Student Guide to Success:

Retention Handbook

Revised March 1, 2012

THE OHIO STATE UNIVERSITY MANSFIELD

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Math Note Taking and Study Skills

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Math Note Taking and Study Skills

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Taking Math into Your Mind

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MAKING MATH NOTE CARDS:

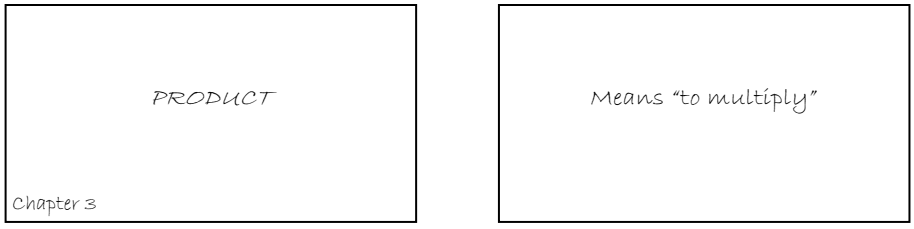
There are two main types of note cards- Q&A cards (with questions on one side and answers on the other) and informational cards. For either type of card, put the section number in small writing on a bottom corner in case you need to refer back to the book for more information. You can use color to help organize your cards. Punch holes in an upper corner and tie the cards loosely together for easy review anywhere.

Q&A Cards:

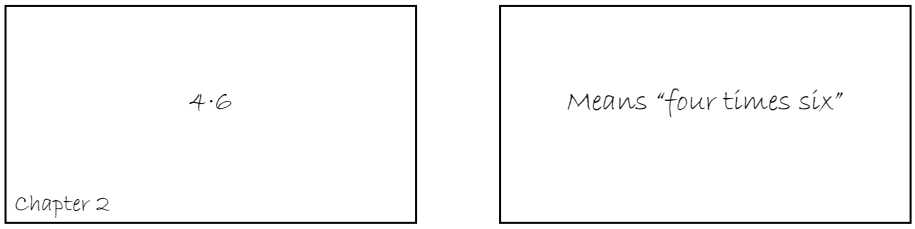
As you review your lecture notes and the textbook, make note cards for new vocabulary, symbols, and sample problems. Place the new vocabulary or symbol on one side of the card with the definition on the other side. Place the sample problem on one side with the work on the other side.

FRONT SIDE OF CARD BACK SIDE OF CARD

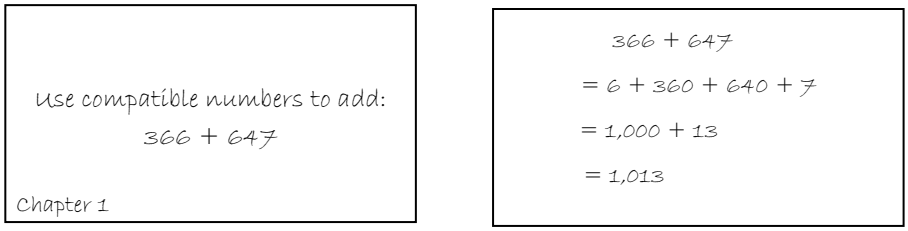
Example 1: Vocabulary



Example 2: Symbol



Example 3: Sample Problem



Informational Cards:

Use the cards to note multiple steps or lists of information. The following example showing the order of operations with an example on the other side is an informational card.

Example

FRONT OF CARD

P Parentheses
() or [] or {}
E Exponents
M Multiply and Divide
A Add and Subtract
Always left to right,
if on the same level.

BACK OF CARD

$28 \div 4 + 4(5-2)^2$

$28 \div 4 + 4(3)^2$ P

$28 \div 4 + 4(9)$ E

$7 + 4(9)$ M

$7 + 36$ M

43 A

Note Card Exercise:

Read the section from your textbook that will be covered in the next class.

1. Make Q&A note cards for all math vocabulary/ symbols/ and example problems.
2. Make informational cards of concepts or steps.
3. Punch holes in the cards and tie them together.
4. Do this for each section as you go.

Problem Solving Strategies:

There is no "one best way" to solve problems. There are simply many useful methods that might work. The more strategies that you practice, the larger your "bag of available problem-solving tricks."

- State the goal specifically – get a focus. Write down what you are asked to find. Define what you seek. How will you measure or recognize it? Often the goal or request is stated at either the beginning or the ending of a problem.
- Decide knowns and unknowns – what does the problem tell you specifically? What don't you know yet? Writing down this information also helps you focus and understand.
- Throw out irrelevant information – which information has nothing to do with what you are asked to find? Eliminate it and use the rest. For example, the problem may give irrelevant details, such as the color of a car of the gender of the people.
- Try something "off the wall" – brainstorm. Hunches or intuitions or wild guesses may seem risky, but they may break through to a solution if you work with them. Think differently from a new perspective.
- Guess and check – estimate and test your estimate. This process is the basis for most science. Make an easy first estimate and see if it works in the problem. Continue refining each estimate, testing it to see if it works in the problem.
- Simplify the problem – if possible, bring the problem level down to one case or a few cases. Solve the simpler problem and then work up one step at a time, watching for patterns.
- Act it out or use objects – model the problem. For new perspectives, move objects or yourself around to develop a visual, kinesthetic image of the situation. For example, if the problem has motion in it, simulate the motion so that you clearly see what happens.
- Make a picture or diagram – use pencil and scrap paper to draw what is happening. Find a way to sketch the relationships. Organize the details graphically. You are merely making a visual simulation of the problem, and details help you understand.

- Organize the data – using a t-table or a chart, list the information in an orderly manner as you discover it. Arranging the data systematically shows you what you know and don't know. Tables help you to see any developing patterns and ensure that you have considered all of the possible cases.

> **Example of a t-table.** Figure 9.1 shows a t-table. The first column is the number of people at a party, and the second column is the number of gifts. The information in this t-table is unorganized. If we organize the information sequentially, we get Figure 9.2 and might begin to see a pattern—that the number of gifts at the party was always two times the number of people.

Figure 9.1 *An Unorganized T-Table*

# of people	# of gifts
2	4
5	10
4	8
3	6
1	2
0	0

- Identify patterns – when the data are organized, patterns are easier to identify. Notice any pattern – relevant to the problem or not – but do not get invested in keeping a particular pattern. Let go of anything that doesn't fit the total picture.
- Work backward – starting at the end of a sequence of events and working back in time cracks some problems wide open. This strategy also presents the data from a different perspective and opens your mind to new thoughts about the problem.
- Use algebra – representing the unknown with a letter and manipulating symbols solves a wealth of problems.
- Consider answers that make sense – what would be too much? Too big? Too small?
- Solve the problem another way – there are many ways to solve a problem. Speculate to find other ways to check the work. Survey other people to look for new methods to solve your problem.
- Generalize – try to make a general rule that can be applied to similar problems even though the specific details change. Generalizing is what a formula does. Identifying patterns assist in finding formulas.
- Confirm your answer – go back over the problem and see how the solution and attempted solutions work. Do answers make sense?

Neutral Negative Math Thoughts and Behavior:

Students experiencing math anxiety or the Mean Math Blues report negative thoughts such as "I can't do math" or "I will never pass" or "I'm the only one who doesn't understand". When thoughts such as these run through our minds over and over, they are "automatic negative thoughts" that influence us in a negative way.

People do not usually overcome anxiety until changes in thoughts are accompanied by changes in avoidance behaviors. This means that you will want to change what you do to avoid math. Here are eight powerful behavioral interventions that could assist you in changing what you do and neutralizing your negativity about math.

- Examine the evidence – what is the evidence that your negative thought is true? Are you overreacting? What is the evidence that the thought is false? What would you do differently if this thought were false? For example, you think you will fail math. Ask yourself the following questions:
  -Have you truly gotten failing test scores?
  -Are the low grades the result of your neglecting studying and homework?
  -Have you refused to get assistance or ask questions?
- Get different perspective – speak to yourself or write down what a good friend would say to you about this negative thought. A close friend is probably more objective and positive than you would be yourself. You may feel like you are the only one struggling. Talk to your teacher, your tutor, and other students in the class to see how realistic your thought is.
- Do something differently – behave in a new way to get a different result. Identify actions that contribute to your negative math thoughts and learn from what you have recognized. Change these actions to behaviors that are new to you. For example, recognize that you cannot expect yourself to understand math when you do not practice by doing your homework.
- Track the number – record the number of times that you think these negative math thoughts. Recognition is one of the first keys to bringing them to consciousness and changing them.

- Identify the worst-case scenario – Ask yourself, "What is the worst thing that can happen in this situation?" Often the worst thing that can happen isn't so bad after all. You can survive all kinds of "terrible" things. Sometimes it is the fear that is worse than the consequence.

- Change the wording – restate the thought in a way that is neutral or could actually be positive. Add the words "right now", or "yet". For example, change: "I will fail math" to "Right now I cannot predict the future and I can certainly do some things to prevent failure."

- Act "As if" – act as if you had whatever trait you lack or are whatever you would like to be. Ask yourself, "How would I look? What would I hear differently? What would I say? How would I behave? Assume new thoughts and behaviors – don't just pretend. "Try on" success.

- Affirm your best – create a mental math picture that is supportive, hopeful, and strengthening. Coupled with asking questions and working math problems, these statements open your subconscious mind to confidence with math and to positive feelings about math, if you repeat them often.

SUBSTITUTION AND MEMORY STRATEGIES – MATH

Substitution:

The substitution strategy is used for solving math problems, especially when the student is unclear about some component of a math equation or cannot set up the appropriate math equation to solve a word problem. With substitution, one simply replaces the unknown part of a math equation or problem with something known. Applications and examples of the substitution strategy are given below.

Fractions:

Math students are often confused when trying to solve math problems with fractions. Try substituting the decimal equivalent of the fraction whenever possible (as long as the decimal is not repeating). Simply divide the numerator by the denominator to get the decimal equivalent of the fraction. For example:

$\frac{1}{2}(x + 4) = 14$

$0.5 (x + 4) = 14$

$0.5 (x) + 0.5 (4) = 14$

$0.5x + 2 = 14$

$0.5x = 12$

$x = 24$

Variables:

Sometimes the meaning or function of variable in an equation is unclear. In this case, substitute an actual number for the variable(s) and work out the problem. The numbers don't necessarily have to "make sense" mathematically – they are just used to help you logically figure out the steps of the problem. Then follow those steps to solve the actual problem with the variable(s). For example:

Given $I = Prt$
Find t in terms of the other variables.

Substitute numbers for the variables except t.
$10 = 30 * 2 * t$

How would you get the numbers on one side?
$10 = 60 * t$
$\frac{10}{60} = t$

What steps did you follow to get t by itself?
Multiply 30 and 2 to get 60, then divide both sides by 60.

Use those steps to solve the real equation.
$I = P * r * t$
$I = (Pr) * t$
$\frac{I}{Pr} = t$

Word Problems:

Students commonly experience difficulty with word problems, especially how to set up the equation using the information given in the question. Try substituting the unknowns or variables with actual numbers to help set up the equation. For example:

Question: Two numbers add up to 15. If the larger number is twice the smaller number, what are the two numbers?

Answer: First we need to assign variables. From the problem we know the relationship between the two numbers: the larger number is twice as the smaller number. If the smaller number is x, then the larger number is 2x.

Now we need to write an equation using the variable plus the other information provided in the question. But how? Try substitution.

Pretend one of the numbers is 2. If the two numbers add up to 15, as the problem states, the other number must be what? 13. How did you get this? This was determined by subtracting the pretend number from 15: 15-2 = 13.

Now generalize. One number is equal to the total minus the other number. In other words, one number equals 15 minus the other number. This is your equation in English. Now you just have to put it into an algebraic expression.

Our two numbers are x and 2x. We replace these into our English equation to get the math equation we need to solve the problem:

One number equals 15 minus the other number:

$X = 15 - 2x$...or...$2x = 15 - x$.

MATH STUDY SKILLS FOR STUDENT SUCCESS:

Set Clear Math Goals –

"To bring satisfaction with math into the present, set short-term, achievable goals frequently. At any time you become frustrated or overwhelmed, pull yourself back to the present moment to discover what small, possible goals you could set and achieve within the next 20 minutes that will blend into your larger goals for your education. These goals could be as simple as:

1. Copy the problem onto a clean sheet of paper.
2. Rework three problems you have completed previously that are similar.
3. Locate the corresponding section in the textbook and reread it from the beginning.
4. Make an appointment to get any needed assistance.
5. Take a three-minute break out of doors.

Short-Term Goals –

These goals get you in the flow with math.

- Work three review problems each day to boost confidence.
- Summarize what you learned in class today.
- Write five questions on what you do not understand in this chapter.
- Recognize how much more math you know now than you did two weeks ago.
- Quiz yourself on last week's work using two problems from each section of the textbook.
- Write down two problems each day that could be on the next math exam.
- Attend class daily on time.
- In class, mark in your notes what the teacher considers important.
- Copy everything the teacher writes on the board into your notes.
- Practice patience with your understanding of new processes. Breathe deeply to relax.
- Mark where you do not understand your notes and textbook and ask questions.
- Complete 90% of the assigned homework with understanding.
- Make an appointment to get help from a teacher, tutor, or counselor.
- Speak personally to the teacher to establish rapport and increase your comfort level in class.
- Introduce yourself to three classmates to develop a math support system.
- Start or attend a study group.

- Bring problems to class with questions. If they do not get answered, find another way to get answers.
- Turn in completed homework on time.
- Begin math study and homework problems within three hours after class.
- Notice your automatic negative math beliefs and read how to reframe them.
- Study in the math tutoring center. (Conard Learning Center). ☺
- Cheer yourself and your fellow students as you learn new ideas. Smile and laugh in math class.

Feedback Activities –

These actions provide feedback about whether or not you understand.

- Teach someone else how to do your homework problems.
- Work the examples from class over until you can do them without consulting your notes.
- Solve a problem several ways.
- Ask yourself if the answer makes sense.
- Work through the original problem using your answer.
- Check your answers against the answers in the back of the textbook.
- Ask questions about your work.
- Summarize in writing the procedures of the solution and draw a picture of the problem.
- Tutor other students.
- Share your work with the class when students are asked to work at the board.
- Show your work to someone who knows how to work the problem. Welcome their corrections as feedback, not criticism.
- Talk over a problem with a tutor.
- Visit the teacher during office hours and ask questions.
- Consult your study group and discuss problems with classmates.
- Answer questions in class asked by the teacher and other students – if only to yourself.
- Copy the examples the teacher gives in class; then work them on your own without looking at your notes.
- Work through examples in the textbook on paper without looking at the book and then compare.
- Guess the next step the teacher will do during class before she does it.
- Solve a problem with a group at the board.
  Managing the Mean Math Blues – Cheryl Ooten & Kathy Moore

SUCCESS STRATEGIES AT YOUR MATH EXAM:

- Ignore others before the exam – do not absorb other people's anxiety. It is perfectly OK to avoid talking with anyone and to sit by yourself before the exam so that you can breathe deeply, look over your review note card, and focus.
- Do a data dump – bring an index card of formulas or facts you find difficult to remember. Look at them before the test. When you receive your exam, quickly write these formulas or facts on your exam paper. Now you do not have to expend any energy trying to recall them later.
- Scan twice – scan the ENTIRE exam twice – once at the beginning and once at the end. At the beginning, notice the kinds of problems, how many, and with which problems you would be comfortable starting with. At the end of the exam, scan again to be certain you have worked every problem.
- Strategize – do the problems and questions that you like first. Make time pencil marks for those that you wish to return to. If there are multiple choice, eliminate the obvious wrong answers first and then do the work until you can choose the exact answer. Ask yourself if your answers are reasonable.
- Use time wisely – do not work on one problem too long. Be sure to save time to check over your problems at the end.
- Trust your subconscious mind – let each question reach into your mind for the answer. If a problem makes no sense, read it and go on. Ideas will come to you as the problem sinks into your subconscious mind and you can continue with the test. This is called parallel processing, and you do it all the time.
- Ignore others during the test – stay focused on yourself. You need only to take charge of yourself and your performance right now.
- Roll over distractions – when you feel stuck or distracted, take a deep breath and then go on.
- Take mini breaks – take 20 second time-outs during the exam to close your eyes, sit up tall, breathe deeply, or stretch your neck and arms.
- Ask questions – ask the instructor questions as needed.

MAKING USE OF MATH NOTE CARDS:

- Prepare question and answer note cards using problems from each section of your book, from your notes, or from review section at the end of each chapter.
- Put the problem on one side and show the work on the other side of the card.
- Make vocabulary cards with the word on one side and the definition on the other side.
- Prepare informational note cards listing important concepts and procedures from the material that will be covered on your exam.
- Carry your note cards with you.
- Test yourself once or twice a day by looking at the question, answer without looking at the back.
- Write out the solutions or definitions or steps.
- Always get feedback by checking your responses with the back side of the card.
- Keep these note cards throughout the course to help you prepare for the final exam.

LEARNING MODES: VISUAL, AUDITORY, KINESTHETIC – MATH:

We access and process information from the environment through our eyes, our ears, and our skin and muscles. Often one of the three modes is primary and is used more than the others. When math is presented in one of your weaker modes, step up your efforts and translate the material to a form you will understand.

How to Improve Visual/Auditory/Kinesthetic Input into Math:

1. Visual –
   Visual learners learn more easily when they see the material. If you are primarily a visual learner, any strategy that allows you to see better, see more, or see connections will assist you to learn more effectively. Often you can adapt material that does not fit your style. Here are actions that assist visual learners to set short-term goals for math work:
   - Sit in the front of classes or meetings so you can see everything.
   - Make interesting-looking note cards with formulas, facts, vocabulary, and sample problems.
   - Sketch the course content. Even the crudest sketch can help you remember ideas.
   - Make note taking fun by using color and little doodles. Embellish the pages or note cards to look nice.
   - Develop skill at note taking by practicing changing verbal input into visual input.
   - List your tasks – even the ones you have completed – to have the satisfaction of visually crossing them out.
   - Use notes on stickies to help you remember. Use your favorite colors.
   - Evaluate the appearance of your study environment. Make it look conducive to learning. A well-placed poster that you love or a desk turned away from clutter may work wonders in clearing your mind to study better.
   - Write yourself encouraging messages and post them where you can see them.
   - Picture yourself in situations in which you have succeeded.
   - Close your eyes when you want to block out unpleasantness.
   - Talk over a problem with a tutor.
   - Visit the teacher during office hours and ask questions.
   - Consult your study group and discuss problems with classmates.
   - Answer questions in class asked by the teacher and other students – if only to yourself.
   - Copy the examples the teacher gives in class; then work them on your own without looking at your notes.

- Work through examples in the textbook on paper without looking at the book and then compare.
- Guess the next step the teacher will do during class before she does it.
- Solve a problem with a group at the board.

HOW TO IMPROVE AUDITORY INPUT – MATH:

Auditory learners can best remember what they hear. Strategies that improve or stress hearing work well for auditory learners especially when they combine auditory input with activity. Here are some ways for auditory learners to set short-term goals:

- Choose the best classroom location for listening.
- Tape-record the class session and listen to your tape.
- Ask questions in class and listen carefully to the replies.
- Read the textbook and class notes aloud to yourself as you study.
- Record and listen to your textbook or your class notes.
- Study with others. Talk about the course material.
- Tell others (whoever will listen) what you are learning in class. Mentally replay your speech during exams.
- Use headphones so that the auditory input is of your own choosing.
- Consider using earplugs during exams to mask distracting noises.
- Speak positively to yourself during your work.

How to Improve Kinesthetic Input –

Kinesthetic learners learn more easily when their skin and muscles are involved. Motion or activity involving the subject matter will help you learn more effectively. Here are some ways for kinesthetic learners to set short-term goals:

- Sit where you can actively participate in classroom events.
- Sit where you can move as needed without disturbing others in class.
- Draw sketches and diagrams in class of the material being taught.
- Take notes creatively using different colors. Turn your notebook around and write up the page from the bottom on occasion.
- Ask and answer questions.
- Make models of the concepts whenever possible. Visit an educational supply store to see mathematical models.
- Become skilled using your fingers and toes when doing math.
- Educate your instructor about kinesthetic learners and ask for assistance in developing models of the material with which you can interact physically.
- Move around as you study your note cards of math facts, formulas, and problems.
- Talk to yourself about the material as you walk.

- Walk a figure-eight pattern, swinging your arms as you recite material you want to remember for your coursework. This walk will activate different parts of your brain and integrate concepts more fully.
- Work on the chalkboard or whiteboard whenever you can.
- Make physical comfort a priority as you study.

CRITICAL TIME – THE BEGINNING OF THE SEMESTER

Get up and running right away. Take charge of success from the beginning to get a head start and lower anxiety. Success builds on success. Here are some short-term goals to get you into the flow at the beginning:

- Enroll at your level – match your skills to the challenges of your math courses by taking the placement test offered by your school and then enrolling in the advised level.

- Pick the best time for class – select a time for you to take the class when you are the most alert and when you will be able to set aside time for studying following the class.

- Match your teacher's style – choose the teacher who best matches your learning style.

- Remember to make time for math - arranger your schedule so that you have time for math. Make math a priority. Math is time intensive so plan accordingly.

- Buy your math book soon – you will need it immediately in your class and will not want to get behind.

- Assemble your supplies – you will need writing tools such as sharp pencils, erasers, highlighters; paper such as graph paper, scrap paper; a calculator; straightedge. Using graph paper for note taking and homework problems organizes those numbers and letters in a line both horizontally and vertically and increases accuracy.

- Organize – set up a math notebook in which you are prepared to file your syllabus, math class schedule, homework assignments, class handouts, class notes, quizzes, past homework, and past exams so that you do not waste time looking for them when you need them. Use divider sheets with tabs labeled with categories so that you can file and find what you need quickly.

- Investigate resources – plan your use of resources (classroom, study environment, teacher, tutors, study groups, library, and study centers) ahead of time so you do not waste time looking for them when you are desperate for assistance. Write down specific locations and phone numbers. You might visit the location of each to ask how to use their services.

- Increase your comfort on campus – spend time hanging out and getting the lay of the land. Locate the bookstore, administration, faculty offices, cafeteria, restrooms, library, counseling offices, and places to sit and relax. Take a friend to explore campus. Locate your classrooms. Look over the whole campus – including parking.

- Set up an educational plan – make an appointment with a counselor to set up an educational plan for your studies and degree program. Arrange your math sequence early in your education because math courses are sequential and the sequence may take several semesters to complete.

- Preview your textbook – this helps you get a head start by having a sense about vocabulary and where you are headed.

READING YOUR MATH BOOK:

Read the section of the textbook your teacher has assigned for the next class. Take notes. Fold your paper vertically as shown in the column method. Label the section number and topic. Place vocabulary, main ideas, and concepts on the left side and work example problems on the right side.

- List all the math vocabulary.
- After reading through the section once, write a statement that encompasses the main idea of the section.
- As you read through the section a second time, work out each example on paper.
- Paraphrase the important concepts that are covered.
- Note any concepts that were difficult or will require extra reviewing. Usually I put a star in the margin of my notes. Write any questions you have for the teacher.
- Look over your notes one more time before the beginning of class.

Powerful Math Questions to Ask:

- What if we tried this?
- What caused this step?
- Where would this happen?
- How could this happen?
- When would this process work?
- Tell me about this piece.
- How do I recognize the difference?
- What else might work?

SHORT-TERM GOALS FOR FLOW WITH MATH AFTER CLASS:

- Know the assignment – do not leave the classroom until you have written a copy of the assignment for next time.

- Rework your notes – reread your class notes immediately and fill in the missing pieces. Then copy them as soon as possible.

- Reread the textbook – right after class you will understand the material you have just heard better than any other time, especially if you previewed the text and have reworked your class notes. Expect to read your math book with pencil and paper handy to work examples.

- Work homework soon – start reviewing and working homework as soon as possible to give yourself time to return to the problems you cannot do immediately. Do all of the homework.

- Study in addition to doing homework – homework alone will not integrate and synthesize what you need to learn in your mind.

- Meet your resources – introduce yourself to your teacher, available tutors, and fellow classmates so you have ready resources when you have questions or need company or motivation. Set up and meet with a study group.

- Stay the course – be persistent. Do not quit. Go to class the whole semester even if you drop the course.

- Keep a record – record all your exam, quiz, and homework grades. Track your grade throughout the class.

ACTIONS TO MAXIMIZE MATH QUESTIONS:

- Prepare a prioritized list – list your questions beforehand so you remember them. Number them from the most to the least important. Copy the problem that the question came from.
- Ignore others in class – sit in the front of the classroom so you do not see any other student's reaction to your questions. Their reactions do not matter but sometimes they stop us from asking what we need to ask.
- Take a chance – be brave. Even if you have never asked questions in math before, try new behavior. There is no way to avoid asking questions if you want to learn.
- Enlist support – get a partner to assist you in asking your question. Go together to see the teacher.
- Ask often – the more you ask, the more comfortable you feel. You might ask a question to which you already know the answer for practice.
- Show your work in public – write questions on the board before class begins. On the classroom sideboard, work the problem out as far as you got. Then the teacher can specifically answer your question.
- Be O.K. – with no answer yet – expect that your questions will not be answered every time you ask. That does not mean the question was not a good one. There are time constraints in class. Ask again later.

Valuable Resources – Teachers:

Communicate with your instructor. When a student expresses goodwill, shows a desire to learn, studies, puts energy into homework, and comes to class, teachers are delighted. When a student interacts with them, teachers are often willing to go far beyond their contact requirements to assist.

- "Play the game" - smile when the teacher reads your name on the roll. Act interested. Do not monopolize classroom air time but participate in discussions with answers and questions.
- Check in – stop by the teacher's office or desk after class and introduce yourself. Share how this class will help your hopes and dreams. Share any concerns you have about your performance. Let your teacher know you as a student.
- Show kindness – treat the teacher respectfully as a fellow human being. Smile and greet the teacher at the start of the class.
- Communicate – inform the teacher if a personal event hinders your studies. Do not just disappear one week and reappear the next. Do not use these events as excuses. Learn

the rules of the school for absences and incompletes so you know your options. Do not expect the teacher to give you a good grade if you have not fulfilled the requirements.

- Participate – volunteer answers to the teacher's questions. Help set up or take down the classroom so the teacher has time to interact with students before or after class.
- Know the boundaries – read the course syllabus and refer to it often so that you know the ground rules and expectations of the teacher in your course. Do not expect allowances that other students would not receive.

