

# CHM 112: General Chemistry II

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Chemistry: Atoms First, 4<sup>th</sup> ed  
J. Burdge & J. Overby, McGraw Hill

Ch. 13: Physical Properties of Solutions

Ch. 14: Chemical Kinetics

Ch. 15: Entropy & Gibbs Energy

Ch. 16: Chemical Equilibrium

Ch. 17: Acids, Bases, & Salts

Ch. 18: Acid Base Equilibria & Solubility Equilibria

Ch. 19: Electrochemistry

Concepts build on each other &  
on knowledge from CHM 101

**Chemistry Labs Start Wednesday Jan. 22<sup>nd</sup>**

**Required introductory/safety sessions  
are held the first week!**

**Safety Training is required for all  
Chemistry Labs**

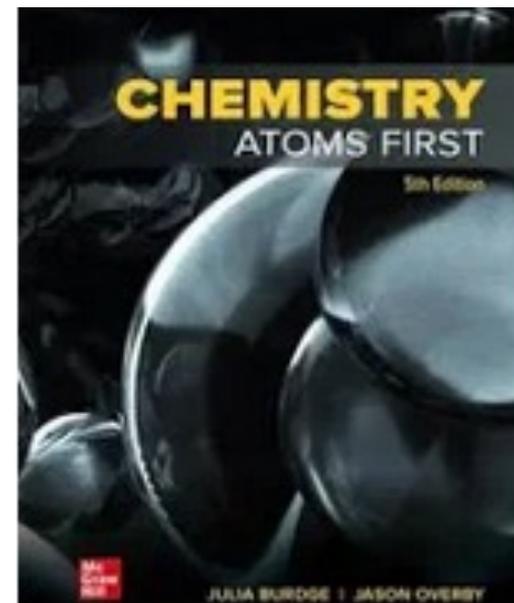
**You must complete the required on-line lab  
safety module before attending your first  
experiment. This module will be completed  
during the first lab meeting!**

**See your CHM 114 Brightspace site for an introductory  
presentation with details about safety training and lab  
and department policies. This information will be  
covered in lab the first week of classes!**

# Course Organization & Expectations

## Required Materials

- Book: Chemistry: Atoms First 5<sup>th</sup> edition
  - By Julia Burdge & Jason Overby
  - Published by McGraw Hill
  - Can use either paper or electronic
- Access to Aleks online homework
  - Chapter Intro assignments
  - Homework assignments
- Scientific calculator
- Brightspace/URI email
  - Gradebook
  - Announcements
  - Links to course resources
  - Possibly some additional assignments
- Many course resources can also be accessed through <https://www.chm.uri.edu/index.php/misc-user-page/?buttonname=miscbutton&person=mdonnelly&topicname=CHM112>



Chapters 13–19

# Useful Information: lecture notes, old videos from remote learning, etc. available on course resources site

<https://www.chm.uri.edu/index.php/misc-user-page/?buttonname=miscbutton&person=mdonnelly&topicname=CHM112>

THE UNIVERSITY OF RHODE ISLAND

DEPARTMENT OF CHEMISTRY

1-401-874-2318 chemistry@etal.uri.edu

Home People ▾ Research For Prospective Students For Current Students Links ▾ Contact Us

Dr. Donnelly's CHM 112 Student Resources

Course Information

- Syllabus
- Beaupre 100 Seating Chart

Connect Information

- General Connect Information
- Registration Information

Lecture Slides

- Introductory Material
- Chapter 13
- Chapter 14
- Chapter 15

Links to lecture videos made during remote learning are also available in case you need to miss class.

# Brightspace

Course Home Content Assignments Discussions Quizzes Classlist Grades Class Progress Course Tools Help More



Updates

D2L Visual TOC

Course Introduction - Start Here!

50% 2 of 4 Topics Completed

Syllabus and Schedule

0% 0 of 2 Topics Completed

Link to course content videos and s...

Help Is Available!!!

Announcements

There are no announcements to display.  
[Create an announcement](#)

Calendar

Thursday, January 16, 2025

Upcoming events

There are no events to display.  
[Create an event](#)

Announcements – might need to opt in to receive emails!

