Use all three kinds of practice

Start with the lessons and chapter checks. Use the flashcards to retrieve rules after a delay, and use the one-sheets to untangle similar ideas. Take each practice exam once under the stated conditions before reading its explanations. Repeatedly memorizing the same answers is not evidence that a new question is mastered.

Keep an error log

For every missed or guessed answer, record the topic, the decisive fact you missed, the rule in your own words, and a new example. Revisit the lesson, then answer the question aloud after at least one day. A practice score is a study signal, not a validated prediction or guarantee of passing.

Your study route

Week 1 / Hydraulic foundation and distribution layout

- Study chapters 1-5 and calculate geometry, unit conversions, flow and storage balances with units visible.
- Draw a simple supply-to-customer map showing storage, pressure zones, isolation and alternate paths.
- Review hydraulic cards and record whether each error came from formula choice, units or arithmetic.

Week 2 / Disinfection and equipment

- Study chapters 6-16, separating dose, demand, residual and product strength.
- For D2, work through the chloramine, breakpoint, byproduct and signal-scaling extensions; D1 learners should first master the shared foundation.
- Explain how valves, pumps, meters, hydrants and feed systems can fail and which evidence distinguishes the causes.

Week 3 / Piping, quality and first grade practice

- Study chapters 17-25 and trace a repair from isolation through sanitary return to service.
- Complete only your selected grade in Form A using the 180-minute publisher pacing.
- Classify every missed answer by domain, then redo the relevant worked example without the solution.

Week 4 / California responsibilities and final review

- Study chapters 26-30; verify current sampling, cross-connection and emergency instructions from the cited primary sources.
- Review all 72 cards and four one-sheets; explain the major contrasts aloud.
- Complete your selected grade in Form B and review errors. Confirm current eligibility, appointment duration, permitted aids and official scoring instructions before testing.

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Exam coverage map

Match the public exam topics to the chapters below. Official weights are identified where published. Publisher-selected practice allocations are labeled in the rows or practice instructions; they are not official exam weights. Topic rows without separate weights remain part of their parent domain. This map describes coverage, not official endorsement.

DIS / Disinfection: purpose and effectiveness, free/combined/total residual, demand, dose and product calculations, main/well/tank methods and barriers, breakpoint/chloramine chemistry, nitrification, byproducts, sampling, dilution and analytical quality. Grade-specific depth is identified in the chapters.

Weight: D1 15/100; D2 20/100. | Chapters: 06, 07, 08, 09, 10, 32 | Source 1

HYD / Distribution design and hydraulics: units and conversions; area, volume and surface geometry; flow/velocity, demand and storage balance; head/pressure, elevation, friction, surge and cavitation; network layouts, maps, pressure zones, storage and power calculations.

Weight: D1 20/100; D2 20/100. | Chapters: 01, 02, 03, 04, 05, 14, 31 | Source 1

EQP / Equipment operation, maintenance and inspection: isolation/control/check/air valves; meters and accuracy; hydrants; pumps, wells, suction and operating points; feeders; protective equipment; sensors, SCADA, alarms, standby power and energy control. Includes mechanical meter components and well measurement methods.

Weight: D1 20/100; D2 20/100. | Chapters: 11, 12, 13, 14, 15, 16, 33 | Source 1

REG / Drinking-water regulations, management and safety: standards and compliance; operator responsibilities; sampling plans, RTCR and lead/copper; cross-connection policy; confined spaces, excavation, hazardous energy and chemicals; emergency response, notification, maintenance, work orders and records.

Weight: D1 15/100; D2 10/100. | Chapters: 19, 21, 26, 27, 28, 29, 30, 33, 35 | Source 1

PIPE / Water mains and piping: materials, compatibility, legacy hazards and hydraulic condition; joints, fittings, thrust and restraint; excavation, bedding, backfill and dewatering; leaks, isolation, repair classification and return to service; service connections, abandonment, cross-connections and flushing routes. Includes tapping-method distinctions and conditional leakage-test acceptance.

Weight: D1 20/100; D2 20/100. | Chapters: 17, 18, 19, 20, 21, 34 | Source 1

QUAL / Water quality and sources: groundwater/surface-water vulnerability, wellheads and sanitary surveys; indicators and pathogens; pH, alkalinity, hardness, concentration units, contaminants, corrosion and cathodic protection; storage barriers, age, biofilms, residual trends and complaint investigation. Includes the hydrologic cycle, well influence and recovery, and cathodic-protection applications.

