

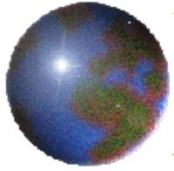


# ***Ace Dr. Cook's Chem 1201: Metacognition is the Key!***

**Saundra Y. McGuire, Ph.D.**

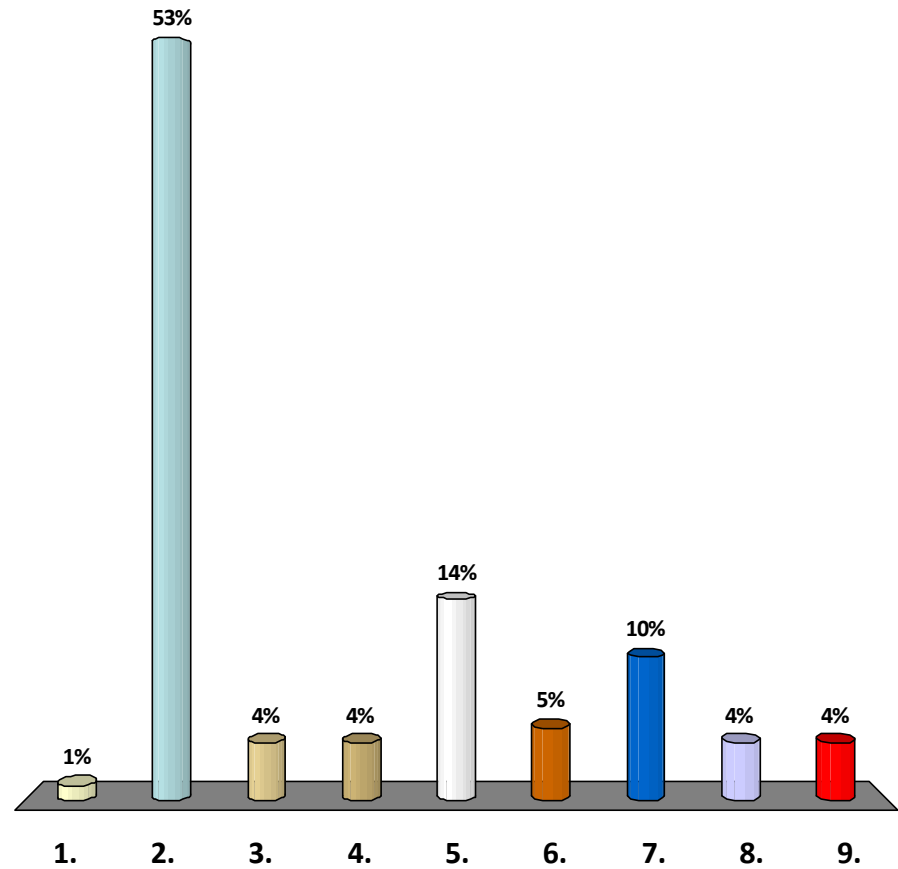
**Retired Asst Vice Chancellor & Professor of Chemistry**

**Director Emerita, Center for Academic Success**



## *What's your career track?*

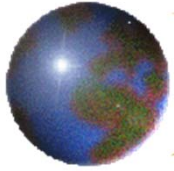
1. Education
2. Engineering
3. Science
4. Pre-Dent
5. Pre-Med
6. Pre-Nursing
7. Pre-Vet
8. Other Pre-Health
9. Other



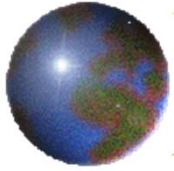
# LSU Center for Academic Success

## National College Learning Center Association Frank L. Christ Outstanding Learning Center Award



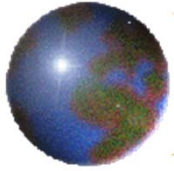


*Presidential Award  
White House Oval Office  
November 16, 2007*



## *Sydney's Story: Intro and emails*

- First encounter on September 23, 2013
- Email on October 14, 2013
- Email on January 9, 2014
- Email on January 20, 2014
- Email on May 7, 2014



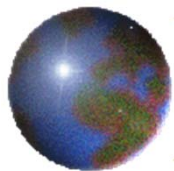
## *Sydney's Fall 2013 Test Grades*

- Calculus

64, 100, 97, 96, 90, 93      A in course

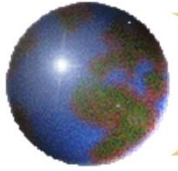
- Chemistry

65, 95, 90, 70, 96      A in course



## *The Story of Four Other LSU General Chemistry Students*

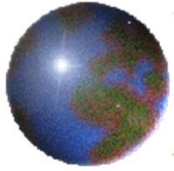
	Final Grade:
✦ Robert 42, <u>100, 100, 100</u>	A
✦ Kristy 60, <u>100, 99, 84</u>	A
✦ Blanche 63 <u>79, 87, 100</u>	A
✦ Joshua 68, 50, (50), <u>87, 87, 97</u>	A



# *What Made the Biggest Impact?* *Getting the Most Out of Homework!*

- ✦ Start the problems early--the day they are assigned
- ✦ **Do not flip back to see example problems; work them yourself!**
- ✦ Don't give up too soon (<15 min.)
- ✦ Don't spend too much time (>30 min.)