MEMORY STRATEGIES – MATH:

Terms and Definitions:

1. Key Words:
   Highlight and focus on key words in the definitions. This reduces the amount of information to be remembered and helps one to identify words that may be omitted in fill-in test questions.

2. Association:
   Once the key words have been identified, try to associate the term with the key words. You can use phonetic associations, vivid visual associations, associations with prior knowledge, or other associations. Some examples are:
   - The *numerator* is the *top* number in a fraction, whereas the *denominator* is the *bottom* number in a fraction. Remember that "numerator" and "top" go together because they begin with letters that are close to each other in the alphabet. Similarly, "denominator" and "bottom" also begin with letters that are close together in the alphabet, plus the letters "d" and "b" look very similar in form.
   - A *polynomial* is a series of one or more *terms* that are added or *subtracted*, such as $3x + 2y – 4$. To associate this word with its definition, try this visual association: Picture a prison inmate in a black and white striped outfit whose prison *term* involves *adding* and *subtracting* a bunch of parakeets named Polly.

3. Flash Cards:
   Flash cards are useful for registering definitions of terms into memory. Write the term on one side of the card and the definition on the other. Use the flash cards to test your recall. Practice recalling the definition when given the term and visa versa.

4. Running Concept Lists:
   Make a running concept list by writing all terms and definitions on notebook paper divided into two columns. The terms go in the left-hand column and the definitions with highlighted key words are written in the right-hand column. Fold the paper or cover one column to test your recall of the terms and their definitions.

Symbols:

1. Characterization:
   Try drawing or visualizing math symbols as characters in order to remember their meaning. For example:
   - A cursive M stands for *mean* of a *population.* Draw or picture in your head a bunch of angry-looking M's to remember this symbol.
   - In the equation I = Prt, the P stands for the principal (amount of money) invested. Draw or picture in your head a large P that will remind you of your school principal – a face in the loop of the P and arms holding a ruler or some other significant object. Have little dollar signs floating around the P to help you remember the symbol represents a sum of money.

2. Flash Cards:
   Symbols and their meanings may be summarized on flash cards and reviewed periodically to store them in memory.

3. Running Concept Lists:
   Make a running concept list by writing all symbols and their meanings on notebook paper divided into two columns. The symbols go in the left-hand column and the meanings are written in the right-hand column. Fold the paper or cover one column to test your recall of the symbols and their meanings.

Math Equations and Rules:

1. Association:
   Try phonetic, visual, and other associations to remember math equations and rules. The goal is to associate the math equation or rule with something you already know or something with which you are familiar. For example:
   - This association based on fundamental moral principles helps one to remember the rules for multiplying signed numbers (REFERENCE). "Good" things in this association represent positive numbers and "bad" things represent negative numbers.
     a. A good thing happening to a good person is good.
        (positive times positive equals a positive).

b. A good thing happening to a bad person is bad.
(positive times negative equals a negative).
c. A bad thing happening to a bad person is good.
(negative times negative equals a positive).

- The rules for converting decimals to percentages may be remembered using a variety of associations.
  a. Use common experiences in the association: Think of common percentages we see in our everyday lives, such as sales (50% off) or runaway inflation rates (150%). These are big numbers. Decimals are small numbers (0.5, 1.5). How do you make a large number smaller? By dividing. How do you make a small number larger? By multiplying. So to change from percentages to decimals (large to small), you divide by 100. And to change from decimals to percentages (small to large), you multiply by 100.
  b. Use alphabetic associations to remember the rules: To change from percent to decimal, you move the decimal point two places to the right. When you start with a percentage you move to the *right, p* and *r* are close in the alphabet. To change from decimal to a percentage, you move the decimal two places to the left. When you start with a *decimal* you move to the *left* – decimal ends in *l* and left begins with *l*.
- Use a variety of associations to keep straight the equations for the perimeter (P = 2L + 2W) and Area (A = L*W) of a rectangle.
  a. Associations based on real-life experiences can be used to remember the equations. When ordering fence to go around the perimeter of your yard, you would order so many feet or meters – the units are raised to the first power. How do you keep the units of something in the first power? By adding – so use the equation with the addition sign. Now, when ordering to cover the area of your room, you would order so many square feet or square yards – the units are raised to the second power. How do you get units to the second power? By multiplying – so use the equation with the multiplication sign.
  b. A simple association based on the length of the equations might help you to keep them straight. The *perimeter* is a long word and it corresponds to the longer of the two equations. The word *area* is a short word and it corresponds to the shorter of the two equations.

2. Flash Cards:
   Math equations and rules may be summarized on flash cards and reviewed frequently to store them in memory.

3. Running Concept Lists:
   Make running concept lists of math equations and rules using notebook paper divided into two columns. The names of the equations or rules go in the left-hand column and the mathematical expressions are written in the right-hand column. Fold the paper or cover one column to test your recall of math equations and rules.

4. Problem Solutions:
   Problem solutions refer to the correct order of steps required to successfully solve math problems.

5. Rehearsal:
   Repetitious review of the steps for solving a problem aids in registration in long-term memory. The effectiveness of this strategy is enhanced when rehearsals are done frequently and when rehearsals are made active by vocalizing, listening to recordings, or writing.

6. Practice:
   Working several practice problems for each solution set aids in registration. Try working sample problems from the book or problems for which answers are indicated in the book. Check answers to insure accuracy.

7. Solve Forwards and Backwards:
   Registration in long-term memory is enhanced when problems are solved forwards and backwards. Work the problem to find the answer, and then take your answer and work back to the original problem.

8. Procedure Cards:
   Try using procedure flash cards to register solutions in long-term memory. On one side of the card write the type of problem and/or give an example. On the other side write the steps in English for solving the problem and actually show the steps for solving the example.

9. Explain the Problem to Someone Else:
   Remembering is enhanced when one explains or "teaches" the problem solution to another person. Try working with another student in the class, with a tutor, or with a friend or family member. Carefully and thoughtfully go through the solution process, step by step. Find an empty classroom and "teach" by writing the steps on the chalk board.

10. Frequent Review:
    Review the solution often. Take flash cards with you to review while waiting in line or between classes. Explain the problem solution to a friend while walking to a class. Frequent reviewing aids registration of information in your memory.

11. Mnemonics:
    Problem solutions may be registered in memory using mnemonics. Take the first letter of each step and form it into a cue word or cue phrase. The classic math mnemonics are:
    - FOIL
      This cue word stands for the steps in multiplying two binomials: multiply the First terms, then multiply the Outer terms, then multiply the Inner terms, and finally multiply the Last terms.
    - Please Excuse My Dear Aunt Sally
      This cue phrase helps in remembering the order of operations: Parentheses, Exponents, Multiplication, Division, Addition, and Subtraction. Combine it with a mental image of your aunt doing something rude in an operating room to enhance your memory.

12. Past Experience:
    To remember the problem solution during a testing situation, think of specific practice problems that were similar to the test problems.

13. Key Words and Associations:
    Use visual associations or associations with real-life experiences to remember the key words in the steps for solving a particular problem. For instance:

    Problem: Find the equation of a line that passes through the points (8, -3) and (-2, 1).
    Key words: Equation of a line, through two points.
    Steps in Solution: Find the slope, use the point-slope formula, solve for Y.

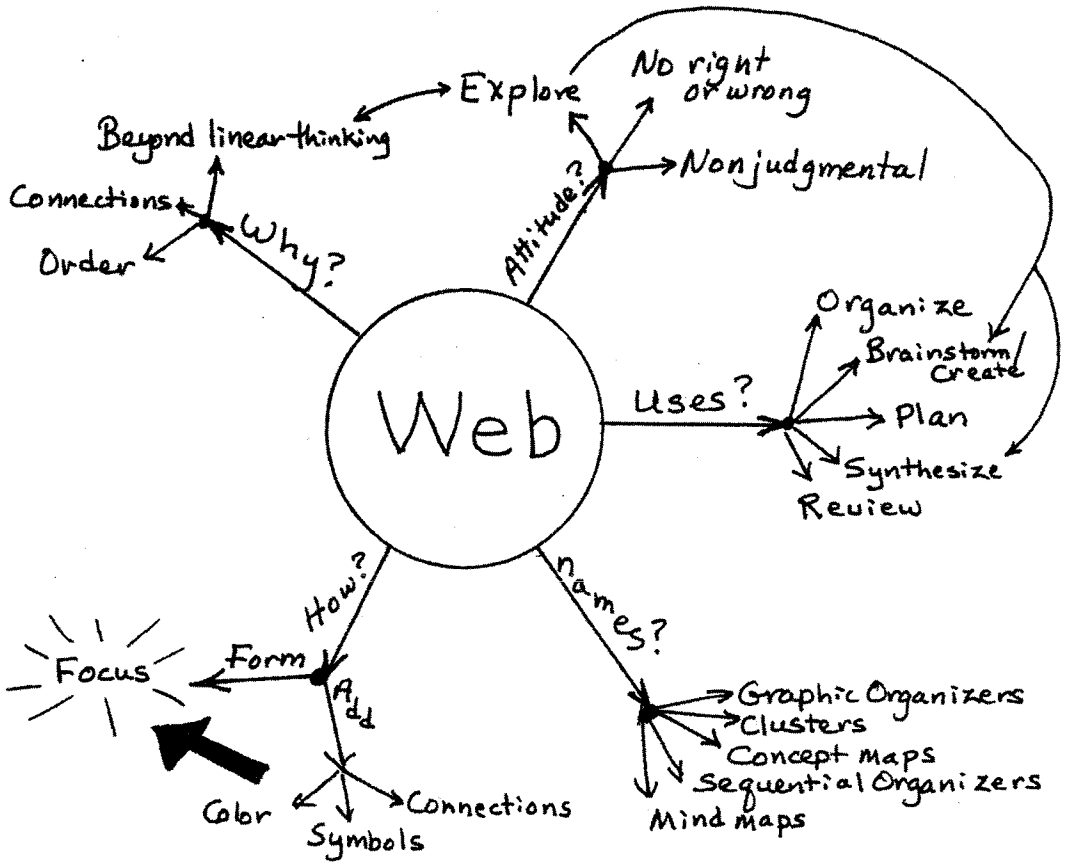
    Visual Association: Picture the slope equation at the top of points of two mountain peaks [step 1], go down the mountain slope to the point-slope formula [step 2], and move to the Y of a clear mountain stream to find your equation [step 3].

MIND MAPPING – MATH

Mind maps are powerful tools increasing your ability to remember and synthesize material. They can also be used for reviewing math, preparing for exams, organizing notes, and planning your studies. Mind Maps increase math understanding by connecting and organizing concepts.

How to Mind Map:

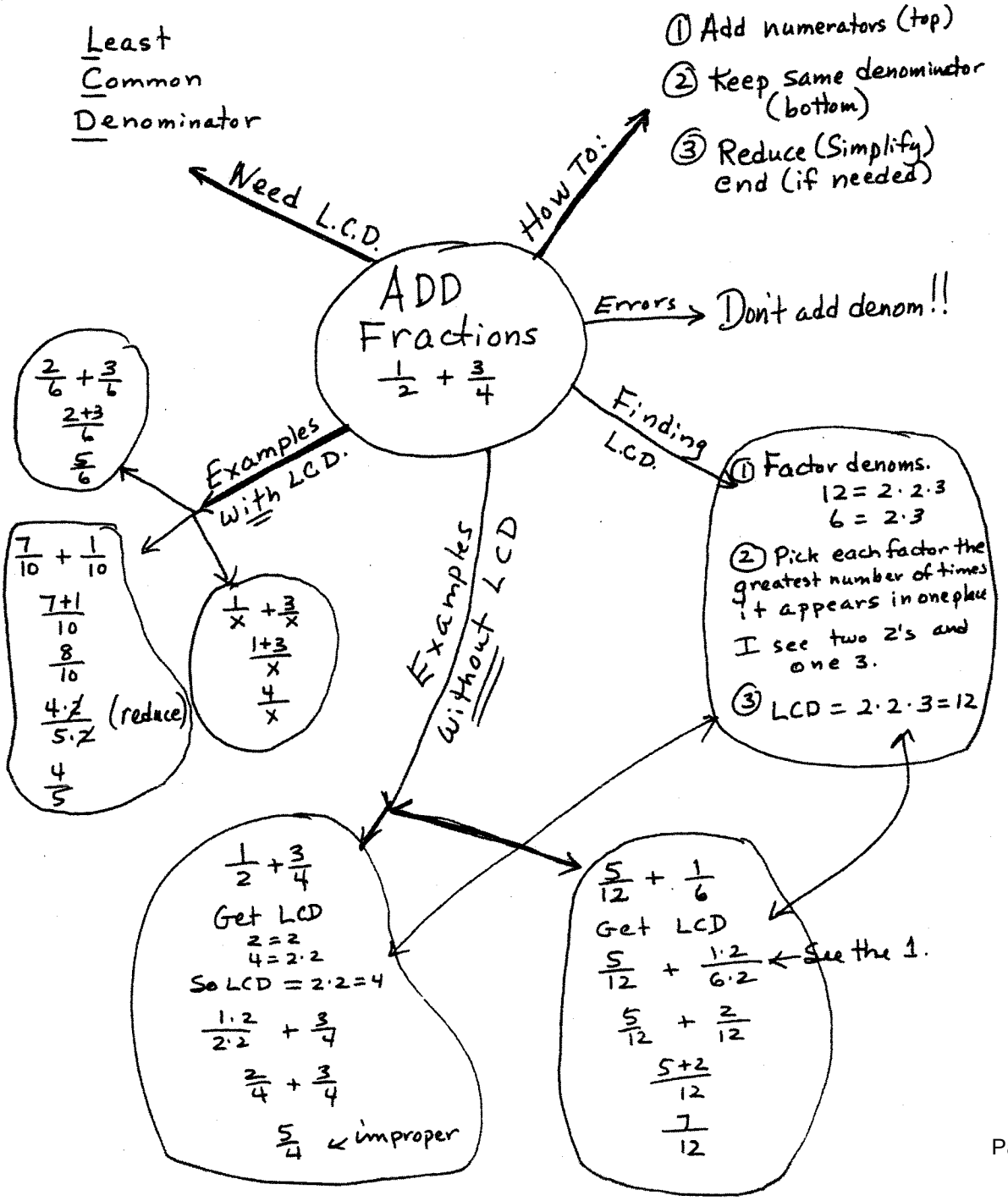
1. In the center of a blank sheet of paper, write the main idea or focus you wish to explore. Preferably use one word or a symbol. Imagine that this is the hub of a bicycle wheel.
2. Surround the main idea with all of the related ideas by drawing lines out like the spokes of a wheel. Print one word or symbol representing each related ideas on each line or at the end of it.
3. Elaborate on related ideas. If you wish, add spokes to the related idea, making a mini wheel.
4. Add color. Show any other connections. Use pictures, words, and symbols.



Suggested Uses for Mind Mapping with Math:

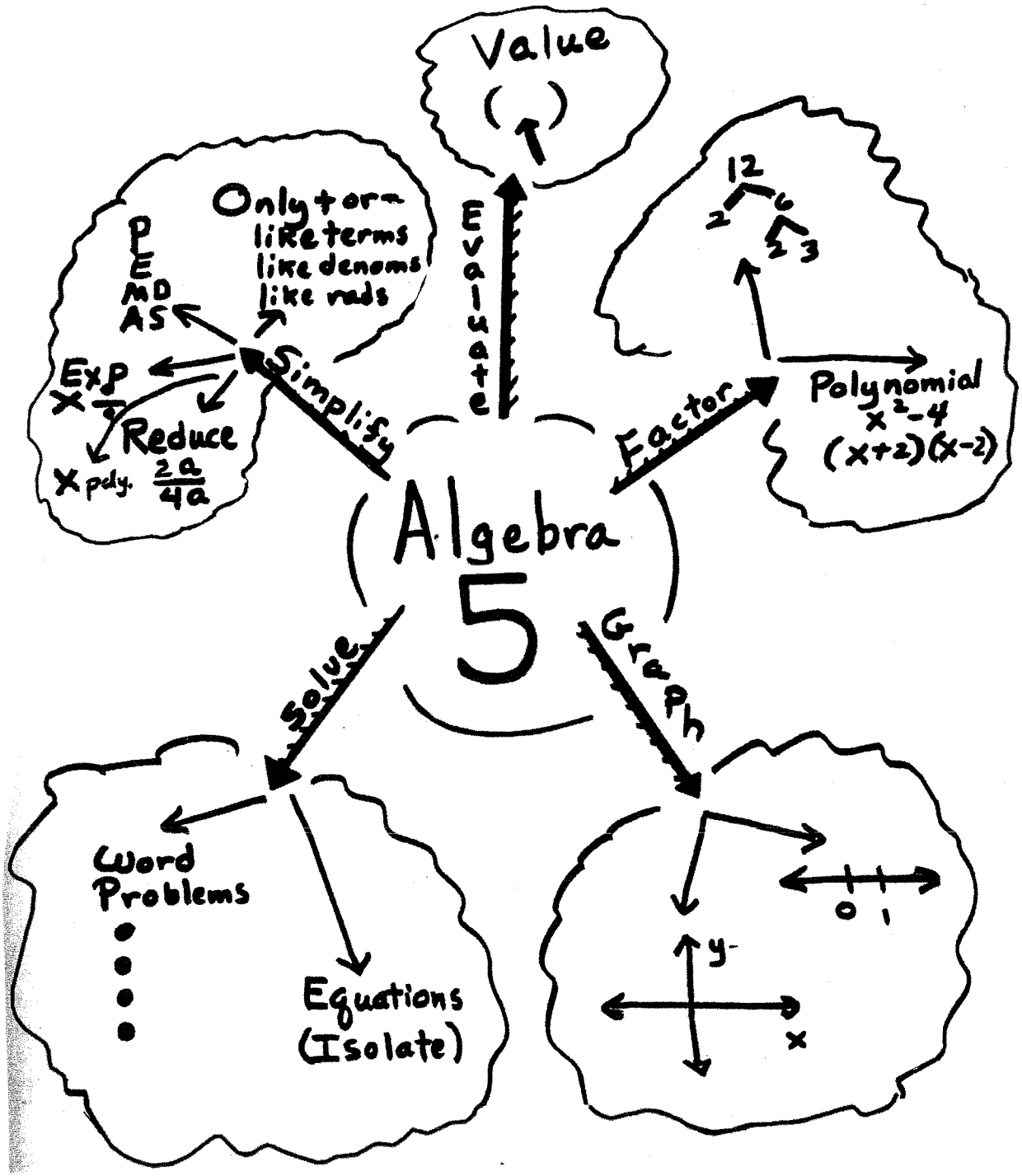
1. Take notes.

   Listening carefully to your math instructor for the organization of the lecture, put the topic of the class day in the center of your paper and fill in different procedures and examples as related ideas. You can circle related ideas and draw in arrows to show connections. Here is a Mind Map of notes on adding fractions. Remember that your thought process is unique, so this Mind Map may make no sense to you. Your Mind Map would look different.



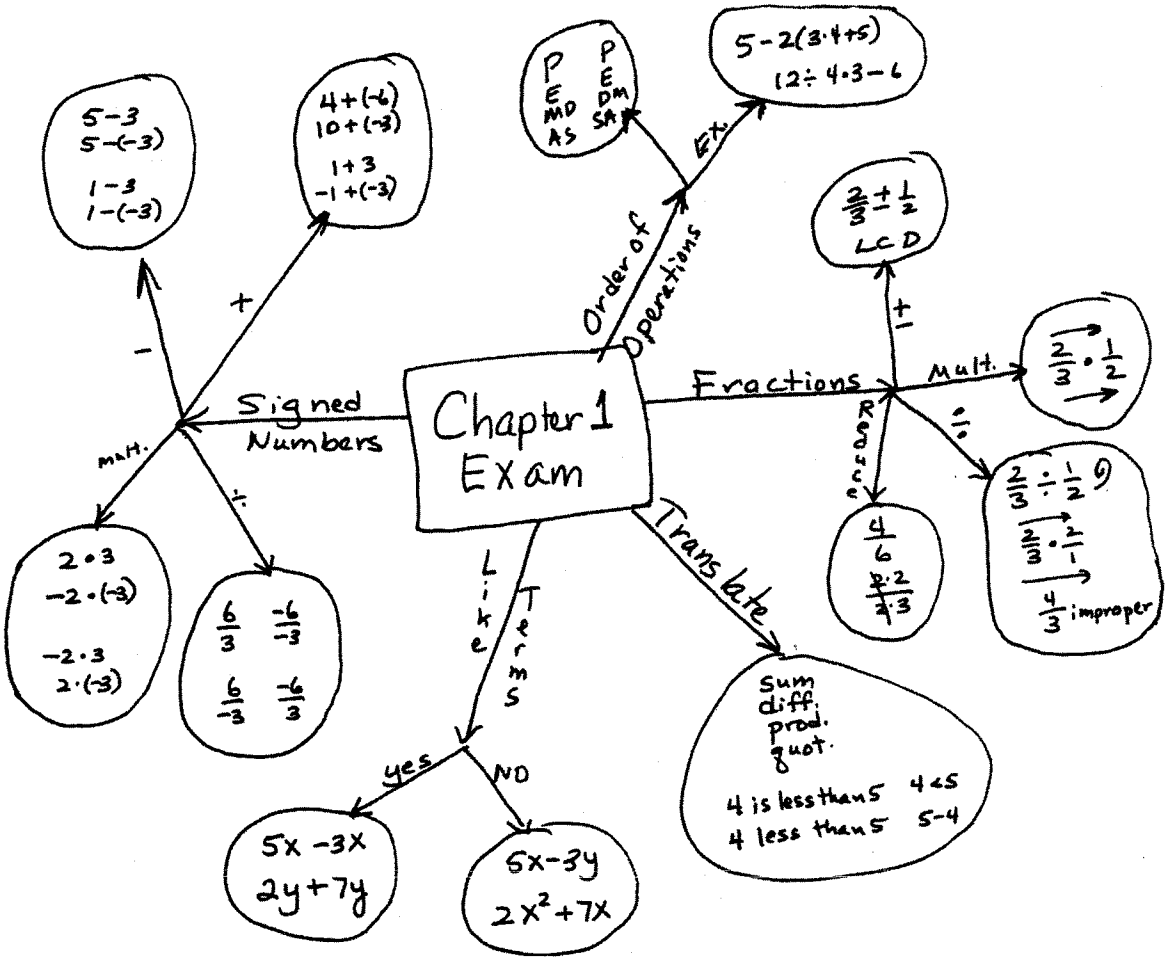
2. Review your math course.

Put the name of the course or concept you want to review in the center as the hub. Add the related ideas surrounding it like the spokes of a bicycle wheel. Here is an example of using this technique to review basic Algebra. You do not have to understand algebra to notice that I consider five major ideas/procedures in algebra in algebra to be simplify, evaluate, factor, graph, and solve.



3. Prepare for exams.

Several days before the test, write the words "Next exam" or "Exam #3" or "Chapter 4 exam" in the center of a blank paper. Using your notes and your book, find the main topics that will be covered. Print these topics on the spokes and fill in words and examples appropriately. Placing sample problems from class notes into the Mind Map would be excellent test preparation. Here is an example of a Mind Map for preparing for an exam that would be given early in my pre-algebra course.



4. Plan your studies.

   As the main focus for planning, you could write "To do", "Study activities", "Week's work", "Final exam prep", or whatever you need to plan. Brainstorm activities that need to be done as the spokes and then break each activity down further. Draw in connections. Use highlighters to mark your priorities. Here is an example of a brainstorming beginning map for "Study activities." You can see that many of the subtopics are related and could be placed under one heading. This is only a preliminary map for getting ideas down where you can see them and then organize them.

Act for Success:

Mind Map for test prep.

- Write down "Next Test" in the middle of a big sheet of paper.
- Surround these words with the concepts and problems that you believe will be on your next test.
- Go through your book and class notes, adding and elaborating.
- Put page numbers or problems by topics.
- Take 30 minutes to write down specific problems for each topic.
- Copy the answers on a separate piece of paper.
- Take 30 minutes and work problems and correct them.

Managing The Mean Math Blues – Cheryl Ooten & Kathy Moore

STEPS TO MATHEMATICS LEARNING: (BLOOM'S TAXONOMY)

1. Take material from the course and apply it to solve problems. (Application)
   (a) Lectures:
      - Before class review ideas from the previous section and read over the section to be covered.
      - Learn to apply concepts by practicing problems during class (while taking notes or during time set aside for this).
      - If class time is set aside, ask questions when you have trouble, or ask the teacher before or after class.
      - After lecture cement each technique by trying other example or homework problems with the same concept.
   (b) Book:
      - Work through examples in the text until you understand the steps.
      - Work homework problems using methods introduced in the text.
      - Try to complete all homework problems after you understand the techniques to produce repetition that will improve your ability to do entire problems correctly and cut down on silly mistakes.
      - If you cannot solve the problems yourself and read the solution in the solution manual, wait a day and try the problem again.

2. Identify which tools need to be used for a problem. (Analysis)
   - After getting a grasp for a particular technique or tool, write down which types of problems use that tool.
   - Find identifying features, such as key words or phrases, used in each type of problem to be able to choose the proper tool.
   - Ask yourself, how did I know how to do that problem?
   - For each chapter and before each test, make a chart of the different types of problems, a way to identify the type of problem, and the tool(s) used to solve the problem.

3. Solving problems using multiple tools. (Synthesis)
    - Some test and exam problems require the use of multiple techniques from different sections of the course or use complicated techniques that are built upon a number of techniques learned earlier in the course.
    - Practice breaking down homework or review problems into multiple parts and listing the techniques used for each part.
    - Review and practice difficult techniques that are used in many types of problems.
    - A good source for these types of problems is the review section of each chapter.

4. Solving conceptual problems. (Evaluation)
    - Some problems do not ask you to use tools you have learned in the course but want you to apply concepts in a new way. These problems require an understanding of the ideas underlying the techniques and tools used to solve problems.
    - Write down the concept or idea behind each tool or technique.
    - Connect the concept to other concepts used in the course, i.e. which other concepts are needed to understand Concept A and which other concepts are dependent on Concept A.
    - Try to understand why the idea is true and what the concept means.
    - If concept is difficult to understand, ask professor, tutor, help room teacher, or other student to explain the concept, then look for opportunities to explain the concept to another student.
    - Create a concept map for the chapter or course and update it when new concepts are learned.
    - As you work a problem using techniques connected to the concept, make sure the method of solving makes sense: Are there other more efficient or better methods?
    - Create your own conceptual problem using the concept.
    - Identify and practice any conceptual problems on review sheets, old tests, or in the book.