# Communication

- Check your URI email account frequently!
- Brightspace will be used to
  1. Provide resources & links to useful information
  2. Communicate important information to students
    - You may need to opt in to receive email notifications from Brightspace
  3. Post grades

The screenshot shows the Brightspace interface for a course titled "CHM102: Laboratory for Chemistry 101\_00...". The user's name, Maria Donnelly, is visible in the top right corner. A purple arrow points to the user's name, with the text "Click on the box by your name to get the drop down box". Below the name, a dropdown menu is open, showing options: "View as Collaborator", "Profile", "Notifications", "Account Settings", and "Log Out". A purple arrow points to the "Notifications" option, with the text "Select notifications". Below the dropdown, the "Notifications" section is visible, with a purple oval highlighting the "Instant Notifications" section. The list of notifications includes: "Activity Feed - new comments from others on a post", "Activity Feed - new posts created by others", "Announcements - announcement updated", and "Announcements - new announcement available".

THE UNIVERSITY OF RHODE ISLAND | CHM102: Laboratory for Chemistry 101\_00... | MD Maria Donnelly

Course Home Content Assignments Discussions Quizzes Classlist Grades Class Progress C View as Collaborator Change

## Notifications

Control how you receive notifications about activity in your courses. You can receive a periodic summary of activity, or receive instant notific

**Instant Notifications**

- Activity Feed - new comments from others on a post
- Activity Feed - new posts created by others
- Announcements - announcement updated
- Announcements - new announcement available

Click on the box by your name to get the drop down box

Select notifications

At a minimum, get notifications for announcements. You can get additional notifications if you choose

# Course Organization & Expectations

## Homework

- Homework will be completed and submitted through the McGraw Hill Aleks online homework program
- There are two types of homework:
  - Chapter Intro Assignments – one per chapter
    - An introduction to the chapter – questions on basic information such as key terms
    - "Read the chapter" assignments
    - Due before or near the start of each chapter
  - Homework assignments – one or two per chapter
    - Ten points per question
    - Best to complete after attending lecture on material
- Chapter Intro & Homework assignments are graded the same way
  - Ten points per question
  - Can be submitted late automatically with 1% per day loss of credit
- Initial due dates are on Tuesdays and Fridays

# Aleks Registration

[https://www.aleks.com/highered/math/HE\\_Student\\_Registration\\_No\\_Access\\_Code.pdf](https://www.aleks.com/highered/math/HE_Student_Registration_No_Access_Code.pdf)

Aleks Class Code for Spring 2025: JHPFC-4WKAX  
Class Name: CHM 112 Sec3 TTh 9:30

## Student Registration Instructions

Before you begin, you will need a **10-character Class Code**.

For assistance during registration, please contact ALEKS Customer Support at <http://support.aleks.com>.

**Step 1:** Go to [www.aleks.com](http://www.aleks.com) and select **SIGN UP NOW!** under the Registered Users box.

**Step 2:** Enter the 10-character class code provided by your instructor and click **Continue**.

**Step 3:** Verify your enrollment information. If it is incorrect, check your class code and click on **(Modify)** to make any corrections. If your information is correct, click on **Continue**.

# Aleks Registration

[https://www.aleks.com/highered/math/HE\\_Student\\_Registration\\_No\\_Access\\_Code.pdf](https://www.aleks.com/highered/math/HE_Student_Registration_No_Access_Code.pdf)

Aleks Class Code for Spring 2025: JHPFC-4WKAX  
Class Name: CHM 112 Sec3 TTh 9:30

**Step 4:** Select whether or not you have used ALEKS before and click on **Continue**.

If you have used ALEKS before, you will be prompted to enter your existing login and password.  
You can retrieve your login information by clicking on **I forgot my login information**.

**Step 5:** If you entered your existing ALEKS account information in Step 4, you will be prompted to verify your email address at this time.

Otherwise, complete the registration steps to create a new ALEKS account and click on **Continue**.  
A confirmation email will be sent to the email address you provided.

**IMPORTANT: Be sure to save your new login information!**

**Step 6:** Once your registration is complete, you will be in your ALEKS class and can begin with the Answer Editor Tutorial. Please see Appendix B to learn more about managing your ALEKS account.

# Aleks Assignments

May make you go through a tutorial and a knowledge check when you first enter the course site – not part of your grade – just do whatever you need to get past it.


**ALEKS®** CHM 101 Sec 1 TuTh 9:30am - Sec 1
 
 Hi, Maria! 

UP NEXT

Solving for a variable in terms of other variables in a linear equation wit...