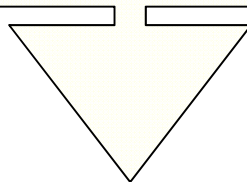


*Why will this make the biggest impact for you?  
Because you've been starting the homework  
much too late!*

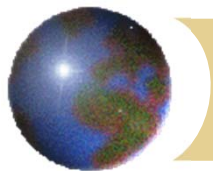
HW Ch. 1-2	HW Ch. 3	E
10	10	
8.1	11.9	
1.0	0.0	
4.4	0.0	
9.4	12.0	
8.4	0.0	
9.9	0.0	
2.0	0.0	
9.3	0.0	
8.7	0.0	
1.0	0.0	
1.0	0.0	
0.0	0.0	
0.0	0.0	
5.2	0.0	
4.4	0.0	
0.0	0.0	
9.7	1.4	
9.8	0.0	

# Performance in Gen Chem 1202 Sp 2013 Based on One Learning Strategies Session

	Attended	Absent
Exam 1 Avg.:	71.33%	69.27%
Homework Total	169.8	119.1
Final course Avg*.: <b>Final Course Grade:</b>	<b>82.36%</b> <b>B</b>	<b>67.71%</b> <b>D</b>

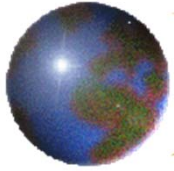


**The 50-min presentation on study and learning strategies  
resulted in an improvement of two letter grades!**



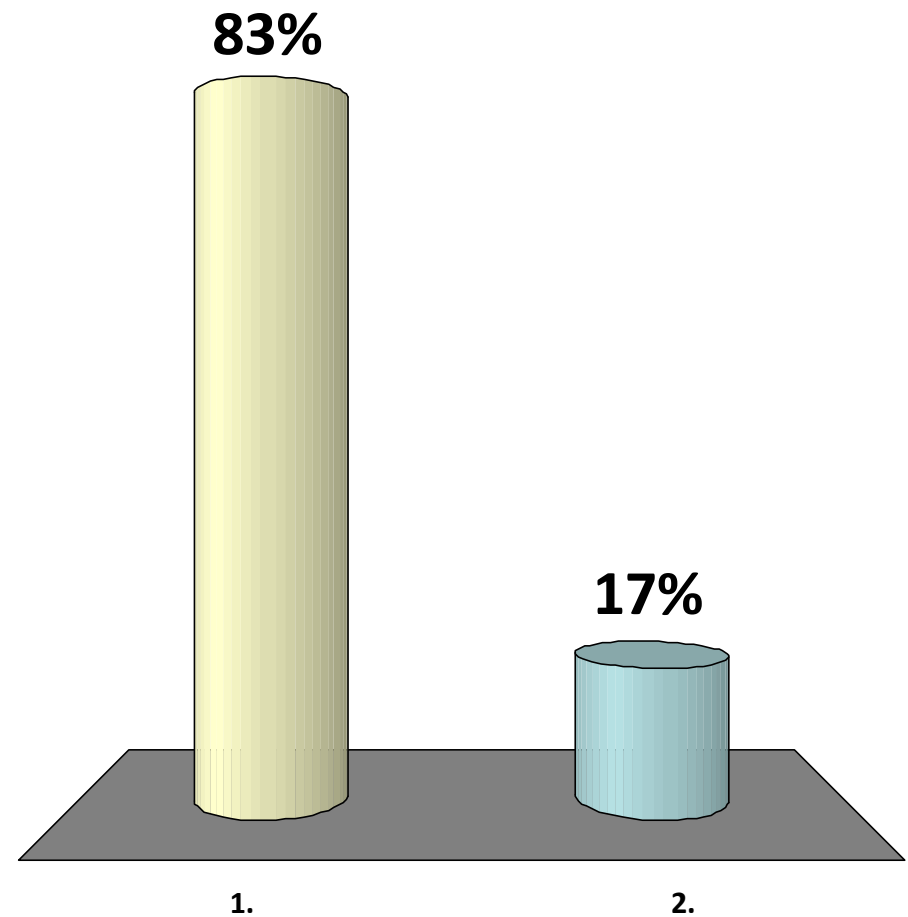
## *Reflection Questions*

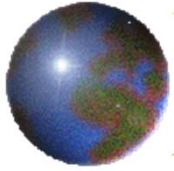
- ⊕ What's the difference, if any, between *studying* chemistry and *learning* chemistry?
  
- ⊕ For which task would you work harder:
  - A. Make an A on the test
  - B. Teach the material to the class?