TAKING MATH INTO YOUR MIND:

Step 1 – Intake:

Math students often believe they must memorize everything. This is not true. Learning math is about finding meaning and fostering those dendrite networks in your brain. This involves understanding and then practicing in as many ways as possible. You want your brain connections to last long term. They store your math vocabulary, concepts, and procedures. It is those long-term connections that will assist you in making future mathematical insights and solving problems.

How to Take Math into Your Mind Memorably:

- Pick and choose – choose to spend most of your time on what is most important, as pointed out by your teacher. Review what is important and summarize your choices on note cards.
- Get feedback soon – how do you know you really understand? Use what you learn immediately to clarify that it is correct. You may have misunderstood and formed incorrect connections in your mind. The longer you practice incorrectly and travel the wrong brain pathway, the more difficult a mistake is to correct.
- Write or draw what you see and think – visualize it and say it in your own words. It will help you notice detail. Look for unusual, vivid relationships between nonmathematical ideas and mathematical ideas. For example: to remember pi, think of the fact that pies are round like pies.
- Observe details – details can be sensory data, key words, patterns, similarities/differences, and the context.
- Be active with what you want to learn – manipulate and experiment. Find real-life examples of what you are learning. Make analogies that you understand.
- Chunk the information – research tells us that we can remember only seven bits of information at a time. Break information down into smaller, easier-to-remember pieces of three to four bits each.
- Tune everything else out – stop interference. Your psychic energy is limited, so focus it on your studies.
- Have fun – intention and good humor help brain function. Smile. Laugh a lot and enjoy the absurdity of it all. Work with positive people in a study group. Do not sit by negative complainers.

Step 2 – Storage:

Keep those connections. These six techniques will help your brain to store them solidly and permanently.

- Say to yourself, "this information is important" – nonessential information disappears quickly. When the instructor points out important information, making a mental note to yourself of its importance solidifies it in your mind. Recognizing the importance might even motivate you to write the information down or to review the information several times.
- Use hard storage to support – write things down. Take careful notes from all of your resources. Develop a note-taking system so you can find assignments, important points, or examples at a glance.
- Use it, do not lose it – repetition and practice reinforces the wiring in your brain. Revisit the concepts and processes within hours of class, and then review again in the following days and weeks.
- Allow yourself settling time – pace yourself. Your brain needs to process math information with no new challenging input coming in. Spend from 20-50 minutes learning and then spend about 10-15 minutes resting or doing something unrelated to what you just learned. A knowledgeable teacher will build settling time into the class structure.
- Develop habits – your habits – what you repeat again and again – will form well established pathways in your brain. Develop successful routines for common procedures such as note taking, studying, or problem solving. Form such study habits as labeling all class notes with the date, name of the class, and page numbers; highlighting important concepts in red; heading to the library/learning center right after class.
- Sleep – to remember, you require sufficient rest, especially early morning sleep. The hours between 3 a.m. and 6 a.m. are the hours when you process and understand your long-term memories during rapid eye movement. Studies show that lack of sleep interferes with brain function.

Step 3 – Recall:

Be able to retrieve those brain connections that you have made. The key to retrieving or accessing what you have stored in your brain is to understand and to practice. The more you practice the math concepts and techniques, the more easily you can remember them as needed.

How to Retrieve the Math You Already Know:

- Take in and store math carefully – the best way to retrieve math you already know from your mind is to have taken it in and stored it carefully in the beginning.
- Link actions with words or ideas – actions create motor memory. Move around as you say the ideas aloud. Linking words or ideas with actions can be used to remember anything and at any math level from basic math into more advanced math.
- Link images with words or ideas – vivid pictures involve sensory memory. For example, link images with ideas as you make a little sketch to remember your to-do list of six or seven errands such as pick up dog food, pick up laundry, get money, reserve hotel room, call Mike, buy orange juice, and gas the car. Each errand appears symbolically in the sketch, which can be posted on your garage door.
- Use mnemonics – make up sentences, goofy words, songs, and rhymes that state, spell out, or remind you of the first letter of the words you want to remember. For example, "spring ahead, fall back" to remember which way to turn the clock for daylight savings time.

Note Taking and Learning Strategies

- A Guide to Biological Sciences
- Color Coding & Homework Organizers
- Effective Note Taking
- Flash Cards
- FORM Strategy
- Formatting Your Notes
- Getting the Most Out of Your Textbook
- Highlighting
- Learning Strategies – Chemistry Specific
- Learning Strategies
- Memory & Learning Styles
- Memory Builders

THE OHIO STATE UNIVERSITY MANSFIELD

Note Taking and Learning Strategies

- Note Making
- Note Taking & In-Class Skills
- Note Taking Mistakes
- Questions to Increase Understanding
- Read, Stop & Ask
- REAP Strategy
- Text of the A.S.P.I.R.E. Exercise
- Writing a Laboratory Report

THE OHIO STATE UNIVERSITY MANSFIELD

A GUIDE TO WRITING IN THE BIOLOGICAL SCIENCES – PRACTICAL TIPS FOR SCIENTIFIC WRITING:

Below you will find a list of some common mistakes found in undergraduate writing.

1. Proofread!
   You should check your paper to catch and correct these and other common errors.
2. Abbreviations:
   You should avoid abbreviations by writing out the full word (minimum, October, Virginia, temperature…). Exceptions include common biological terms like ATP and DNA, units of measure (m, g, cm…), and mathematical or chemical formulas. Sentences should never begin with an abbreviation or an acronym.
3. Acronyms:
   You may wish to introduce an acronym for a term that is repeated often: if your pater deals with soybeans, Glycine max, you may use the full scientific name once and substitute G. max thereafter. If you are writing a paper about tidal freshwater marshes, the first time the terms appear, you can introduce an acronym: "Tidal freshwater marshes (TFM) are important transitional zones in the landscape." Throughout the rest of your paper, you would refer to TFM.
4. Chemical Elements:
   These elements are not proper nouns, do not capitalize them. Only the first letter of the symbol is a capitol letter: nitrogen (N), carbon (C), calcium (Ca).
5. Contractions:
   In formal writing, you should never use contractions (didn't, can't, haven't).
6. Data:
   The word "data" is plural, as in "the data *were* collected on January 21, 2001."
7. Direct Quotes:
   These should be avoided, unless you are presenting another author's specific definition or original label. You can usually paraphrase the writing effectively and more concisely, taking care to properly attribute the sources of your statements.
8. Fluff:
   It is obvious when students do not understand what they are writing about, and their grades suffer as a result. Read and re-read your references. Consult a textbook or another reference to help you resolve any aspects of the paper you do not understand before you start writing.
9. Footnotes:
   These should not be used.

10. Run-on Sentences:
    You should review your writing to make sure that each sentence presents one or two clear ideas. This will also help you organize sentences within paragraphs in a logical order.
11. Scientific Names:
    Names consisting of genus and species, should be underlined or italicized, with only the genus capitalized: *Homo sapiens* or <u>Ilexa opaca.</u>
12. Significance:
    In science, the word "significant" implies the result of a statistical test. It cannot be used to say, "the number of root nodules on red clover plants increased significantly when nitrogen was added," if you did not perform a statistical test to determine significant differences. You should analyze your results to determine whether they are statistically significant and report the test you used, the significance level (p=0.05), calculated statistic (t calc), and degrees of freedom.
13. Slang:
    Do not use slang. Try to use precise, scientific terms where possible (without necessary jargon) and avoid colloquialisms and figures of speech: "somewhat", "rather than", "sort of", "many", or "a great deal" instead of "a lot".
14. Spell-check:
    Your word processor's spell-check and/or grammar-check function is not error-free. It cannot tell you when to use "it's" and "its", and it cannot tell you that a particular sentence does not make sense. Give yourself enough time to proofread and correct your paper.
15. Tenses:
    When describing methods and results, you should use the past tense. The present tense is appropriate for accepted facts, such as the background information presented in the introduction. In addition, you may use the present tense when you discuss your results and conclusions. Looking over other scientific papers may help you answer questions you might have on this topic.
16. Units:
    All units of measure must be metric or SI (international system).

Color Coding and Homework Organizers

Color Coding

With respect to time management, color coding has two applications. Color coding may be used to organize information on time planners and to evaluate one's use of time.

Organizing Information

When recording information on semester, monthly, weekly or daily grids, use different colors of ink to designate different types of activities. For example, one may record classes in black ink, assignments in red ink, work in green ink, and social activities in blue ink. A related approach is to write all activities in one color of ink but use different highlighters to distinguish types of activities.

Evaluating Time Management

Color coding also provides a means of quickly evaluating how effectively time is used.

- Try highlighting all classes in one color and all studying outside class in another color. If time is used effectively, there should be twice as many hours of the latter than the former.
- Or, highlight all academic activities in one color and all social events in another color. If there are more hours of the latter than the former, one should reexamine one's priorities and budget more time for academics in the future.
- A third approach is to xerox the original planner and then use highlighters to keep track of when tasks were accomplished. If a task was completed on or before the due date, mark it with one color. If a task was completed one to two days after the due date, mark it with another color. Use a third color to mark tasks completed three or more days after the due date. If there is more of the third color than the others, one is not managing time very well.

Homework Organizer

The chart below may be used to organize the due dates of assignments in each course. The "homework organizer" is adapted from Mengel (1992).

Put a copy of the homework organizer in the front of one's three-ring notebook for each class. Post copies on the bulletin board of one's room. Check the chart daily for reminders about upcoming assignments. Cross off assignments as they are completed.

COURSE: **INSTRUCTOR:**

HOMEWORK

Due Date	Description	Specific Tasks
.	.	.
.	.	.
.	.	.
.	.	.

LABS

Due Date	Description	Specific Tasks
.	.	.
.	.	.
.	.	.
.	.	.

PAPERS / PROJECTS

Due Date	Description	Specific Tasks
.	.	.
.	.	.
.	.	.
.	.	.

TESTS / QUIZZES

Due Date	Description	Specific Tasks
.	.	.
.	.	.
.	.	.
.	.	.

EFFECTIVE NOTE TAKING:

- The most effective order of activities when taking notes is: listen, look, think, understand, paraphrase, then write.

- Note taking style should be tailored to the type of presentation:
  1. Lectures – listen and take notes as the instructor speaks.
  2. Seminars – listen to the discussion, write down main points after class.
  3. Labs – keep a notebook handy to record brief notes about procedures and results.

- Listen for the following types of information during lecture; this is important material that should be recorded in notes:
  1. Information not contained in the assigned readings.
  2. Explanations of obscure material within the texts and readings that students might not understand.
  3. Demonstrations or examples that provide greater understanding of the subject matter.
  4. Background information that puts the course material in context.

- Strive to understand the big picture of the lecture. Do not waste time writing down details and copying tables or illustrations that can be found in the book and copied later. Instead, write brief notes about the subject being discussed.

- Avoid writing in full sentences.

- When in doubt about the importance of a piece information, write it down. Check its significance later against the required readings or with the instructor.

- Write on your own notebook paper. There is not enough space to take notes on outlines or handouts provided by the instructor.

- Do not be stingy with notebook paper. Skip lines or leave empty spaces for adding information, clarifying information, or writing questions.

- Be cautious when loaning your notes to another student. Give him/her a Xerox copy instead, and always get his/her name and phone number. Lost notes are irreplaceable.

- Make your own set of notes. While you certainly may supplement your notes with those of another student, do not rely solely on notes taken by someone else. The notes may not be as complete or accurate as your own, you may not understand another person's shorthand or symbols, and another person may not record things he/she already knows but you do not.

- Always date your notes. Put the day, month, and year at the top of every page. Dating notes helps one to find certain pieces of information and to organize notes.

- Always put page numbers on your notes. Like recording dates, using page numbers helps one to find information and to organize notes. Page numbering is particularly useful if notes are dropped and scrambled out of order.

- Put page numbers at the top of each page. You may want to start at "page 1" for each day, or you may choose to have a running page count for each unit (between exams) or for the entire semester or quarter.

- If you recopy or reorganize notes, be sure to renumber and re-date the pages.

- Check the accuracy and completeness of notes by using any combination of the following sources of supporting information: textbook and other assigned readings, class mates, instructor, and tutors.

FLASH CARDS:

Much of studying involves the remembering of different kinds of information. In a course where there are large amounts of FACTUAL information, the use of flashcards may be helpful. Kinds of material that might be considered appropriate for flashcards are vocabulary words, formulas, equations, definitions, dates, names, etc.

The primary advantage of flashcards over other review techniques is that since the cards are more conveniently carried, they will probably be reviewed more often than material in a notebook or a textbook. FREQUENTLY REVIEW of cards is what makes them effective. Short reviews FREQUENTLY REPEATED will generally be more effective than long sessions of cramming. Objections about flashcards usually state that "they take too long to make." One should keep in mind, however, that the writing down of the material on the cards is an aid to memory in itself. One learns while preparing the cards!

SUGGESTIONS FOR MAKING AND USING FLASHCARDS:

- When a word is encountered that cannot be precisely defined, copy on a 3 x 5 card the entire sentence in which the word occurs. Underline the word so that it stands out.
- When a small number of these cards have accumulated, look up the words in an unabridged dictionary.
- On the same side of the card that has the excerpted sentence, the word with its syllables and diacritical markings should be printed so that accurate pronunciation is possible. You will find it much easier to use the word in conversation if you PRACTICE SAYING IT OUT LOUD. Nothing else should be placed on the front of the card, unless you wish to footnote the source of your sentence, phrase, or word.
- Now use the reverse side of the card. If the word has been made up of a prefix and a root, record this information on the card. Knowing the derivation of the word and some of its ancestry will help you learn the word with greater precision.
- Write the several definitions or variations of the definitions on the reverse side. Place an asterisk beside the definition that best fits the word as it was used in your original sentence.
- Review cards OFTEN. Carrying them with you will facilitate frequent review.
- Prepare the cards WELL IN ADVANCE of the date that the material is due to be tested or learned.
- Study most of those cards that you DO NOT KNOW or are not sure of. Reviewing cards you know is a temptation but is an inefficient use of time.

- When learning cards for the first time BREAK THEM UP INTO SMALL GROUPS. Learn one group of cards, then move to another group reviewing all cards from time to time. Carry about a dozen of these filled-out cards in your shirt pocket or hand bag, so that they will be handy to review whenever there is a spare moment. You could look at them when standing in a cafeteria line, waiting for a bus, sitting in someone's outer office, and so on.

- Shuffle the cards frequently and flip through them rapidly. This avoids learning the card in a certain order. Remember it is NOT the cards that improve memory, it is rather HOW OFTEN THEY ARE REVIEWED.

FORM STRATEGY:

The FORM strategy is an advanced organizer instruction routine teacher's use at the beginning of class. It aids in organizing content-area instruction. The goals are to provide students with the main idea of the lecture and to preview how information will be presented. The strategy helps students to follow lectures and pick out the most important information to be recorded in notes.

1. Focus of Lesson:
    - What will the lesson be about?
    - What are the key points that will be addressed?
    - What questions do students hope will be answered?
2. Organization of Lesson:
    - How will the key points be presented?
    - What learning enhancers will be used to make it easier?
    - What is the sequence of activities you will be using during the lesson?
3. Relationship
    - Relationship to the past: What have students learned in the past that will make learning easier?
    - Relationship to the future: If students master the material, then how will they benefit?
4. Most Important to Learn:
    - If students do not learn anything else from the lesson but this one thing, what would it be?

NOTE TAKING – FORMATTING YOUR NOTES:

When taking notes in lecture, there is no perfect format to follow. Ways of taking notes are as varied as the people who take them. There are, however, some general formatting rules to follow that will greatly improve the quality and usefulness of your notes, whatever style you choose.

Rule 1: Do not cram too much information into small spaces. Paper is one of the cheapest things you will purchase in college, so do not be afraid to use lots of it. Your notes will be much easier to read and work with if you leave sufficient space between ideas.

Rule 2: Leave room in your notes for supplementary information. When you study your notes after lecture and compare the professor's discussion of an idea with what is in the textbook, you will often find it useful to add diagrams or additional commentary. Be sure to leave room for this information while taking your notes in class.

Rule 3: Include questions about ideas you do not understand. If something the professor says in class does not make sense as you take notes, be sure to include a question mark or partial sentence to remind yourself that this idea needs clarification. That way you will remember to look up this information in the textbook, or ask the professor directly.

Rule 4: Do not try to be a perfect artist in class. The diagrams and graphic images the professor uses in lecture were probably made by a professional. Indeed, many of these things can probably be found in your textbook. Do not waste time attempting detailed renditions of them during lecture. Rather, make simple versions and then refine those drawings as you study your notes.

Rule 5: Some students find it useful to recopy their notes after class, or even type them up. While this activity does take extra time, it is a good way to catch mistakes, review the lecture material, and begin the process of studying repeatedly. If you opt for this helpful note-taking strategy, then be sure to build sufficient time into your study schedule for it.

NOTE TAKING – GETTING THE MOST OUT OF YOUR TEXTBOOK:

Textbook use in courses will vary with the teaching style of the professor. Some professors will rely heavily on the textbook to fill in gaps of content information that they do not have time to cover in lecture. Others will use the textbook more as a reference source to supplement or reinforce your understanding of the main points covered in lecture. In addition, the degree to which you will be tested on specific information from the textbook will vary among professors.

- At the beginning of a course, you should determine which textbook usage style your professor employs and adjust your reading strategy accordingly.
- If the professor's style is not obvious, do not hesitate to ask him/her directly about the role of the textbook in lectures.
- To get maximum effect from a textbook, you need to get in the habit of using it regularly.
- You should consult the book both before and after a topic has been covered in lecture.
- The best use of a textbook before lecture is to skim the assignment for the day, concentrating on the section headings, boldfaced words, figures, and figure captions.
- After lecture, you should go back and carefully reread the assignment. This time looking for details that reinforce the lecture discussion and supplement your notes with this information.
- Any figures used from the textbook that the professor used during lecture should be paid special attention, possibly recopying some form of these figures into your notes.

TAKING NOTES – HIGHLIGHTING:

Poor Use of Highlighting:

1. Excessive highlighting is not a good way to emphasize important ideas in the text. In fact, many learning specialists believe that by highlighting too much, you simply are putting off learning as you "paint" the textbook your favorite color.

   Instead, try using the highlighting on key words or phrases only, or try highlighting only the parts of the text that do not make sense. That way you can come back later and quickly identify the section on which you need to place additional effort.

Better Use of Highlighting:

1. Excessive highlighting is not a good way to emphasize important ideas in the text. In fact, many learning specialists believe that by highlighting too much, you simply are putting off learning as you "paint" the textbook your favorite color.

   Instead, try using highlighting on key words or phrases only, or try highlighting only the parts of the text that do not make sense. That way you can come back later and quickly identify the section on which you need to place additional effort.

LEARNING STRATEGIES – CHEMISTRY SPECIFIC:

READING STRATEGIES:

1. SQ3R Approach:
    - Recommended for most chemistry courses.
    - Begin by surveying the chapter to determine the major ideas to be covered and to activate prior knowledge.
    - Surveying involves reading the introduction, section headings, and conclusion.
    - Then form section headings into questions that may be answered by the text. Read text carefully for content one section at a time, paying attention to illustrations as they are mentioned in the text.
    - After reading each section, recite to yourself the main ideas and key terms of the section. Record these points in an outline/organizational format. (Record main ideas in a reading grid).

2. Mediated Instruction of Text:
    - Interventions made by an instructor that are intended to guide students through an assignment. Ex.) matching student background to content and organization of text, guiding students in discerning and understanding the text's meaning, providing opportunities for students to use new information in a variety of ways.
    - May be used before, during and after reading the assignment.

3. Information Organization:
    - Flash Cards:
      a. vocabulary terms
      b. chemical symbols for elements/molecules
      c. chemistry equations
    - Color-Coded Cards:
      a. color coding aids in encoding and recalling information
      b. organize chunks of chemistry information
      Ex.) ions with 1 negative charge recorded in one color
      ions with 2 negative charges recorded in another color

- Running Concept Lists:
  a. used to organize same types of information as flash cards
  b. terms, formulas, symbols or names are written in right-hand columns of page
  c. definitions, equations, meanings and contributions are recorded in left-hand column
- Matrices:
  a. may be used to summarize information about 2 or more concepts
  b. matrix = “rectangular arrangement of numbers”
- Flow charts

LEARNING STRATEGIES:

1. The Link Method:
   The Link Method is one of the easiest mnemonic techniques available, but is still quite powerful. It is not quite as reliable as a peg technique, as images are not tied to specific, inviolable sequences. It functions quite simply by making associations between things in a list, often as a story. The flow of the story and the strength of the visualizations of the images provide the cues for retrieval.
   - How to Use:
     Taking the first image, imagine associations between items in a list. Although it is possible to remember lists of words where each word is just associated with the next, it is often best to fit the associations into a story: otherwise by forgetting just one association, the whole of the rest of the list can be lost.

     As an example, you may want to remember a list of counties in the South of England: Avon, Dorset, Somerset, Cornwall, Wiltshire, Devon, Gloucestershire, Hampshire, Surrey.

     This could be done with two approaches, the pure link method, and the story method.
   - <u>Pure Link Method:</u>
     This would rely on a series of images coding information:
     Example:
     a. An AVON (Avon) lady knocking on a heavy DOoR (Dorset).
     b. The Door opens to show a beautiful SuMmER landscape with a SETting sun (Somerset).
     c. The setting sun shines down onto a field of CORN (Cornwall).
     d. The CORN is so dry it is beginning to WILT (Wiltshire).
     e. The WILTing stalks slowly fall onto the tail of the sleeping DEVil (Devon).
     f. On the DEVil's horn a woman has impailed a GLOSsy (Gloucestershire) HAM (Hampshire) when she hit him over the head with it.
     g. Now the DEVil feels SoRRY (Surrey) he bothered her.

     Note that there need not be any reason or underlying plot to the sequence of images: all that is important are the images and the links between images.

- Story Method:
  Alternatively this information may be coded by vividly imagining the following scene:
  Example:
  An AVON lady is walking up a path towards a strange house. She is hot and sweating slightly in the heat of high SuMmER (Somerset). Beside the path someone has planted giant CORN in a WALL (Cornwall), but it is beginning to WILT (Wiltshire) in the heat. She knocks on the DOoR (Dorset), which is opened by the DEVil (Devon). In the background she can see a kitchen in which a servant is smearing honey on a HAM (Hamshire), making int GLOSsy (Gloucestershire) and gleam in bright sunlight streaming in through a window. Panicked by seeing the DEVil, the AVON lady panics, screams "SoRRY" (Surrey), dashes back down the path.

  Given the fluid structure of the mnemonic, it is important that the images stored in your mind are as vivid as possible, and that significant, coding images are much stronger than ones that merely support the flow of the story.

  This technique is expanded by adding images to the story. After a number of images, however, the system may start to break down.

MEMORY AND LEARNING STYLES:

The main reason we forget something is because we never really learned it in the first place.

1. MEMORY:

   A good memory is something we must work towards. Things are forgotten because they never really made a strong impression on us in the first place. The reasons for this lack of impression are as varied as from one person to the next. Nevertheless, the most common reasons are:

   - You are thinking about something else – you are not listening.
   - You do not think the idea was important.
   - You do not take or have the time to learn or store the material properly.

   To remember information, you need to know that your memory operates on four levels of efficiency. Your ability to remember something increases from level 1 to level 4 depending on what you do with the information.

   - Level 1: Hear or read the material once (not reliable for a test).
   - Level 2: Read the information and review it once or twice (this is cramming – you will forget most of what you have read).
   - Level 3: Read the information, review the material several times, write it down, and test yourself over the next two days (expect fairly good recall).
   - Level 4: Repeat and frequently write down the information over a period of 3-6 days (gives you excellent retention).

   If you do not review what you have learned, you will forget 70% within an hour and 84% within 48 hours. One of the best forms of review is teaching or telling someone else about the information using your own words. This is where study groups become valuable.

2. LEARNING:

People learn and memorize information using a variety of "learning styles". Learning styles are how you concentrate, process and remember new and difficult information. You may remember information more easily through any combination of the following styles:

- Hearing
- Seeing
- Reading
- Writing
- Illustration
- First -hand experience

Be aware of your best styles. Most information presented to you in college is by lecture. Reading textbooks and other related material, as well as doing all the assignments are the other parts of the learning equation. It is beneficial for you to combine learning styles to be successful.

When you are studying:

- Say the information.
- Write it down.
- Read it over and over.
- Put it into form or format that will make sense to you.
- Draw a diagram.
- Relate the information to what you already know.
- Picture and try to experience what you are learning.
- Teach the information to someone else.

MEMORY BUILDERS:

1. Motivated Interest:
   Careful attention insures better memory. Do you think jumpers find it hard to learn how to parachute? Find something in a subject to keep you interested.
2. Meaningful Organizations:
   A map, chart, or outline structures memory in the present and future tense.
3. Selectivity:
   "He hears what he wants to hear", indicates the effect of selective listening. The person or idea which is recalled usually has something special which made him/it stand out.
4. Intention to Remember:
   Consider parts of a conversation you listen to carefully or completely space out. Which will be most likely remembered?
5. Basic Background:
   Association of new facts and old is one sure way to build memory. If there is no old, the new will "catch" much more slowly. Also, this emphasizes the import of review.
6. Recitation/Questioning:
   Why do we remember songs on the radio so well? Of course, we hear them over and over. When we ask questions about a strange word in a song (or lecture) we are even more likely to remember.
7. Consolidation:
   Pulling together new learning makes it more memorable. If we recognize that the person in the red hat and the person who lives on the corner are the same person, the association aids later recall.
8. Distributed Practice:
   How often have you learned how to fix machinery, cook a meal, or play a game, only to forget the process later. Drill is boring but rewarding.

NOTE MAKING:

Learning to make notes effectively will help you to improve your study and work habits and to remember important information. Often, students are deceived into thinking that because they understand everything that is said in class they will therefore remember it. This is dead wrong! Write it down.

As you make notes, you will develop skill in selecting important material and in discarding unimportant material. The secret to developing this skill is practice. Check your results constantly. Strive to improve. Notes enable you to retain important facts and data and to develop an accurate means of arranging necessary information.

