

# Math for Operators

## *A Necessary Skill for Water & Wastewater Operators*



Version 1.1 – March 2019

*Prepared for Pacific Northwest  
Section AWWA*

# Content & Goals

To review basic math skills and to practice those skills on practical problems

# Outline:

- ***Math for Operators***
  - **Math Basics**
    - Aids to Navigation
    - Units of Measure
    - Algebra
    - Trigonometry
    - Conversion Factors
    - Practical Applications
  - **Practical Examples**
  - **Operator Problem Solving**



# Workshop Housekeeping

***Sign-in***

***Thanks to speakers :***

***Nathan Know-it-all***

***Sally Speaker***

***Thanks to host group:***

***Rachael Registration***

***Larry Lunchbox***

# Workshop Housekeeping 2

***Breaks & lunch***

***Restroom location***

***Evaluations***

***CEU Certificates***

***State reporting***

# IMPORTANT!!



**TURN YOUR CELL  
PHONE OFF OR TO  
VIBRATE**

# Evaluation

- Tell us what you think!

**Workshop/Training Evaluation Form**  
**Arc-Flash / Electrical and Controls**  
 [date]  
 [workshop location]

[Subsection or committee logo if available]



How did you hear about the workshop?

Email	PNWS E-newsletter	Water Matters	PNWS Webpage	Supervisor/Co-worker	Other

Why did you attend today's workshop? (check all that apply)

Convenient location	Need CEUs	Interested in topic	Boss said "GO!"	New and different	Other (please specify)

What did you enjoy most from this workshop?

What did you enjoy the least from this workshop?

Suggestions for improvement:

  


Would you return to attend future workshop?

Yes

No

Why or why not?

  
  


Did this workshop meet your needs?

Yes

No

Were you able to hear the instructor(s)?  
 Were you able to see the screen or boards?  
 Were you the handouts helpful?

Yes	<input type="checkbox"/>
Yes	<input type="checkbox"/>
Yes	<input type="checkbox"/>

No	<input type="checkbox"/>
No	<input type="checkbox"/>
No	<input type="checkbox"/>

Most of the time	<input type="checkbox"/>
Most of the time	<input type="checkbox"/>
Most of the time	<input type="checkbox"/>

Food & refreshments – please rate the food and refreshments for lunch and breaks:

	Great!	Okay+	Okay	Okay -	No Thanks
Morning break	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lunch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Afternoon break	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other comments and/or suggestions for future workshops & training:

  
  


Please leave your evaluation on the table or chair or drop it off at the registration table.

Thank you for your response and comments. All comments help us develop better and more relevant training.

# Introductions

- Name
- Who you work for
- What you do for them
- What you would like to get out of today's workshop





# Safety

***The cornerstone of everything  
we do***

Especially important during emergency response. We want to have everyone helping, not adding to the problem by getting injured or requiring special attention & resources.

# Safety – Mission Critical

There are many hazards associated with water operations. Some examples include;

- Confined spaces
- Trenching & excavation
- Electrical
- Vehicles & equipment
- Chemicals
- Ergonomic

“If you’re not doing the job safely, you are not doing it right.”



*Photo from Tualatin Valley  
Water District*

# Protecting Yourself and Others

## Rules to live by:

1. **You** are responsible for your safety and the safety of others
2. Follow the rules
3. If you're not trained for it; Don't do it
4. Work smarter, not harder
5. Don't take short cuts
6. Practice good housekeeping
7. Be Prepared
8. Be a safety advocate



*Photo from Tualatin Valley Water District*

**“It’s better to take a minute to save your life than to lose your life in a minute.”**

# Personal Protection Equipment - PPE

Includes but is not limited to:

- Safety Glasses/Shield
- Hard Hat
- Hearing Protection
- Visible Safety Shirt/Jacket
- Protective Toe Footwear
- Gloves
- Gas Monitors
- Harness
- Radio/Flashlight



*Graphic from Whitney Equipment Company, Inc.*

# 811 – Call Before You Dig – *it's the law*

## Utility Notification Center

- Each state operates its own 811 center
  - ID – 811 or 1-800-342-1585 (Boise) & 1-866-729-5140 (CdA)
  - OR – 811 or 1-800-332-2344
  - WA – 811 or 1-800-424-5555
  - Or on-line
- Open 24/7
- May be regional within a state
- 2 days advanced notice is required
- <https://youtu.be/ZH7cXJ2PpdY>



**Know what's below.  
Call before you dig.**

*Graphic from Tualatin Valley  
Water District*

# AWWA Commercial Time!



American Water Works Association

**Pacific Northwest** Section

# Are You (or Your Utility) a Member?

- Join AWWA
- Become involved in the subsection
- Become involved in the Section
- Applications & more info on registration table



American Water Works Association  
**Pacific Northwest** Section  
Northwest Washington Subsection

# Section & Subsection Training



American Water Works Association  
**Pacific Northwest** Section  
Northwest Washington Subsection



# Subsection Events



American Water Works Association  
**Pacific Northwest** Section  
Northwest Washington Subsection



# PNWS Training-in-a-Box (TIAB)

- Workshop curricula prepared by the Section's Training Coordination Committee to increase the quality and consistency of training in PNWS and to increase distribution of that training throughout the Section
- Current programs:
  - ARC Flash & Electrical
  - Basic Waterworks
  - Emergency Preparedness
  - Water Storage Basics
  - Math for Operators / P&IDs
  - Groundwater Basics
- Upcoming programs:
  - Chemistry for Operators
  - Water Quality Basics



American Water Works Association

**Pacific Northwest** Section

Northwest Washington Subsection

# Presentations

- Will be made available as PDFs on the subsection web site for your use.



# Questions, Comments and Suggestions?



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PNWS

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Chair

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American Water Works Association

**Pacific Northwest** Section



PNWS-AWWA  
Training  
Coordination  
Committee