Weight: D1 10/100; D2 10/100. | Chapters: 22, 23, 24, 25, 27, 35 | Source 1

LESSON 01

01 / Units, ratios and a reliable calculation method

- Write the requested unit first.
- Convert length before squaring or cubing it.
- Check the time basis and reasonableness of the result.

Start with the quantity being requested

A calculation begins with a physical question: how much water, how quickly it moves, what pressure it produces, or how much chemical is required. Write the requested unit before selecting a formula. Gallons, gallons per minute and pounds per day describe different things. A number without its unit can be correct arithmetic and still answer the wrong question. Keep units beside each intermediate result so a missing time conversion is visible.

Use dimensional cancellation rather than a memorized string of operations. To convert 360 gallons per minute to gallons per day, multiply by 60 minutes per hour and 24 hours per day. Minutes and hours cancel, leaving gallons per day. Dividing by one million then changes gallons per day to million gallons per day. A tank containing 0.36 million gallons is a volume; a plant producing 0.36 MGD is a rate. They have the same numerical prefix but are not interchangeable.

Convert dimensions before squaring them

One foot contains 12 inches, but one square foot contains 144 square inches. One cubic foot contains 1,728 cubic inches. For a circular pipe, convert the diameter to feet before calculating a cross-sectional area in square feet. A 6-inch diameter becomes 0.5 foot, whose square is 0.25 square foot before the circular-area factor is applied. Squaring 6 and then dividing by 12 produces an area with the wrong scale.

Percentages must also be expressed in the form required by the calculation. A 12 percent strength is a fraction of 0.12. If a product contains 12 percent available chemical by weight, dividing the required active pounds by 0.12 gives product pounds. The label basis matters: percent by weight, percent by volume and available-chlorine concentration cannot be substituted without the necessary density or conversion information.

Ratios compare compatible quantities. A chlorine-to-ammonia ratio must identify whether ammonia is reported as nitrogen and whether both measurements share that basis. A per-capita demand divides a daily volume by population; it does not divide by service connections unless the question specifically asks for use per connection. Read every qualifier attached to the data.

Estimate before accepting the answer

Check the order of magnitude before using a calculator. At 500 gpm, one hour supplies about 30,000 gallons, so a result of 30 gallons is implausible. An answer can fail even when all entered digits are accurate because the chosen equation is wrong. Keep extra digits during intermediate steps and round only at the end to the requested precision. If a test supplies a conversion factor, use it consistently; small differences between 7.48 and more precise values can change the last digit.

Write a short meaning statement after the calculation. For example, 0.72 MGD means 720,000 gallons during a full day at that continuous rate. It does not mean that a pump running only eight hours produces that volume. Distinguish operating hours from calendar hours and actual measurements from assumed constant conditions. This habit is especially useful when the question combines unit conversion with a changing pump schedule.

Work it through / Apply the idea

A pump runs at 250 gpm for 8 hours. Find its daily delivered volume in million gallons.

1. $250 \times 60 \times 8 = 120,000$ gallons.
2. $120,000 / 1,000,000 = 0.120$ MG.
3. The operating-day volume is 0.120 MG; continuous 24-hour operation would be a different assumption.

Result. The pump delivers 0.120 million gallons during the stated schedule.

Volume / Flow rate

Volume is an amount; flow rate is an amount per unit time.

Keep these ideas

- Write the requested unit first.
- Convert length before squaring or cubing it.
- Check the time basis and reasonableness of the result.

Source references: 1, 2

Check your understanding

1. A meter records 450,000 gallons over a full day. What is the average daily flow in MGD?
 - A. 4.5 MGD
 - B. 0.45 MG per minute
 - C. 450 MGD
 - D. 0.45 MGD
2. Which value represents 8 percent as a decimal fraction?
 - A. 0.08
 - B. 0.8
 - C. 0.008
 - D. 8.0
3. A pipe diameter is 9 inches. Which diameter should be squared for area in square feet?
 - A. 0.0625 ft
 - B. 108 ft
 - C. 0.75 ft
 - D. 9 ft

Check the reasoning

1. Answer D / HYD

Divide daily gallons by one million.

