



SOUTHWEST
ENVIRONMENTAL
FINANCE CENTER

US Territories Wastewater Operator Training Series

Session 1: Program Overview, Study Tips & Test Preparation

6/24/25

The Training Program

Welcome & Overview

Your trainers for today:



Heather Himmelberger
Director, SWEFC



James Markham
Research Engineer



Valeria Cortes-Mora
Professional Intern



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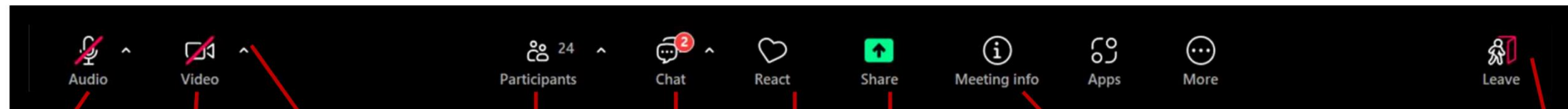
SCHOOL OF
ENGINEERING



This training series is funded by the EPA

Attendee Meeting Controls

- Locate your control bar
- All attendees will see a black horizontal bar on their screen
- If your control bar is not visible, it may be hidden
 - Move your cursor to the screen's bottom (or top) to reveal this control bar.



1. Mute/unmute

2. Start/stop
your video

3. Enable Virtual
Background

4. View Meeting
Participants

5. Chat

6. Reactions/raise hand

7. Share
screen

8. Meeting
info

9. Leave meeting

WPI/ABC Operator Certification

Get the latest water industry news, insights, and resources from our new blog IMMERSE. [Check it out!](#)



Superior Water Starts Here™



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Search ...

Standardized Wastewater Treatment Operator Exams

Wastewater Treatment Operator Need-to-Know Criteria

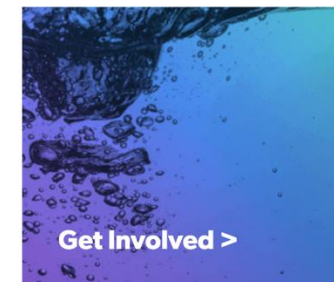
Need-to-Know Criteria outline the content that will be covered on WPI's standardized examinations provided through [ABC Testing](#), a WPI service.

- [Wastewater Treatment Operator Class I](#)
- [Wastewater Treatment Operator Class II](#)
- [Wastewater Treatment Operator Class III](#)
- [Wastewater Treatment Operator Class IV](#)

Wastewater Treatment Operator Formula/Conversion Table

WPI standardized exams are administered with a Formula/Conversion Table containing mathematical formulas and common abbreviations that may be present on the exam.

- [Wastewater Treatment Operator Formula/Conversion Table](#)



Schedule for 2025:

Date	Topic
6/24/25	Program Overview, Test Format, Study & Test Tips
7/8/25	Treatment Overview - Reg history, overview
7/22/25	WW Math Part 1 (Areas & Volumes)
8/5/25	WW Math Part 2 (Flow Rates & Detention Times)
8/19/25	Collection Systems - Gravity systems
9/2/25	Collection Systems - Pumping & force mains
9/16/25	Collection System Maintenance
9/30/25	Operator Safety/OSHA/Chemical Safety & Inventory
10/14/25	Preliminary Treatment
10/28/25	Primary Treatment: Sedimentation
11/11/25	Fixed-Film Media
12/2/25	Activated Sludge Part 1
12/16/25	Activated Sludge Part 2

Sign in for
every session
to ensure you
get credit for
attending



**US Territories Water & Wastewater Operator Certification
Virtual Training Series Group Attendance Sheet**

Session Title: _____

Session Date: _____

Training Location: _____

Attendee Name	Attendee Signature	Arrival Time	Departure Time

I hereby certify that the individuals listed above attended the referenced training session.

Name: _____
Signature: _____
Title: _____
Date: _____

Please scan this sheet after each training session and email it to swefc@unm.edu with the subject line: "US Territories Op Cert Attendance Sheet"

Study Tips

Introduction

A man with dark hair and a beard is shown from the chest up, wearing a dark blue t-shirt. He has his hands behind his ears, covering them completely, and his mouth is wide open in a scream or shout. His eyes are closed, and his facial expression is one of intense distress or panic. The background is a plain, light-colored wall. Overlaid on the center of the image is a semi-transparent dark blue rectangle containing the text "Don't Panic!" in a white, sans-serif font.

Don't Panic!

The operator tests
cover **knowledge
you use (or could
use) on the job.**

Certified Operator

“a certified operator is a person who is certified by a certifying agency or commission as being qualified to supervise or operate one of the classifications of water supply systems or wastewater facilities”.

Operator Duties May Include

- Inspecting equipment
- Monitoring operating conditions, meters, and gauges
- Collecting and testing water and sewage samples



- Recording meter and gauge readings and operational data
 - Documenting and reporting test results to regulatory agencies
-
- Operating equipment to purify and clarify water or to process or dispose of sewage
 - Cleaning and maintaining equipment, tanks, filter beds, and other work areas

**Leverage your
experience.**

A close-up, slightly blurred photograph of a person's hand holding a blue pen, writing on a document. The person is wearing a grey, textured sweater. The document has some faint, hand-drawn diagrams. In the background, there is a wooden desk, a white coffee cup on a brown coaster, and a spiral-bound notebook. A semi-transparent dark grey rectangle is overlaid on the center of the image, containing the text "Why study?".

Why study?

To **find** out where
your **knowledge**
gaps are

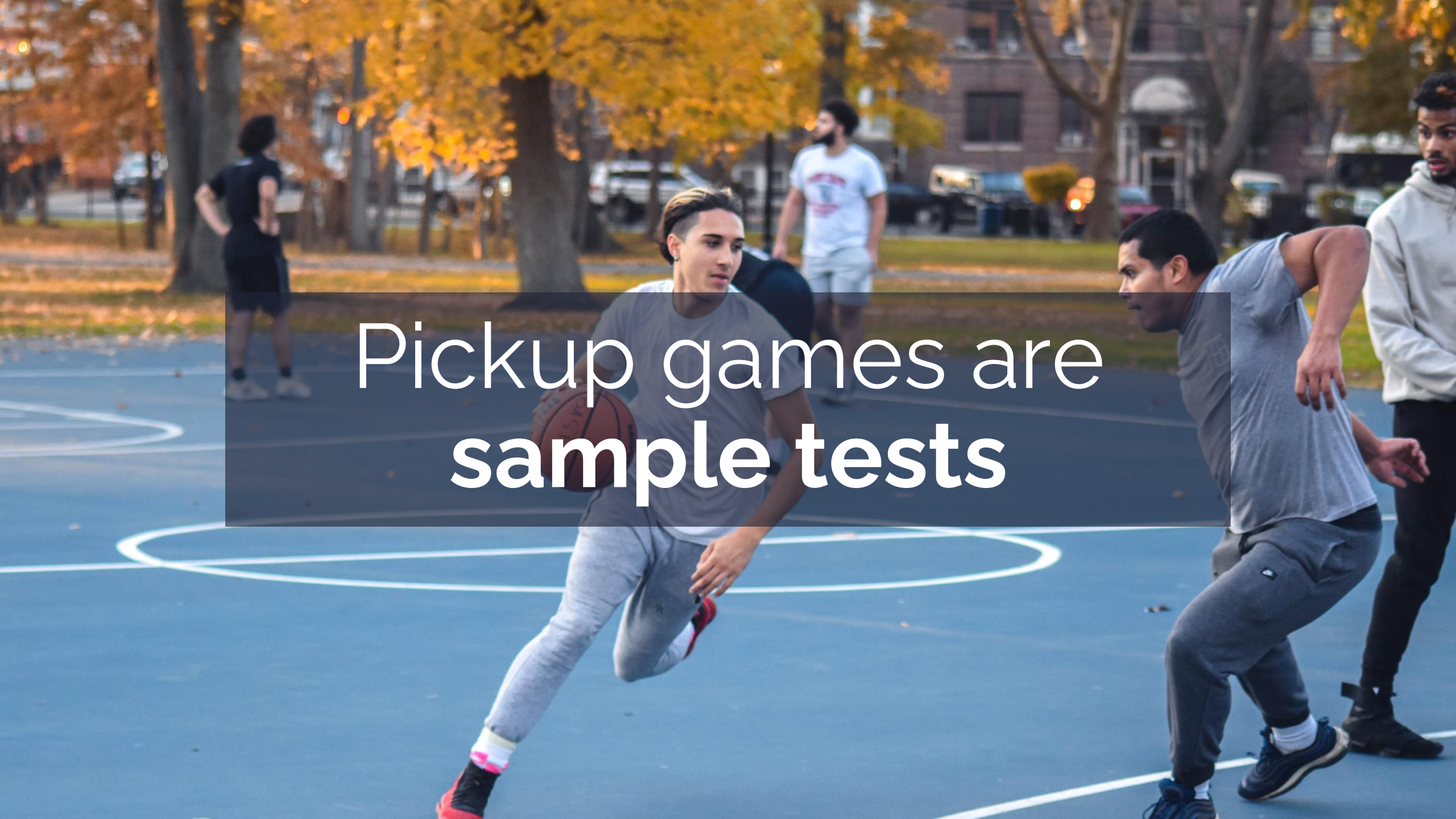
A close-up photograph of a Wilson basketball resting on a metal rack. The ball is orange with black lines and features the Wilson logo and 'MARCH MADNESS' branding. A semi-transparent dark blue rectangle is overlaid on the image, containing the text 'Basketball?'.