## *Which mode have you been in?*

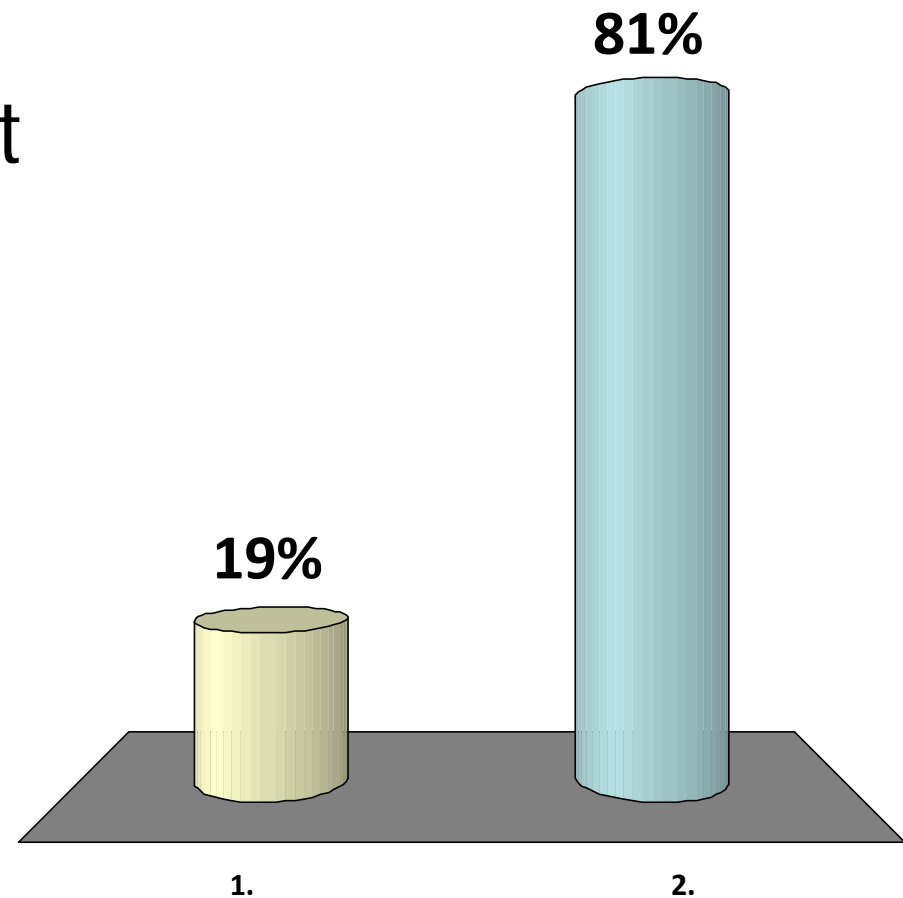
1. Study mode
2. Learn mode

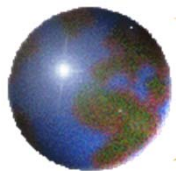




## *For which task would you work harder?*

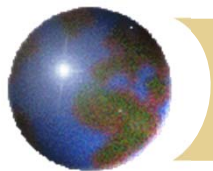
1. Make an A on the test
2. Teach the material





## *To Ace Chem 1201 (and everything else!)*

- ✦ Stay in *learn* mode, not *study* mode
- ✦ Study as if you have to *teach* the material, not just make an A on the test



*Why is this so important?*

*Because 1201 is Harder Than HS Chem*

- ✦ The course moves a lot faster
- ✦ The material is conceptually more difficult and cumulative
- ✦ The problems are more involved
- ✦ The tests are less straightforward and require you to ***apply*** several concepts at one time

## Example of challenging questions from CHEM 1201 Exam 1:

A flask weighs 43.50 g when empty and 105.50 g when filled with water at 21 °C ( $d_{H_2O(l)} = 0.99802 \text{ g/mL}$ ). What is the volume of the flask (in L)?

**17%** A)  $4.359 \times 10^1 \text{ L}$

**14%** B)  $6.188 \times 10^1 \text{ L}$

**3%** C)  $1.616 \times 10^{-2} \text{ L}$

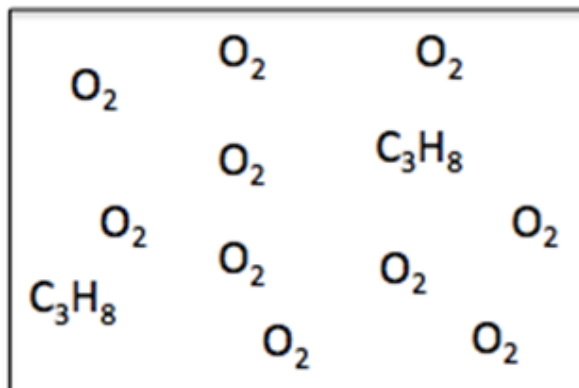
**\*37%** D)  $6.212 \times 10^{-2} \text{ L}$

**29%** E)  $1.057 \times 10^2 \text{ L}$



## Example of challenging questions from CHEM 1201 Exam 1:

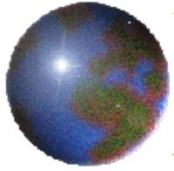
Consider a mixture of propane ( $C_3H_8$ ) and oxygen ( $O_2$ ) shown below.



How many molecules of  $CO_2$ ,  $H_2O$ ,  $C_3H_8$ , and  $O_2$  will be present if the combustion of propane reaction goes to completion?

		$CO_2$	$H_2O$	$C_3H_8$	$O_2$
12%	A)	3	4	1	0
21%	B)	4	6	0	0
33%	C)	3	3	1	4
12%	D)	6	4	0	1
<b>*21%</b>	E)	3	4	0	0

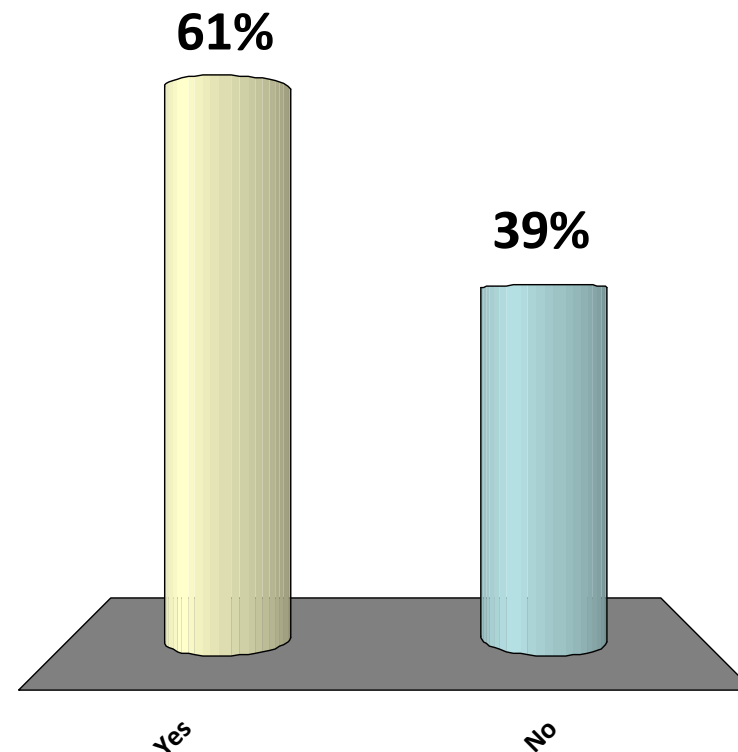




*Did you think there might be a mistake in this problem, but spent extra time trying to figure out why you didn't get any of the answers listed?*

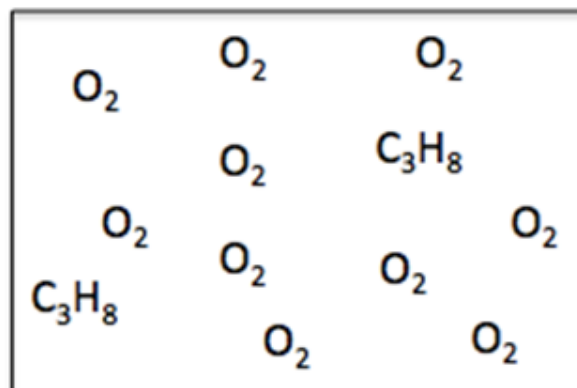
A. Yes

B. No



## Example of challenging questions from CHEM 1201 Exam 1:

Consider a mixture of propane ( $C_3H_8$ ) and oxygen ( $O_2$ ) shown below.

