

Dr. Randa Roland

Thimann 317

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website: <http://tinyurl.com/randaro>

username and password are

click on Summer Chem 1M and 1N

rarochem & boom

Office Hours:

Mon & Wed 2-3 &/or just email me (appt.)

Materials: Purchased access to online lab materials and assignments through <http://webassign.net>

ISBN 978-1-92-855080-8 General Chemistry Labs CHEM 1M and 1N \$25-\$30

Lab notebook (makes duplicates); scientific calculator; goggles (purchase if desired or use those provided in lab)

Grading:	Written procedure and data tables (7)	35%
	Online prelabs (7) and data worksheet	5%
	Online in-lab assignments (7)	35%
	Online reviews (7)	5%
	Online quizzes (7)	10%
	Scholarship	10%

You must enroll into the correct section on WebAssign (the one in which you are enrolled)

Class Keys:	Section A	ucsc 4831 0439
	Section B	ucsc 0183 4873

To pass this course, you must perform all experiments; turn in all pre-lab outlines/tables; submit all pre-lab, in-lab, and review assignments by the required due date/time; and, score at least 50% total on the online quizzes. This grading scheme is tentative but changes will be announced. There is a 25%-per-day-late penalty for late work (this includes turning work in at the end of the lab period). You must submit original work. If you are already enrolled by the first day of class, you have a spot in the lab as long as you are on time to your first lab meeting (late/absent students will be dropped).

Make-ups: Do not miss a lab session. You must notify the instructor and your TA in advance of an absence. Make-ups must be performed no later than the following class meeting after the missed lab period, and documentation regarding the absence must be provided. Approved reasons for absence are medical emergencies, UCSC-sanctioned trips, and immediate family funerals.

Safety/attire: You must sign an agreement to follow the safety rules. Wearing goggles is a must. Closed-toed shoes, as well as covered shoulders, calves, and mid-sections, are required. No tank-tops, halter-tops, shorts, sandals, etc., are allowed. No "modified" clothes such as feet in sandals in plastic bags.

Date	Exp. #	Title
7/31	---	Requirements, locker check-in, webassign; data worksheet
8/2	1	Density
8/7	2	Empirical Formula of MgO
8/9	4	Antacid Analysis by Back Titration
8/14	6	Hydrogen Emission Spectrum
8/16	9	Allura Red in Mouthwash
8/21	12	Reaction Rates
8/23	14	Vitamin C Analysis; Check-out

<u>Introduction to WebAssign 2012</u>	Homework	8-2-12 07:00 AM PDT
<u>WebAssign Tutorials</u>	Homework	8-2-12 07:00 AM PDT
<u>Lab 1 - Density: PreLab</u>	Prelab	8-2-12 07:00 AM PDT
<u>Lab 1 - Density: InLab</u>	Inlab	8-7-12 07:00 AM PDT
<u>Lab 1 - Density: Review Questions</u>	Review	8-7-12 07:01 AM PDT
<u>Lab 2 - Empirical Formula: PreLab</u>	Prelab	8-7-12 07:02 AM PDT
<u>Lab 2 - Empirical Formula: Quiz</u>	Quiz	8-7-12 07:03 AM PDT
<u>Lab 2 - Empirical Formula: InLab</u>	Inlab	8-9-12 07:00 AM PDT
<u>Lab 2 - Empirical Formula: Review</u>	Review	8-9-12 07:01 AM PDT
<u>Lab 4 - Acid Neutralization with Antacid: PreLab</u>	Prelab	8-9-12 07:02 AM PDT
<u>Lab 4 - Acid Neutralization with Antacid: Quiz</u>	Quiz	8-9-12 07:03 AM PDT
<u>Lab 4 - Acid Neutralization with Antacid: InLab</u>	Inlab	8-14-12 07:00 AM PDT
<u>Lab 4 - Acid Neutralization with Antacid: Review</u>	Review	8-14-12 07:01 AM PDT
<u>Lab 6 - Quantum States: PreLab</u>	Prelab	8-14-12 07:02 AM PDT
<u>Lab 6 - Quantum States: Quiz</u>	Quiz	8-14-12 07:03 AM PDT
<u>Lab 6 - Quantum States: InLab</u>	Inlab	8-16-12 07:00 AM PDT
<u>Lab 6 - Quantum States: Review</u>	Review	8-16-12 07:01 AM PDT
<u>Lab 9 - Determination of Concentration: PreLab</u>	Prelab	8-16-12 07:02 AM PDT
<u>Lab 9 - Determination of Concentration: Quiz</u>	Quiz	8-16-12 07:03 AM PDT
<u>Lab 9 - Determination of Concentration: InLab</u>	Inlab	8-21-12 07:00 AM PDT
<u>Lab 9 - Determination of Concentration: Review</u>	Review	8-21-12 07:01 AM PDT
<u>Lab 12- Rate Properties of an Iodide Oxide: PreLab</u>	Prelab	8-21-12 07:02 AM PDT
<u>Lab 12- Rate Properties of an Iodide Oxide: Quiz</u>	Quiz	8-21-12 07:03 AM PDT
<u>Lab 12- Rate Properties of an Iodide Oxide: InLab</u>	Inlab	8-23-12 07:00 AM PDT
<u>Lab 12- Rate Properties of an Iodide Oxide: Review</u>	Review	8-23-12 07:01 AM PDT
<u>Lab 14- Vitamin C in a Commercial Product: PreLab</u>	Prelab	8-23-12 07:02 AM PDT
<u>Lab 14- Vitamin C in a Commercial Product: Quiz</u>	Quiz	8-23-12 07:03 AM PDT
<u>Lab 14- Vitamin C in a Commercial Product: InLab</u>	Inlab	8-24-12 07:00 AM PDT
<u>Lab 14- Vitamin C in a Commercial Product: Review</u>	Review	8-24-12 07:01 AM PDT