Here are some hints on note making:

1. Do not write down everything that you read or hear. Be alert and attentive to the main points. Concentrate on the "meat" of the subject and forget the trimmings.
2. Notes should consist of key words or very short sentences. If a speaker gets sidetracked it is often possible to go back and add further information.
3. Take accurate notes. You should usually use your own words, but try not to change the meaning. If you quote directly from an author, quote correctly.
4. Think a minute about your material before you start making notes. Do not take notes just to be taking notes! Take notes that will be of real value to you when you look over them at a later date.
5. Have a uniform system of punctuation and abbreviation that will make sense to you. Use a skeleton outline and show importance by indenting. Leave lots of white space for later additions.
6. Omit descriptions and full explanations. Keep your notes short and to the point. Condense your material so you can grasp it rapidly.
7. Do not worry about missing a point.
8. Do not keep notes on oddly shaped pieces of paper. Keep notes in order and in one place.
9. Place a ? next to information you write in your notes but about whose meaning you are not sure.
10. Re-write your notes to make them more complete by changing abbreviated words into whole words, symbols into words and shortened sentences into longer sentences.
11. Make your notes more accurate by answering any questions you had when writing your notes in class. Use your text book and resources to obtain the information you need to answer your questions.
12. Check with other students to be sure you did not leave out any important information.

13. Shortly after making your notes, go back and review and rework (not redo) your notes by adding and spelling out unclear items. Remember, we forget rapidly. Budget time for this vital step just as you do for the class itself.
14. Organizing notes can be made easy by use of three-ring binders.
    (a) Notes may be easily inserted and removed for reorganizing, recopying, or reviewing.
    (b) Supplementary course papers may be organized and added using a hole punch.
    (c) Dividers may be inserted for separating notes by major topic or for separating notes from syllabi, handouts, quizzes, homework, and other course papers.
    (d) Easily transported from class to room to library.

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NOTE TAKING AND IN-CLASS SKILLS:

Adequate notes are a necessary adjunct to efficient study and learning in college. Think over the following suggestions and improve your note-taking system where needed.

1. Attend class – attendance in class enhances the chance you will get a passing grade in a course.
2. Red textbook material – all material relevant to the topic being covered should be read prior to attending class.
3. Listen actively – if possible think before you write – but do not get behind.

4. Be open-minded about points you disagree on. Do not let arguing interfere with your note-taking.

5. Raise questions if appropriate.

6. Develop and use a standard method of note-taking including punctuation, abbreviations, margins, etc.

7. Take and keep notes in a large notebook. The only merit to a small notebook is ease of carrying and that is not your main objective. A large notebook allows you to adequately indent and use an outline form.

8. Leave a few spaces blank as you move from one point to the next so that you can fill in additional points later if necessary. Your objective is to take helpful notes, not to save paper.

9. Do not try to take down everything that the lecturer says. It is impossible in the first place and unnecessary in the second place because not everything is of equal importance. Spend more time listening and attempt to take down the main points. If you are writing as fast as you can, you cannot be as discriminating a listener. There may be some times, however, when it is more important to write than to think.

10. Listen for cues as to important points, transition from one point to the next, repetition of points for emphasis, changes in voice inflections, enumeration of a series of points, etc.

11. Many lecturers attempt to present a few major points and several minor points in a lecture. The rest is explanatory material and samples. Try to see the main points and

do not get lost in a barrage of minor points which do not seem related to each other. The relationship is there if you will for it. Be alert to cues about what the professor thinks is important.

12. Make your original notes legible enough for your own reading, but use abbreviations of your own invention when possible. The effort required to recopy notes can be better spent in rereading them and thinking about them. Although neatness is a virtue in some respect, it does not necessarily increase your learning.

13. Copy down everything on the board, regardless. Did you ever stop to think that every backboard scribble may be a clue to an exam item? You may not be able to integrate what is on the board into your lecture notes, but if you copy it, it may serve as a useful clue for you later. If not, what the heck - - you have not wasted anything. You were in the classroom anyway.

14. Sit as close to the front of the class, there are fewer distractions and it is easier to hear, see and attend to important material.

15. Get assignments and suggestions precisely – ask questions if you are not sure.

16. Noteworthy notes – after you have finished class, immediately rush to the nearest computer lab and retype your notes. You need to rewrite those phrases as complete thoughts and sentences; dot your I's and cross your T's and use "cut and paste" to put your notes into some type of logical sequence. While retyping your notes you are using several modalities: you review as you read your notes aloud, you use your hand to type, and your reread again as you proof read what you have typed. Research indicates that 80% of new material can be recalled if you review notes within the first 24 hours of presentation.

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TAKING NOTES – NOTE TAKING MISTAKES:

Beginning college note takers often make some basic mistakes. Here are 2 easy ones to avoid that will greatly improve the quality of your notes:

1. Avoid writing down every word:
   Trying to write down every word the professor says is both pointless and impossible. You must learn to concentrate on what is being said and filter out the nonessential portions that connect important ideas and examples. Remember, by definition, notes are supposed to be an abbreviated version of what the professor says.

2. Most content is in the lecture:
   There is probably more content in a lecture than what the professor actually writes on the overhead or blackboard. Although what the professor writes down is obviously important, in most lectures there will also be important spoken material that connects the ideas and terms that actually end up on the screen or board. Again, you must learn to recognize and record these connectors.

LEARNING STRATEGIES – QUESTIONS TO INCREASE UNDERSTANDING:

The following sample questions focus on thinking skills and are intended to increase student understanding of information.

1. Observing and Recalling:
    - What did/do you notice about this_____?
    - What did/do you feel/see/hear/smell_____?
    - What do you remember about_____?
    - What did you find out about_____?
    - How did_____?

2. Relationships, Summarizing, Organizing, and Retelling:
    - Tell me in your own words how_____.
    - What is another way we could say/explain/express that?
    - How are these similar/different?
    - Which ones do you think belong together? Why do you think these belong together? Why do not others belong?
    - What happened to cause_____?
    - What things/events lead up to_____?

3. Predicting, Inferring, and Anticipating:
    - What do you think are some reasons/causes that_____?
    - What feeling do you think made _____ act as he/she did?
    - If _____ were changed, what do you think would have happened/would not have happened? Why do you think it would have happened? Why do you think it would not have happened?
    - What do you think happened before/yesterday/earlier/when_____?
    - Judging from the title/picture, what do you think is about/is going to happen?

Reflective Questioning:

The purpose of reflective questions is to encourage students to think carefully about material and to process information in new ways. Examples are:

- What is the main idea of _____?
- How does _____ affect _____?
- What is the new example of _____?
- Explain why_____.
- Explain how_____?
- What conclusions can be drawn from_____?
- What is the difference between _____ and _____?
- How are _____ and _____ similar?
- How would I use _____ to _____?
- What are the strengths and weaknesses of _____?
- What is the best _____ and why?
- This idea is important because_____.

READ, STOP, AND ASK:

This simple rule can really help you in your efforts to assimilate textbook information. The sheer quantity and density of information in, for example, biology texts can sometimes be overwhelming, so one way to help transfer what you have read from your short-term memory into your long-term memory is to read a section no longer than one page, stop, and then quiz yourself on what you have just read and how it relates to what you already know about the subject. This method plays on the human brain's ability to learn more easily when material is presented in short segments. It also forces you to make conceptual and factual connections between new and old ideas, which helps to organize complex information in your brain more meaningfully.

REAP STRATEGY:

REAP stands for Relating, Extending, Actualizing, and Profiting. The purposes of the strategy are to organize notes and to make course content more personal to students. Class notes are taken on one side of the paper and the opposite page is used for recording memory triggers and related information.

Directions:

1. Divide Paper:
    - Use spiral notebook or a three-ring binder with loose leaf paper.
    - Divide the left-hand page into two columns by drawing a vertical line from top to bottom. Label the left column "Triggers" and the right column "REAP".
    - Leave the right-hand page as is. Include the student name, course, date, and page number at the top of the right-hand page.

2. Record Notes:
    - Take notes only on the right-hand pages.
    - Use short sentences and skip lines between major ideas.

3. Record Triggers:
    - The trigger column is used to record words, phrases, or visual images that will trigger the corresponding main idea in the notes section.
    - Fill in this section immediately or shortly after class.

4. Record REAP words:
    - The REAP column should also be filled in immediately or shortly after class.
    - In the REAP column, the student writes words or phrases that…
        (a) Relate the material to his/her own life.
        (b) Extend the material outward into the outside world.
        (c) Actualize the material; note how information might work in the world.
        (d) Profit from the ideas – consider how the student and society might profit from the ideas.

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TEXT OF THE A.S.P.I.R.E. EXERCISE:

A: Approach/Attitude/Arrange:

- Approach your studies with a positive attitude.
- Arrange your schedule to eliminate distractions.

B: Select/Survey/Scan:

- Select a reasonable chunk of material to study.
- Survey the headings, graphics, pre- and post questions to get an overview.
- Scan the text for keywords and vocabulary: mark what you do not understand.

P: Piece together the parts:

- Put aside your books and notes
- Piece together what you have studied, either alone, with a study pal or group: summarize what you understand.

I: Investigate/Inquire/Inspect:

- Investigate alternative sources of information you can refer to:
  Other text books, websites, experts, tutors, etc.
- Inquire from support professionals (academic support, librarians, tutors, teachers, experts) and other resources for assistance.
- Inspect what you did not understand.

R: Reexamine/Reflect/Relay

Reexamine the content/Reflect on the material/Relay understanding:

- Reexamine.
- What questions are there yet to ask? Is there something I am missing?
- Reflect:
  How can I apply this to my project? Is there a new application for it?
- Relay:
  Can I explain this to my fellow students? Will they understand it better if I do?

E: Evaluate/Examine/Explore:

- Evaluate your grades on tests and tasks: look for a pattern.
- Examine your progress: toward achieving your goals.
- Explore options: with a teacher, support professional, tutor, parent if you are not satisfied.

WRITING A LABORATORY REPORT:

It is extremely important that you understand the need for, and format of, a good report. Scientific work of any sort is useless unless its results can be communicated to others. Over the years a particular format, or general outline, has evolved for the preparation of scientific reports. It is this format which you should get accustomed to using. Generally a scientific paper has five sections.

1. Introduction: Include a statement of the problem to be investigated, why the work was carried out, history and theoretical background of the problem, a brief statement of the general method of approach to the problem, and expected results.

2. Methods and Materials: This section tells the reader how and with what the work was done. The methods and materials section of a research paper is often glossed over by many readers, but, in terms of the report as a historical document, this section is crucial. You should try to strike a balance between an over-detailed description of even the most trivial items and a very sketchy statement that provides insufficient information. The important guideline is that another worker of similar training and ability, following your description, should get the same results. Note that this section should be written as a description of what you did, not as a set of instructions.

3. Results: Here is the real meat of a report. In this section you should describe the important qualitative and quantitative observations in your work. Data should be tabulated and/or graphed and described. One of the common errors in report-writing is to say, "The data are plotted in Fig. 1" without saying something like, "As can be seen from the graph, absorbance at 260nm is relatively constant up to about 80EC, after which a sharp rise is noted." Be aware that tables and graphs are not self-explanatory, and must be summarized for the reader. All graphs and tables should be numbered and provided with a title. Additional information which makes the data more comprehensible should be provided as needed.

4. Discussions and Conclusions: This section serves two functions. First, it provides a place where the data may be fully discussed and interpreted, and second, it allows the author to delve into the realms of speculation. Here one may address questions like "why did something unexpected happen?"; "what would happen if the reaction were carried out at higher pH?"; "why did the expected results not materialize?" In this section the author may (discretely) pat him – her –self on the back, criticize other workers results, suggest improvements in methodology, etc.

5. References: Some papers have no references, others have 200 or more. There is no correct number of references, but there is a correct philosophy and format: any time you refer to a previously reported idea, result, method, etc., you must insert a citation. Every quotation must be referenced. Not to do so is, at best, a violation of scientific and literary ethics and, at worst, plagiarism.

   A. Where do the references go? References may appear at the bottom of the page on which they are first cited, or listed at the end of the paper. The latter seems to be more convenient; the bottoms of pages in the report may thus be reserved for other footnotes.
   B. How do you designate and list references? In the body of a report, a reference may be designated in one of two ways - - by name of author or by number. If you list the references at the end of the paper, the order depends on which method you use, as follows:
      1. By Author and date: One method is to place the last name(s) of the author(s) and the year of publication in parentheses, immediately following the referenced thought. As an example, one might write,

         "A phosphorylated histidine residue has been proposed as an important component in the mechanism of action of succinylcoenzyme A synthetase (Bridge, Millen and Boyer, 1968)".

      2. By Number: In the second method a citation may be designated by a number in parentheses (not a superscript; superscripts are reserved for footnotes). In this case, one would write:

         "A phosphorylated histidine residue has been proposed as an important component in the mechanism of action of succinylocoenzyme A synthetase (6)."

         If this method is used, references are listed at the end of the report in the order in which they appear in the text, rather than alphabetically.

C. What is the format of a reference? With either method of citation the format of the reference list should be as follows:

1. For a periodical: A reference to a periodical should include, in the order given:
   a. Name(s) of author(s), (last name, first initial).
   b. Name of periodical (use standard abbreviations).
   c. Volume number, underlined.
   d. Page on which article begins (or where it begins and ends).
   e. Year of publication, in parentheses.
   -For example:
   Bridger, W. A. Millen, W.A. and Boyer, P.D.
   Biochemistry, 1: 3608 (1968).

2. For a book: A reference to a book should include, in the order given:
   a. Name(s) of author(s), as above.
   b. Title of book, in quotation marks.
   c. Edition, if more than one have been published.
   d. Name of publisher.
   e. City of publication.
   f. Year of publication.
   g. Volume number (if necessary).
   h. Page(s) on which the point cited is found.
   -For example:
   Lehninger, A.L. "Biochemistry", 2nd ed. Worth
   Publishers, Inc. N.Y. 1975, p.224.

Finally, there is a note about form and style. Philosophically, science should be independent of scientists, their times, and places of work. That is the actual discoverer of a principle is less important than the principle itself. If, for example, Watson and Crick had not developed the structural model of DNA, then surely someone else would have done so. In conformance with this philosophy scientific writing should be impersonal. Thus, reports should be written in the third person, rather than the first. It is also traditional to write scientific papers in the passive, rather than the active, voice. For example, one should avoid statements like, "I heated the protein solution to 100EC and formation of a precipitate was noted."

Reports should be written with care, typed if possible, but in any event, completely legible, as soon as possible after completion of the experiments described. The actual recording of data in the laboratory should be done in a notebook. Loose leafs are often the most convenient, but never write your data on loose scraps of paper or paper towels and always put your data sheets into your notebook immediately.

Reading

- 5 Techniques for Improving Your Reading
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THE OHIO STATE UNIVERSITY MANSFIELD

Reading

The Pivotal Words

Tips on Underlining a Textbook

Understanding Structure of a Text

Using Your Textbook

5 TECHNIQUES FOR IMPORVING YOUR READING AND STUDYING SKILLS:

1. Survey the Chapter:
   Do not read the chapter yet! Do these steps first:
   - Read the title – prepare your mind to study the subject.
   - Read the introduction and/ or summary – think about how this chapter fits the author's purposes, and focus on the author's statement of most important points.
   - Quickly look over each boldface heading and subheading – organize your mind before you begin to read – build a structure for the thoughts and details to come.
   - Look over any graphics, charts, maps, diagrams, etc. They are there to make a point – do not miss them.
   - Notice the reading aids – *italics,* and boldface print show that something is important.
   - Also, the chapter objective and the end-of-chapter questions are all included to help you sort, understand and remember the information.

2. Question:
   Do not read the chapter yet! Do these steps first:
   - Create questions from your reading to help your mind think about the material.
   - Look at each section at a time and turn the boldface headings into as many questions as you think will be answered in that section. The better the questions, the better your understanding will be. You may always add more questions as you continue. When your mind is actively searching for answers to questions, it is learning! This is also the best way to predict test questions – where do you think your teachers think up questions?!
   - Here is an example: if a heading says "Parts of the Flower", you can make a question like: "What are the parts of a flower?" "Historic People" can be a question like "Name some historic people".
   - Make as many questions as you possibly can.

3. Read:

   OK, now it is time to read the chapter, but follow these steps:

   - As you read, look for the answers to the questions you wrote, and write the answers in your notes!
   - Read each section of the chapter with your questions in mind. Look for the answers, and take note of questions you did not think of that were answered in that section.

4. Recite:

   As you read the chapter, you should recite your notes.

   - Reciting means practicing out loud what you have written down. Yes, that is right – talk to yourself!
   - After each section of reading, stop, think about your questions, and see if you can answer them from memory. If not, look back again (as often as necessary) but do not go on to the next section until you can say what you have learned!

5. Review:

   Spend 15 minutes every day reviewing your notes.

   - Once you have finished the entire chapter using the steps above, go back over all the questions that you made. See if you can still answer them. If you cannot, read the chapter again, being careful to answer your own questions.

ACTIVE READING CHECKLIST:

Use this handy checklist to see if you are an active reader. Select YES or NO as applicable.

1. I preview chapters before lectures.
   - o Yes o No
2. I create chapter outlines.
   - o Yes o No
3. I divide the chapter into manageable sections.
   - o Yes o No
4. I write summaries in my own words after each section.
   - o Yes o No
5. I highlight key concepts and main ideas.
   - o Yes o No
6. I review definitions and key words.
   - o Yes o No
7. I use note cards to write formulas and main ideas.
   - o Yes o No
8. I use note cards to write out questions and answers.
   - o Yes o No

9. I form a study group, and we exchange summaries and possible test questions.
    - o Yes o No

10. I practice teaching main concepts to other members of my study team.
    - o Yes o No

11. I use mind maps to create links and connections between concepts in a logical manner.
    - o Yes o No

12. I read chapter summaries.
    - o Yes o No

13. I review graphs, charts, pictures, and tables.
    - o Yes o No

14. I answer end of chapter questions.
    - o Yes o No

15. I compare reading notes with lecture notes.
    - o Yes o No

16. I read sitting in a firm chair.
    - o Yes o No

17. I read difficult material standing up or while taking notes at the board.
    - o Yes o No

18. I make reading an active process by asking questions and staying alert.
    - o Yes o No

19. I focus on main ideas, not individual words.
    - o Yes o No

20. I stay focused by looking for examples that support main points.
    - o Yes o No

*If your score totals at least 15 Yes answers, you are an active reader. If not, practice the strategies above until they become habits.

CRITICAL READING:

Critical reading applies to non-fiction writing in which the author puts forth a position or seeks to make a statement. Critical reading is *active reading.* It involves more than just understanding what an author is saying. Critical reading involves questioning and evaluating what the author is saying and forming your own opinions about what the author is saying.

Here are the things you should do to be a critical reader:

- Consider the context of what is written. You may be reading something that was written by an author from a different cultural context than yours. Or, you may be reading something written some time ago in a different time context than yours. In either case, you must recognize and take into account any differences between your values and attitudes and those represented by the author.
- Question assertions made by the author. Do not accept what is written at face value. Before accepting what is written, be certain that the author provides sufficient support for any assertions made. Look for facts, examples, and statistics that provide support. Also, look to see if the author has integrated the work of authorities.
- Analyze assumptions made by the author. Assumptions are whatever the author must believe is true in order to make assertions. In many cases, the author's assumptions are not directly stated. This means you must read carefully in order to identify any assumptions. Once you identify an assumption, you must decide whether or not the assumption is valid.
- Evaluate the sources the author uses. In doing this, be certain that the sources are credible. For example, Einstein is a credible source if the author is writing about landmark achievements in physics. Also be certain that the sources are relevant. Einstein is not a relevant source when the subject is poetry. Finally, if the author is writing about a subject in its current state, be sure that the sources are current. For example, studies done by Einstein in the early 20th century may not be appropriate if the writer is discussing the current state of knowledge in physics.
- Identify any possible author bias. A written discussion of American politics will likely look considerably different depending on whether the writer is a Democrat or a Republican. What is written may very well reflect a biased position. You need to take this possible bias into account when reading what the author has written. That is, take what is written with "a grain of salt".

CRITICAL READING STRATEGIES:

Here are seven critical reading strategies. These are strategies that you can learn readily and then apply not only to the reading sections in a class, but also to your college reading. Although mastering these strategies will not make the critical reading process an easy one, it can make reading much more satisfying and productive and thus help you handle difficult material well and with confidence.

Fundamental to each of these strategies is annotating directly on the page:

- Underlining key words, phrases, or sentences.
- Writing comments or questions in the margins.
- Bracketing important sections of the text.
- Constructing ideas with lines or arrows.
- Numbering related points in sequence.
- Making note of anything that strikes you as interesting, important, or questionable.

Most readers annotate in layers, adding further annotations on second and third readings. Annotations can be light or heavy, depending on the reader's purpose and difficulty of the material.

1. Previewing: *Learning about a text before really reading it.*
   Previewing enables readers to get a sense of what the text is about and how it is organized before reading it closely. This simple strategy includes seeing what you can learn from the headnotes or other introductory material, skimming to get an overview of the content and organization, and identifying the rhetorical situation.

2. Contextualizing: *Placing a text in its historical, biographical, and cultural contexts.*
   When you read a text, you read it through the lens of your own experience. Your understanding of the words on the page and their significance is informed by what you have come to know and value from living in a particular time and place. But the texts you read were all written in the past, sometimes in a radically different time and place. To read critically, you need to contextualize, to recognize the differences between your contemporary values and attitudes and those represented in the text.

3. Questioning to understand and remember: *Asking questions about the context.*
   As students, you are accustomed (I hope) to teachers asking you questions about your reading. These questions are designed to help you understand a reading and respond to it more fully, and often this technique works. When you need to understand and use new information though it is most beneficial if you write the questions, as you read the text for the first time. With this strategy, you can write questions any time, but in difficult academic readings, you will understand the material better and remember it longer if you write a question for every paragraph or brief session. Each question should focus on a main idea, not illustrations or details, and each should be expressed in your own words, not just copied from parts of the paragraph.

4. Reflecting on challenges to your beliefs and values: *Examining your personal responses.*
   The reading that you do for a class might challenge your attitudes, your consciously held beliefs, or your positions on current issues. As you read a text for the first time, mark an X in the margin at each point where you felt a personal challenge to your attitudes, beliefs or status. Make a brief note in the margin about what you feel or about what in the text created the challenge. Now look again at the places you marked in the text where you felt personally challenged. What patterns do you see?

5. Outlining and summarizing: *Identifying the main ideas and restating them in your own words.*
   Outlining and summarizing are especially helpful strategies for understanding the content and structure of a reading selection. Whereas outlining reveals the basic structure of the text, summarizing synopsizes a selection's main argument in brief. Outlining may be part of the annotating process, or it may be done separately. The key to both outlining and summarizing is being able to distinguish between the main ideas and the supporting ideas and examples. The main ideas form the backbone, the strand that holds the various parts and pieces of the text together. Outlining the main ideas help you to discover this structure. When you make an outline, do not use the text's exact words.

Summarizing begins with outlining, but instead of merely listing the main ideas, a summary recomposes them to form a new text. Whereas outlining depends on a close analysis of each paragraph, summarizing also requires creative synthesis. Putting ideas together again - in your own words and in a condensed form - - shows how reading critically can lead to deeper understanding of any text.

6. Evaluating an argument: *Testing the logic of a text as well as its credibility and emotional impact.*
   All writers make assertions they want you to accept as true. As a critical reader, you should not accept anything on face value but to recognize every assertion as an argument that must be carefully evaluated. An argument has two essential parts: a claim and support. The claim asserts a conclusion - - includes reasons (shared beliefs, assumptions, and values) and evidence (facts, examples, statistics, and authorities) that give readers the basis for accepting the conclusion. When you assess and argue, you are concerned with the process of reasoning as well as its truthfulness (these are not the same thing). At the most basic level, in order for an argument to be acceptable, the support must be appropriate to the claim and the statements must be consistent with one another.

7. Comparing and contrasting related readings: *Exploring likenesses and differences between texts to understand them better.*
   Many of the authors we read are concerned with the same issues or questions, but approach how to discuss them in different ways. Fitting a text into an ongoing dialectic helps increase understanding of why an author approached a particular issue or question in the way he or she did.

HOW TO READ A DIFFICULT BOOK:

- Skim the book first.
- Look at the title page and any sub-titles.
- Look at the Table of Contents to get a sense of the structure.
- Look for things you understand.
- Star reading.
- Read over difficult material a second time. If you still do not understand it, move on to something else or take a break and come back to it.
- Look for the important words.
- Stop at the end of each paragraph or section and paraphrase in your own words what you just read.
- Read out loud. Hearing what we read is like reading it a second time.
- Meet with your instructor and discuss your confusion. Point out the paragraphs you found hardest to understand.
- Find a tutor.
- Use another text. Concepts are sometimes easier to understand if expressed in a different way.
- Read with a dictionary in your lap.
- Pretend you understand, and then explain it to someone else or even yourself.
- Do NOT get stressed over difficult material.
- Read footnotes, arguments, and references.

Pennstatelearning.psu.edu/resources/study-tips/reading-comp

READING:

What do you do when you read? Do you start at the beginning and read the words on every line until you get to the end?

A method that you might find more productive is to:

Survey the text

Skim it to get the gist of it, then, if you need to,

Read for more detail.

You might also be trying to locate some specific information on a page, in which case you would need to *scan* the text. See the following techniques to help make your reading much more productive.

1. SURVEYING –
   This is a technique for quickly identifying the content of a text. It is what we do when we pick up a book or magazine and have a quick look at what it is about before we buy it.
   It helps you to identify those readings most relevant to your particular purpose, how information is presented and the overall organization. It can help you to familiarize texts so you know where to look for information when you need it, as well as determine if a book or journal is suitable for a particular purpose.

   How to do it:
   - Read the title and any cover blurb and try to predict the content.
   - Look at the contents page and index to see which topic areas are covered.
   - Lick through the book, looking at key words in chapter headings and major sub-headings.
   - Read the introduction or preface of a book, or the abstract of a research article, to get a summary of the content.

2. SKIMMING –

We skim when we look quickly over a chapter or article to get a general idea of what it is about and identify the main ideas. In general reading, we do this when we quickly look at a newspaper or magazine story before we decide whether or not to read it in full. Because you might not have time to read anything, skimming can help you to select only those texts that are useful and relevant to your study purpose. It gives you a quick overview of an article or chapter. In this way it helps to build up your initial schema (what you know about a particular topic) as background information for classes or to prepare you for further reading or studying.