[START MY PATH](#)

WORKING TOWARD

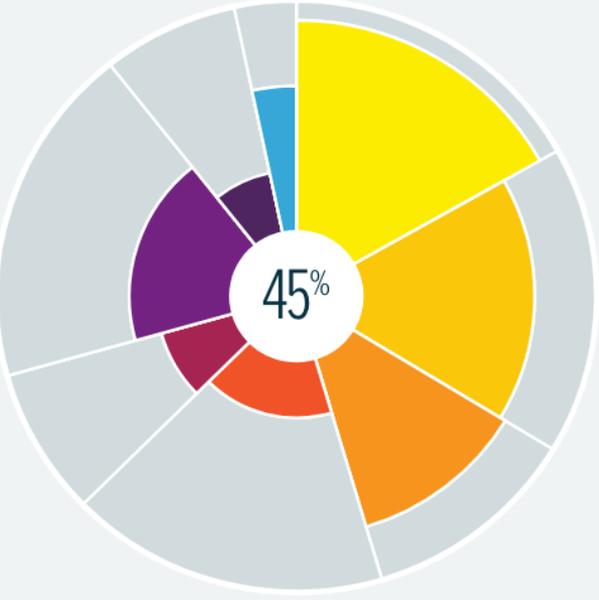
Class Progress  
105 of 233 Topics  
Due Dec 20 11:59 PM

Pre-chapter Assignment 1  
Questions: 10  
Due Friday 11:59 PM  
 Opens Wednesday 12:00 AM

[View Assignment List](#)

## To get to ebook

Mastered: 105   Learned: 0   Remaining: 128



**45%**

 Timeline

 ALEKS Pie

- **Math and Physics**  
(41 Topics)
- **Measurement and Matter**  
(41 Topics)
- **Atoms, Ions and Molecules**  
(27 Topics)
- **Chemical Reactions**  
(42 Topics)
- **Thermochemistry**  
(17 Topics)
- **Electronic Structure and Chemical Bonding**  
(46 Topics)
- **States of Matter**  
(15 Topics)
- **Acids and Bases**  
(4 Topics)

**To get to assignments**

[Calendar](#)

[ALEKS Pie Detail](#)

# Aleks Assignments

Not part of grade but program may require it (hopefully it is gone).

Assignments

Name	Status	Type	Start	Due	Progress	Details
 Initial Knowledge Check	Closed	Knowledge Check	-	-	-	-
 Chapter 1 Intro Assignment	Upcoming	Homework	09/04/2024 12:00 AM	09/06/2024 11:59 PM	-	0 of unlimited attempts Final Submission Date: 12/11/2024 11:59 PM
 Chapter 1 Homework	Upcoming	Homework	09/04/2024 12:00 AM	09/13/2024 11:59 PM	-	0 of unlimited attempts Final Submission Date: 12/11/2024 11:59 PM

Graded assignments.  
Will be one intro  
assignments and one or  
two homework  
assignments per chapter.

# Aleks eTextbook

Clicking on the box of lines opens the menu on the left

The screenshot displays the ALEKS interface for a chemistry course. On the left is a navigation menu with items: Home, Learn, Review, Assignments, Worksheet, Calendar, Gradebook, Reports, Message Center, Textbook, ALEKSPedia, and Tell me more about ALEKS. The main content area shows course progress for 'CHM 101 Sec 1 TuTh 9:30am - Sec 1'. It includes a progress bar (Mastered: 105, Learned: 0, Remaining: 128), a 'UP NEXT' section with a 'START MY PATH' button, and a 'WORKING TOWARD' section showing 'Class Progress 105 of 233 Topics Due Dec 20 11:59 PM'. Below this is a 'Pre-chapter Assignment 1' section with 'Questions: 10' and a due date of 'Friday 11:59 PM'. A 'View Assignment List' link is at the bottom. On the right is a circular progress chart showing 45% completion, with a legend for various topics: Math (41 Tc), Mea (41 Tc), Aton (27 Tc), Cher (42 Tc), Ther (17 Tc), Elect Bond (46 Tc), State (15 Tc), and Acid (4 To).

Click on Textbook to access the ebook.