Quizzes appear
the day before
they are due @
12:00 AM (midnight)

Web Assign

- significant figures are graded

$$2.00e2 = 200.$$

- decimal notation or scientific notation

$$2.00e-2 = 0.0200$$

Prelabs - 5 submissions

Inlabs - 10 submissions

Review - 5 submissions

Quizzes - 3 submissions

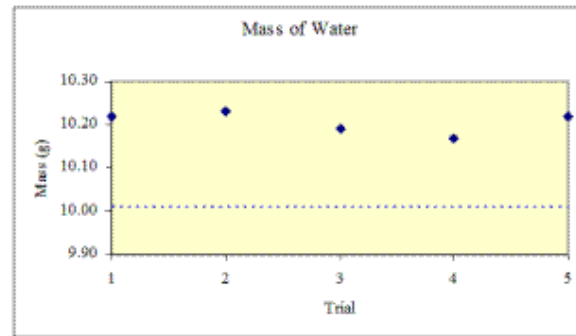
-10% for each retry } per question
-10% for each retry }

Some labs require files uploaded

1MB size limit

Accuracy — how close to the true value

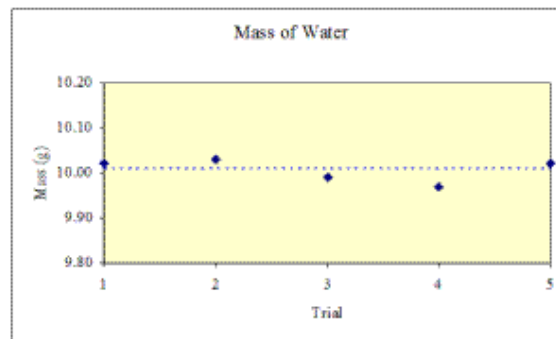
Trial	Mass (g)
1	10.22
2	10.23
3	10.19
4	10.17
5	10.22



Precision — how "fine" is our scale?

Trial	Mass (g)
1	10.02
2	10.03
3	9.99
4	9.97
5	10.02

avg 10.006



average mass =

$$\frac{\text{sum the values}}{\text{divide by \# trials}}$$

uncertainty (standard dev'n), $\sigma = \sqrt{\frac{\text{sum of } (x_{\text{individual}} - x_{\text{avg}})^2}{\# \text{ trials} - 1}} = 0.0251$ round σ to 1 sig fig

Not 10.006 ± 0.0251 NO! Report $10.01 \pm 0.03 \text{ g}^*$

* had σ been to the tenths place — $10.0 \pm 0. \underline{\quad} \text{ g}$

Precision and Accuracy

(Another Example)