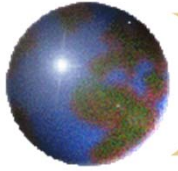


How many molecules of  $CO_2$ ,  $H_2O$ ,  $C_3H_8$ , and  $O_2$  will be present if the combustion of propane reaction goes to completion?

	$CO_2$	$H_2O$	$C_3H_8$	$O_2$
A)	3	4	1	0
B)	4	6	0	0
C)	3	3	1	4
D)	6	4	0	1
E)	<b>6</b>	<b>8</b>	<b>0</b>	<b>0</b>

- Recognize that this is a stoichiometry with a limiting reactant problem (maybe?)
- Write and balance reaction equation:  
 $C_3H_8 + 5 O_2 \rightarrow 3 CO_2 + 4 H_2O$
- 1 : 5 molar ratio between reactants
- You have 2 moles of  $C_3H_8$  and 10 moles of  $O_2$
- You have stoichiometric amounts of both
- Nothing left over, everything reacts, forming

**6  $CO_2$  and 8  $H_2O$**

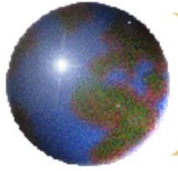


## *Effective test taking strategies*

- ✦ Survey the test and start with the easy questions (ALL questions are worth 7.5 points, regardless of time required or difficulty level.)
- ✦ Budget your time per question; move on to the next one if you're getting bogged down
- ✦ If something looks like a mistake, note it and say something about it to Dr. Cook



# **Using Metacognition to Become an Expert Learner in Chemistry**



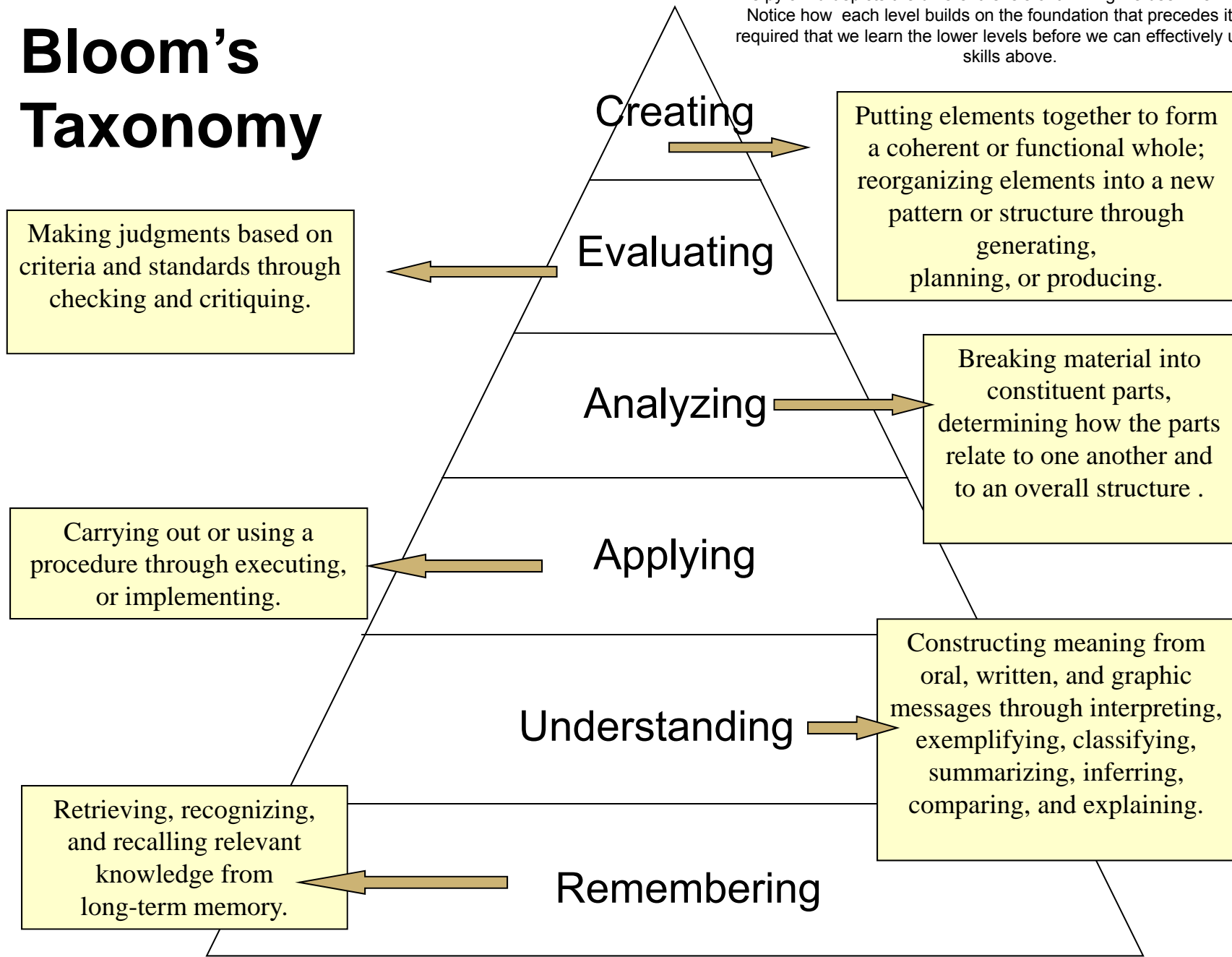
## *Metacognition*

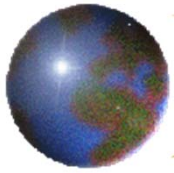
**The ability to:**

- ✚ **think about thinking**
- ✚ **be consciously aware of oneself as a problem solver**
- ✚ **monitor and control one's mental processing (e.g. "Am I understanding this material?")**
- ✚ **accurately judge one's level of learning**