Basketball?



Study is practice

People with **better
study methods** and
strategies **score
higher** on exams

A group of young men are playing basketball on an outdoor court. The court is blue with white lines. In the foreground, a man in a grey t-shirt and grey pants is dribbling the ball while being defended by another man in a grey t-shirt and grey pants. Other players are visible in the background, including one in a white t-shirt and light shorts, and another in a black t-shirt and shorts. The background features trees with yellow autumn leaves and a brick building. A semi-transparent dark grey rectangle is overlaid on the center of the image, containing the text.

Pickup games are
sample tests

Test areas you have
trouble with may
point to **gaps in your
practical knowledge**

Use that information
to **fill the gaps** by
rounding out your
skill sets.



The OPCert Test is Game Day

If your test outcome
isn't what you
wanted, **change how
you study!**

Study Tips:

How to run good Practice

A close-up, slightly blurred photograph of a person's hand writing on a document. The hand is wearing a grey, textured sweater. A blue pen with a silver clip is held in the hand. The document has some faint, hand-drawn diagrams. In the background, there is a wooden desk, a white coffee cup on a brown coaster, and a spiral-bound notebook. A semi-transparent dark grey rectangle is overlaid on the center of the image, containing the text "Make a study plan" in white.

Make a **study plan**



Manage your time

Sun

Mon

Tue

Wed

Thu

Fri

1

2

3

4

5

7

8

9

10

11

12

14

15

16

17

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29

30

Start studying early

A close-up, slightly blurred photograph of a person's hand holding a blue pen, writing on a document. The person is wearing a grey, textured sweater. The document has some faint, hand-drawn diagrams or sketches. In the background, a white coffee cup with a brown base is visible on a wooden desk. The overall lighting is warm and soft.

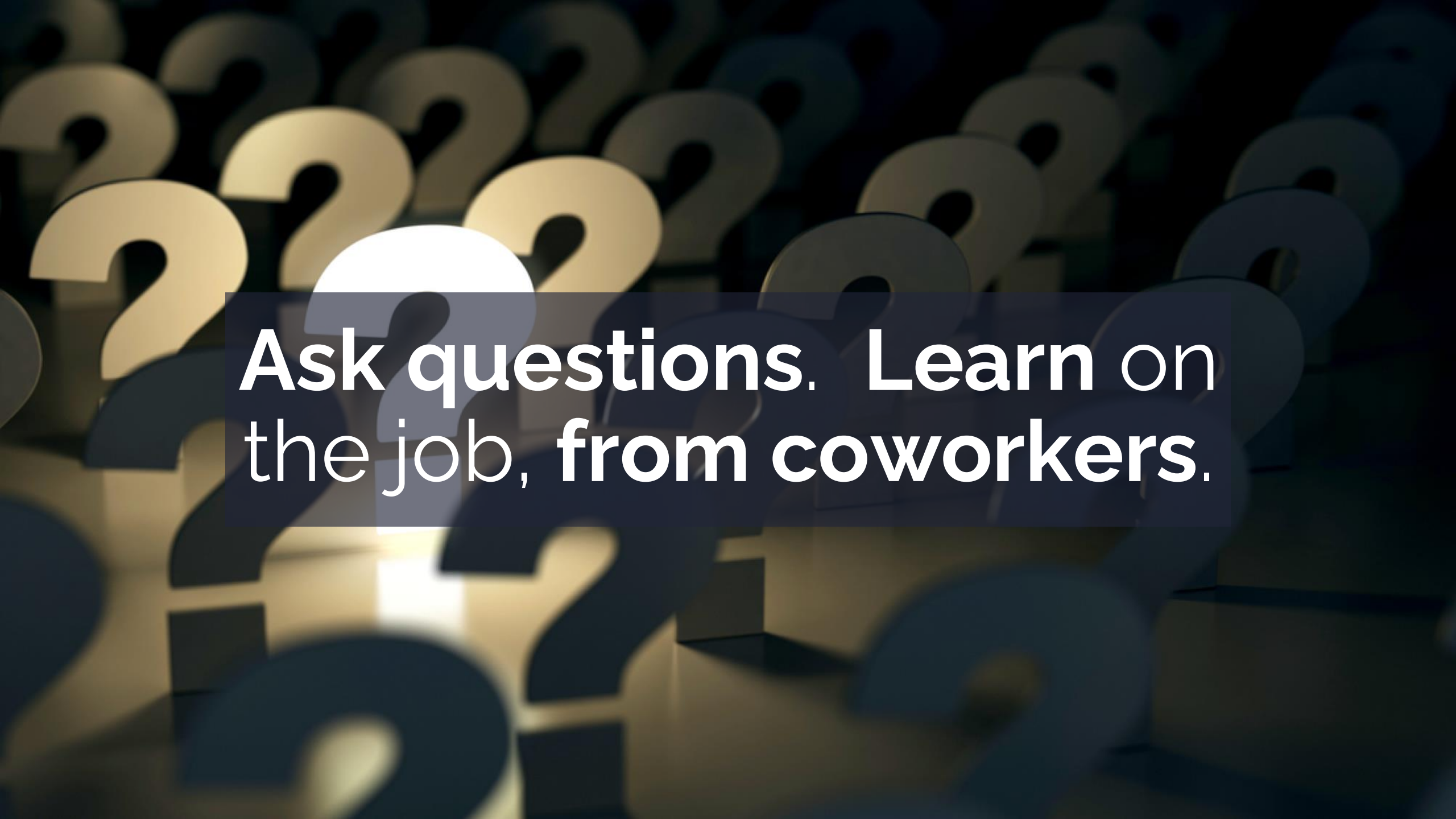
**Nail down the
fundamentals**

A close-up, slightly blurred photograph of a person's hand holding a blue pen, writing on a document. The person is wearing a grey, textured sweater. In the background, a white coffee cup sits on a wooden desk, and a spiral-bound notebook is visible. The overall scene suggests a focused, creative, or professional workspace.

Build on your practical
knowledge

A close-up, slightly blurred photograph of a person's hand writing on a document with a blue pen. The person is wearing a grey, textured sweater. The document has some faint, hand-drawn diagrams or flowcharts. In the background, a white coffee cup with a brown base is visible on a wooden desk. The overall scene suggests a focused work environment.

Work harder on weak spots



**Ask questions. Learn on
the job, from coworkers.**

A grayscale photograph of a person sitting at a desk, reading a book. A glass of milk is on the desk to the left. The text 'Read training handouts and manuals' is overlaid in white on a dark blue rectangular background.

**Read training
handouts and manuals**

WPI/ABC Website: gowpi.org

Get the latest water industry news, insights, and resources from our new blog IMMERSE. [Check it out!](#)



Superior Water Starts Here™



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Search ...

Study Guide

Study materials to help you succeed.

WPI works with AWWA and WEF to develop guides to help operators prepare for taking a certification exam. These guides are available for purchase from:

Water Treatment and Distribution Operators

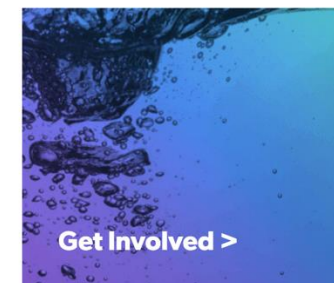
- [American Water Works Association](#) Bookstore