# Course Organization & Expectations

## Exams

- Exams will be held in Beaupre 100 at the scheduled class time.
  - Dates are in the syllabus and the schedule in this presentation
  - There will be four in-class exams and one final exam
- You will be assigned a seat for your exams
  - When you arrive, your exam will be waiting for you at your seat with your name on it
  - Leave your bag at the front, take your calculator and something to write with, and begin your exam
- Calculators with advanced functions (able to read pdf files, access the internet, etc.) cannot be used on exams.
- If you feel there is an error in the grading of your exam, you must bring this to my attention within 48 hrs of the graded exam being returned to you. No grade changes will be considered after this time.

# Missed Exams

- To eliminate the need for make-up exams, if you miss an in-class exam, your final will count twice in place of the missed exam.
  - Make-up exams generally do not help students, so this policy is strongly recommended.
- If you will miss an exam for a school sanctioned event you must contact me in advance. You are eligible to take the exam in the Testing Center, but date options are limited so advance notice is required. Without advance notice, the final will count twice.
- Official documentation is required to request a make-up exam.
  - Documentation must explicitly cover the date of the exam and must state that the student is UNABLE to attend class on that date.
  - Health Services stated policy is that they do not provide doctors notes.
  - Per the University Manual, make-up exams must be requested within 7 calendar days of the absence. Requests must be made in writing via email and must include appropriate documentation.
  - All make-up exams will be held on the last day of classes (Wednesday 4/30) so that all students can take their make-up on the same day.
  - Make-up exam cancellations must be made via email no later than one week before the make-up exam date.
  - If you request a make-up exam but do not show up to take the make-up exam, you will receive a zero for that exam. The final will not replace the grade on a make-up exam.
  - A second missed exam will require University documentation.

# General Course Schedule

Chapter	Title	Week/Date
13	Physical Properties of Solutions	1-3
14	Chemical Kinetics	
<b>Exam 1</b>	<b>Chapters: 13 &amp; 14</b>	<b>Thursday Feb. 13<sup>th</sup></b>
15	Entropy and Gibbs Energy	4-6
16	Chemical Equilibrium	
<b>Exam 2</b>	<b>Chapters: 15 &amp; 16</b>	<b>Thursday March 6<sup>th</sup></b>
17	Acids, Bases, and Salts	7-10
18	<b>Acid-Base Equilibria</b> and Solubility Equilibria	
<b>Exam 3</b>	<b>Chapters: 17 &amp; first part of 18</b>	<b>Tuesday April 8<sup>th</sup></b>
18	<b>Acid-Base Equilibria and Solubility Equilibria</b>	11-13
19	Electrochemistry	
<b>Exam 4</b>	<b>Chapters: second part of 18 &amp; 19</b>	<b>Tuesday April 29<sup>th</sup></b>
<b>**Final Exam: Tuesday May 6<sup>th</sup> 8:00 – 10:00am</b>		

\*\* Final exam dates are set by the University and are subject to change

## Important Spring 2025 Semester Dates:

- Wednesday Feb. 12<sup>th</sup> – last day to drop courses with no transcript designation of “W”
- Monday Feb. 17<sup>th</sup> – Presidents Day, classes do not meet
- **Wednesday Feb. 19<sup>th</sup> – Monday classes meet to make up for Presidents Day**
- Wednesday March 5<sup>th</sup> – Last day to drop classes in ecampus (after this date, a form is required that must be signed by your Academic Dean)
- March 9<sup>th</sup> – 15<sup>th</sup> – Spring Break
- Tuesday March 18<sup>th</sup> – Freshmen Mid-Term grades due at noon
- Wednesday Apr. 30<sup>th</sup> – last day of classes
- Thursday May 15<sup>th</sup> – final grades due in ecampus at noon

# Extended Course Schedule

- Tentative – Dates for chapters being covered & assignment due dates are subject to change due to pace of the class.
- In Semester Exam dates will not change unless classes are cancelled.
- See Aleks for most current assignment due dates.
- Full extended schedule can be found in the syllabus and schedule module on Brightspace.