# Bloom's Taxonomy

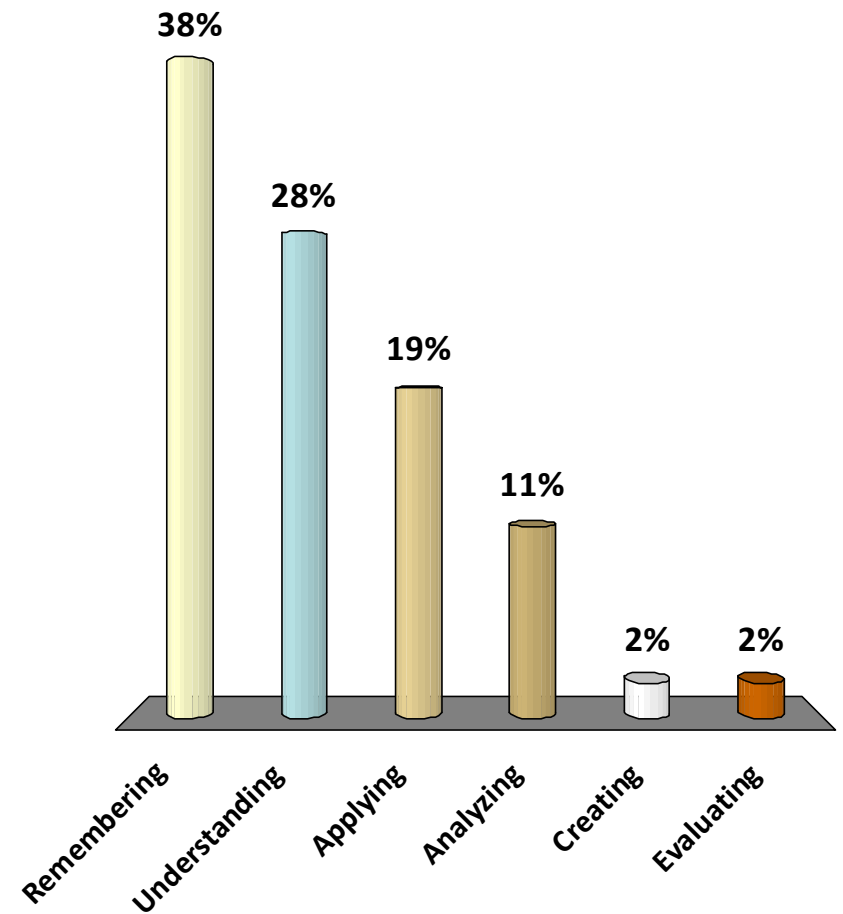
This pyramid depicts the different levels of thinking we use when learning. Notice how each level builds on the foundation that precedes it. It is required that we learn the lower levels before we can effectively use the skills above.



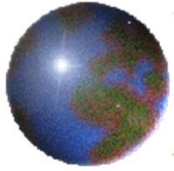


*At what level of Bloom's did you have to operate to make A's and B's in high school?*

- A. Remembering
- B. Understanding
- C. Applying
- D. Analyzing
- E. Creating
- F. Evaluating

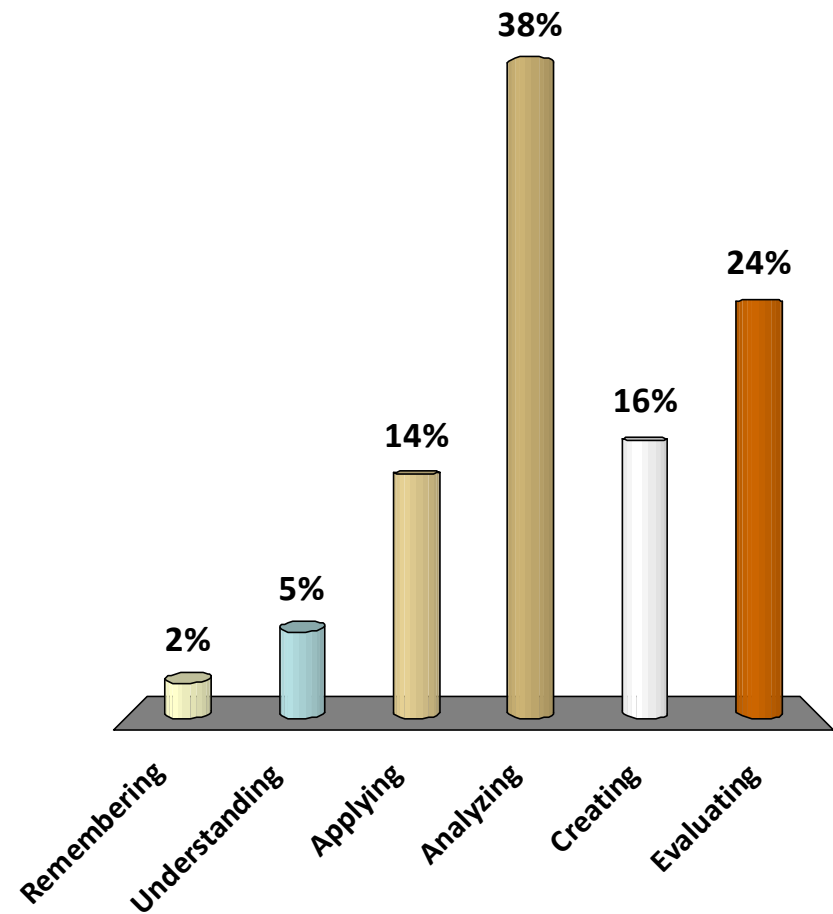






*At what level of Bloom's do you think you'll have to operate to make A's and B's in LSU courses?*