Phone (800) 926-7337

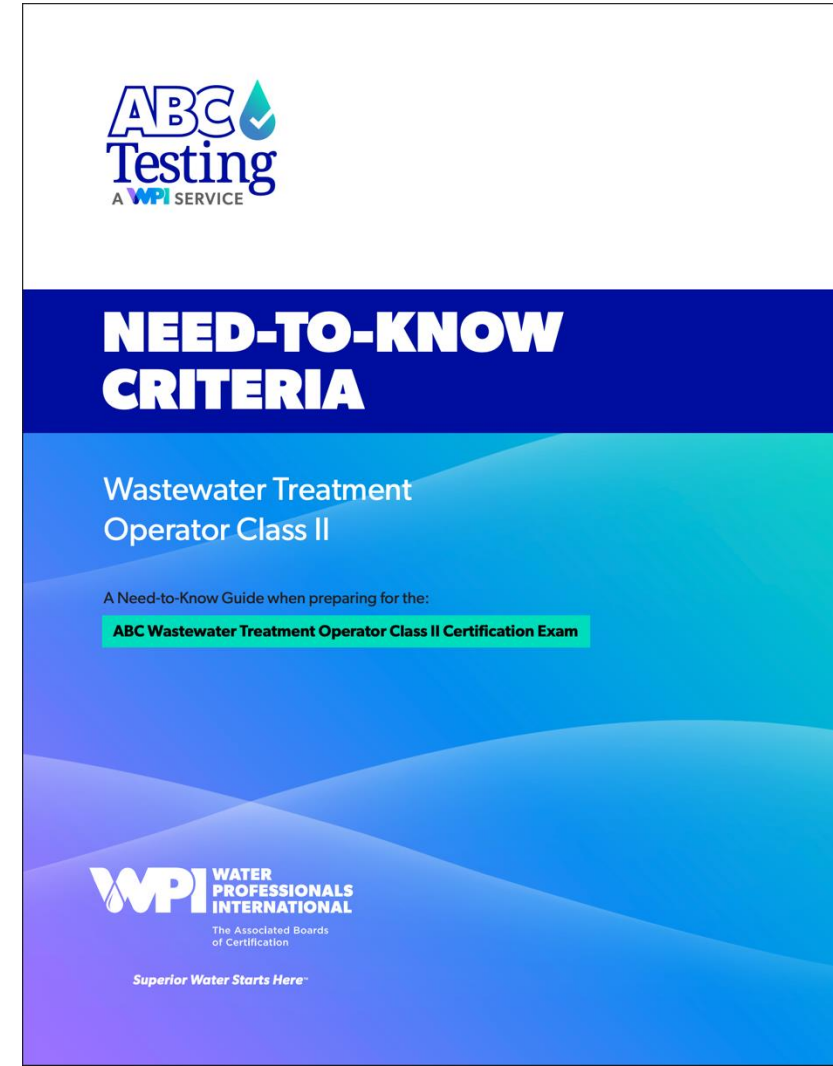
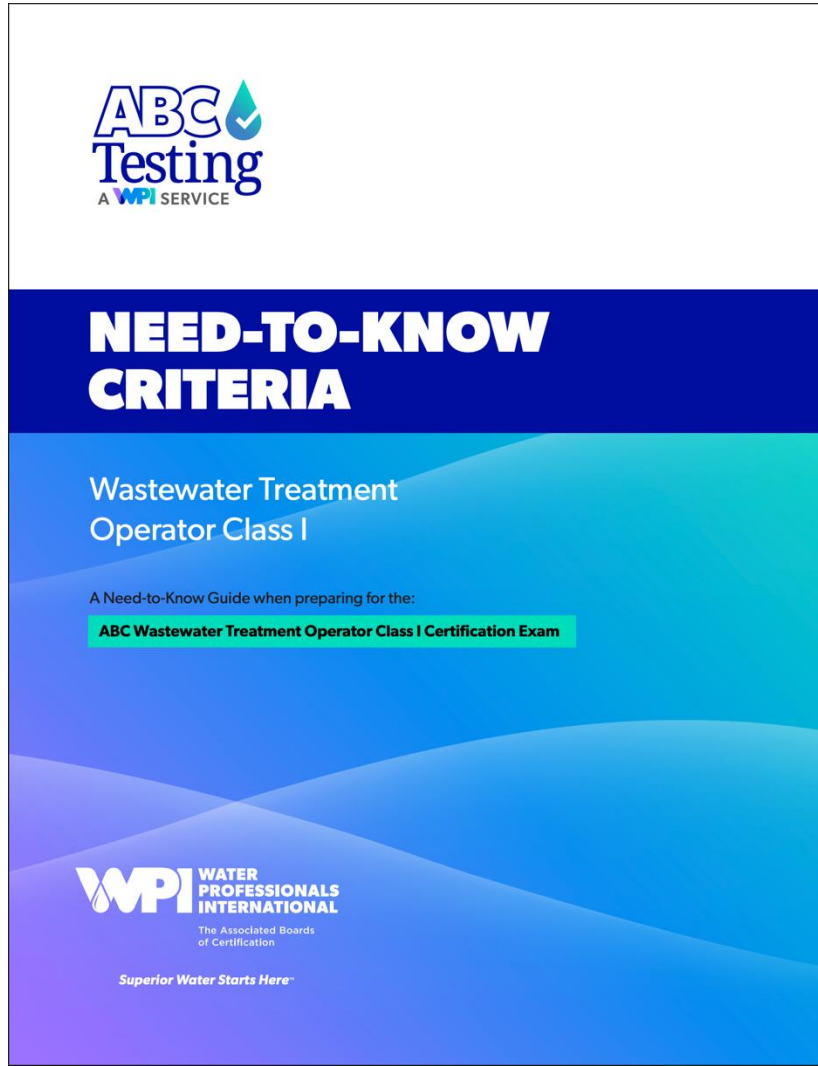
- [WSO Water Treatment, Grade 1](#)
- [WSO Water Treatment, Grade 2](#)
- [WSO Water Treatment, Grades 3 & 4](#)
- [WSO Water Distribution, Grades 1 & 2](#)
- [WSO Water Distribution, Grades 3 & 4](#)
- [Water Operator Certification Exam Prep Book](#)
- [Water Operator Certification Exam Prep App](#)

Wastewater Treatment, Collection, and Wastewater Lab

- [Water Environment Federation](#) Bookstore



Need to Know Criteria



Need to Knows

Topic	WW Level 1	WW Level 2	WW Level 3	WW Level 4
Security, Safety, & Administrative Procedures	10%	10%	10%	10%
Equipment Evaluation and Maintenance	25%	20%	20%	15%
Equipment Operation	25%	20%	20%	15%
Treatment Process Monitoring, Evaluation, & Adjustment	30%	30%	30%	35%
Laboratory Analysis	10%	15%	15%	20%
Total	100%	100%	100%	100%



For a complete list of each certification level:
<https://www.gowpi.org/services/testing-services/>

Question Formats



Recall – tasks at this level typically require the simple recall or recognition of specific facts, concepts, processes, or procedures, with little to no problem-solving involved. You may be asked to identify, illustrate, recall, and/or recognize specific information.



Application – tasks at this level will involve some basic problem solving, calculations, or the interpretation and application of data. You may be asked to calculate, categorize, classify, compare, differentiate, explain, specify, translate, and/or apply knowledge.

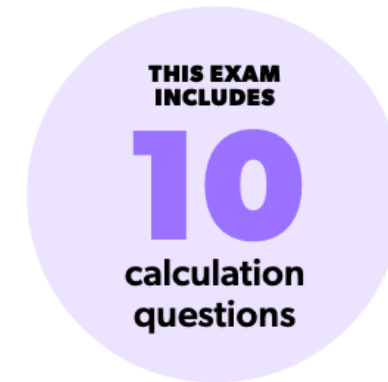


Analysis – tasks at this level may involve higher level problem solving, evaluation, or the fitting together of a variety of elements into a meaningful whole; they will usually require many steps in the thought process. You may be asked to analyze, evaluate, formulate, generalize, judge, predict, and/or use inductive or deductive reasoning to arrive at a solution.

Wastewater Level 1:

EXAM CONTENT OUTLINE

NUMBER OF QUESTIONS	CONTENT AREA	JOB TASK COMPLEXITY LEVELS
10	Laboratory Analysis	 2  7  1
25	Equipment Evaluation & Maintenance	 12  10  3
25	Equipment Operation	 8  14  3
30	Treatment Process Monitoring, Evaluation, & Adjustment	 5  10  15
10	Security, Safety, & Administrative Procedures	 7  3  0
100*	Total	 34  44  22



*Your exam may contain up to 10 extra unscored pre-test questions (see *Before You Dive In* for more details).

There will be math.

Learn the formula sheet

Formula/Conversion Table

Wastewater Treatment, Collection,
Industrial Waste, & Wastewater Laboratory Exams



$$\text{Alkalinity, mg/L as CaCO}_3 = \frac{(\text{Titrant Volume, mL})(\text{Acid Normality})(50,000)}{\text{Sample Volume, mL}}$$

$$\text{Amps} = \frac{\text{Volts}}{\text{Ohms}}$$

$$\text{Area of Circle}^* = (0.785)(\text{Diameter}^2)$$

$$\text{Area of Circle} = (3.14)(\text{Radius}^2)$$

$$\text{Area of Cone (lateral area)} = (3.14)(\text{Radius})\sqrt{\text{Radius}^2 + \text{Height}^2}$$

$$\text{Area of Cone (total surface area)} = (3.14)(\text{Radius})(\text{Radius} + \sqrt{\text{Radius}^2 + \text{Height}^2})$$

$$\text{Area of Cylinder (total exterior surface area)} = [\text{End \#1 SA}] + [\text{End \#2 SA}] + [(3.14)(\text{Diameter})(\text{Height or Depth})]$$