Significant figures — determined by the equipment used
& the # of times a measurement is made

Multiple measurements of one quantity — average

1) 149 g

2) 150 g

3) 151 g

$$\Rightarrow \frac{149 + 150 + 151 \text{ g}}{3} = 150 \text{ g}$$

1) 140 g

2) 150 g

3) 160 g

$$\Rightarrow \frac{140 + 150 + 160 \text{ g}}{3} = 150 \text{ g}$$

but, you must
use different
#s of

significant
figures in
final value
reported!

$$\bar{X} = \text{average value} = \frac{\text{sum of individual trials}}{\# \text{ trials}}$$

To represent the fluctuation in the above measurements around the average value, we use standard deviation, σ

set 1
149
150 $\Rightarrow$ 150 = average
151

$$\sigma = \sqrt{\frac{(149-150)^2 + (150-150)^2 + (151-150)^2}{3-1}} = 1$$

set 2 $\sigma = 10$

$$\sigma = \sqrt{\frac{\text{sum of (individual trial - average)}^2}{\# \text{ trials} - 1}}$$

WebAssign using set 1 as example:

if each individual trial is measured to the ones place,

enter: 149

150. or $1.5 \times 10^2 \Rightarrow$

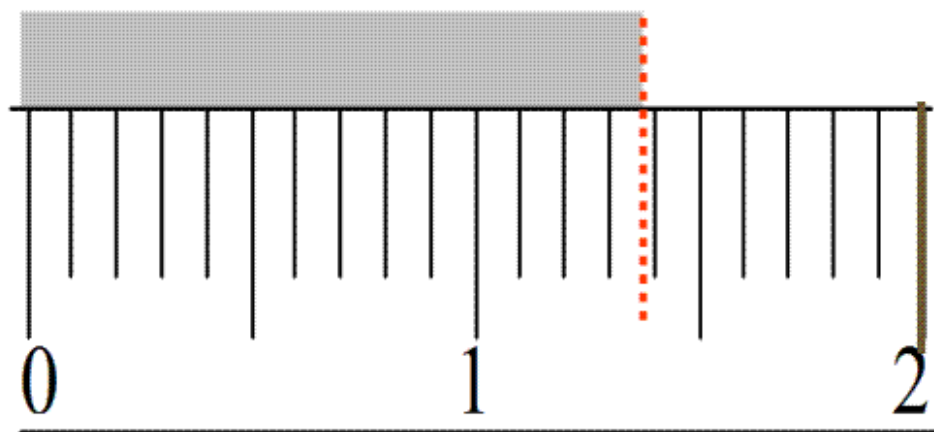
151

average 150. & $\sigma = 1$

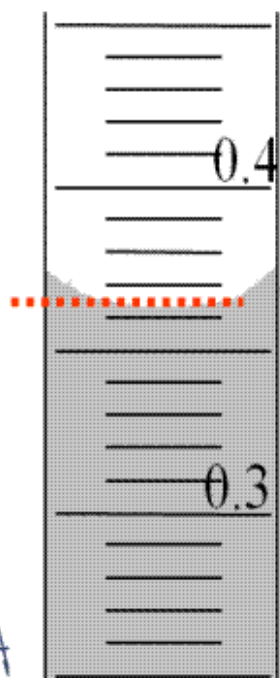
so final is $150. \pm 1$

Set 2 150 ± 10

Just a single measurement? What is σ ?



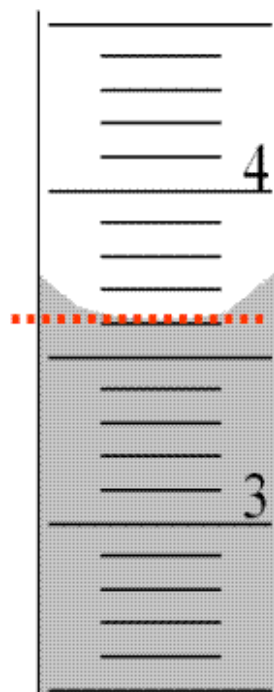
1.38
or 1.39 cm } $1.38 \pm 0.01 \text{ cm}$



0.365 mL
 $\pm 0.005 \text{ mL}$

A

mL



$3.60 \pm 0.05 \text{ mL}$

B

mL

What is a significant figure in a value?