- A. Remembering
- B. Understanding
- C. Applying
- D. Analyzing
- E. Creating
- F. Evaluating

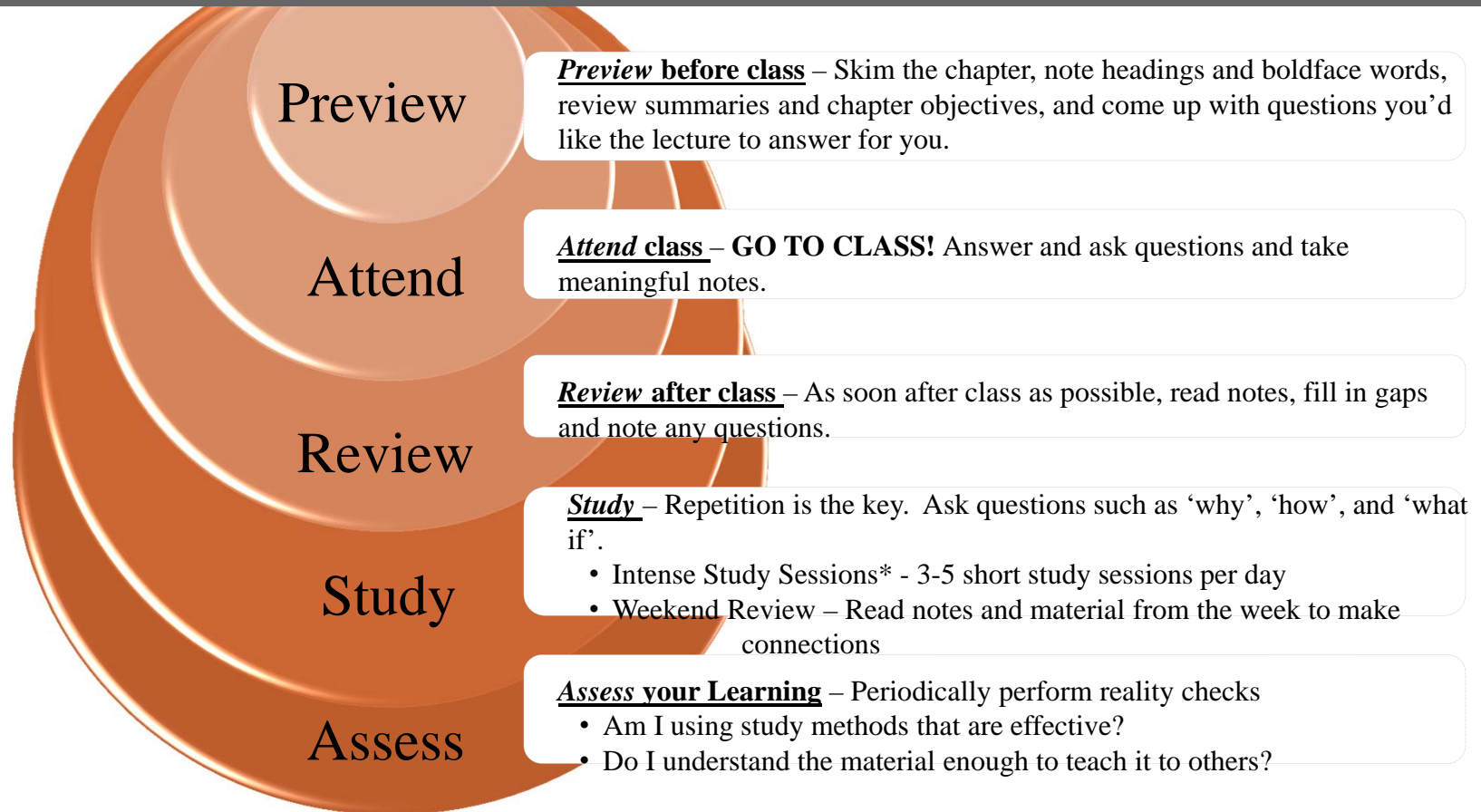


*How do you move yourself **higher**  
on Bloom's Taxonomy?*



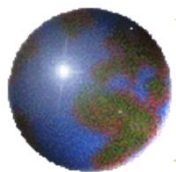
*Use the **Study Cycle**  
with **Intense Study Sessions!***

# The Study Cycle



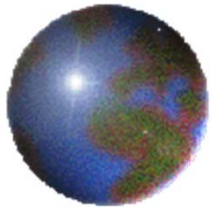
## \*Intense Study Sessions

1	<b>Set a Goal</b>	(1-2 min)	<b>Decide what you want to accomplish in your study session</b>
2	<b>Study with Focus</b>	(30-50 min)	<b>Interact with material</b> - organize, concept map, summarize, process, re-read, fill-in notes, reflect, etc.
3	<b>Reward Yourself</b>	(10-15 min)	<b>Take a break</b> – call a friend, play a short game, get a snack
4	<b>Review</b>	(5 min)	<b>Go over what you just studied</b>

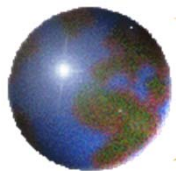


## *Effective Metacognitive Strategies*

- ✪ **Always solve problems without looking at an example or the solution**
- ✪ **Memorize everything you're told to memorize (e.g. polyatomic ions)**
- ✪ **Always ask why, how, and what if questions**
- ✪ **Test understanding by giving "mini lectures" on concepts**
- ✪ **Spend time on chemistry every day**
- ✪ **Use the Study Cycle with Intense Study Sessions**
- ✪ **Attend SI sessions on a regular basis**
- ✪ **Aim for 100% mastery, not 90%!**