Where SA = surface area

$$\text{Area of Rectangle}^* = (\text{Length})(\text{Width})$$

$$\text{Area of Right Triangle}^* = \frac{(\text{Base})(\text{Height})}{2}$$

$$\text{Average (arithmetic mean)} = \frac{\text{Sum of All Terms}}{\text{Number of Terms}}$$

$$\text{Average (geometric mean)} = [(X_1)(X_2)(X_3)(X_4)(X_n)]^{1/n} \quad \text{The } n\text{th root of the product of } n \text{ numbers}$$

$$\text{Biochemical Oxygen Demand (seeded), mg/L} =$$

$$\frac{[(\text{Initial DO, mg/L}) - (\text{Final DO, mg/L}) - (\text{Seed Correction, mg/L})][300 \text{ mL}]}{\text{Sample Volume, mL}}$$

$$\text{Biochemical Oxygen Demand (unseeded), mg/L} =$$

$$\frac{[(\text{Initial DO, mg/L}) - (\text{Final DO, mg/L})][300 \text{ mL}]}{\text{Sample Volume, mL}}$$

$$\text{Blending or Three Normal Equation} = (C_1 \times V_1) + (C_2 \times V_2) = (C_3 \times V_3)$$

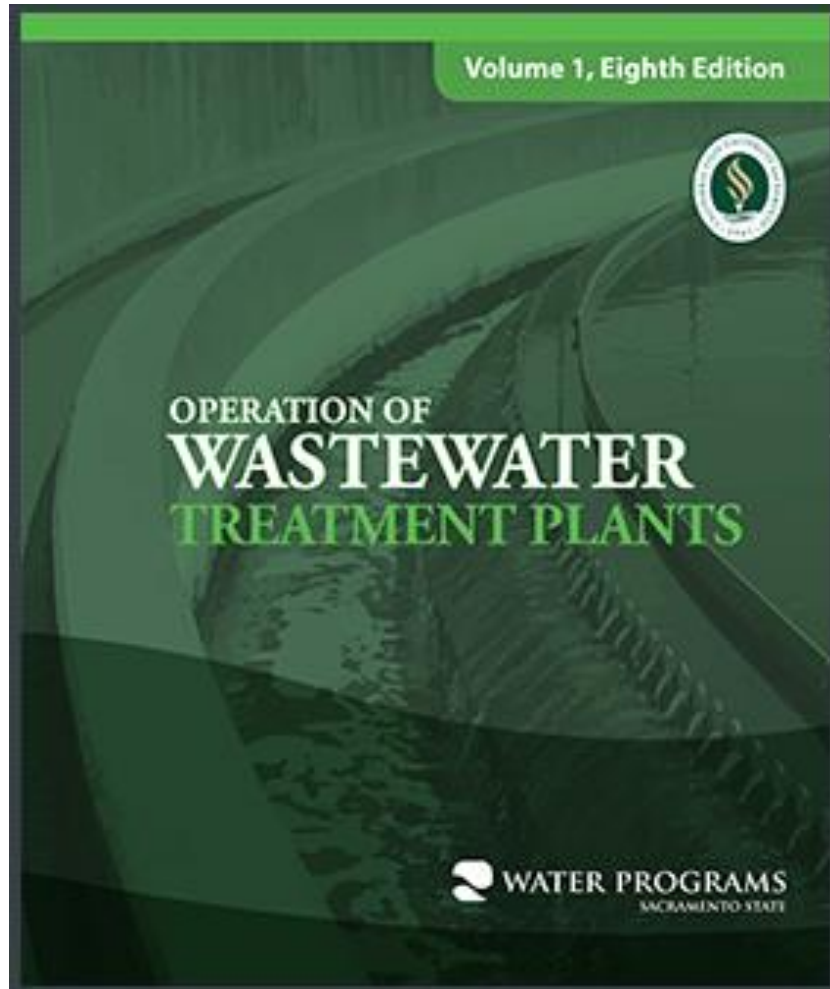
Where $V_1 + V_2 = V_3$; C = concentration, V = volume or flow; Concentration units must match; Volume units must match

$$\# \text{ CFU/100mL} = \frac{[(\# \text{ of Colonies on Plate})(100)]}{\text{Sample Volume, mL}}$$

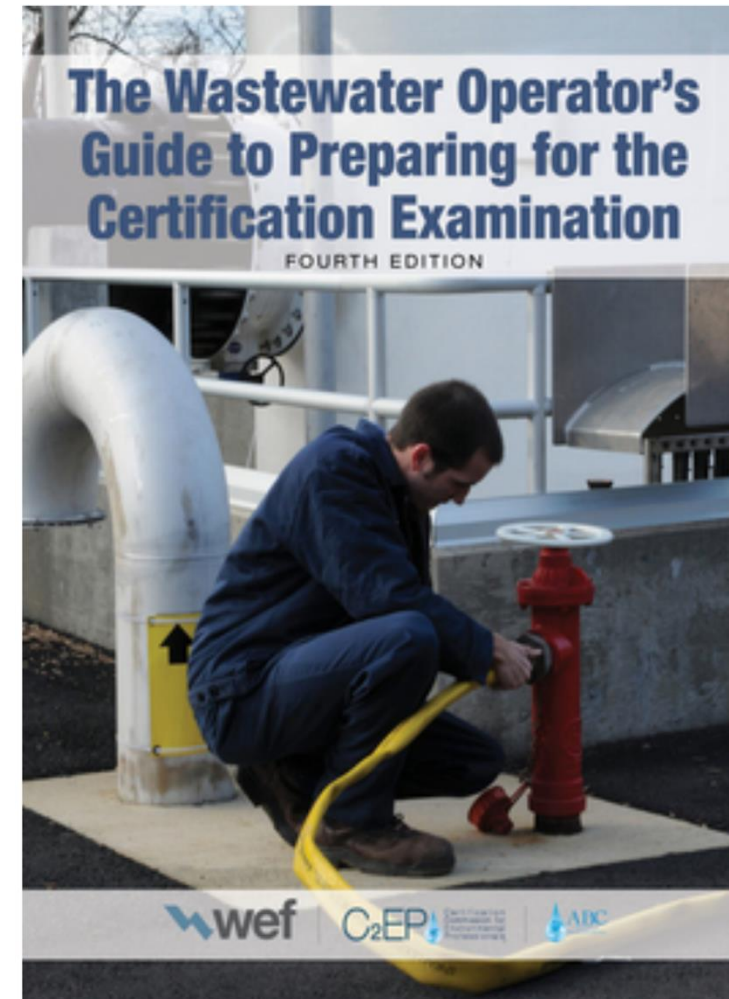
*Pie Wheel Format for this equation
is available at the end of this document