By focusing on key points, skimming helps you to build up your initial schema. This is important because your ability to take in what you read depends on your ability to integrate new information with knowledge you already have.

How to do it:

- Read the title and any sub-headings quickly and try to predict the content of the text. It does not matter if your original prediction is wrong; it is only a warm up exercise for your brain and, of course, you adjust your thoughts to any new information you gather as you go along.
- Move your eyes very quickly across the pages, taking in text features such as diagrams, lists, numbering sequences, bold print, italics or underlining use to highlight key words.
- Read the abstract of a journal article because it summarizes the main points of the article; read the introduction of a chapter because it identifies the topic and focus and enables you to preview the main ideas.
- Read the first sentence of each paragraph because this is often the topic sentence, which contains the main idea of the paragraph.
- Look for key words that identify the topic and focus.
- Look for content words that answer the questions: Who? What? Where? Why? When? How?
- Look for linking words, which help identify the relationship between ideas and give direction to the text. Some examples of these words are: therefore, in addition, however, because, resulting in, since. Look for compare/contrast, cause/effect, problem/solution, listing, and time sequences.
- Read the final paragraph, conclusion, or final summary.
- Skim again to clarify the main ideas. Do not read in detail, although you might slow down for new information, which takes longer for your brain to process or link in with your existing schema.
- Mentally review the main structure of the text.

3. SCANNING –

   Scanning is a reading skill we use to quickly locate specific information; for example, when we check a phone number in a directory or look at an index to find out the page number of an article. When you scan, you know what you are looking for (e.g. key words, dates, etc.) but need to locate it on the page; when you skim, you are looking for the main ideas of a text.

   How to do it:

   - Decide what you are looking for: a key word or phrase, date, name.
   - Disregard all information that is not relevant to what you are looking for. (If something looks as if it could be useful for another part of your research, mark it quickly so that you can come back to it later; do not let yourself be side-tracked).
   - Move your eyes systematically over the text, looking for the information you need.
   - Use peripheral vision to help scan the page quickly.
   - When you have found what you are looking for, slow down and read carefully around it. It may be necessary to go back and read information leading up to the key word to help you understand the context in which it is being said.

4. READING FOR DETAIL –

   When you want to be certain that you fully comprehend the author, you need to read more slowly and carefully. It is best to do this after you have read in a more general way (surveying, then skimming a couple of times, increasing the depth with each skim). This is probably what most readers attempt at a first reading, if they are not aware of how useful the skimming process is. Reading for detail allows you to understand the logic and details of an explanation or argument and to see more clearly how the ideas were interconnected. You need to do this when you analyze and evaluate information for assignments.

   How to do it:

   - Read for general meaning first and mark passages that need more detailed reading.
   - Number the main points in the text or in your notes to show the development of ideas more clearly, highlighting main and subordinate ideas.
   - Relate sections of the text together focusing on relationships between ideas such as cause/effect, problem/solution, contrast/comparison.

- Pay close attention to the exact meaning of words and how the author uses them to convey meaning. Also, take notice of words that you might skim over in more general reading.
- Record what you have read in a variety of ways using a note-taking method that works well for you.
- Also note your comments and reactions.
- Re-read as often as you need to.
- Mentally review to assist recall.

5. READING WITH UNDERSTANDING –

If you are not asking yourself what you understand and what you do not yet understand as you read, you could be wasting your time. It is important to be in control of what you know and what you need to work on. Reading with understanding means being in control of what you are reading and looking for patterns of organization in the texts.

There is likely to be only a few key words or phrases that are preventing you from understanding any text you are having difficulty with, so write a list of these and find out what they mean. You might find this information:

- In a glossary in the back of your textbook
- In specialist dictionaries (try the reference section of the library)
- In other texts that might give definitions or examples
- By doing a search for the key word/phrase on the Internet

It is not enough just to understand the meanings of the key words or phrases. We also need to understand the relationship between these concepts. Information is most often organized in these ways:

- Cause and Effect – there can be one or more causes and one or more effects for each cause.
  Ex. - "The advertising copy write was not successful because there was too much text.
- Contrast and Comparison – shows way in which things are alike and ways in which they are different.
- Listing – the items in a list can usually be placed in any order without altering the meaning (except those in a time sequence).

Ex. – "Effective time management depends on a clear understanding of long term and short term goals, and examination of one's timetable and a list of tasks in priority order."

- Problem and Solution – writers often use this pattern when stating a question and its answer. They can be similar to cause and effect statements, but always have a potential answer or solution, rather than just cause or effect.
  Ex. – "I often have difficulty in getting my assignments in on time, so this semester I am working on some time management strategies."

6. READING WITH QUESTIONS -

   If you do not set goals for yourself as you read, you might start drifting off into a day-dream. One of the easiest ways of setting goals is to ask questions before, during and after reading.

   Before we get into specific questions, it is a good idea to think of some general reasons for reading. Here is a range of purpose for reading:

   - I want to learn it – to commit to memory.
   - I want to get the gist of it – to get a broad overview.
   - I want to be able to answer an exam question on the topic.

   Other more specific questions you need to ask are:

   - Do I need to read this?
   - Why am I reading it…will it help with my assignment?
   - Do I need to read all of it?
   - What is the best approach to dealing with this article?

   As you read a section of a book or article, look for information to help you answer:

   - Questions about the author's purpose.
     1. Why did they write it.
     2. For whom is the material intended?

- Questions about the content.
  1. On which aspects of the topic has the author chosen to concentrate and which to omit?
  2. What is the main argument or theme in the material?
  3. Is there any evidence of deliberate bias, such as choice of sources or interpretation of material?
  4. How are the contents related to what you know about the topic?

- Questions about the structure.
  1. How does the author introduce the subject?
  2. Are there summaries at the ends of each chapter?
  3. How does the conclusion relate to the introduction and to the rest of the material?

- Questions about the style and format.
  1. In what style has the material been written? For example, is it formal or informal, simple or complex, persuasive, narrative, or analytical?
  2. How does the style and format influence your reaction to the material?

READING STRATEGIES:

Below is a list of reading strategies to be used, 3 strategies may be enough to help make you a better reader. Your goal should be to develop a better reading system that will help you throughout your learning experience.

1. Read sitting up, with a good light, at a desk or table.
2. Keep background noise to a minimum. Loud rock and roll music will not make you a better reader.
3. The same goes for screaming kids, talking roommates, television or radio. Give yourself a quiet environment so that you can concentrate on the text.
4. Keep paper and pen within reach.
5. Before beginning to read, think about the purpose of the reading. Why has the teacher made this assignment? What are you supposed to get out of it? Jot down your thoughts.
6. Survey the reading. Look at the title of the piece, the sub-headings. What is in dark print or stands out? Are there illustrations or graphs?
7. Read the introduction and conclusion, then go back and read the whole assignment. Or read the first line in every paragraph to get an idea of how the ideas progress, then go back and read from the beginning.
8. Scan the entire reading, then focus on the most interesting or relevant parts to read in detail.
9. Pay attention to when you can skim and when you need to understand every word.
10. Write as you read. Take notes and talk back to the text. Explicate (explain in detail) and mark up the pages. Write down what interests you or bores you. Speculate about why.
11. If you get stuck in the reading, think and write about where you got stuck. Contemplate why that particular place was difficult and how you might break through the block.
12. Record and explore your confusion. Confusion is important because it's the first stage in understanding.
13. When the going gets difficult, and you do not understand the reading, slow down and reread sections.
14. Break long assignments into segments. Read 10 pages, then do something else. Later, read the next 10 pages and so on.
15. Read prefaces and summaries to learn important details about the book. Look at the table of contents for information about the structure and movement of ideas. Use the index to look up specific names, places, and ideas.
16. Translate difficult material into your own words. Create an alternative text.
17. Answer the questions at the end of the chapter.

18. Answer these questions in your own words. What is the author talking about? What does the author want me to get out of this?
19. Read the entire piece, then write one paragraph or one sentence summary.
20. Transcribe your notes in the book or handwritten notes into more formal notes on the computer. Turn your first notes into a list of ideas or a short essay.
21. Review the ideas in the text after you finish reading. Ask yourself questions to determine what you got out of the reading.
22. Mark up the text, bring it to class, and ask questions about what you do not understand.
23. Post an email to the class mailing list and ask for responses from the teacher and fellow students.
24. Consult another source. What does another author have to say on the same topic?
25. Disagree with the author. Become a devil's advocate. Remember, you do not have to believe an idea to argue about it.
26. Think about the text in three ways:
    a. Consider the text itself, the basic information right there on the page (this is the level of most high school readers and many college students).
    b. Next, think about what is between the lines, the conclusions and inferences the author means you to draw from the text.
    c. Finally, go beyond the thinking about the text. What creative, new, and different thoughts occur as you combine your knowledge and experiences with the ideas in the reading?

READING TEXTBOOKS:

Textbooks can be difficult to read because there is a lot of information crammed into each page. However, there are steps you can take to help you read, understand and retain the information.

1. First, you need to get an overview of the textbook.
    - Skim through the contents page, identifying the chapters that are likely to be useful to you. In many cases you will only need to deal with certain chapters.
    - Read any general introduction to the book. This often has summaries of the main ideas in each chapter, which will help you when you read the chapter later.

2. Once you get an overview, the more you know about what you are reading, the easier it will be to process it into your long-term memory.
    - Ask yourself what you already know about the topics covered in the chapter.
    - Also, ask yourself how this material fits into your course.
    - Survey what you are about to read by looking at the headings, subheadings, and any charts, graphs, or pictures.
    - Read the introduction for any summary information about the chapter.

3. Study the review questions if provided.

4. Read one paragraph at a time, and before you begin to read that paragraph look for a reason to read the paragraph. Use clues such as the heading or topic sentence. Do not mark as you read.

5. When you finish the paragraph, ask yourself a question about it. Write the question in the margin of your textbook.

6. Now mark the answer to the question by underlining, numbering, boxing, circling, etc. (only if it is your book, of course!).

7. Cover the text and asking yourself the question written in the margin. This will help to put the information into your long-term memory.

8. Recite the answer in your own words.

9. Now go to the next paragraph and continue the process.

It may take longer to read a chapter this way, but there are many advantages:

- You can read it a bit at a time and take advantage of short periods of time you usually waste or did not have for a whole chapter. For instance, you could do one or two paragraphs in the train or bus when traveling to and from the campus.
- You (almost) never have to re-read the chapter.
- You know possible test questions in advance.
- You have a systematic way to study your textbook.
- You are more likely to stay awake!

READING STRATEGIES – READING EFFICIENTLY BY READING INTELLIGENTLY:

Whether they are project documents, trade journals, blogs, business books or ebooks, most of us read regularly as part of our jobs, and to develop our skills and knowledge.

But do you ever read what should be a useful document, yet fail to gain any helpful information from it? Or, do you have to re-read something several times to get a full understanding of the content?

Think about What You Want to Know:

Before you start reading anything, ask yourself why you are reading it. Are you reading with a purpose, or just for pleasure?

Once you know your purpose, you can examine the resource to see whether it is going to help you.

For example, with a book, an easy way of doing this is to look at the introduction and the chapter headings. The introduction should let you know who the book is intended for, and what it covers. Chapter headings will give you an overall view of the structure of the subject.

Ask yourself whether the resource meets your needs, and try to work out if it will give you the right amount of knowledge. If you think that the resource is not ideal, do not waste time reading it.

Know How Deeply to Study the Material:

Where you only need the shallowest knowledge of a subject, you can skim material. Here you read only chapter headings, introductions, and summaries.

If you need a moderate level of information on a subject, then you can scan the text. This is when you read the chapter introductions and summaries in detail. You can then speed read the contents of the chapters, picking out and understanding key words and concepts. (When looking at material in this way, it is often worth paying attention to diagrams and graphs).

Only when you need full knowledge of a subject is it worth studying the text in detail. Here it is best to skim the material first to get an overview of the subject. This give you an understanding of its structure, into which you can then fit the detail gained from a full reading of the material. (SQ3R) is a good technique for getting a deep understanding of a text).

Read Actively:

When you are reading a document or book in detail, it helps if you practice "active reading" by highlighting and underlining key information, and taking notes as you progress. (Mind Maps are great for this). This emphasizes information in your mind, and helps you to review important points later.

Tip: If you are worried about damaging a book by marking it up, ask yourself how much your investment of time is worth. If the book is inexpensive, or if the benefit that you get from the book substantially exceeds its value, then do not worry too much about marking it. (Of course, only do this if it belongs to you).

Know How to Study Different Types of Materials:

Different types of documents hold information in different places and in different ways, and they have different depths and breadths of coverage.

By understanding the layout of the material you are reading, you can extract the information you want efficiently.

1. Magazines and Newspapers:
   These tend to give a fragmented coverage of an area. They will typically only concentrate on the most interesting and glamorous parts of a topic – this helps them boost circulation! As such, they will often ignore less interesting information that may be essential to a full understanding of a subject, and they may include low value content to "pad out" advertising.
   The most effective way to getting information from magazines is to scan the contents table or indexes and turn directly to interesting articles. If you find an article useful, then cut it out and file it in a folder specifically covering that sort of information. In this way you will build up sets of related articles that may begin to explain the subject.
   Tip: You can apply the same strategies to reading online versions of newspapers and magazines. However, you need to make sure that you do not get distracted by links to other, non-relevant material.

2. Reading Individual Articles:
   There are three main types of articles in magazines and newspapers:
   - News Articles – these are designed to explain the key points first, and then flesh these out with detail. So, the most important information is presented first, with information being less and less useful as the article progresses.
   - Opinion articles – these present a point of view. Here the most important information is contained in the introduction and the summary, with the middle of the article containing supporting arguments.
   - Feature Articles – these are written to provide entertainment or background on a subject. Typically the most important information is in the body of the text.

   Tip 1: Nowadays, you probably read many articles online. You can easily save links to these in a bookmark folder to reference later. Make sure that you title folders so that you can easily find the link again. For instance, you could have separate folders for project research, marketing, client prospects, trade information, and professional growth. Or, it might be helpful to title folders using the website or publication name.

   Tip 2: Remember that there are many online articles and electronic documents that were not originally designed to be read on a screen. (This will also include documents that are emailed to you). If you find it hard to read these on the screen, print them out. This is especially important for long or detailed documents.

Make Your Own Table of Contents:

When you are reading a document or book, it is easy to accept the **writer's structure of** thought. This means that you many not notice when important information has been left out, or that an irrelevant detail has been included.

An effective way to combat this is to make up your own table of contents before you start reading. Ask yourself what sections or topics you are expecting to see in this document, and what questions you want to have answered by the end of the text.

Although doing this before you start reading the document may sound like a strange strategy, it is useful, because it helps you spot holes in the author's argument. Writing out your own table of contents also helps you address your own questions, and think about what you are expecting to learn from the text.

Use Glossaries with Technical Documents:

If you are reading large amounts of difficult material, it may be useful to use or compile a glossary. Keep this beside you as you read.

It is also useful to note down the key concepts in your own words, and refer to these when necessary.

Further Reading Tips:

- The time when you read a document plays a role in how easy the reading will be, and how much information you will retain. If you need to read a text that is tedious, or requires a great deal of concentration, it is best to tackle it when you have the most energy in the day.
- Where you read is also important. Reading at night, in bed, does not work for many people because it makes them sleepy (which means that you may not remember the information). Everyone is different, however, so read in a place that is comfortable, free of distractions, and that has good light – this is important even if you are reading from a screen.
- It can be helpful to review the information when you have finished reading. When you are done, write a paragraph that explains, in your own words, what you just learned. Often, putting pen to paper can help strengthen your recall of new information, so that you retain it more effectively.

Key Points:

If you want to read more effectively, identify what you want to learn from each response you read, and know how deeply you want to study the material. And, consider "active reading" by making notes and marking-up the material as you go along. It is also useful to know how to study different types of material.

Making your own table of contents before you read material, and using glossaries for technical resources, are other useful reading strategies.

Remember that it takes practice to develop your reading skills – the more you use these strategies, the more effective you will become.

www.mindtools.com

SIX READING MYTHS:

Myth 1: I Have to Read Every Word –

Many of the words used in writing grammatically correct sentences actually convey no meaning. If, in reading, you exert as much effort in conceptualizing these meaningless words as you do important ones, you limit not only your reading speed but your comprehension as well.

Myth 2: Reading Once is Enough –

Skim once as rapidly as possible to determine the main idea and to identify those parts that need careful reading. Reread more carefully to plug the gaps in your knowledge.

Many college students feel that something must be wrong with their brain power if they must read a textbook chapter more than once. To be sure, there are students for whom one exposure to an idea in a basic course is enough, but they either have read extensively or have an excellent background or a high degree of interest in the subject.

For most students in most subjects, reading once is not enough. However, this is not to imply that an un-thinking Pavlovian-like rereading is necessary to understand and retain materials. Many students automatically regress or reread doggedly with a self-punishing attitude. ("I did not get a thing out of that paragraph the first time, so if I punish myself by rereading it maybe I will this time.") This is the hardest way to do it.

Good reading is selective reading. It involves selecting those sections that are relevant to your purpose in reading. Rather than automatically rereading, take a few seconds to quiz yourself on the material you have just read and then review those sections that are still unclear or confusing to you.

The most effective way of spending each study hour is to devote as little time as possible to reading and as much time as possible to testing yourself, reviewing, organizing, and relating the concepts and facts, mastering the technical terms, formulas, etc., and thinking of applications of the concepts-in short, spend your time learning ideas, not painfully processing words visually.

Myth 3: It is Sinful to Skip Passages in Reading –

Many college students feel that it is somehow sinful to skip passages in reading and to read rapidly. We are not sure just how this attitude develops, but, indeed, the educated person was one who could quote long passages from books from memory.

Today proliferation of books and printed matter brought about by the information explosion creates a reading problem for everyone. You must, of course, make daily decisions as to what is worth spending your time on, what can be glanced at or put aside for future perusal, and what can be relegated to the wastebasket.

Myth 4: Machines are Necessary to Improve My Reading Speed –

The best and most effective way to increase your reading rate is to consciously force yourself to read faster. If you find yourself in need of a pusher, use a 3x5 card as a pacer, or use your hand, or your finger. However, there is one caution you should observe if you try this. Be sure that your hand or finger or card is used to push, not merely to follow your eyes.

Myth 5: If I Skim or Read Too Rapidly My Comprehension Will Drop –

Many people refuse to push themselves faster in reading for fear that they will lose comprehension. However, research shows that there is little relationship between rate and comprehension Some students read rapidly and comprehend well, others read slowly and comprehend poorly. Whether you have good comprehension depends on whether you can extract and retain important ideas from your reading, not on how fast you read. If you can do this, you can also increase your speed.

If you concentrate on your purpose for reading - - e.g. locating main ideas and details, and forcing yourself to stick to the task of finding them quickly - - both speed and comprehension could increase. Your concern should be not with how fast you can get through a chapter, but with how quickly you can locate the facts and ideas that you need.

Myth 6: There is Something About My Eyes that Keeps Me from Reading Fast –

Of course, if you cannot focus your eyes at the reading distance, you will have trouble learning to skim and scan. Furthermore, if you have developed the habit of focusing your eyes too narrowly and looking at word parts, it will be harder for you to learn to sweep down a page of type rapidly.

Usually it is your brain, not your eyes, that slows you down in reading. Your eyes are capable of taking in more words than your brain is used to processing. If you sound out words as you read, you will probably read very slowly and have difficulty in skimming and scanning until you break this habit.

SPELLING STRATEGIES:

Imagery:

1. Look at the word and say each letter.
2. Close your eyes and visualize the word.
3. Cover the word and print it. Are you right?
4. Repeat step 3 two more times.

1. Look at the word and say each letter
2. Close your eyes. Pretend you see the word on the world's largest movie screen.
3. Pretend that you are nailing each letter to the screen. Say each letter as you nail it in.
4. Now pretend that you are pasting each letter to the screen. Say each letter as you paste it on.
5. Pretend that a floodlight is illuminating the letters so brightly that the word will always be shining in your mind.

Index Study Cards:

1. Copy the word on to the front of the card.
2. Mark visual cues such as small words or word parts (circle, underline, highlight).
3. Say and print the word in its parts.
4. Turn the card over. Write the word from memory and mark the visual cues again.
5. Cover the word and print it. Are you right? Do this two more times.
6. Add the card to your file box. Review the words 3 times a day until they are permanently filed in long-term memory.

Teaching and Learning, Diana Browning Wright

STEPS TO FOLLOW IN SKIMMING FOR MAIN IDEAS:

1. First, read the title of the chapter or selection carefully. Determine what clues it gives you as to what the selection is about. Watch for key words like "causes", "results", "effects", etc., and do not overlook signal words such as those suggesting controversy (e.g. "versus", "pros and cons"), which indicates that the author is planning to present both sides of an argument.

2. Look carefully at the headings and other organizational clues. These tip you off to the main points that the author wants you to learn. You may be accustomed to overlooking boldface headings and titles which are the obvious clues to the most important ideas. If you concentrate on the details and ignore the main ideas, you will have much more difficulty retaining the information you read.

   Remember that authors of college textbooks want you to recognize the important concepts. They use:
   a. Major headings and subheadings to convey major points.
   b. Italicized words and phrases so that crucial new terms and definitions will stand out.
   c. Lists of points set off by numbers or paragraphs that begin with the phrases such as "The three most important factors…" etc.
   d. Redundancy or repetition. By stating and restating the facts and ideas, the author ensures that you will be exposed in different ways to the concepts she feels are the most crucial for you to understand. She hopes that on at least one of these exposures you will absorb the idea. Therefore, it is vital that you recognize when an important concept is being restated in slightly different words and when you have completely mastered the idea.

THE PIVOTAL WORDS:

No words are as helpful while reading as the prepositions and conjunctions that guide our mind along the pathways of the author's ideas. A word like furthermore says, "Keep going!" However says, "Easy!" Master these words and phrases and you will almost immediately become a better reader, for they will whisper directions in your inner ear.

Additive Words:

These say, "Here is more of the same coming up. It is just as important as what we have already said.

also	further	moreover
and	furthermore	too
besides	in addition	

Equivalent Words:

They say, "It does what I have just said, but it does this too."

as well as	at the same time	similarly
equally important	likewise	

Amplification Words:

The author is saying, "I want to be sure that you understand my idea; so here is a specific instance."

for example (e.g.)	specifically	as
for instance	such as	like

Repetitive Words:

They say, “I said it once, but I am going to say it again in case you missed it the first time.”

again	in other words
to repeat	that is (i.e)

Contrast and Change Words:

“So far I have given you only one side of the story; now let us take a look at the other side.”

but	on the contrary	still
conversely	on the other hand	though
despite	instead of	yet
however	rather than	regardless
nevertheless	even though	whereas
in spite of	notwithstanding	

Cause and Effect Words:

“All this has happened; now I will tell you why.”

accordingly	since	then
because	so	thus
consequently	hence	therefore
for this reason		

Qualifying Words:

These say, “Here is what we can expect. These are the conditions we are working under.”

if	although	unless
providing	whenever	

Concession Words:

They say, “Okay! We agree on this much.”

accepting the data	granted that	of course

Emphasizing Words:

They say, “Wake up and take notice!”

above all	more important	indeed

Order Words:

The author is saying, “You keep your mind on reading: I will keep the numbers straight.”

finally	second	then
first	next	last

Time Words:

“Let us keep the record straight on who said what and especially when.”

afterwards	meanwhile	now
before	subsequently	presently
formerly	ultimately	previously
later		

Summarizing Words:

These say, “We have said many things so far. Let us stop here and pull them together.”

for these reasons	in brief
in conclusion	to sum up

TIPS ON UNDERLINING A TEXTBOOK:

I. TOOLS –
   A. Pen and straight edge
   B. Highlighter
   C. Note paper

II. PURPOSES –
   A. Study begins when you decide what you will learn. When you underline, you decide what you will learn.

   B. If you underline accurately, you will be able to review and make notes more easily.

III. GUIDELINES FOR UNDERLINING –
   A. Read an entire section first.

   B. Do not underline too much.

   C. Select information you want to learn to make into notes.

   D. Make major points stand out clearly.
      1. Use numbers.
      2. Use double underlining.
      3. Use stars.

   E. Make margin notes.
      1. Use key words.
      2. Use brief summaries.
      3. Make questions if you do not understand, so that you can return to that section.

   F. Realize that introductions rarely contain material that needs to be underlined.

G. Turn major headings and sub-headings into questions.
    1. Underline the condensed answer.
    2. Answers may include information in:
        - Topic sentences.
        - Words printed in special type.
        - Numbered lists.
        - Pay attention to and be aware of words in transition, introduction, conclusion, and definition (in other words, accordingly, since, then, of course, but, yet, more important, likewise, besides, for these reasons, subsequently, afterwards, that is, that means, etc.).

H. Should see major facts in an outline form.

I. Use brackets when several lines are important to underline.

J. Use numbers when a series of ideas are important.

K. Mark a question mark beside unclear sections of information.

L. Write down questions in your notebook for class that you have for the professor.

UNDERSTANDING STRUCTURE OF TEXT/BOOK/ARTICLE:

Understanding the structure of a text:

Understanding the structure of a text helps you to get a general idea or understanding of what the text is about, its specific contents, how it is organized and whether it is suitable for your needs.

Understanding the structure of a textbook:

To gain an understanding of a textbook's content and structure, you should look at the Table of Contents. Areas to look at include:

- Main parts
- Sections
- Chapters
- Chapter Topics
- Headings and Sub-headings
- Diagrams and Charts

Understanding the structure of an article:

To understand the structure of an article or other reading, look at the following sections:

- Abstract (will provide an outline of the article)
- Sections
- Headings and Sub-headings
- Charts and Diagrams

Determine relevance:

To determine if the text contains relevant information, you should ask yourself questions such as:

- What do I already know about this topic?
- What do I need to know about this topic?
- Can I find what I need to know in the Table of Contents, the index or through the structure of the reading?
- Are there specific areas, e.g. chapter or sub-headings, that match what I need to know?