- A. This is ten times the measured volume.
- B. The measured interval was a day, not a minute.
- C. The million-gallon conversion is missing.

Source references: 1, 2

2. Answer A / HYD

Divide the percentage by 100.

- B. That represents 80 percent.
- C. That represents 0.8 percent.
- D. This is the percentage number, not its fraction.

Source references: 1, 2

3. Answer C / HYD

Nine inches divided by twelve is 0.75 foot.

- A. This applies an area conversion to a length.
- B. This multiplies instead of converting to feet.
- D. This treats inches as feet.

Source references: 1, 2

LESSON 02

02 / Pipe, tank, trench and surface geometry

- Use internal dimensions for water capacity.
- Include only the surfaces specified in an area problem.
- Keep geometric capacity separate from usable storage.

Draw the shape and identify the water depth

The volume of a rectangular space is length times width times depth when all dimensions use the same unit. A cylindrical volume is circular area times length or water depth. Using 0.785 times diameter squared gives an approximate circular area. The radius-based equivalent is pi times radius squared. These formulas describe the internal water space; outside pipe diameter and nominal trade size can differ from the actual inside diameter. Use the dimension specified in the question.

A vertical tank's shell height is not necessarily its water depth. If a tank is 25 feet tall but contains 18 feet of water, calculate the water volume with 18 feet. For a partially filled horizontal cylindrical tank, the full-cylinder formula multiplied by the depth fraction is generally invalid because cross-sectional area does not vary linearly with depth. Unless the required geometry is supplied, use a tank calibration table or the stated method rather than inventing that shortcut.

Separate surface area from capacity

An interior-wall coating or disinfection problem asks for area, not volume. The curved wall area of a vertical cylinder is circumference times wall height, or pi times diameter times height. Add the floor area only when the requested surface includes the floor. Add a roof or ceiling only when it is explicitly part of the task. A D2 question can test this distinction without requiring advanced geometry: identify which faces are included before adding them.

A trench volume in cubic feet is its stated length times average width times depth for a rectangular approximation. Divide cubic feet by 27 to express cubic yards. If a problem asks for net backfill around a pipe, subtract the pipe's displaced external volume when instructed. Excavated material can expand, and compacted backfill can differ from loose volume; apply only the swell or compaction factor actually supplied. Do not treat an exam volume estimate as a shoring design or a purchase order without field confirmation.

Circular valve-face area is commonly needed in square inches for force calculations with psi. The same circle can be measured in square feet for a different purpose, but pressure and area units must agree. Label the area result before multiplying by pressure.

Use capacity as a working quantity

Multiplying cubic feet by 7.48 gives approximate US gallons. A well's water column uses the water-filled length, not the total drilled depth. A long main uses pipe length, not burial depth. Capacity can support later calculations for disinfection, turnover, draining or filling; it is the starting inventory rather than a statement about available pressure.

Distinguish gross storage from usable storage. Water below an outlet, emergency reserve, fire reserve and minimum operating levels may limit what can be drawn for ordinary demand. A question that gives only geometric dimensions supports a geometric capacity calculation. It does not automatically support a claim that every gallon is available. Explain the assumption when translating a calculation into an operating decision.

Work it through / Apply the idea

A cylindrical tank has an internal diameter of 20 ft and a water depth of 12 ft. Use 0.785 and 7.48.

1. Area = $0.785 \times 20 \times 20 = 314$ sq ft.
2. Volume = $314 \times 12 = 3,768$ cu ft.
3. Gallons = $3,768 \times 7.48 = 28,184.64$ gal.

Result. The approximate contained water volume is 28,185 gallons.

Wall area / Water volume

Wall area is a surface in square units; capacity is a space in cubic units.

Keep these ideas

- Use internal dimensions for water capacity.
- Include only the surfaces specified in an area problem.
- Keep geometric capacity separate from usable storage.

Source references: 1, 2

Check your understanding

1. A rectangular tank contains water 10 ft long, 8 ft wide and 5 ft deep. Its volume before gallon conversion is what?

- A. 800 cu ft
- B. 80 sq ft
- C. 23 cu ft
- D. 400 cu ft