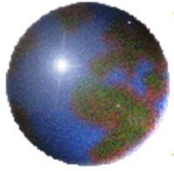


**Which One of the Next Two  
Slides More Accurately  
Describes YOUR Actions  
Before Test 1?**



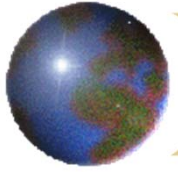
## *Top 5 Reasons Folks Did Not Do Well on Test 1 in Gen Chemistry:*

1. Didn't spend enough time on the material
2. Started the homework too late
3. Didn't memorize the information I needed to
4. Did not use the book
5. Assumed I understood information that I had read and re-read, but had not applied



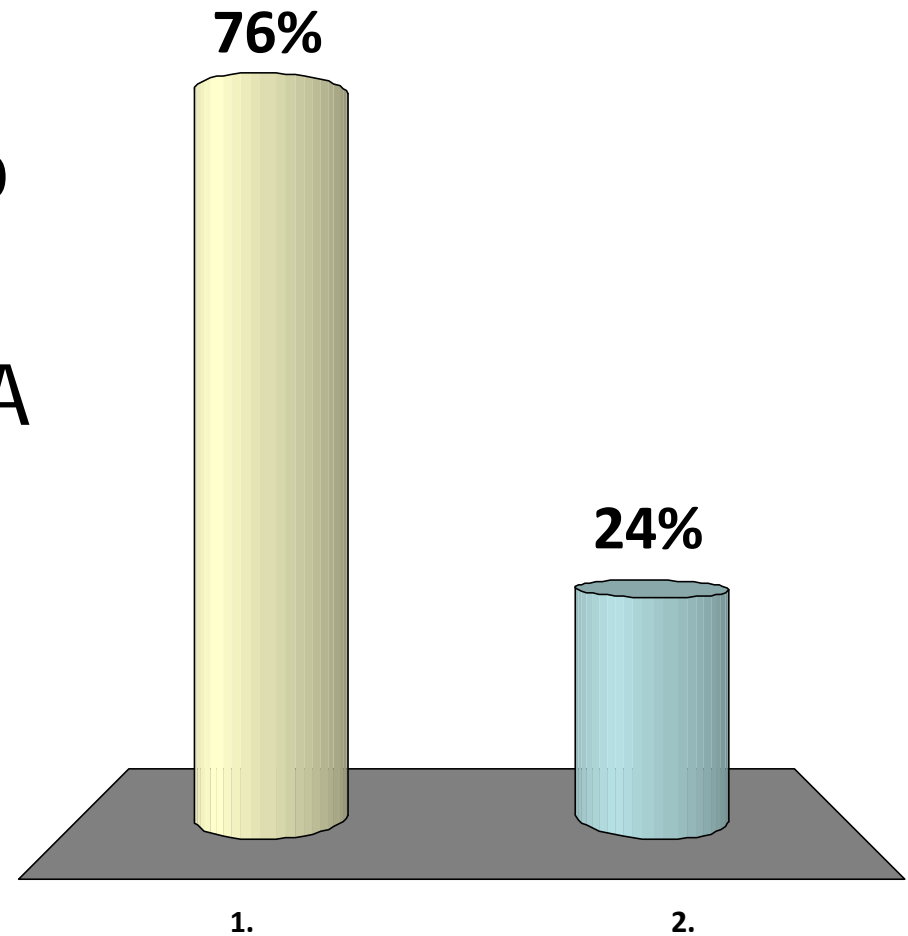
## *Top 5 Reasons Folks Made an A on Test 1:*

1. Did preview-review for every class
2. Did a little of the homework at a time
3. Used the book and did the suggested problems
4. Made flashcards of the information to be memorized
5. Practiced explaining the information to others

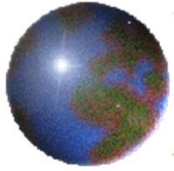


## *Which group did you most resemble?*

1. Group that did not do well
2. Group that made an A







## Email from an Engineering Professor at New Mexico State Received on 10/22/2013

*...At the end of the presentation, they were given a survey to determine their self-assessment of their use of the strategies, and were divided into groups*

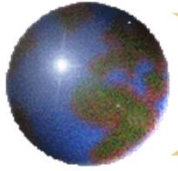
***Group 1: students who did not use the strategies***

***Group 2: students who used the strategies***

*The results are shown below:*

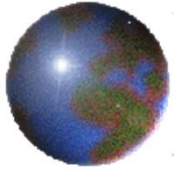
Use of Strategies	Av. on Exams 1 and 2
Students who did not use the strategies	58 and 54
Students who used the metacognitive learning strategies	95 and 80

***Using the strategies makes the difference!***



*So, What Can You Do, Starting Now, to Pursue Your 4.0 this fall?*

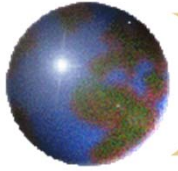
- ✦ Spend more time studying  
(at least 2 hours/week for every hour in class)
- ✦ Aim for higher learning levels and 100% understanding
- ✦ Use office hours and study groups productively
- ✦ Use the Study Cycle  
with Intense Study Sessions
- ✦ Use Metacognition to Study Smarter!!!



# *Get the Most Out of Homework*

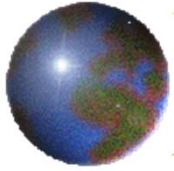
## *Reprise*

- ✦ Start the problems early--the day they are assigned
- ✦ **Do not flip back to see example problems; work them yourself!**
- ✦ Don't give up too soon (<15 min.)
- ✦ Don't spend too much time (>30 min.)