USING YOUR TEXTBOOK:

When you purchase a new book, there are several things you should do automatically:

I. Look in the front:

1. Red and think about the table of contents.
    - This will show you the overall organization of the course and help identify what is important.
    - It will get you interested in the material.
2. Glance over any preface or foreword to see what the book is trying to do.
3. Consider the title. This is often a significant statement about the book's "slant". Do you know the author?

II. Look in the back:

1. Glance at the index. This is a listing of subject and pages upon which they can be found.
    - You can tell from the percentage of known and unknown words how difficult the text will be for you.
    - You can see with great precision what the course is concerned with.
    - You can look up specific items of interest.
    - As a review for tests, you can easily look up unknown items since the page number is given.
2. Is there a glossary listing unknown words and their definitions?
    - The main concern of many courses is to teach the vocabulary of the subject. This is a vital section, not something to be ignored.
    - Make a page tab out of scotch tape, and undertake to study and learn these words during the term. Use the tab for easy reference during time between classes – time which might otherwise be wasted.
3. Determine what other possibly useful materials are in the back – before you need them. You do not have to ream them now; just know that they exist.

III. Determine how a typical chapter is constructed.

(All of the other chapters will be put together the same way. If one chapter has a summary, they all will; if one chapter has questions, they all will).

- Use this knowledge when you have a reading assignment.
- Structure your approach accordingly.

IV. Do not be afraid to write in your textbook.

1. Write vocabulary words, condensations of ideas, personal reactions, etc.
2. Interact with the book the way you would interact with a person.
3. Your texts provide a valuable resource during and after your academic career.

Study Skills

- 10 Steps to Academic Success
- 12 Steps to Effective Studying
- Active Study
- Being a Successful Student, Attitude
- Being a Successful Student, Decision Making
- Being a Successful Student, Lessons Learned
- Editing Lecture Notes
- Eliminating Internal Distractions
- How to Memorize Other than Rote
- Memory Builders
- Motivation
- Setting Goals

THE OHIO STATE UNIVERSITY MANSFIELD

Study Skills

- SQ3R
- Staying Alert in Class
- Study Skills Assessment Tool
- Study Skills Checklist
- Success Behavior Check Sheet
- Successful Strategies for Solving Problems
- Ten Study Habits for Successful Students
- Weekly Flow Chart for Studying

THE OHIO STATE UNIVERSITY MANSFIELD

TEN STEPS TO ACADEMIC SUCCESS

1. Set individual academic and personal goals.

2. Choose courses carefully, especially during your first year.

3. Know and use resources.

4. Meet and get to know faculty.

5. Learn actively.

6. Manage your time well.

7. Know and actively use reading skills.

8. Develop strong listening and note-taking skills.

9. Develop and improve your writing and speaking skills.

10. Get involved in co-curricular activities; learn skills and gain experience.

12 STEPS FOR EFFECTIVE STUDYING:

Studying effectively is a process, not an event. The process leads to success.

1. Plan a definite time for studying every day. This will discourage procrastination and prevent a pile-up of work. Studying every day even for a short period of time, keeps you from falling behind. Prioritize your list and begin completing the most difficult material first.
2. Know the purpose of and understand each assignment before leaving class. If you understand what to do and how to do it, your study time will be shortened. Keep a record of all assignments in a special section of your notebook or on a separate calendar.
3. Predicting the amount of time you need for each assignment causes you to work smarter as well as harder and more productively. By keeping track of the actual amount of time you spend on your assignments, you are more likely to concentrate and less likely to become bored.
4. Time yourself to see how long it takes you to read five pages of your textbook. This will help you determine the amount of time needed to complete a reading assignment. Because a textbook is loaded with information, you may have to read some sections more than once. Even instructors have to reread material. Allow time for reflecting and thinking about what you have read.
5. Reading assignments are usually completed and due prior to the instructor lecturing on the material. Take a little time before class to review the material so you are ready to participate in class discussions and are prepared for any quizzes.
6. Adopt a textbook reading strategy, (like SQ4R), or whatever works for you. Pay attention to charts, diagrams, and special "boxed text" areas. They are definite aids to understanding the material.
7. Every time you study, spend at least ten minutes reviewing the material from your previous study session. These "refresher shots" are part of the secret for long-term memory retention. This habit of frequent review also results in less time needed for studying prior to a major exam.
8. Study during the day. You are probably less efficient at night.

9. Study for 30 to 40 minutes and then take a 5-minute break, or if your concentration and discipline will allow, study for 50 minutes and take a 10-minute break. Get up, walk around, stretch, drink some water, or eat a light snack. Taking regular breaks refreshes your mind so you can concentrate better, finish faster, and retain more.
10. If you do study at night set a "stopping time" for yourself. This "time frame" will encourage hard work in anticipation of the clock going off. You may even set a goal for yourself to complete an assignment before the time limit. This increased impetus may help you to concentrate.
11. Do not cram the night before a test. Distribute your review in half-hour segments over a period of days. If you do not adopt a structured study schedule, you will not master required course material and you will set yourself up to fail.
12. Learning is accumulative. New ideas must be incorporated with previous material from lectures, readings, and any other assignments such as labs. You have to continuously make the connection in your mind from new material to previously learned material and/or experiences. Putting it all together is easier if you schedule time daily to read, to think, to write, to reflect, and to review.

Improved learning is the natural result of this 12 Step approach to studying and effectively using your time.

Not having enough time to study means you lack organization, so by managing your time, you have control over your life and a chance to do more of what you want to do.

Know the percentages! We retain:

- 10% of what we read
- 20% of what you hear
- 30% of what we see
- 50% of what we see and hear
- 70% of what we talk about with others
- 80% of what we experience personally
- 95% of what we teach to others

academic.cuesta.edu

ACTIVE STUDY:

A. Introduction:

Learning takes time. Very few people have photographic memories. Learning requires repetition – meaningful repetition. This is why active study techniques are so vitally important. The "recording disk" of the brain accepts new material much faster if it "hears", "sees", "feels", "tastes", and detects motion (kinetic energy) during input or recording time. Then too, the more times around the learning circuit, the longer lasting the impression. If you are able to place abstract ideas into diagrammatic form, you will remember the concept.

B. Mnemonics:

Material that is difficult to master can be organized by finding the key words in each point, noting the first letter, and arranging the letters into a sense or nonsense word (the sillier, the better). Examples:

1. What are the qualities of a scientist? (mnemonic answer: PIPOC)
   P erserverance
   I ntelligence
   P atience
   O riginality
   C uriousity

2. Why did the U.S. enter World War 1? (mnemonic answer: SPRENCZ)
   S ubmarines, Germans lifted restrictions on use of
   P ropaganda, British control of
   R ussians overthrew the tsar
   E conomic ties of U.S. with Britain and France
   N eutrality, German violations of U.S.
   C ultural ties with Britain
   Z immerman telegram

   Note: in example 2, the student has devised a mnemonic based on key words. If you have a basic understanding of each point, you ought to be able to write a complete essay from the mnemonic SPRENCZ. Example 1, however, represents the type of mnemonic a student could use to learn a short list of items for an objective test. If you need to memorize a long list of items such as the state in the union, alphabetize and learn in small "chunks". You can always depend on the alphabet.

Break down a list, rearrange, put on a study card and master. In the example of learning the states of the union, it is easier to remember that there are four states whose names begin with "A", no "Bs", one "D", etc. then to try to memorize the list.

C. Study Cards:

In printing study cards, the student is using kinetic energy (energy in motion), thus making the impression stronger on the brain, and the student will be able to use the cards for overlearning. Another reason for having students make study cards is that they are convenient to carry and flip through for mastery. Reading the cards silently, however, is too passive. Go over the cards orally. A student will not master the cards by passively reading them. Learning requires the expenditure of energy. The student must be actively engaged in producing the sounds, using muscles and burning energy to make the sound.

D. Memory:

1. General points to consider:
    a. The student must focus his or her attention on whatever needs to be remembered. If you intend to remember something, you probably will.
    b. The student must be "sold" on the course. Why is this subject worth knowing? Correlative reading may enhance the student's interest. For example, historical novels are a marvelous way to learn history. The greater the knowledge, the greater the interest.
    c. Help the students classify and associate. Many authorities feel that you will master information faster if you learn in groups of seven or fewer at a time.
    d. Have the students overlearn through repetition.

BEING A SUCCESSFUL STUDENT:

Attitude, Not Ability, Will Determine Your Success in College

Do not think that intelligence (ability) will substitute for a good attitude, because it will NOT. Being bright is a gift that many people squander because of a bad attitude. Attitude, not ability, will determine your success.

SURVIVAL TIPS:

- Think like an advertiser. In advertising, the first thing the ad must do is tell the customers how the product or service will benefit them. Otherwise, it's nearly impossible to sell anything. Therefore, find the benefit to you by looking at the syllabus and discovering two or three issues that you find interesting. Focus on those for starters. Other benefits will follow.
- Look for long-term, not short-term benefits. As you begin to look for benefits, beware of shortsightedness. Students tend to look for instant gratification-what's in it for me. Take the long view to learning. Ask yourself, "What can history teach me?" "Will understanding the whys help me understand the whats?" the answer is absolutely…YES. What you learn in college helps prepare you to think through important issues and apply them to your daily life.
- Act like a baby-sitter. Pretend that you are counseling a younger brother/sister about a particular class and you sense a negative attitude. You want to tell them how important such a course is and why it should be taken seriously. What advice would you give them? By giving yourself good, solid advice, you teach yourself.
- Remember the Tortoise and the Hare. This is a corny story that you no doubt have heard since you were a child. But it is right on the money. The two, as you recall, were in a race. The hare should have won hands down, no sweat. But he took his talent (aptitude) for granted and underestimated a competitor with great attitude. Attitude beats aptitude every time.
- Avoid making negative comments about the course or the professor. Negative comments about people can become self-destructive. Making and repeating comments begins to program your thinking for good or bad. When you start down this negative path it's pretty hard to get back. I've seen students develop an "attitude" and then try to defend it long after everyone else has seen that it no longer makes sense. Keep your comments positive – they foster a positive attitude.

BEING A SUCCESSFUL STUDENT:

DECISION MAKING – LISTENING TO YOUR INSTINCTS

College is full of choices – some good, some bad. The choices abound: To study or not; to drink and drive or not; to cheat or not. My message to you is a takeoff on what the psychiatrist said: Do not do something unless you are prepared for the consequences of your actions.

SURVIVAL TIPS:

- Figure out how you make your best decisions. Most people decide either with their heads or their hearts. "Head" types decide based on the logic and the arguments for and against doing something much like a lawyer might. They weigh both sides of an issue and even internally argue both sides of the issues. Whichever seems the stronger of the two arguments wins. "Heart" types tend to use their gut as a basis to react to issues. They rely much more on their basic gut reactions to situations as a barometer. If things feel right, then this type of person can be assured that chances are good they are making the right decision. Both head and heart decision makers are very good at the process if they rely on their distinctive strengths.
- Test your decision with those who think differently than you. When you are about to decide on an issue that is important to you, get some counterpoint views from people who do not think like you. It is always better to test your ideas among friends and relatives before you expose your decision to the scrutiny of the world. Much less painful; much more constructive.
- Use the Red-Face Test. Ask yourself this one basic question: If I did this thing I am about to do, and it was reported on the front page of my local newspaper or put on the evening news, would I be embarrassed? If the answer is yes…then do not just walk from the situation, run from it. You will be glad you did.
- Find a sounding board. Everyone needs someone to listen to them. I once heard that psychiatrists and psychologists get about a 50% cure rate but that people who have a good friend they can talk to are cured at a rate over 70%. A good sounding board is vital to your mental health. Find one.
- When you make a bad decision, learn from it. Bad decisions are as much a part of life as breathing. Most people would "revise" some decisions in their lives, given the opportunity. The key is not that you make a bad decision here or there, but that you learn from it. You should mature from the experience.

BEING A SUCCESSFUL STUDENT:

IMPORTANT LESSONS ARE LEARNED FROM FAILURE

A conventional piece of wisdom says that most successful business people fail at least 3 times in their careers. That is because in order to be successful, you have to stretch, work outside your comfort zone, and take risks. Risks are scary but they also provide opportunities. So, if you are to be successful, you will be taking risks. Some ventures will fail – the nature of the beast. Learn and for goodness sake, do not stop taking risks.

SURVIVAL TIPS:

- Learn, do not burn. When you fail, learn from it by asking yourself why it happened. Was it a scheduling problem or something more fundamental like your writing or reading skills? The worst thing to do is sit in your room stewing about the course, the professor, your roommate, or the stars. Often when faced with a failure, people blame virtually everybody and everything else rather than face up to the fact that they alone are responsible.
- Do not be afraid to change your major. Do not do this lightly or without consulting people who care, but also do not be afraid to do it if you find a significant mismatch between you and your major.
- Keep a sense of humor. Above all things in college, as in life, keep your sense of humor and start by laughing at yourself. Failure can make us all deadly serious, as if our actions would change the course of generations to come. Get over it. Look at a misstep with humor. For your own health, learn to laugh.
- Great people fail. Great men and woman fail. They lose elections, fall from grace. In fact, there is an old saying, "What does not kill you makes you stronger." I believe that to be true in my experience.
- You cannot please everyone. One sure formula for failure is trying to please everyone around you. You have to define life and success for yourself. The definition of failure and success varies, and it is all relative. Keep yourself as the focus when drawing those boundaries.

EDITING LECTURE NOTES:

1. There are several good reasons for organizing and reviewing your notes as soon as possible after the lecture.
    - While the lecture is still fresh in your mind, you can fill in from memory examples and facts which you did not have time to write down during the lecture. Moreover, you can recall what parts of the lecture were unclear to you so that you can consult the lecturer, the graduate assistant, a classmate, your text, or additional readings for further information.
    - Immediate review results in better retention than review after a longer period of time. Unless a student reviews within 24 hours after the lecture or at least before the next lecture, his retention will drop; and he will be relearning rather than reviewing.
2. A method of annotation is usually preferable to recopying notes. The following suggestions for annotating may be helpful:
    - Use asterisks or other signal marks to indicate importance.
    - Use margins or blank pages for coordinating notes with the text. Perhaps indicate relevant pages of the text beside the corresponding information in the notes.
    - Use a key and a summary.
      a. Use one of the margins to keep a key to important names, formulas, dates, concepts, and the like. This forces you to anticipate questions of an objective nature and provides specific facts that you need to develop essays.
      b. Use the other margin to write a short summary of the topics on the page, relating the contents of the page to the whole lecture or to the lecture of the day before. Condensing the notes in this way not only helps you to learn them but also prepares you for the kind of thinking required on essay exams and many so-called “objective” exams.

ELIMINATING INTERNAL DISTRACTIONS:

Internal distracters are sources of distractions that originate from within the individual. They include disinterest, lack of motivation, and low self-esteem.

1. Overcome Disinterest:
    - Create interest by acquiring information about the subject from a variety of sources – lectures, texts, magazines, television, radio and other students.
    - Tying new information to old bodies of knowledge more relevant and more interesting.
    - Actively use new knowledge by asking questions, anticipating next steps, talking, and writing.
    - Make new information personal and relate it to matters of personal concern.
    - Use new knowledge in other classes.
    - Work with classmates to maintain interest in the subject or task.

2. Motivation:
    - Identify specific ambitions or goals that may be fulfilled through success in school or in a class.
    - Focus on the positive aspects of a course or an instructor.
    - Picture yourself being successful.
    - Make the information relevant to yourself personally.
    - Use new knowledge in novel ways.

3. Negative Self-Talk:
    - The inefficient learner tends to engage in negative self-talk.
    - Such students must become aware of this behavior and its implications.

4. Positive Self-Talk:
    - This is the process of making appropriate suggestions to oneself in order to positively influence how one feels.

ELIMINATING EXTERNAL DISTRACTIONS:

External distractions are sources of distractions that originate outside the student. They include environmental factors such as noise, people, objects, and odors. Other external distractions are related to poor time management, organization, and study skills. Personal problems are another external source of distraction.

1. Environmental Factors:
    - The area in which one studies should be free of distraction such as noise or the movement of people.
    - In the classroom, the student should find the "power center" of the room based on the instructor's actions. Sit where other active students are sitting.

2. Personal Problems:
    - Personal problems will occur, but they should remain outside the classroom/studying environment. Students can be encouraged to seek counseling and ways to relieve stress.

HOW TO MEMORIZE OTHER THAN ROTE:

The ex-basketball star Jerry Lucus was also a Phi Beta Kappa at Ohio State. He attributes his scholastic prowess to a memory system he developed. Lucus and Harry Lorayne (a memory expert) wrote The Memory Book. The following is a partial summary of their book.

1. Attempt to associate the material that you are trying to memorize with something that has a special meaning to you, or something you personally think is funny:
    - Ex.) How to memorize the "lines on the music staff, the treble clef (E,G,B,D,F). Make a word out of each letter, using the staff letter as the first letter of the word. Every Good Boy Does Fine."
2. "Assume you wanted to learn ten items in sequence: airplane, tree, envelope, earring, sing, baseball, salami, star, nose….All you need to do is form a ridiculous picture in your mind's eye - - an association between two things.."
    - Ex.) A giant tree is flying instead of an airplane, or an airplane is growing instead of a tree.
    - Continue with this process until you get through the entire list.
3. Try to associate things you know to things you do not know.
    - Ex.) People have remembered that Mount Fujiyama is 12,356 feet high by associating it to a calendar (12 months, 365 days in a year).
4. Try to "Link" bits of sequential information together. If one bit of information leads you to the next in your memorization, then you are "linking" properly.
    - Ex.) Attempt to see the things you are trying to memorize as being out of proportion (too big), in exaggerated numbers (too many), or with too much action (a dancing rock).
5. Try substituting familiar sounding words for those you are not familiar with.
    - Ex.) "can't elope – cantaloupe".

"The Memory Book", Jerry Lucus & Harry Lorayne

MEMORY BUILDERS:

Several factors aid memory; consider how you might apply them for yourself.

1. Motivated Interest:
    - Careful attention insures better memory. Do you think jumpers find it hard to learn how to use a parachute? Find something in a subject to keep you interested.
2. Meaningful Organizations:
    - A map, or outline structures memory in the present and future tense.
3. Selectivity:
    - "He hears what he wants to hear", indicates the effect of selective listening. The person or idea which is recalled usually has something special which made him/it stand out.
4. Intention to Remember:
    - Consider parts of a conversation you listen to carefully or completely space out. Which will be most likely remembered?
5. Basic Background:
    - Association of new facts and old is one sure way to build memory. If there is no old, the new will "catch" much more slowly. Also, this emphasizes the import of the review.
6. Recitation/Questioning:
    - Why do we remember songs on the radio so well? Of course, we hear them over and over. When we ask questions about a strange word in a song (or lecture) we are even more likely to remember.
7. Consolidation:
    - Pulling together new learning makes it more memorable. If we recognize that the person in the red hat and the person who lives on the corner are the same person, the association aids later recall.
8. Distributed Practice:
    - How often have you learned how to fix machinery, cook a meal, or play a game, only to forget the process later. Drill is boring but rewarding.

MOTIVATION:

Motivation has a strong influence on how well you do your job. Students often develop a "Slave Mentality". That is, they see themselves performing tasks which are required by their teachers but which are utterly meaningless to them.

In contrast, the students who see how their schoolwork fits into their plans for themselves become willing workers. It is quite true that "you can do anything you want to do" because wanting makes the necessary work easy.

Determination to work does not mean the same as motivation. "Will Power" will not work over a lengthy period of time. Yu can force yourself on occasion, but there are definite limits to the success of such an approach.

How to Gain Motivation:

1. Decide what you are trying to do in college. (You may need a counselor or other advisor to help with this, but that is why they are there). Find out exactly how you go about achieving what you want. (What classes are required. Equally important, what classes are not required. How long will it take you? How much will it cost?) With this information you can see the end of the tunnel. You can see yourself progressing, and you can avoid a lot of "wheel spinning."

2. Make college your job. Do not let the incidental business of earning a living and leading a social life interfere with your central task of getting through schools. If something must be neglected (and good planning can usually avoid this), then neglect something other than school. Your job is probably a short-term, dead-end proposition anyway. Do not get bumped out of school just to work 48 hours a week for the minimum wage.

    a. Real students own their own books, have a suitable place to work, and keep their materials conveniently available.
    b. Most distractions come from within you. If you have trouble concentrating, try to see what is bothering you and take steps to eliminate it. Most problems yield to direct action, but you must do the acting.

3. Set short-range goals.

    a. Analyze your study task. What do you want to achieve? How can it best be done?
    b. Set a definite time limit. You can get as much done in one hour as six if you know you must. Work expands to fit the time available.
    c. Evaluate your success or failure. You can learn best from making mistakes, provided you recognize that they are mistakes.

SETTING GOALS:

The Best Time for Setting Goals:

It does not matter when you begin to set goals. Some students will start at the beginning of the school year, others set goals after the New Year, but it does not matter when you start a new beginning. You may be prompted to set new goals for yourself for many reasons and at many times.

Setting Goals Like a P-R-O:

There are three major considerations when you set your goals that make up your P-R-O attitude:

- Be Positive.
- Be Realistic.
- Use Objectives.

Positive:

There are many books written about the power of positive thinking. Many people believe positive thinking is an essential factor when it comes to success, but it does not have anything to do with mystical powers or magic. Positive thoughts merely keep you on track and prevent you from holding yourself back in a negative funk.

When you set goals, concentrate on positive thoughts. Do not use words like "I will not fail algebra". That will only keep the notion of failure in your thoughts. Instead, use positive language:

- I will pass algebra with a "B" average.
- I will be accepted into three superior colleges.
- I will increase my SAT total scores by 100 points.

Realistic:

Do not set yourself up for disappointment by setting goals that you cannot realistically achieve. Failure can have a snowball effect. If you set a goal that is not attainable and miss the mark, you are likely to lose confidence in other areas.

For instance, if you fail a midterm in algebra and you resolve to improve your performance, do not set a goal of a final "A" grade overall if it is not mathematically possible.

Objectives:

Objectives are the tools you will use to reach your goals; they are sort of like the little sisters to your goals. Objectives are steps you take to ensure you stay on tract.

For Example:

- Goal: Passing algebra with a "B" average.
- Objective 1: I will review the pre-algebra lessons I learned last year.
- Objective 2: I will see a tutor every Wednesday night.
- Objective 3: I will mark every future test in my planner.

Your objectives must be measurable and clear – never wishy-washy. When you set goals and objectives, be sure to include a time limit. Goals should not be vague and unbounded.

SQ3R – A READING AND STUDY SKILL SYSTEM:

A. SURVEY – gather the information necessary to focus and formulate goals.
   1. Read the title – help your mind prepare to receive the subject at hand.
   2. Read the introduction and/or summary – orient yourself to how this chapter fits the author's purposes, and focus on the author's statement of most important points.
   3. Notice each boldface heading and subheading – organize your mind before you begin to read – build a structure for the thoughts and details to come.
   4. Notice any graphics – charts, maps, diagrams, etc. are there to make a point – do not miss them.
   5. Notice reading aids – italics, bold face print, chapter objectives, end-of-chapter questions are all included to help you sort, comprehend, and remember.

B. QUESTION – help your mind engage and concentrate.
   One section at a time, turn the boldface heading into as many questions as you think will be answered in that section. The better the questions, the better your comprehension is likely to be. You may always add further questions as you proceed. When your mind is actively searching for answers to questions it becomes engaged in learning.

C. READ – fill in the information around the mental structures you have been building.
   Read each section (one at a time) with your questions in mind. Look for the answers, and notice if you need to make up some new questions.

D. RECITE – retrain your mind to concentrate and learn as it reads.
   After each section – stop, recall your questions, and see if you can answer them from memory. If not, look back again (as often as necessary) but do not go on to the next section until you can recite.

E. REVIEW – refine your mental organization and begin building memory.
   Once you have finished the entire chapter using the preceding steps, go back over all the questions from all the headings. See if you can still answer them. If not, look back and refresh your memory, then continue.

   REMEMBER: THE INFORMATION YOU GAIN FROM READING IS IMPORTANT. IF YOU JUST "DO IT" WITHOUT LEARNING SOMETHING, YOU ARE WASTING A LOT OF TIME. TRAIN YOUR MIND TO LEARN!!!!

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STAYING ALERT IN CLASS:

- Be prepared and organized for class.
- Get motivated for class and develop an interest in the subject matter.
- Get adequate rest so you are not tempted to sleep in class.
- Sit where the action is; select an appropriate seat.
- Be an "opportunist", finding areas of common interest between you and the instructor.
- Ask yourself, "Why is this information important?" and "How will it help me?"
- Identify the speaker's purpose and adapt to it. Is the aim to inform, persuade, or entertain?
- Listen for central themes rather than for isolated facts. Make connections between the facts and themes or among different themes even if the instructor doesn't do so explicitly.
- Work on note taking skills.
- Keep active during class. Take notes constantly. Ask questions and answer questions. During lag times in the lecture you can write questions in your notes, underline important terms and concepts, or relate the lecture material to the readings.
- Plan to summarize the content of the lecture within 8 hours; work with a friend if necessary.
- If all else fails, take deep breaths to increase oxygen flow. Or, remove one shoe. This sets up a temperature difference in your body that can help to keep you alert.

STAYING ALERT WHILE READING:

- Get adequate rest so you are not tempted to fall asleep.
- Try the SQ3R strategy or the Skim-Read-Review strategy for reading.
- Work for short intervals of time and take breaks between intervals.
- Mix up your subjects or assignments to avoid boredom.
- Reward yourself for completing the reading.

STUDY SKILLS ASSESSMENT TOOL:

Discover Your Strengths and Weaknesses

Good study skills can make a big difference in your school performance. Even if you find a particular subject difficult to understand, you will find that being organized and knowing how to tap in to your natural strengths can add valuable points to your scores.

Use the assessment tool below to determine your score. Mark each topic with a score from 1 to 5, with 5 meaning "strongly agree" and 1 meaning "strongly disagree".

1. I have a specific study space.
   Score ___
   Students are different. Some need a completely quiet room free from interruptions when they study, but others actually study better listening to quiet music in the background or taking several breaks. Either way, you should establish a regular time and place for studying. Take the time to assess your real needs and establish a clear routine.

2. I know my best learning style.
   Score __
   Do you learn better by seeing, hearing, or acting out the information you receive? In other words, are you a mostly visual, auditory, or kinesthetic learner? Actually, everybody learns by mixture of methods, but one method or type is usually dominant in each person. By determining your dominant learning style you can improve your memory and your grades.