Study Guides

<https://www.owp.csus.edu/>



<https://connect.wef.org/>

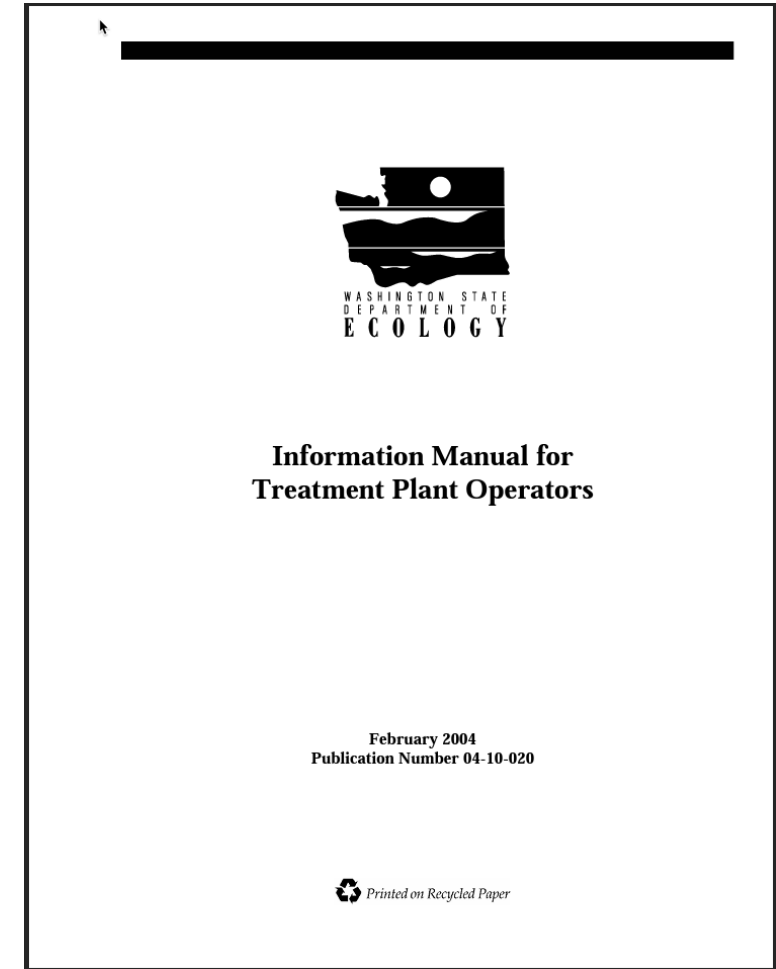


Other Study Guides and State Websites can be useful

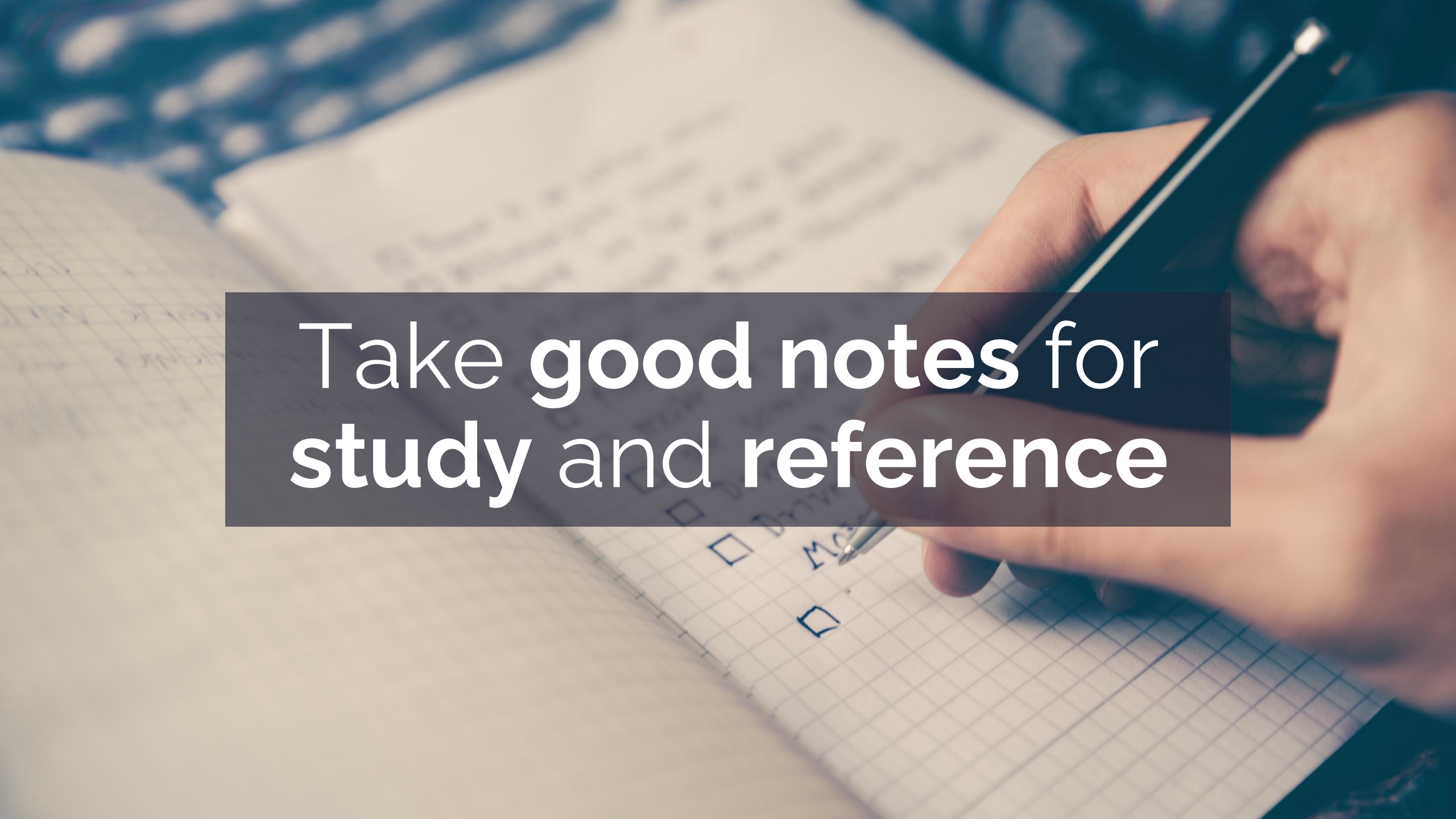


- [California State University, Sacramento](#)
- [Association of Boards of Certification \(ABC\)](#)
 - [Examination Study Resources](#)
 - [Need to Know Criteria](#)
 - [Formula Conversion Table](#)
 - [Treatment Plant Operator \(TPO\) magazine](#)
- [Water Environment Federation \(WEF\)](#)
 - [Technical Resources](#)
- [American Water Works Association \(AWWA\)](#)
 - [Math](#)
 - [W/W operator certification](#)

For Example:



The "Red Book": <https://apps.ecology.wa.gov/publications/SummaryPages/0410020.html>

A close-up photograph of a person's hand holding a black pen, writing on a piece of lined paper. The paper has some handwritten notes and checkboxes. A semi-transparent dark grey rectangular box is overlaid on the center of the image, containing white text. The background is slightly blurred, showing more papers and a desk.

Take good notes for
study and reference

Review for facts and figures

Pipe Size

A sewer line should be at least large enough to allow the use of the cleaning equipment available.

When sized properly, a sewer line should flow one half full during average daily flows.

The air space above the half full sewer line helps to maintain aerobic conditions in the wastewater and provides some room for error in determining design flow.

Question: How full should a sewer line flow if it is sized properly?

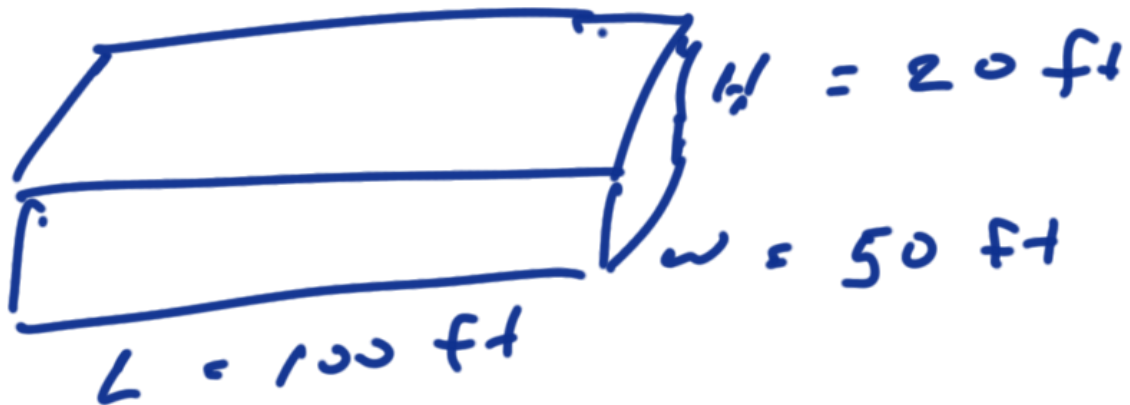
Answer: half full during average daily flows

Question: What does the airspace in the sewer do?

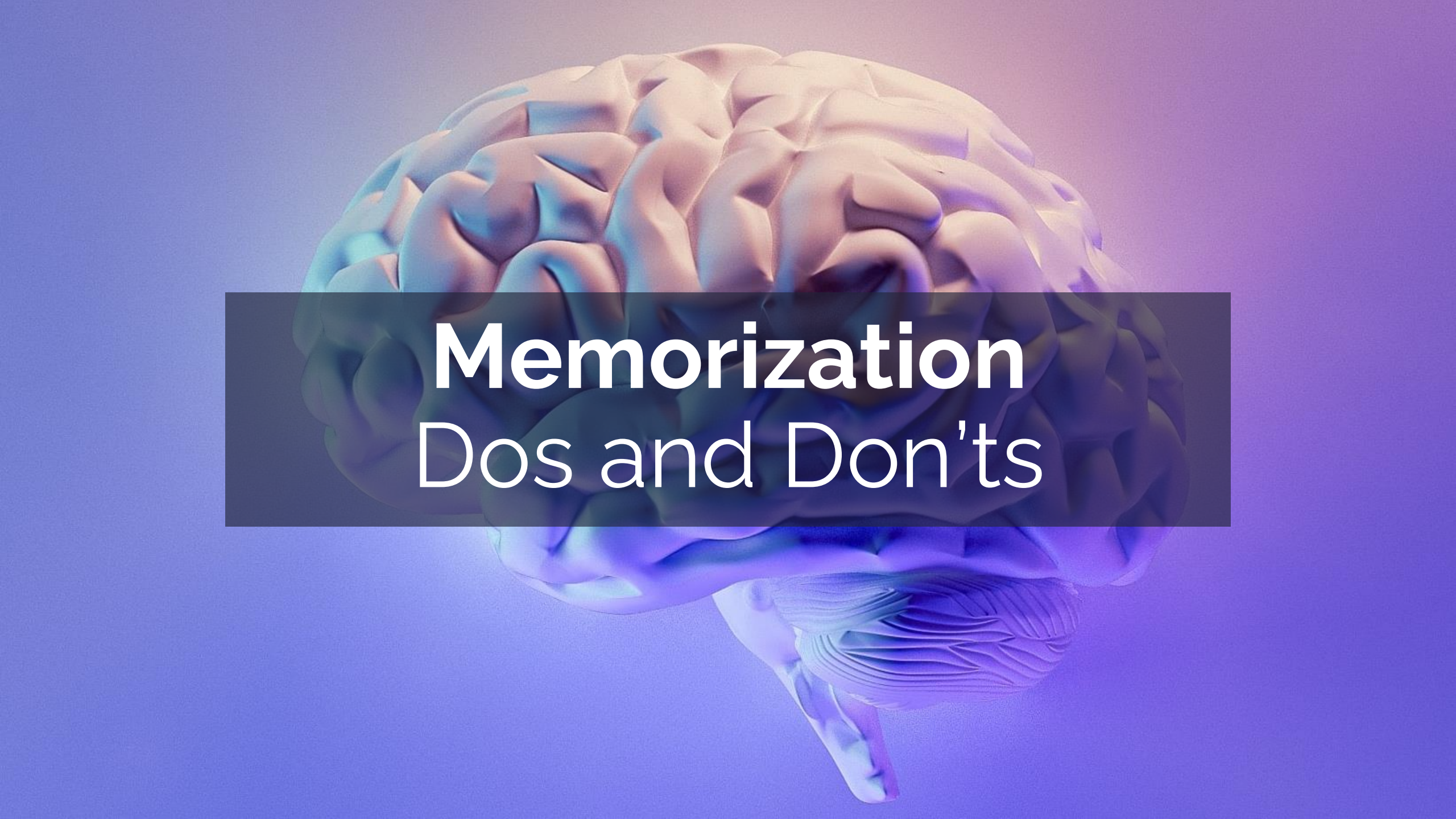
Answer: Helps maintain aerobic conditions and provides room for error in design flow.