## + Assignment due – Blue

Date	Day	Chapters & Assignments
1/20	M	No Classes
1/21	Tu	No Classes
1/22	W	
1/23	Th	Introduction & CH 13
1/24	F	
1/27	M	
1/28	Tu	CH 13; <a href="#">CH 13 Intro Assign. due</a>
1/29	W	
1/30	Th	Chap 13 & 14
1/31	F	<a href="#">CH 13 HW due</a>
2/3	M	
2/4	Tu	CH 14; <a href="#">CH 14 Intro Assign. due</a>
2/5	W	
2/6	Th	CH 14
2/7	F	<a href="#">CH 14 HW A due</a>
2/10	M	
2/11	Tu	CH 14 & 15; <a href="#">CH 14 HW B due</a>
2/12	W	
2/13	Th	<b>Exam 1 Chapters 13 &amp; 14</b>
2/14	F	

# Course Organization & Expectations

## Grading

Online Chapter Intro & Homework Assignments & Attendance Quizzes	15 %
4 Semester Exams (17 % each)	68 %
Final Exam	17 %
<b>Total</b>	<b>100%</b>

- Your final course average will be calculated using the following formula:

$$\text{Course Avg.} = (\text{Homework Avg.} \times 0.15) + (\text{Exam Avg.} \times 0.85)$$

- The Homework Average includes the Chapter Intro & Homework assignments on Aleks & attendance quizzes
  - Each Chapter Intro & Homework assignment counts for a given number of points based on the number of questions. Each question is worth 10 points.
  - Each attendance quiz counts for 20 points
  - HWK Avg. =  $(\text{pts. earned} / \text{total \# of pts possible}) \times 100$

# Incomplete Policy

Incomplete grades will only be assigned in the case of a real emergency. In order to receive an incomplete, a student's **course work must have been passing** and the student **must have completed at least half of the coursework for the semester.**

Incompletes should be made up within one year of the semester in which the grade of incomplete was assigned. **If an incomplete is not made up within two years, or prior to the student's expected graduation date or departure from the University, whichever is earlier, the "I" will be replaced with a grade calculated for the student based on the work completed and including zeroes for any work not completed.**

According to the University manual, arrangements to resolve an incomplete must be made by the midsemester following the semester in which the incomplete was received (for undergraduates). **If a student fails to make such arrangements, the incomplete may be changed as early as the end of the semester following the semester in which the incomplete was received.**

## Be Courteous to Your Classmates

- If you arrive late/need to leave early, use the back entrance
- Your peers can be a great resource, but please wait till after lecture to talk with them/ask them questions
- Give everyone a chance to answer
- Remember why you are here
  - TV shows, games, movies, & social media will not help you learn
  - they are also visible to the students sitting behind you & can be quite distracting

# Getting Help

**Make sure to seek help right away if you feel you are struggling with material**

- Office hours
  - Use Starfish to sign up for a time (or just stop by!)
  - Beaupre 117C is in the corridor behind room 115 (the study room at the beginning of the lab corridor)
  - Appointments are not required, but those with appointments receive priority for their scheduled time.
  - Can also email questions
- Chemistry department TAs also hold office hours
  - Held in Beaupre 115
  - Can ask any 112 or 114 TA for help
  - Link to the TA office hour schedule will be posted in Brightspace as soon as it is available.
- AEC also offers tutoring ([www.uri.edu/aec](http://www.uri.edu/aec))

**I am happy to help!!!**



# Your choices will determine your level of success

- **Attendance is important**
  - prepare in advance – become familiar with key terms & ideas
  - pay attention, ask me questions
  - print out slides and bring them with you to take notes on
- **Assignments are designed to help you learn**
  - focus on WHY you need to follow certain steps to solve problems rather than trying to memorize the steps
  - ask yourself what you do and do not understand
- **Complete assignments on time**
  - mastery of early material will help with material covered later
  - avoid having assignments build up & losing points due to lateness
- **Seek help right away!**
  - office hours
  - TAs in Beaupre 115 Learning Center
  - AEC tutoring group or walk in tutoring

**CHM 101 Knowledge is Essential!!!**

**Some CHM 101 information that you will need is listed on the following slides.**

**See ME or a CHM 102 or 114 TA ASAP if you need help remembering CHM 101**

**Can also use the resources from my CHM 101 class – the link is in Brightspace**

# Science Basics

## Measurements:

- SI units & prefixes
- Scientific notation - know how to work with your calculator
- Rounding & significant figures

## Dimensional Analysis

- Use of dimensional analysis to solve problems
- Conversions between mass, volume, moles, etc.

## Percents, fractions, ratios (mass, elemental, moles, etc.)

- Know the difference between them & how to find them for chemical systems.