3. I use a student planner.
   Score __
   "The paper was due today?"
   We've all been there at some point. Somehow, the assignment due date just slipped right up on us without our noticing. That is why organizational skills are so important to school performance. Who can afford to score a big fat "O" on a paper, just because we got lazy and did not pay attention to the due date? By using a student planner, you can avoid costly mistakes like this!

4. I maintain healthy sleep habits.
   Score __
   According to a study by sleep expert Mary Carskadon, PhD, teens should receive more than nine hours of sleep every night. That is a great thought, but is it possible? Think about it – do you sleep that long?

5. I always eat breakfast.
   Score __
   If you are facing an important test, this might be a good time to change your eating habits. Studies have shown that eating a good breakfast can actually enhance your performance on a test. One study in particular shows that "Breakfast consumption has a short-term effect in improving selected learning skills, especially work memory."

6. I use color to stay organized.
   Score __
   When you organize your homework, you can improve your study habits and your grades. One way to do this is to use color-coded supplies, like folders, highlighters, stickers, and flags of various colors. Simply assign a certain color for each specific class, and stick to the rules you establish!

7. I have a handle on procrastination.
   Score __
   Do you procrastinate? Most of us put things off from time to time, like studying for a test or starting on lengthy research papers. But giving in to diversions can really hurt us in the long run. Do you recognize the signs of procrastination?

8. I remember my homework every day.
   Score __
   I left my homework at home! How many times have you said this? It is a terrible feeling to know you are going to get a failing grade on homework after you actually did the work. It seems so unfair! There are ways to prevent this dilemma and others, but you must be willing to prepare ahead of time to save yourself from future headaches.

9. I study for every test.

   Score __

   Believe it or not, some students never study before a test. Do you study effectively for every test? If you are looking for a good way to study, try this tip: Next time you are facing a big exam, try concentrating on essay topics. Essay questions are based on themes and overall ideas. Teachers like to use essay questions because they give students the opportunity to express everything they have learned over the weeks or months, using their own words. Essay test answers reveal more than the bare facts, though. When submitting essay answers, students are expected to cover lots of information in an organized, sensible manner.

10. I am always prepared for test days.

    Score __

    The key to battling test-day jitters is thorough preparation! But full preparation means more than knowing the test material. It is important to prepare your mind and body for the experience of working under pressure.

    Now add up all your scores for a total. How did you do?

    A total score of 30-50: You have very strong study skills. Congratulations! You know your strengths and use them. You also have great organization skills.
    A total score of 20-29: You use some of your strengths, but you could improve your performance by sharpening some of your skills.
    Below 20: You may not be performing up to your true potential. By learning to get organized, or by learning more about your personal learning style, you could improve your grades!

STUDY SKILLS CHECKLIST:

Read each statement and consider how it applies to you. If it does apply to you, circle Yes. If it does not apply to you, circle No. The purpose of this inventory is to find out about your own study habits and attitudes.

1. Yes or No, I spend too much time for what I am learning.
2. Yes or No, I usually spend hours cramming the night before an exam.
3. Yes or No, If I spend as much time on my social activities as I want to, I do not have enough time left to study, or when I study enough, I do not have time for a social life.
4. Yes or No, I usually try to study with the radio and TV turned on.
5. Yes or No, I cannot sit and study for long periods of time without becoming tired or distracted.
6. Yes or No, I go to class, but I usually doodle, daydream, or fall asleep.
7. Yes or No, My class notes are sometimes difficult to understand later.
8. Yes or No, I usually seem to get the wrong material into my class notes.
9. Yes or No, I do not review my class notes periodically throughout the semester in preparation for tests.
10. Yes or No, When I get to the end of a chapter, I cannot remember what I have just read.
11. Yes or No, I do not know how to pick out what is important in the text.
12. Yes or No, I lose a lot of points on essay tests even when I know the material well.
13. Yes or No, I study enough for my test, but when I get there my mind goes blank.
14. Yes or No, I often study in a haphazard, disorganized way under the threat of the next test.
15. Yes or No, I often find myself getting lost in the details of reading and have trouble identifying the main ideas.
16. Yes or No, I rarely change my reading speed in response to the difficulty level of the selection, or my familiarity with the content.
17. Yes or No, I cannot keep up with my reading assignments, and then I have to cram the night before a test.
18. Yes or No, I often wish that I could read faster.
19. Yes or No, When my teachers assign papers I feel so overwhelmed that I cannot get started.
20. Yes of No, I usually write my papers the night before they are due.
21. Yes or No, I cannot seem to organize my thoughts into a paper that makes sense.

ucc.vt.edu/stdysk/checklis.html

Success Behavior Check Sheet

Successful behavior often begins with the recognition of personal goals, strengths, and weaknesses. Provided below are fifteen identified behaviors which can help in achieving academic success. One can use this list as a check sheet for monitoring successful behaviors.

1.	**Identify your goals, strengths, and weaknesses.**
2.	**Identify your campus help resources to build on your strengths and work on overcoming your weaknesses.**
3.	**Arrange text and required materials before classes meet.**
4.	**Build a study plan, including when and how much youll need to study to meet your goals.**
5.	**Go to every class.**
6.	**Sit in the front row and keep your mind actively on your learning goals, as well as those of the instructor and the course.**
7.	**Take good notes, and use them to identify questions of importance to you.**
8.	**Actively develop questions about course content to clarify your understanding.**
9.	**Participate in class discussions, to try out your own understanding of concepts and to raise questions of importance to you.**
10.	**Study with a study partner, going over key points, clarifying difficult areas and discussing Points that might come up on the exam.**
11.	**Build a study plan for tests.**
12.	**Dont miss quizzes or tests.**
13.	**Hand in assignments on time.**
14.	**Hand in assignments that are neat and legible.**
15.	**Use your campus help resources through the term, not just before important tests.**

SUCCESSFUL STRATEGIES FOR SOLVING PROBLEMS ON ASSIGNMENTS:

Solving complex problems is a challenging task and warrants ongoing effort throughout your career. A number of approaches that expert problem-solvers find useful are summarized below, and you may find these strategies helpful in your own work. Any quantitative problem, whether in economics, science, or engineering, requires a two-step approach: analyze, then compute. Jumping directly to "number-crunching" without thinking through the logic of the problem is counter-productive. Conversely, analyzing a problem and then computing carelessly will not result in the right answer either. So, think first, calculate, and always check your results. And remember, attitude matters. Approach solving a problem as something that you know you can do, rather than something you think that you cannot do. Very few of us can see the answer to a problem without working through various approaches first.

Analysis Stage:

- Read the problem carefully at least twice, aloud if possible, then restate the problem in your own words.
- Write down all the information that you know in the problem and separate, if necessary, the "givens" from the "constraints".
- Think about what can be done with the information that is given. What are some relationships within the information given? What does this particular problem have in common conceptually with course material or other questions that you have solved?
- Draw pictures or graphs to help you sort through what is really going on in the problem. These will help you recall related course material that will help you solve the problem. However, be sure to check that the assumptions underlying the picture or graph you have drawn are the same as the assumptions made in the problem. If they are not, you will need to take this into consideration when setting up your approach.

Computing Stage:

- If the actual numbers involved in the problem are too large, small, or abstract, and seem to be getting in the way of your thinking, substitute simple numbers and plan your approach. Then, once you get an understanding of the concepts in the problem, you can go back to the numbers given.
- Once you have a plan, do the necessary calculations. If you think of a simpler or more elegant approach, you can try it afterwards and use it as a check of your logic. Be careful about changing your approach in the middle of a problem. You can inadvertently include some incorrect or inapplicable assumptions from the prior plan.

- Throughout the computing stage, pause periodically to be sure that you understand the intuition behind each concept in the problem. Doing this will not only strengthen your understanding of the material, but it will also help you in solving other problems that also focus on those concepts.
- Resist the temptation to consult the answer key before you have finished the problem. Problems often look logical when someone else does them; that recognition does not require the same knowledge as solving the problem yourself. Likewise, when soliciting help from the course head, ask for direction or a helpful tip only – avoid having them work the problem for you. This approach will help ensure that you really understand the problem – an essential prerequisite for successfully solving problems on exams and quizzes where no outside help is available.
- Check your results. Does the answer make sense given the information you have and the concepts involved? Does the answer make sense in the real world? Are the units reasonable? Are the units the ones specified in the problem? If you substitute your answer for the unknown in the problem, does it fit the criteria given? Does your answer fit within the range of an estimate that you made prior to calculating the result? One especially effective way to check your results is to work with a study partner or group. Discussing various options for a problem can help you uncover both computational errors and errors in your thinking about the problem. Before doing this, of course, make sure that working with someone else is acceptable to your course instructor.
- Ask yourself why this question is important. Lectures, precepts, problem sets, and exams are all intended to increase your knowledge of the subject. Thinking about the connection between a problem and the rest of the course material will strengthen your overall understanding.

THE TEN STUDY HABITS OF SUCCESSFUL STUDENTS:

Successful students have good study habits. They apply these habits to all of their classes.

Successful students:

1. Try not to do too much studying at one time.
   If you try to do too much studying at one time, you will tire and your studying will not be very effective. Space the work you have to do over shorter periods of time. Taking short breaks will restore your mental energy.

2. Plan specific times for studying.
   Study time is any time you are doing something related to schoolwork. It can be completing assigned reading, working on a paper or project, or studying for a test. Schedule specific times throughout the week for your study time.

3. Try to study at the same times each day.
   Studying at the same times each day establishes a routing that becomes a regular part of your life, just like sleeping and eating. When a scheduled study time comes up during the day, you will be mentally prepared to begin studying.

4. Set specific goals for their study times.
   Goals will help you stay focused and monitor your progress. Simply sitting down to study has little value. You must be very clear about what you want to accomplish during your study times.

5. Start studying when planned.
   You may delay starting your studying because you do not like an assignment or think it is too hard. A delay in studying is called "procrastination". If you procrastinate for any reason, you will find it difficult to get everything done when you need to. You may rush to make up the time you wasted getting started, resulting in careless work and errors.

6. Work on the assignment they find most difficult first.
   Your most difficult assignment will require the most effort. Start with your most difficult assignments since this is when you have the most energy.

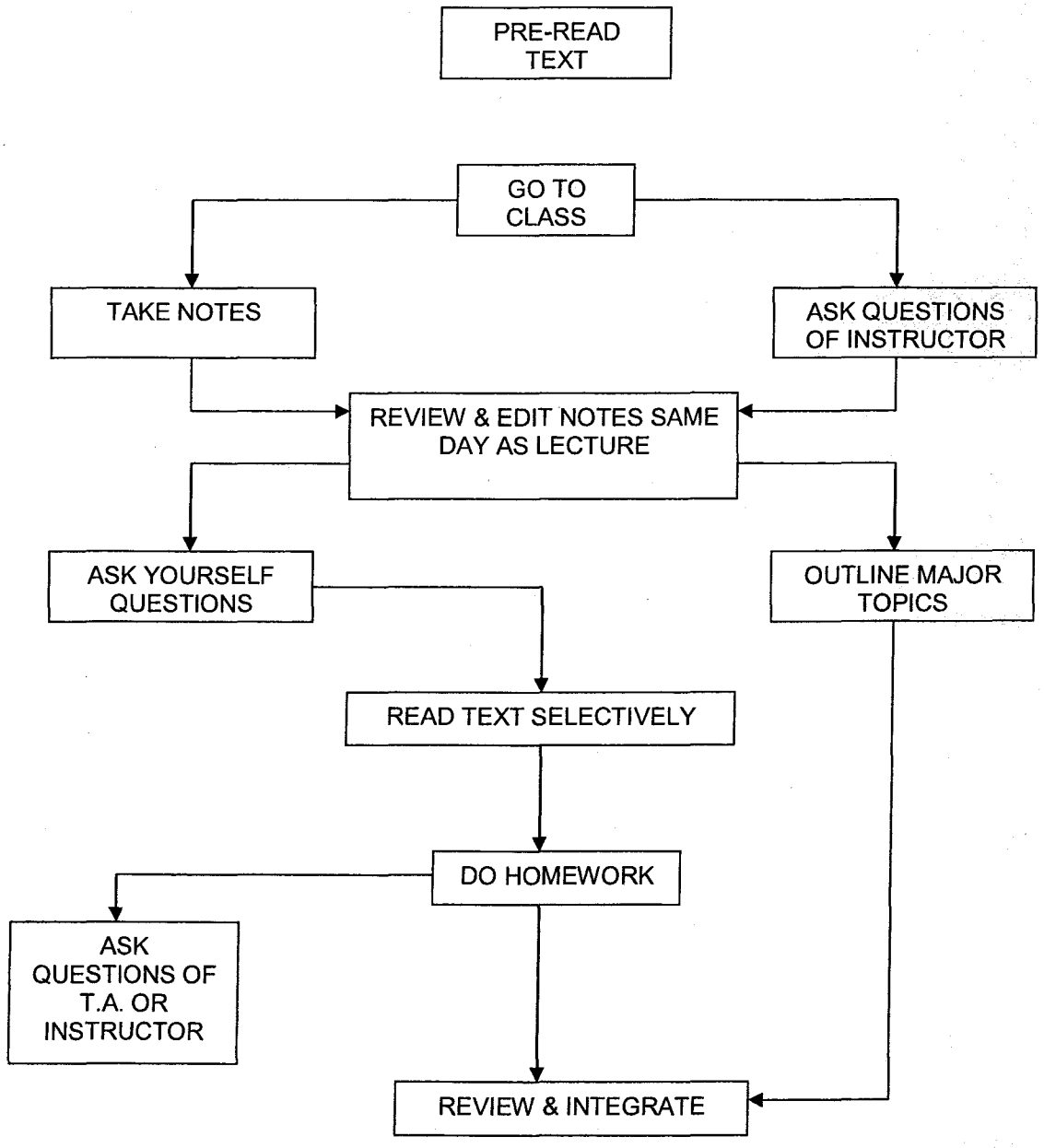
7. Review their notes before beginning an assignment.
   Reviewing your notes can help you make sure you are doing an assignment correctly. Also, your notes may include information that will help you complete an assignment.

8. Tell their friends not to call them during their study times.
   Two study problems can occur if your friends call you during your study times. First, your work is interrupted. It is not that easy to get back to what you were doing. Second, your friends may talk about things that will distract you from what you need to do. Here is a simple idea – turn off your cell phone during study times.

9. Call another student when they have difficulty with an assignment.
   This is a case where "two heads are better than one."

10. Review their schoolwork over the weekend.
    Yes, weekends should be fun time. But there is also time to do some review. This will help you be ready to go on Monday morning when another school week begins.

A WEEKLY FLOW CHART FOR STUDYING



Test Taking

- General Test Taking Strategies
- Test Preparation & Test Taking Strategies
- Essay Tests
- Fill-In/Short Answer Tests
- Identify & Explain Tests
- Matching Tests
- Multiple Choice Tests
- Number Problems
- Open Book Tests
- Oral Tests
- Quantitative Math Test Preparation Tips
- Standardized Tests

Test Taking

- Take Home Tests
- True-False Tests
- Verbal Analogy Tests
- Vocabulary
- After the Test

TEST TAKING:

General Things to Know:

- When and where is the test?
- What chapters or topics will be covered?
- What types of questions will be asked?
- What the instructor looks for in answers.
- Is it open-or-closed book?
- What supplies are needed?
- Who will administer the test?
- Who will grade the test?
- How the test will be graded.

1. Study in the Testing Room:
   Work in the test room in order to become comfortable with those surroundings, especially if the testing room is not the usual lecture or lab room. Visit the test room often to review for the exam or complete homework assignments.

   Find a desk in the room where you want to sit during the test. Pick a seat away from sources of distraction like wall charts or maps, aisles, doors, and windows. The seat should be in a well-lit and well-ventilated section of the room. Arrive early enough at the test to get that desk.

   To insure your comfort during the test, take note of the room temperature and dress accordingly. Check if there is a clock in the room; if not, plan to wear a watch to the test.
2. Prepare Mentally:
   Bolster your confidence by reflecting on past exam successes and your pre-test preparation. Avoid worrying about what other students are doing.

   Picture yourself in the testing situation. Imagine you are calm, cool and collected. Picture yourself scanning the test, knowing all the answers, and turning in a passing test.

   Use relaxation techniques to quell feelings of anxiety. Avoid depressing or infuriating situations before the test. Get psyched up by listening to your favorite music.

3. Assemble the Necessary Supplies:
   Gather and organize all the supplies you will need the night before the test. This includes pens, sharpened pencils, eraser, paper or blue books, calculator, ruler, student ID card, and watch. Organize notes of formula lists if these study materials may be used during the test.

In the Test Room:

Some students become anxious in the test room, waiting for the exams to be distributed. This is the time when good students will brag about their preparation and poor students will moan about the impending failure. Timing and mental preparation are vital at this stage.

1. Arrive on Time:
   Arrive at the testing room in enough time to get the seat you want to get relaxed. But don't arrive so early that you have time to become anxious.

   If you have an early exam or have trouble waking up, make arrangements to insure that you arrive at the test on time. Set two clocks, with the second set to go off soon after the first. Use one battery-operated or wind-up clock in case there is a power outage. Ask friends or family members to call you to ensure you are awake.

   If you are commuting, plan to arrive at the testing room one hour ahead of time. Then if you have car trouble, you have time to enact an alternate plan (bus, taxi, or friend) to get to the test.

2. Prepare Mentally:
   Don't resist the test, even if you believe tests are useless and unnecessary. Instead, bolster your confidence by reminding yourself about your effective test preparation and your past successes. Use relaxation techniques to calm any anxieties. Concentrate, and block out all distractions. Ignore others as they vent their worries or boast about their knowledge. Listen to a headset if necessary.

TEST TAKING-GENERAL STRATEGIES:

The seven strategies discussed in this section may be used for most types of tests in nearly every subject. They are arranged in the order in which they should be used when taking a test. The strategies should become part of every student's test-taking plan.

1. Dump Information:
   Information dumping refers to quickly writing down all information that one feels he/she may forget or confuse as the test is completed. If you fear you will forget or confuse names, dates, formulas, statistics, etc., dump that information on the back of the test as soon as you receive it. It is also helpful to dump mnemonics, organizational aids, and other memory devices as soon as possible. Refer to the "dumped" information when answering questions.

2. Read the Directions:
   Very carefully read the directions for all sections of the test. Pay special attention to words like "and", "or", "have to", "may", and "best". For example, are you to "answer questions A and B" or "answer question A or B"? Are you to "circle the best answer" or "circle the correct answer"? Take note of what questions are to be answered, if answers may be used more than once, or if there is more than one answer for each question.

   Break up complicated directions and run-on sentences into smaller parts. Flag tricky directions by circling or underlining them so you don't forget to follow them carefully. For example, are answers to be written on blanks or circled? Are multiple choice answers to be written in upper or lower case letters? Some instructors are sticklers and will deduct points if answers are not in the designated place or form.

   Take note of how questions will be scored. Most often only those questions answered correctly will be used to calculate the score. But some tests, like standardized tests, penalize the student for incorrect answers and scores are calculated by subtracting the number wrong from the number right. Another thing to note is if partial credit is given. Use all supporting material indicated in the directions: notes, scrap paper, calculator, etc. Don't be arrogant and try to do even simple math in your head; that's the way "stupid mistakes" are made.

3. Scan the Test:

   After reading the directions, quickly scan the entire test. Take note of the types of questions: essay, true-false, matching, etc. Pay particular attention to the number of questions and the amount of information required to answer each. Look at the point values for each section or question. Quickly categorize sections as easy or difficult, and jot down a note in the margin next to each section.

   Decide if the exam is a "speed test" or an "accuracy test". Speed tests are tests that only the best students will be able to finish in time. Most standardized tests (e.g. ACT, SAT,GRE) are speed tests. Accuracy tests are tests that average students should have time to finish. Most exams encountered in school are accuracy tests, on which students are graded for content and organization.

4. Develop a Plan:

   The next step involves quickly developing a plan for completing the exam. Budget your time for completing each section or question, and stick to your schedule. For speed tests, allow equal time for each section or question. For accuracy tests, spend more time on the questions worth the most points. Leave the time-wasting, lower-point questions for last.

   Start with the easy questions, with the material you know the best, or the type of question (essay, true-false, multiple choice, etc.) on which you do the best. However, if you start with the questions you know the most about, be careful not to go overboard and spend too much time on them.

   Plan to give more information in the answers to the higher-point questions than in the answers to the lower-point questions. Budget time for checking your answers or filling in blanks. Check your watch or the clock constantly, after every section or each page for example, to make sure you stay on schedule. Plan to use the entire time period allowed for the exam; there is no sense in rushing through the test.

5. Read the Questions Carefully:

   Don't skip sample questions and answers, because they may give you clues as to what the instructor expects or how answers should be marked or organized. Break down complicated questions into more manageable parts and then work on each part individually. Number each part to make sure all of them are answered. Ask the instructor to interpret or reword a question if you don't understand it. Don't over interpret the questions or look for hidden meanings.

6. Make Educated Guesses:

   If you don't know the answer to a question right away, circle the question and go back to it later after you have worked through the entire test once. If you labor over something you don't know, you're wasting precious time. However, avoid rereading questions over and over again as that wastes time too.

   When the answer is not clear, look for clues in the questions and the answer choice (for multiple choice or matching). Clues include grammar (only the correct answer is grammatically correct), verb tense (past, present or future tenses should match between question and answer), word type (noun versus verb), and singular versus plural (should match between question and answer). Substitute simple words for difficult or unknown words in the question and answers. Use context clues or your knowledge of word elements to decipher words. Look for content clues in other test questions.

   If two answers look correct; and the directions indicate that there is only one correct answer for each question, pick the most obvious answer. If no answer seems to be quite right, pick the closest one. If all else fails, make a guess at the answer. Guessing pays off if you are not penalized for incorrect answers or if partial credit is given.

7. Watch Out for Careless Errors:

   Reread the directions to make sure you have completed each section of the test correctly. Then reread the questions to make sure you read them accurately and understand what they are asking.

   Double-check your answers after you have completed the test and the pressure is reduced. Reread answers to make sure that you wrote what you intended to write and that you answered all parts of the question.

   Be sure that all numbers (especially "2" and "5", "4", and "9") and letters (especially "a", and "d", "t", and "f") are clearly legible. Double check any math calculations, using a different method if possible. Always use a calculator if permitted.

   Make sure all answers are in the right places. Be sure all questions have an answer, even if it is just a guess (unless you are penalized for wrong answers).

TEST PREPARATION AND TEST TAKING STRATEGIES:

-USING THE SUBJECT HISTORY AS AN EXAMPLE

1. **Study Guides-**
   Study guides summarize the key terms, concepts, people, dates and events to be learned for an exam. The material may be organized by type of information like terms.
   Example:
   East Asian History
   Terms:
   - Ethnocentrism
   - Samuri
   - Kamikaze
   - Daimyo
   - Extraterritoriality

   People:

   - Ch'ien Lung
   - Tzu His
   - Konoye
   - Yamashita
   - Tokugawa Teyasu

   Events:

   - 100 Days of Reform
   - The Long March
   - Let 100 Flowers Bloom
   - Cultural Revolution
   - The Meiji Restoration
   - Siberian Intervention
2. **Practice Questions-**
   One of the best ways to prepare for history tests is to make up and answer practice questions. Find out what types of questions will be asked, and work individually or in groups to form and respond to sample questions.

3. **Identification Questions-**
   For identification questions, develop lists of significant terms, people, events, places, policies, dates, concepts. Refer to the lecture notes for key terms (they should be in the recall column if the Cornell Method of note taking is used), and look in the book for highlighted items or end-of-chapter term lists. Organize the definitions, contributions, and explanations for the key items using flash cards, running concept lists, or another organizational tool. Use visual elaboration, visual imagery, and other memory strategies to encode the information.
4. **Essay Questions-**
   A number of strategies are available for essay questions. First, try turning the section headings of each chapter into questions. If the reading grid approach was used while reading, this task becomes relatively simple. Rephrase the topic heading in each cell of the grid into a question, and the answer should already be summarized in the box.

   Second, look at the end of each chapter for review questions from the reading. Questions for discussion at the end of each chapter are also candidates for exams. Consider how they would be answered as well.

   Third, history instructors often ask questions related to temporal and spatial frames. Even more common are questions dealing with cause and effect relationships, generalizations, comparison of historical events or people, and interpretations. Below are summarized a number of guiding questions that may be formed into practice essay questions specific to the content of a history course.
   - What were the events leading up to X?
   - Which of the events caused X to happen?
   - What were outcomes and effects growing out of these events?
   - Did event X cause event Y?
   - What evidence do we have to support this hypothesis?
   - What was the long-term significance of these events?
   - How extensive is the evidence?
   - How biased are the sources?
   - What are other interpretations of the evidence?

5. **Test Taking-**

Several general test taking strategies should be employed for history exams. For instance, information that may be forgotten or confused should be dumped immediately upon receiving the test. Be sure to carefully read directions, taking note of the number of questions to be answered and their point values. Skim the questions and develop a plan for answering them in the allotted time; don't be caught with questions to answer when time expires. Outline the answers before writing them.

When answering essay questions, be sure to demonstrate your understanding of the temporal and spatial frameworks of the events and people with plenty of examples, supporting evidence, and illustrations if appropriate. Demonstrate your understanding of cause and effect relationships, general patterns across time and space, and similarities and differences between events and people.

When specific details and examples are not recalled, try to use estimations instead. For example, if you forget the exact year of the fall of the Aztec Empire, at least write that it was in the 1530's or the early 16^{th} century. If you forget that the treaty ending the Civil War was signed in Appomattox, at least write that the event took place in Virginia.

Essays should always begin with summary sentences to introduce the main points of the answer. Examples are:

- This was essentially a period of westward migration.
- This was an era of conquest.
- This was a 160 year span of intense intolerance.
- This was a period when peoples of Eastern Europe threw off the yoke of communism and sought freedom.
- This was a period in his life when he became intensely interested in the world outside of himself.

ESSAY TESTS:

Essay tests are common in college-level courses, especially in the humanities and sciences. They allow instructors to test student's abilities in remembering, organizing, and evaluating information. Essays are considered relatively subjective questions, because there is no one specific answer that is correct. Though the instructor usually looks for certain points to be made in the answer, there are varying degrees of correctness. Sometimes instructors will accept as correct some answers that diverge from common interpretations, as long as the answers are logically and substantively supported.