TANK Volume $V = L \times W \times H$

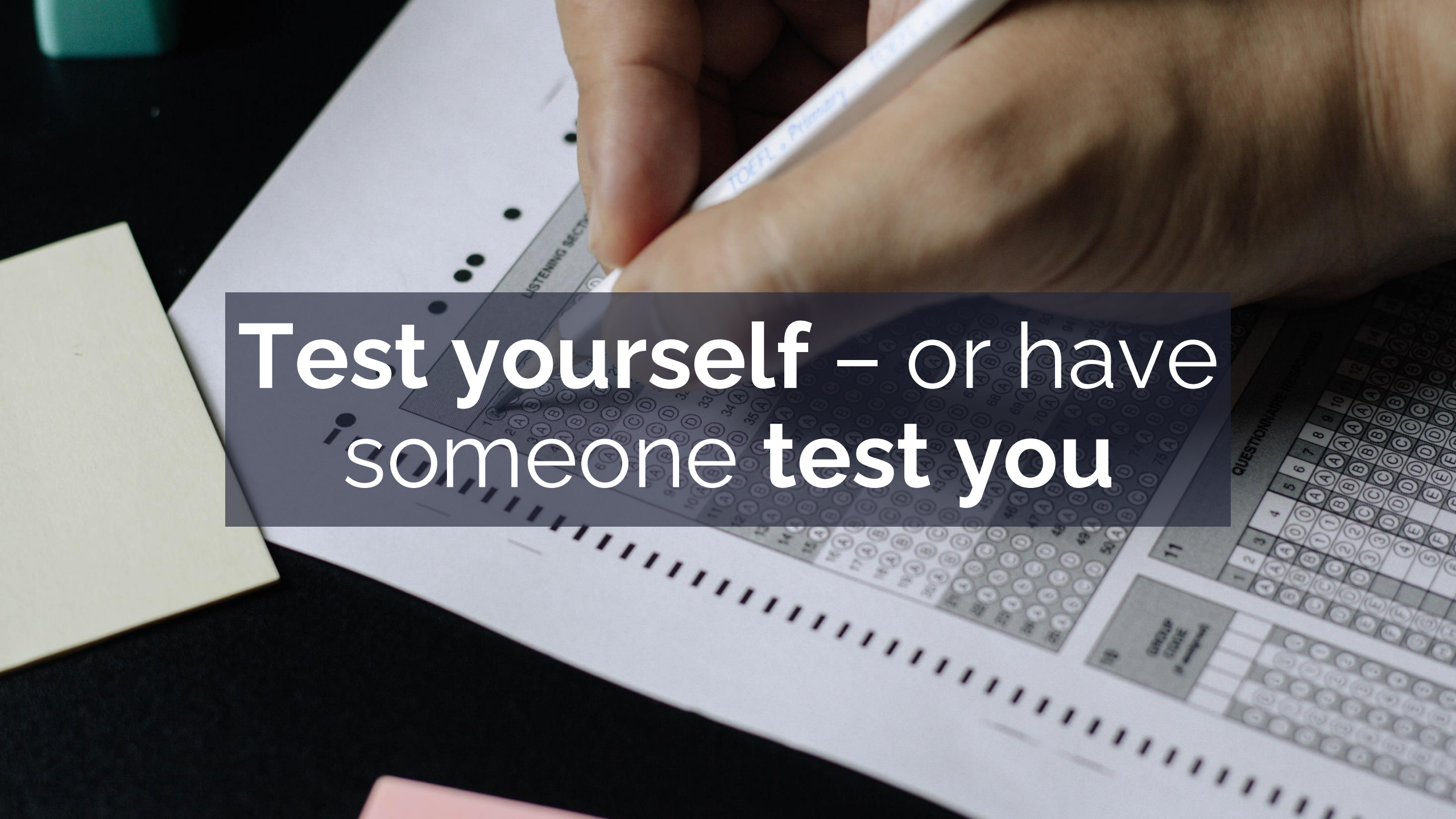
Draw sketches
if they help



$$\begin{aligned} V &= 100 \text{ ft} \times 50 \text{ ft} \times 20 \text{ ft} \\ &= 100,000 \text{ ft}^3 \end{aligned}$$



Memorization Dos and Don'ts

A close-up photograph of a person's hand using a white pencil to fill out a TOEFL Primary Listening Section answer sheet. The hand is positioned over a grid of bubbles, with the pencil tip touching one of them. The answer sheet is white with black text and bubbles. The text "TOEFL Primary" is visible on the pencil. The background is dark, and there are some yellow and pink sticky notes visible on the left side of the frame.

Test yourself – or have
someone test you

A stack of blank, cream-colored index cards is shown, slightly fanned out, resting on a light-colored, textured surface. A dark gray rectangular overlay is positioned horizontally across the middle of the stack, containing the text "Index (Flash) Cards" in a white, bold, sans-serif font.

Index (Flash) Cards

A person wearing a grey textured sweater is sitting at a desk, looking at an open book. Their hands are visible, holding the pages. To the left, there are some papers with handwritten notes. To the right, a smartphone is lying on the desk. A semi-transparent dark grey rectangle is overlaid in the center of the image, containing the text 'Study with a partner if it helps' in white. The background is slightly blurred, showing what appears to be a bookshelf.

Study with a partner if it helps



Test Tips:

What to do on Game Day

Know Your Testing Format

Different jurisdictions use
different formats

Three Testing Options

Computer-Based Testing

PSI is WPI's international computerized exam administrator. Through this partnership, PSI handles the scheduling and administration of computerized exams at PSI Test Centers. Candidates immediately receive their score reports at the conclusion of the exam and clients are able to access examinee results through a password-protected web portal.

Watch the brief [PSI Test Center Experience](#) (external link) video for a quick test center tour that shows candidates what to expect during a testing session.

Web-Based Testing

A WPI-supported, web-based option exists for clients to administer computerized exams through their own local resources, such as community colleges and field offices. Similar to paper-based exam administration, clients are responsible for scheduling, arranging, and proctoring exam sessions.

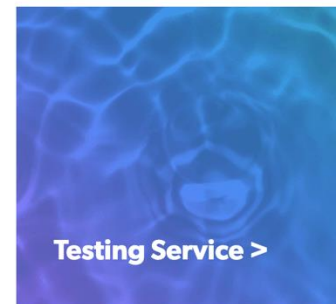
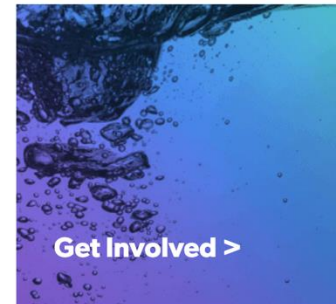
WPI's web-based exams are password protected and require a two-step process with unique IDs and passwords for both proctor and candidate. Candidates immediately obtain their score reports and clients receive email notification of exam results at the conclusion of the exam session.

A web-based exam process demo is available [here](#).

Paper-Based Testing

Clients using ABC's paper-based exams are responsible for scheduling, arranging, and proctoring exam sessions. WPI will provide test books, administration instructions, and scannable sheets for candidates to record their answers.

Following the administration of the exam, the client returns all exam material to WPI for scoring and report generation. As part of the scoring process, WPI's Testing Team performs quality control steps, such as evaluating missing or smudged marks on the scanned sheets.