Nonzero digits are significant

212

3sf

Zeros

leading - NO

0.00212

3sf

buried - YES

202

3sf

trailing

NO if "NO"

200

1sf

2×10^2

Ask: Is there a written
decimal point?

YES IF
"YES"

200.

3sf

2.00×10^2

200.00

5sf

2.0000×10^2

"200" ± 10 ?

2.0×10^2

Math can't make a result more precise - Rules

add or
subtract

50.5 mL	± 0.5 mL	Report
-1.55 mL	± 0.02 mL	49.0 ± 0.5 mL
48.95 mL	± 0.52 mL	

multiply
or divide

$$(12.5 \text{ cm})(2.06 \text{ cm}) = 25.75 \text{ cm}^2$$
$$\pm 0.1 \text{ cm} \quad \pm 0.01 \text{ cm}$$

use
relative $\Rightarrow \frac{\sigma_x}{x}$
error

$$\pm 25.75 \text{ cm}^2 \left(\frac{0.1 \text{ cm}}{12.5 \text{ cm}} + \frac{0.01 \text{ cm}}{2.06 \text{ cm}} \right) = \pm 0.331 \text{ cm}^2$$

Report $25.8 \text{ cm}^2 \pm 0.3 \text{ cm}^2$

$$y = mx + b$$

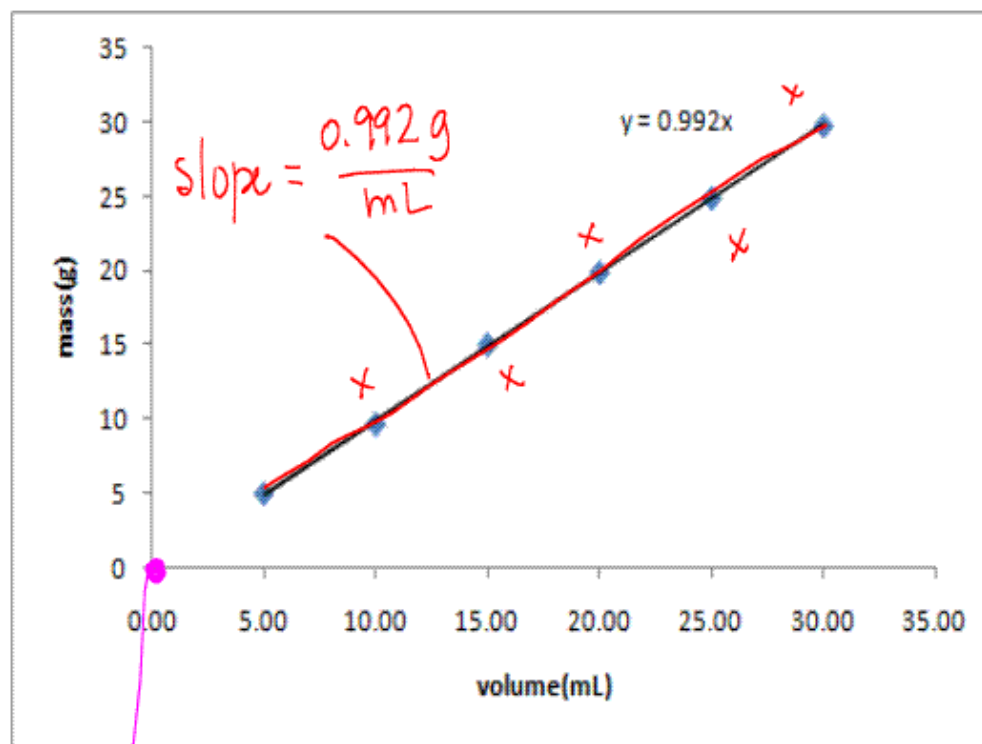
$\uparrow$ dependent $\uparrow$ independent

y intercept $\Rightarrow$ should it be zero or not?

Slope of the
BEST FIT LINE!!!

not individual data points

volume(mL)	mass(g)
5.00	4.93
10.00	9.62
15.00	14.99
20.00	19.86
25.00	24.89
30.00	29.77



here, b should be zero (zero mL $\equiv$ zero grams)

Next time:

- Written procedural outline or flowchart
& data tables (empty for now) in lab notebook
- Online prelab for experiment 1, Density