*Get the Most from SI Sessions,  
Tutorial Centers, Office Hours,  
and Study Groups*

- ✦ Try to understand the concept or work the problem by yourself first
- ✦ Come prepared to ask questions
- ✦ Explain the material to the tutor or instructor



# CAS Resources

# Study Group Starter Kit

- ❖ CAS Study Group Starter Kit
- ❖ [www.cas.lsu.edu/study-groups](http://www.cas.lsu.edu/study-groups)

Center for Academic Success

## Study Group Starter Kit



LSU

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# CAS Services

## Learning Strategies

### CONSULTATIONS

- Students
- Faculty

## Academic Support

### TUTORING

- Walk-in
- On-line



### WORKSHOPS and Outreach

### SUPPLEMENTAL INSTRUCTION

*All CAS Services have been documented to improve academic performance and student retention*

### About the CAS

Who We Are | What We Do | Support the CAS | FAQs | Contact Us

### Academic Support

Tutoring | Supplemental Instruction | Study Groups | Resources

### Faculty, Staff & Parents

Helpful Resources | Services & Programs | Academic Intervention Team | Faculty FAQs

### Learning Strategies

Workshops & Presentations | My Plan for Success | Tips & Tools | Request a Consultation



### QUICK LINKS >

Online Resources | Workshops | Semester Calendar | Tutoring Hours | S.I. Sessions | Private Tutors | Job Opportunities | [Presentation Requests](#) | GPA Calculator

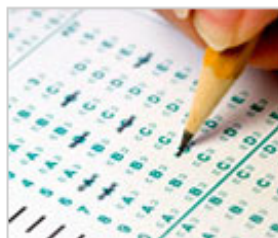
### CREATE MY PLAN FOR SUCCESS >



[How I Learn](#)



[Get Organized](#)



[Ace My Tests](#)



[Reduce My Stress](#)

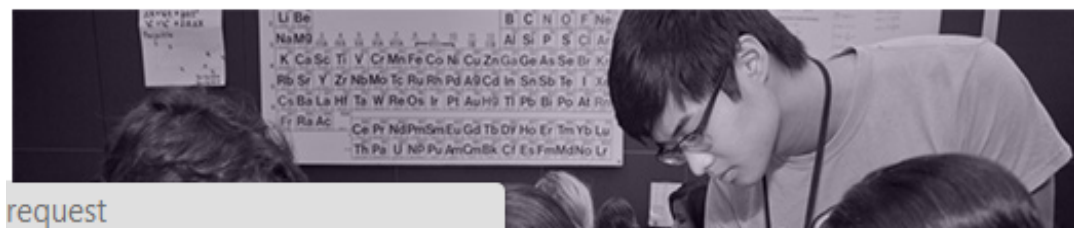
**LSU CARES**  
Concerned for a Student? Geaux Here.

### MAKE THE MOST OF CAS >

Search the CAS

I want to attend/utilize:

### 7 Myths About Tutoring at LSU



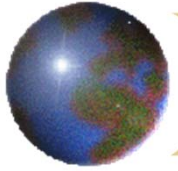
request

### SHARE MY SUCCESS >

Tell us what has worked for you.

CAS News



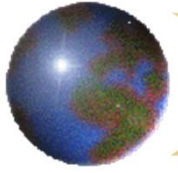


## Challenge to Dr. Cook's students

- ✦ Metacognition Discussion – Sep 29, 2014
- ✦ Average on Exam 2: 120 (80%)

How do I know you CAN do this?

*Because students at  
New Mexico State University did it!*



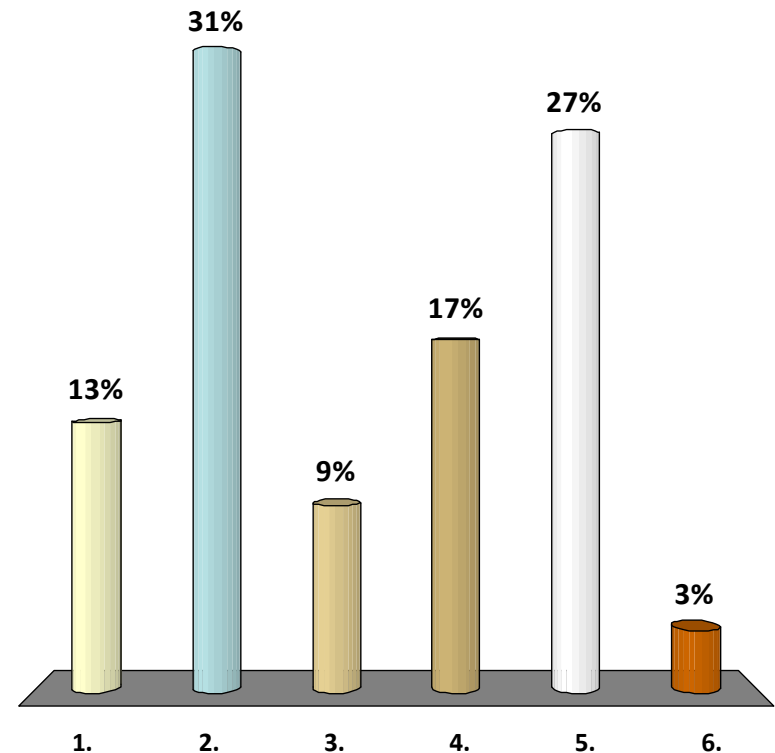
## *Writing Exercise*

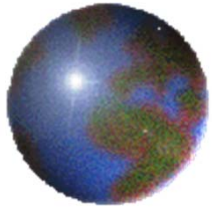
What strategy will you use  
for the next three weeks?



# *Which one strategy are you most likely to implement for the next test?*

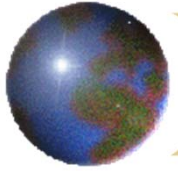
1. Do preview review
2. Do homework differently
3. Use the textbook more
4. Do more problems
5. Practice teaching the material
6. None of the above





*If you don't try it in within  
the next 48 hours...*

... you probably never will.



## *Final Note*

Please visit our website at [www.cas.lsu.edu](http://www.cas.lsu.edu).

We have on-line workshops and information that will teach you even more effective study strategies. We wish you a fantastically successful future!

*The Center for Academic Success*

*B-31 Coates Hall*

*[www.cas.lsu.edu](http://www.cas.lsu.edu)*