Share



Reference Guides

Know your test tools

Reference Guides

Formula/Conversion Table

Wastewater Treatment, Collection,
Industrial Waste, & Wastewater Laboratory Exams



$$\text{Alkalinity, mg/L as CaCO}_3 = \frac{(\text{Titrant Volume, mL})(\text{Acid Normality})(50,000)}{\text{Sample Volume, mL}}$$

$$\text{Amps} = \frac{\text{Volts}}{\text{Ohms}}$$

$$\text{Area of Circle}^* = (0.785)(\text{Diameter}^2)$$

$$\text{Area of Circle} = (3.14)(\text{Radius}^2)$$

$$\text{Area of Cone (lateral area)} = (3.14)(\text{Radius})\sqrt{\text{Radius}^2 + \text{Height}^2}$$



**Monitor your time
during the test**

Time for test:

3 hrs

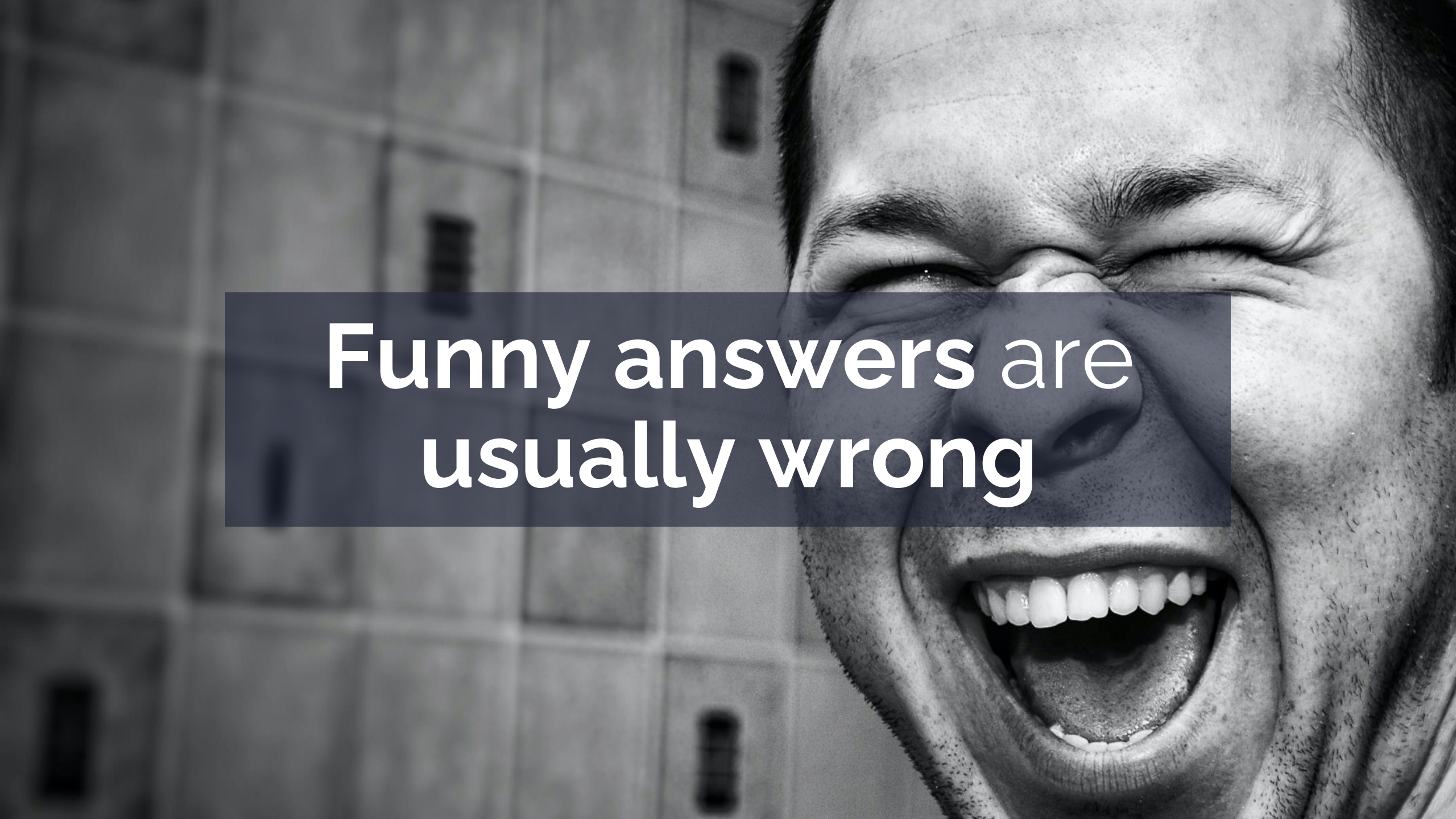
Time per question:

1:48

If you get **stuck**,
don't kill too much **time**.
Circle the **question** and
come back to it **later**.



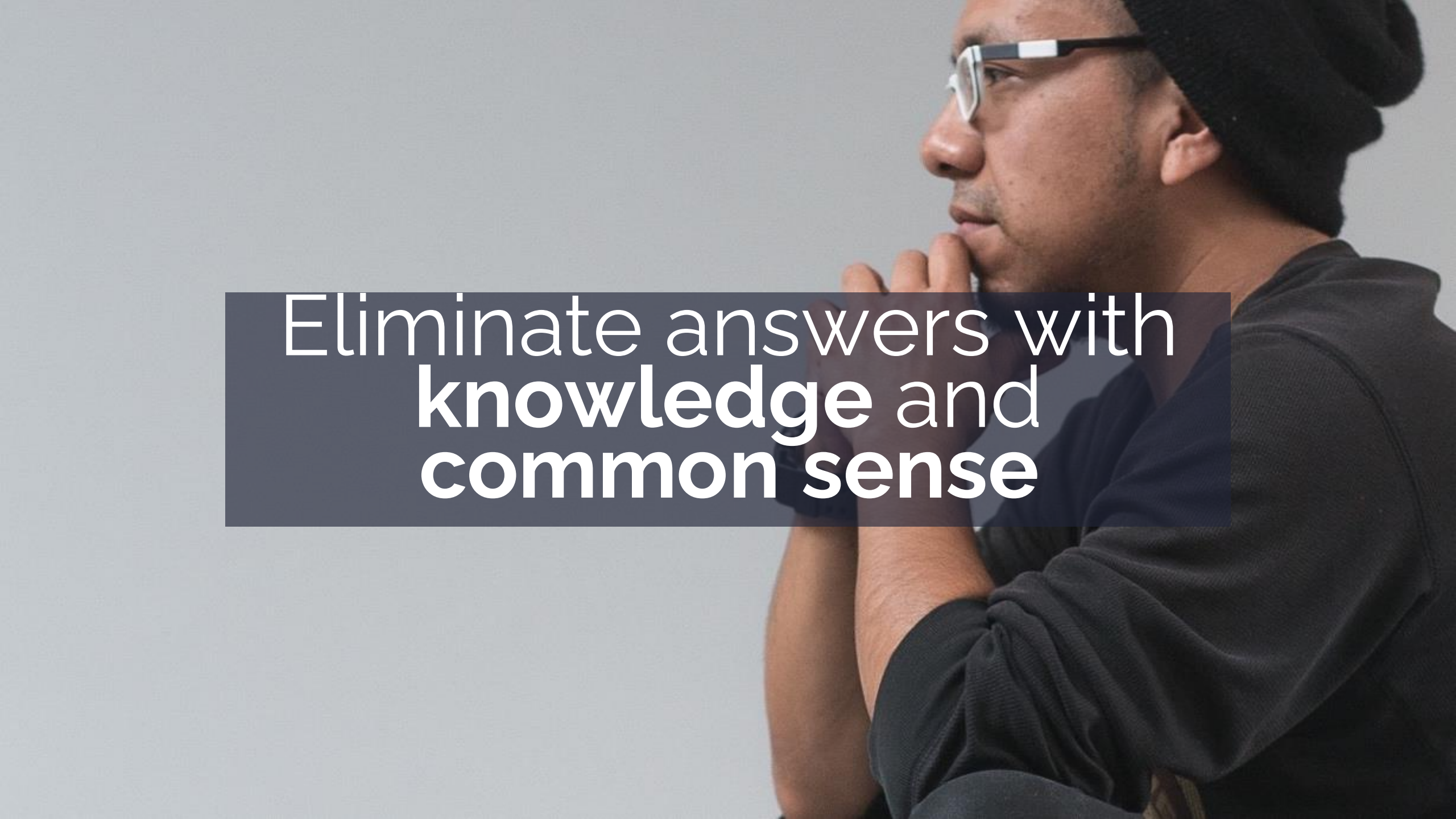
**Don't fight the
premise**



**Funny answers are
usually wrong**

The best way for a manager to transmit information that is important to all employees is:

- ~~A. Tell your mom~~
- ~~B. Send a memorandum~~
- ✓ C. Have a face-to-face meeting
- ~~D. Put a notice on the plant's website~~



Eliminate answers with
knowledge and
common sense

A chlorine cylinder is thought to be leaking. If aqueous ammonia vapor is passed over the valve, the presence of a leak would cause what?