# Chemical Formulas & Names

## Formulas:

- First element symbol is the most positive (metal if ionic)
- If both in same column, first element is lowest
- Covalent – subscripts based on # atoms in molecule
- Ionic – subscripts based on balancing charges

## Names

- Salts & binary molecules – 2 words, one for each element, with first element in formula written first
- 2<sup>nd</sup> word has -ide ending (if not a polyatomic ion)
- Covalent – prefixes indicate # atoms of each element
- Ionic – Roman Numerals indicate charge of cation if more than one charge is possible

## Covalent:

NO = nitrogen monoxide

N<sub>2</sub>O<sub>4</sub> = dinitrogen tetroxide

## Ionic:

Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> = calcium phosphate

Fe<sub>2</sub>Cl<sub>3</sub> = Iron (III) chloride

# Polyatomic Ions

Group of bonded atoms that share a charge

Know the names & formulas of the following:

Ammonium ( $\text{NH}_4^+$ )

Hydronium ( $\text{H}_3\text{O}^+$ )

Acetate ( $\text{CH}_3\text{COO}^-$ )

Carbonate ( $\text{CO}_3^{2-}$ )

Chlorate ( $\text{ClO}_3^-$ )

Perchlorate ( $\text{ClO}_4^-$ )

Sulfate ( $\text{SO}_4^{2-}$ )

Nitrate ( $\text{NO}_3^-$ )

Nitrite ( $\text{NO}_2^-$ )

Phosphate ( $\text{PO}_4^{3-}$ )

Cyanide ( $\text{CN}^-$ )

Permanganate ( $\text{MnO}_4^-$ )

Hydroxide ( $\text{OH}^-$ )

# Stoichiometry

## Mass & Moles

- Finding molar mass
- Conversion between mass & moles
- Using Avogadro's # to convert between particles & moles

## Chemical Equations

- Writing & balancing chemical equations
- Phase meanings (s, l, g, aq)
- Determining amount of products (or reactants, etc.), including limiting reagents

## Percent Composition of Materials

- Calculate mass percent
- Calculate mass of a material from mass percent

# Solution Chemistry

## Molarity

- Calculating molarity
- Conversions between mass, moles & liters

## Solutions & Dilutions

- Using  $M_1V_1 = M_2V_2$
- Calculate mass of solid needed to make a solution

## Acid-Base Titrations

- Identifying acids & bases
- Ionization properties of acids & bases
- Determining concentration of unknown solutions using titration

## Know these Acids:

Hydrochloric Acid:	HCl
Sulfuric Acid:	H <sub>2</sub> SO <sub>4</sub>
Nitric Acid:	HNO <sub>3</sub>
Perchloric Acid:	HClO <sub>4</sub>
Carbonic Acid:	H <sub>2</sub> CO <sub>3</sub>
Phosphoric Acid:	H <sub>3</sub> PO <sub>4</sub>

**You will encounter them frequently**

# Redox Reactions

## Oxidation Numbers

- Determining the oxidation number of each atom in a chemical formula

## Write & Balance Redox equations

- Knowing what was oxidized & reduced
- Determining the number of electrons transferred

## Redox Titrations

- Determining concentration of unknown solutions using titration
- Essentially solution stoichiometry problems

# Gases & Thermodynamics

## Ideal Gas Equation

- Know how to use it
- Using the correct units based on R
- Be able to solve for a variable in  $PV=nRT$  to be used in other problems (like you did in gas stoichiometry)

## Enthalpy ( $\Delta H$ )

- Understanding enthalpy of reactions
- Endothermic vs. Exothermic
- Using enthalpy tables to calculate enthalpy of reactions
- Hess' Law

# Elements & Compounds

## The Electronic Structure of Atoms

- Understanding atomic structure & how it influences reactivity

## The Periodic Table

- Using the Periodic Table to get information about elements

## Chemical bonding

- Understanding how atoms interact with each other to form bonds
- Understanding Lewis Structures & molecular structure

# Math skills are also important

## Solving Problems with the line equation: $y=mx+b$

- Know how to solve for slope, etc.
- Be able to solve the equation when logarithms are present:  $\ln(y) = mx + \ln(b)$
- Be able to solve with inverses:  $1/y = mx = 1/b$

## Logarithms (log) & natural logarithms (ln)

- Be able to use these functions on your calculator
- See appendix 3 in your book for more info on logs

## Algebra & solving equations

## Scientific notation & working with exponents

## Square, cubed, & other root functions