- ~~A. A loud noise~~
- ~~B. An odor of hydrogen sulfide~~
- ~~C. Red smoke~~
- ✓ D. White smoke

A high-angle photograph of a large-scale aquaculture facility. The image shows several long, curved concrete pens filled with water. The pens are separated by low concrete walls topped with a series of small, white, pointed structures. In the lower-left pen, a large, bright orange fish, likely a salmon, is visible swimming. The water in the pens is dark blue, and the surrounding area is a light-colored concrete walkway. The text "Leverage your work experience" is overlaid in white on a dark blue rectangular background in the center of the image.

**Leverage your work
experience**

What units are used to measure settleable solids?



A. mg/l

~~B. ml/g~~

~~C. ml/l~~

~~D. L/g~~

“Not” Questions

Reframe them if it makes them easier to answer.

Which of the following is  a measure of volume?

- A. Cubic ft (ft³)
- B. Cubic meters (m³)
- C. Gallons (gals)
- D. Square inches (in²)

Which of the following is  a measure of volume?

- ✓ A. Cubic ft (ft³)
- ✓ B. Cubic meters (m³)
- ✓ C. Gallons (qals)
-  D. Square inches (in²)

English

1 acre-ft. = 325,828.8 gllons
1 acre-ft. = 43,560 ft³
1 cfs = 0.646 MGD
1 ft³ = 7.48 gallons
1 gallon = 231 in³
1 gallon = 0.1337 ft³
1 gallon = 3.785 liter
1 gallon = 0.000001 MG
1 MGD = 1.55 cfs
1 MGD = 694gpm

VOLUME

Metric

1 liter = 1,000 mL
1 liter = 0.2642 gallons
1 m³ = 264.2 gallons
1 m³ = 35.315 ft³

AREA

(metric)

1 hectar = 2.47 acres

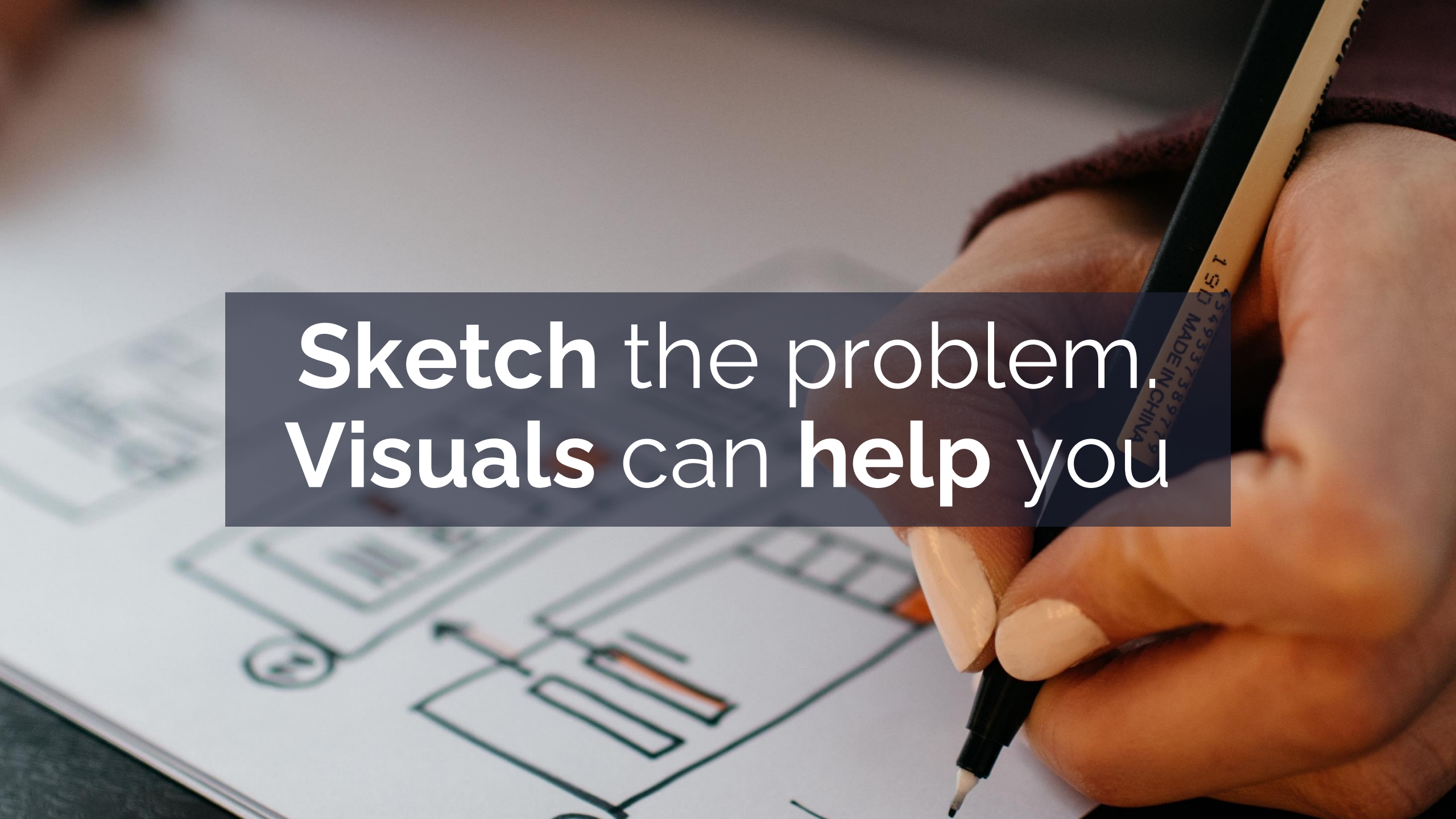
1 acre (ac) = 43,560 ft²

1 acre = 0.405 Hectare (Ha)

1 ft² = 144 in²

1 in² = 6.45 cm²

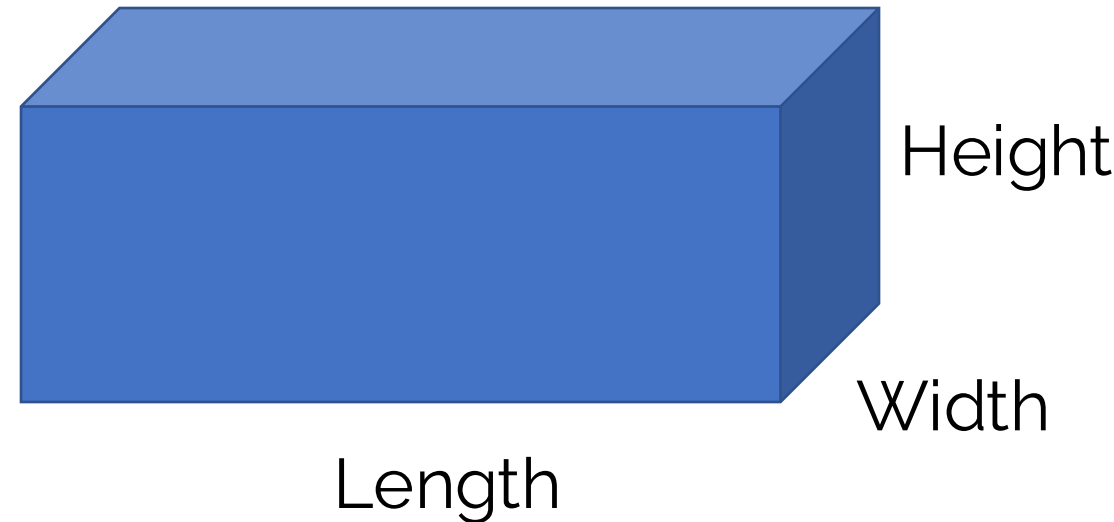
1 yd³ = 27 ft³

A close-up photograph of a person's hand holding a pencil, sketching a circuit diagram on a piece of paper. The hand is positioned on the right side of the frame, with the pencil tip touching the paper. The circuit diagram consists of several rectangular components connected by lines, with some components highlighted in orange. A semi-transparent dark blue rectangular box is overlaid on the center of the image, containing white text. The background is blurred, showing more of the sketching process.

**Sketch the problem.
Visuals can help you**

Which of the following is not a measure of volume?

- ☒ A. Cubic ft (ft^3)
- ☒ B. Cubic meters (m^3)
- ☒ C. Gallons (gals)
- ☒ D. Square inches (in^2)



Length x width x height = units cubed (for example **ft^3**)



In Summary...

Have a **study plan**

Manage your **time**

Read training **handouts** and **manuals**

Take good notes at training and during study
to reference later

Draw sketches of problems –
visuals can **help**

Test yourself – or have someone test you to find your strengths and weaknesses

Focus on the **weak** points

Memorize what you need to

Study with a **partner** – if it helps

Start studying **early** – well **before exam** date



Questions?

CONTACT INFORMATION



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