The following strategies for taking essay tests are presented in the chronological order they should be used before and during the exam:

1. Pre-Test Preparation:
   Before the test, practice writing answers to sample essay questions. Make up your own questions, or consult the textbook or workbook for sample questions. Work with another student to write questions for each other. When answering sample essay questions, give yourself the same amount of time you will have during the actual test. Don't refer to your study materials when answering sample essays.

   It is also important to find out before the test who will be grading the answers. If the instructor is grading the test, find out what types of answers he/she prefers. Does he/she look for facts, for ideas, or for supported interpretations? If someone other than the instructor, a teaching assistant for example, is grading the test, avoid reinterpreting concepts and presenting unpopular view points. Give lots of facts and examples instead.
2. Read the Directions Carefully:
   Many points on essay tests are lost because students fail to read the directions carefully. Pay attention to the following points when reading directions:
   - Are you to answer every question or do you have choices?
   - Where are you to write your answers: on the test, on lined paper, in a blue book?
   - How are you to write your answers: skip a line, one side of page only, etc.?
   - Are there a certain number of ideas you need to include?
   - Are you supposed to write a certain amount of information: a few sentences, a paragraph, etc.?
   - Are you supposed to include dates?
   - Are supposed to include examples?
   - Are you supposed to include the names of important people?

Key words to look for in the directions are listed below. Be sure to know what these words mean.

- Synonym
- Antonym
- None of
- Similar to
- The same as
- All of
- The opposite of
- Assume that
- If
- All but one
- Only one correct choice

3. Budget Your Time:
   Decide how to divide all available time among the questions. Plan to spend more time on the questions that count for more points; spend equal time on questions with the same point value. Allow time to check answers after completing all questions. For each question, allow half of the time for writing an outline and half for writing the answer.
4. Read all Questions Before Answering Them:
   Reading all the questions before answering them allows one's brain to begin processing information. Reading before answering is especially important when one has a choice of questions to answer.

   Determine what information is given, what information is requested for the answer, and how you are to answer the question (e.g. compare, contrast, prove, summarize, etc.). Break down complex questions into smaller parts, numbering each to make sure all parts are answered. Jot down a few notes as you read each question. If you don't understand a question ask the instructor for clarification.

5. Closely Examine Instructions for Directional Words:
   Essay questions often contain verbs asking students to do certain things with the information. Students must know what these words mean in order to provide the information that the instructor wants. The most commonly used directional words and their definitions are provided below. Be aware of variations on these words that are specific to certain instructors; not all instructors use the words in the same way. If unsure, ask the instructor for clarification.

   - Analyze: Break the subject into its component parts and discuss each part.
   - Compare: Show how they are the same and how they differ.
   - Contrast: Show how they differ.
   - Criticize: Examine the pros and cons and give your judgement.
   - Defend: Give details that prove it or show its value.
   - Define: Just give the meaning.
   - Describe: Give the details and examples that show what it is.
   - Discuss and Review: Examine from all angles. (These words are catchalls. Depending on the teacher, they might mean trace, outline, describe, compare, list, explain, evaluate, defend, criticize, enumerate, summarize, or tell all you know about it.)
   - Distinguish: Tell how this is different from others similar to it.
   - Evaluate: Give your opinion as to the advantages and disadvantages.
   - Explain and Show: Show, in logical sequence, how or why something happened (or both).
   - Illustrate: Give examples.
   - Justify: Give the facts and then prove it's true.
   - Name, List, Tell, and Enumerate: Give just the information that is specifically asked for.
   - Prove: Show that it is true and that its opposite is false.
   - Summarize and Outline: Give the main points.
   - Trace: Show how something developed step by step (usually chronologically).

6. Pick a Title:
   Select a title for each essay answer. Titles help to keep one on track while writing the answers. In other words, titles help one avoid straying from the topic of the question and including irrelevant information. Each title should contain the following information: topic, point of view or approach, and boundaries (temporal, spatial) of the topic. For example, if the question asks "compare and contrast British colonial policies in different parts of the world", the title to the answer might be "similarities and differences between British policies in Asian and African colonies in the late nineteen and early twentieth centuries."
7. Organize (Outline) the Answer:
   Good essay writers spend half of their time formulating an outline before answering a question. This may seem like a large investment of time, but outlining insures that each response is organized and answers the questions asked. If one has prepared for the exam by reorganizing information or by making up and answering practice essay questions, the organizing process is completed ahead of time and precious testing time is saved.

   Divide the outline into general points and specific details. The general points usually are taken from the information in the question, or one may restate the different parts of the question. The student supplies the specific details under the appropriate general points. If the essay questions had been anticipated, try to remember the outline you prepared before the exam.

   Organize the main points of the outline. The structure chosen depends on the question and the discipline. Below are five common methods of organization:
   - Chronological Order – order of historical events, cause to effect, step-by-step sequence.
   - From General to Specific – general topic to subtopics, theoretical to practical, generalizations to specific answers.
   - From Least to Most – easiest to most difficult, smallest to largest, worst to best, weakest to strongest, least important to most important, least complicated to most complicated, least effective to most effective, least controversial to most controversial.
   - From Most to Least – most known to least known, most factual to least factual (fact to opinion).

- Giving Both Sides (Grouped or Interspersed) – Pros and cons, assets and liabilities, similarities and differences, hard and easy, bad and good, effective and ineffective, weak and strong, complicated and uncomplicated, controversial and uncontroversial.

Remember that outlining is not the only way to organize information. One may choose to organize the main ideas and specific details for the essay in an alternate format, such as a herringbone map, a matrix or table, a hierarchy or array, a flow chart, or a spider map.

8. Get Active:
   Get actively involved in your essay, showing enthusiasm in your answer. Recall personal experiences related to the topic or exciting lectures, books and movies that interested you in the subject. While these won't be part of your answer, they help to get you in the right state of mind.
9. Write Methodically:
   Write your answer as if you were writing a mini term paper. Your answer should have a title, an introduction or topic statement, a body, and an ending or conclusion.
   - Tips for selecting an appropriate title were discussed previously.
   - Your topic statement can be a reworking of the title.
   - The body should include at least one paragraph for each general point in your outline. Each paragraph in the body should begin with a general summary sentence, usually a complete sentence containing the information in the outline. Skip a line between paragraphs.
   - Your ending can be a summary of the answer, a restatement of the topic sentence, or your interpretations or opinions. Do not introduce new information in the ending.

Use ample details and examples in the answer. Use clear labeling words, such as examples, comparison, similarities, contrasts, differences, supports, arguments, reasons, most probably, main point, exceptions, etc. Underline key words. Think in three's: three paragraphs, three sentences per paragraph, three examples per main topic, etc. Avoid one sentence paragraphs. Be direct and to the point.

10. Don't Waste Space:
    Although it's a good idea to skip lines between paragraphs, don't skip lines between sentences or use only one side of the paper unless told to do so. Avoid ornate or illegible handwriting that takes up a lot of room on the paper. Don't try to fill up extra test booklets by wasting space. Some graders interpret wasted space as a cover up for not knowing the material.

11. Check Your Work:
    You should have allotted time for checking your answers. For content, did you answer the question, and did you stick to your point of view? For organization, did you answer all parts of the question, and are paragraphs and sentences logically ordered? For writing, is your answer clear, is your writing legible, is your grammar correct, and is your punctuation correct?
12. If You Prepared for the Different Questions:
    Sometimes students anticipate that certain questions will be asked, but the test questions turn out to be different. When this happens, make sure you have completely answered the questions you do know. Then look for ambiguity in the questions you don't know, since lack of clarity may allow some leeway in your answer. Stretch what you do know about the topic by giving many examples and comparisons. Add less relevant information by linking it with general statements.
13. If You Run Out of Time:
    If you are running out of time and haven't yet answered all questions, write down the outlines and indicate that you ran out of time for that/those question(s). Some instructors will give partial credit for outlines.

FILL-IN AND SHORT ANSWER TESTS:

Fill-in the blank questions are most often used to evaluate student's recall of details like dates, terms, and people. If well written, fill-ins should be objective questions, having only one correct answer. Short answer questions, on the other hand, help to evaluate students' understanding of concepts and are more subjective. Despite these differences, similar strategies may be used when answering fill-in and short answer tests.

1. Read the Questions Carefully:
   Be sure to understand what the question is asking; refer to the list of instructional terms and definitions in the Essay Tests section of this page. Underline key words and phrases. Break complex questions into smaller parts and evaluate each part separately.
2. Look for Clues:
   Look at the grammar and tense of the questions for clues to the answer. Is the answer a noun, a verb, a qualifier? [Tip: It is a noun if you put the word "the" in front and it makes sense, and it is a verb if it makes sense with "to" in front.] Is it singular or plural? Other questions on the test may provide contextual clues.
3. Don't Overanalyze the Questions:
   Don't read too much into the wording of the questions, but take note of the clues listed above.
4. Watch the Blanks:
   The number of blanks, and sometimes their length, may be a clue to the answer in terms of the number of words, and perhaps the length of the words.
5. Think of the Type of Information Requested:
   Is the instructor looking for a technical term, a person, a number? When two items are compared, is the instructor looking for a qualifier such as increasing, decreasing, less, more, etc.? Does the instructor want you to define, describe, illustrate, or summarize?
6. Make Educated Guesses:
   Examine the key words and phrases in the question; picture them in your notes or try to remember hearing the instructor talk about them. Try to remember what other ideas were discussed in relation to these key words. Again, consider the context and grammar of the question.
7. Over Answer:
   If you think two answers may be correct, write down each with a brief explanation in the margin. If you have time, write more than the directions indicate, unless told otherwise.

IDENTIFY AND EXPLAIN TESTS:

Identify and explain tests are somewhat subjective questions requiring that students write a few sentences summing up the important aspects of the topic. The identification words may be people, places, things, or concepts.

1. Use Descriptive Words:
   To convey extra meaning with only a few words, use descriptive words to describe the topic. For example, instead of saying Patton was a general, write that Patton was an *infamous* general. On the other hand, if one is unsure of the specifics of a topic, use general words to describe it. For example, if one can't remember that Archduke Francis Ferdinand was the heir to the throne in Austria, say that he was a national leader in Eastern Europe.
2. Give Temporal and Spatial Details:
   Whenever possible, indicate the temporal or spatial specifics of the topic. If exact dates or places cannot be remembered, use general terms. For example, if one forgets that Darwin's *Origin of Species* was published in 1859, write that the book was published in the mid-nineteenth century. If one can't remember the exact country (Cambodia) in which the Kkmer Empire arose, write that it was in Southeast Asia.
3. Explain the Significance:
   As specifically as possible, give at least one reason why the topic is important. One may use general terms if the exact significance of the topic is uncertain. In this case, add a specific date or statistic to make the answer appear more detailed.

MATCHING TESTS:

Matching questions are particularly effective for testing students' knowledge of terms and definitions, people and their contributions, dates and important events, and other numerical information. Matching questions are classified as objective.

1. Read the Directions Carefully:
   The directions for matching questions usually contain vital information including whether questions only have one answer or more than one answer, if responses may be used only once or more than once, and how answers are to be written (on an answer sheet, on blanks on test, draw lines to match items, etc.)
2. Read the Column with the Longest Phrases First:
   To save time, read through the column with the longest phrases first. Then read and reread the shorter column to match the two.
3. Do the Easy Questions First:
   Match the items that you know for sure first, marking off the choices as you use them. If answers only can be used once, this reduces the number of choices to select from for the unknown questions.
4. Do the Difficult Question Next:
   Try the process of elimination, crossing off known items first. Try to visualize information in the notes or textbook, or try to associate the questions with things you do know. Look for clues in grammar or tense. If answers may be used more than once, look at the items that have been used already to answer the easy questions; and instructor probably wouldn't indicate that answers could be used more than once unless some of them are. Then concentrate on the answers that have not yet been used.
5. Write Explanations:
   If you are unsure of any of your answers, write a brief explanation of your answer in the margin of the test. Clearly indicate the question number to which you are referring.

MULTIPLE CHOICE TESTS:

The multiple choice format is commonly used in testing because the exams are relatively easy to grade and the questions effectively evaluate the students' knowledge of facts and understanding of concepts. This is an objective form of testing since, if the questions are well written, there is only one correct answer to each question, leaving little room for interpretation.

1. Work Quickly:
   By working quickly through multiple choice tests, one insures that the test is completed in time and that questions are not over-interpreted, with hidden meanings read into them. Read each question only once, underlining key words as one reads. Break complicated questions into smaller segments, so that the answer choices may be checked against each part. Cross out unimportant or irrelevant parts of the question. If you are unable to answer the question after your first reading, mark it for later consideration as time allows.
2. Consider the Instructor:
   If the directions indicate that one should choose the "best" answer to each question, pick the one that the instructor (not you) would think if most correct. Be wary of "all of the above" and "none of the above" responses, since some instructors use these choices when they can't think of another content-related answer to use.
3. Guess Before Choosing:
   Decide what the answer to each question should be before looking at the answer choices. Then examine the choices and pick the answer that most closely matches your answer. If none of the choices is similar to your guess, carefully study the answers looking for key words and other clues. Choose simple answers even if they seem obvious. And remember, never pick an answer without first reading *all* of the choices, no matter how sure you are of the answer.
4. Eliminate Unlikely Answers:
   Cross off answers that are only part correct or only partially answer the question. Eliminate answers that are correct but do not answer the question. If you know for sure that one response is not true, eliminate "all of the above" as a possible answer.

5. Look for Clue Words and Numbers:
   The following clues apply to many choice questions:
   - If two answers are opposites, one of them is *probably* correct.
   - Answers with the following words are *usually* incorrect: always, never, all, none.
   - Answers with the following words are *usually* correct: seldom, generally, most, tend to, probably, usually.
   - Look for grammatical clues between the question and the choices. For example, the question and correct answer *often* have verbs of the same tense and have nouns and verbs that agree.
   - Underline familiar words or phrases from the lecture or textbook.
   - Be aware of degrees of correctness. With numbers and dates, one choice is *usually* too small or too early, and one too large to too late; these choices may be eliminated.
   - If two choices are very similar, differing only in degree, the one expressed in more general terms is *probably* correct.
   - Use the content of other questions as additional clues.
6. Be Wary of Multiple Answers:
   Carefully evaluate "all of the above" and "none of the above" choices before selecting them. For the former, all of the responses should be correct. But if you are absolutely sure that at least two of the choices are correct, then you are probably safe in choosing "all of the above". Select the latter if you are sure at least two of the choices are incorrect.
7. When in Doubt, Guess:
   As long as you are not penalized for wrong answers, guessing is a good strategy to use. Even if you are randomly guessing, you should get about 25% of the questions correct. With educated guessing, the percentage may rise to 75%. Educated guessing involves eliminating all implausible answers first and looking for clues in the question and answers.

   When randomly guessing, try some of these tips:
   - The longest response is often the correct answer.
   - Answer "C" is a good choice if it hasn't been used for several previous questions.
   - Some instructors use patterns in their answers, such as spelling out short words like "cab" or "bad", to make it easier to grade the tests by hand. Looking for patterns may help when guessing (but ignore patterns if you know the material or if the test is machine-graded).
   - The answer that is longest in length may be the correct answer.

8. Do Change Answers:
   Only consider changing answers after completing the entire test. And reread the directions before checking and changing answers. First check the questions that were flagged the first time through the test. Then check the other questions if time permits. If you can't decide between two choices, write an explanation of your choice in the margin of the test. Erase all changes carefully and completely, especially if the test will be graded by machine. Make sure all answers are legible and in the right place (circled, on blanks, on an answer sheet, etc.).
9. Don't Give Up:
   Resist the temptation to become frustrated, bored, or anxious. Move quickly through the test. Look for material that you do know. Apply that information to questions you don't know. Use relaxation techniques to fend off anxiety. Use the entire class period to complete the test and check answers.

NUMBER PROBLEMS:

Tests in some courses such as math or statistics may be comprised completely of number problems. In other courses like accounting, chemistry, geology, and physics, a significant number of test questions may take this form.

1. Work Systematically:
   If the directions indicate that you are not penalized for arithmetic mistakes, spend less time on accuracy and checking answers and spend more time on setting the problem up correctly. If arithmetic errors are counted off your score, do the following: Write all numbers carefully, especially 2 and 5, 4 and 9, and 1 and 7. Write numbers in columns with the decimal points in line. Recopy answers from scrap paper very carefully. Watch units of measurement. If permitted, use a calculator for all arithmetic, even the most simple operations. Leave enough time to check answers, following the guidelines listed in a subsequent paragraph.
2. Organize Your Work:
   Make a list of all the numbers and variables given to you in the problem. Determine what you are supposed to find or calculate. Identify the formula(s) needed to solve the problem. Use pictures and graphs as needed to interpret the question, and label the visual aids with the data provided in the problem. Estimate what the answer should be before you solve the problem. What will be the relative size of the number? Will it be positive or negative?
3. Use All Information Given in the Problem:
   In most cases, all of the data provided in the question will be needed to solve the problem.
4. Study Visual Aids Carefully:
   If graphs and figures are given in the problem, study them carefully. Is the graph origin at (0,0)? What are the intervals for the axes? Are any numbers skipped on the axes? What are the units of measurement?
5. Don't Quit:
   When you run into trouble setting up the answer or solving the formulas, don't give up. Substitute real numbers for the variables to see if the question makes more sense. Think of real-life situations when the formulas or concepts were used.

6. For Multiple Choice Tests:
   Some number problems ask that students solve the problem and choose and answer from a multiple choice list. In this case, cover the answers until you have worked the problem. This helps to reduce biases in the way you set up the problem [unless, of course, you don't know how to set up the problem]. Estimate what the answer should be. As a general rule, eliminate answers that are very high or very low, especially if you have to guess at the answer.
7. Check Your Answers:
   Always budget time to go over your answers. Reread the directions and each question. Make sure you have answered all parts of the question and have used the correct units of measurement. Does your answer make sense, given the information in the problem? Compare the estimated and calculated answers. If time permits, rework the problem using another method. If time permits, reenter the numbers into the calculator to check for accuracy. Check all decimal places and signs. For inequalities, try substituting other numbers besides the answer to see if they make sense.

OPEN-BOOK TESTS:

Like take-home tests, open-book tests may be more difficult than closed-book tests because the instructor usually has higher expectations of the quality and quantity of information to be written by students. Therefore, don't take open-book tests lightly. Prepare for them as seriously as one would for a closed-book test.

1. Preparation:
   Poor performance on open-book tests may be due to running out of time, as students waste time looking for things in the book. To avoid this, prepare thoroughly before the test. Make sure you know where everything is in the book. Mark important pages with paper clips. Or better yet, use tabs or "post-it" notes to briefly describe and label important sections of the text. Become familiar with using the index for looking up specific topics. Prepare summaries of major concepts, listing key points and relevant page numbers. Tape the summaries into the book.
2. Work Through the Test Quickly:
   If you can't find the answer after a few minutes of searching in the book, flag the question and move on. Return to that question as time permits, after you have completed the other questions. Remind yourself to work quickly, avoiding excessive search time in the book.
3. Avoid Plagiarism:
   Plagiarism, or using someone else's ideas without giving them credit, is against the student codes of all schools. In many cases, plagiarism is grounds for dismissal from school. Do not take direct quotes from a printed source without using citations on open-book tests. Paraphrase the information and cite the page number from which the material was taken.

ORAL TESTS:

There are several varieties of oral exams. In one case the topic of the test is supplied to the students ahead of time, permitting some out-of-class preparation. In another case, only the general scope of the test will be indicated. Oral tests evaluate students' knowledge of the topic, their abilities to organize information, and their speaking skills.

Oral tests are administered in the following manner. The student is assigned the topic to be discussed. He/she is given a certain amount of time to prepare an answer, taking notes or making an outline of the information to be covered. After that time, the answer is presented orally.

1. Prepare:
   Familiarize yourself with the main ideas that may be covered by the test. What were the main ideas and concepts presented in lecture? In the book? How would you discuss them? Try to predict what the exam questions may be, and develop an outline or summary of the main points and supporting details to answer each question.
2. Listen Carefully to the Questions:
   If allowed, take notes as you are given the question. Pay particular attention to key words, directional words, and multiple parts of the question. Rephrase the question so it corresponds to what you know about the subject. Ask for clarification if you don't understand the question. Take a few minutes to collect your thoughts.
3. Focus on a Topic:
   Instead of saying a little about several things, try to narrow the topic and discuss it in detail with many statistics, dates, or examples. When narrowing the topic, consider the major points from lecture and/or the section heading in the textbook.
4. Think in Threes:
   Try to include three main points about the topic, and support each point with three specific details.
5. Attend to Appearance:
   One's appearance can greatly influence impressions on the instructor. Wear appropriate clothes, like a skirt or dress pants. When in doubt about what to wear, err on the side of overdressing. Iron your clothes and be well groomed. Use body gestures that indicate confidence: maintain eye contact, stand quietly but not rigidly, and maintain an even tone of voice. Find a "happy medium" in the language used in the answer. Using complicated words that are misused or mispronounced will not impress anyone. Avoid talking to the audience as well. Instead, try to use language that conveys enthusiasm for the subject.

6. If You Don't Know the Answer:
   If you don't know the answer to the question, admit it and explain why. Perhaps the question is beyond the material to be covered by the exam. Or maybe you can't answer that specific question but you can discuss a related topic. Try not to panic. Instead, make a statement like, "That is an interesting question. I don't recall that topic being covered in lecture, but it seems to be related to another issue we discussed in class…"
7. Make a Good Exit:
   After answering the question, wait to be dismissed by the instructor. Don't forget to collect your notes and say "Thank you".
8. Practice:
   Work individually or with other students to practice answering test questions orally. Make up your own questions, or refer to review questions in the textbook or workbook. Practice in front of a mirror or video camera for feedback on your style of presentation. Record the answers on audio cassettes for feedback on the content and organization of the answer. Give yourself the same amount of time you will be given in class.

QUANTITATIVE/MATH PREPARTION TIPS

The following strategies will help you effectively prepare for math tests. Although it often seems impossible to score high on math tests, these tips will help you achieve a high score on your next exam:

- The best way to learn and master math concepts is through repetition and practice. First master fundamental concepts and formulas then practice as many problems as possible.
- Practice problems which relate to each concept you might be tested on. Take time also to practice difficult problems.
- Take time to work through problems before seeking assistance. However, if you are unable to set a problem up, consult a reference book or your teacher.
- Practice problems set up a variety of ways since questions are often set up in confusing ways to test your knowledge. This will also help you learn how to utilize numerous types of formulas.
- Write down all the formulas you must know on a single sheet of paper and memorize these formulas.
- Many students write down the formulas they will have to utilize on a test in the margins or opposite side of the test immediately after getting it. This provides a quick reference, and it is not uncommon for people to forget important facts during a test as it becomes difficult and stress kicks in.
- Since many questions contain more than one part, carefully read instructions in each section.
- If possible, estimate the correct answer before working out a problem. If your answer is nothing what you expected, it may be useful to double-check your work to ensure your figures were correct.
- You must show the steps you took to get a final answer on math tests. You can always go back and review the steps you took if you are unsure of an answer, and teachers frequently provide partial credit on incorrect answers when you show your work.
- Never ignore confusing problems. If you have no idea where to begin, still attempt to work out the problem. Do not erase your work since your teacher can reward you with partial credit.
- If time permits, review your final answers. You can even re-solve problems to double-check your work on a separate piece of paper. If after re-working problems you get new answers, re-examine the instructions or look for calculation errors.

STANDARDIZED TESTS:

Standardized tests include ACT, SAT, GRE, PPST, GMAT, and LMAT. They are used to assess students' knowledge in the areas of reading, math, and science as well as in specific content areas. Good performance on standardized tests is important because they are a condition for acceptance into most undergraduate and graduate programs or they may be required to obtain certification. Standardized tests are timed, meaning students are given a certain amount of time to complete each section of the test.

1. Prepare:
   Study materials can be purchased for some tests such as GRE and GMAT. The study guides provide sample questions as well as strategies for improving one's performance. Send for these materials early as the requests may take weeks to process.
2. Read the Directions Carefully:
   Some standardized tests are graded with "rights only" while others deduct points for incorrect answers. Read the directions carefully to determine how the test is scored, how much time is given per section, how answers are to be recorded, etc.
3. Study Sample Questions:
   Most standardized tests provide sample questions and answers for each section of the test. Study these carefully to get an idea of what the questions are looking for and how to mark your answers.
4. Work Quickly:
   Most standardized tests are speed tests, meaning only the best students will be able to complete the entire test during the allotted time. Spend the same amount of time on each question. For example, if there are 30 questions in a section and you are given 60 minutes to complete the section, spend no more than 2 minutes on each question. If you don't know the answer after reading the question once, mark it and move on; go back to all flagged questions if time permits after you have looked over the entire section.

TAKE-HOME TESTS

Take-home tests are a special variety of essay exams, the difference being take-home tests are completed outside of the class. They share the other characteristics of essay tests: subjective, evaluate students' abilities to interpret and apply information, and evaluate students' abilities to organize information.

1. Synthesize:
   Instructors usually grade take-home tests, in part, on the students' abilities to synthesize information from a variety of sources, especially the lecture notes and the textbook. It is therefore necessary to include information from all relevant sources, including outside readings, movies, and guest speakers, in your answers. Your answers should demonstrate that you have consulted all these sources of information.
2. Avoid Plagiarism:
   Plagiarism, or using someone else's ideas without giving them credit, is against the student codes of all schools. In many cases, plagiarism is grounds for dismissal from school. Do not take direct quotes from a printed source without using citations on take-home tests. Avoid excessive use of the words and ideas of others.
3. Proofread:
   Never turn in a take-home test without proofreading it or having someone else look it over. More will be expected in the way of organization, logical transitions between ideas, grammar, punctuation, and spelling on take-home tests compared to in-class exams. Do not lose points for these types of errors. Run the spell checker and grammar checker on your computer or word processor. Ask a qualified person, like a tutor or an English major, to look over the answers for grammar (not content).
4. Do Your Own Work:
   Instructors can easily spot take-home tests completed by students who worked together. In some cases, students will be penalized for having similar answers that suggest cooperative work, especially if students were instructed to work on their own. Be on the safe side; write your own answers. Make your test unique. Make it stand out from others.
5. Keep Copies:
   Make a copy of your test answers before you turn in the test. This way you will have proof that the test was completed in case the instructor misplaces your exam. Make a back-up copy of the disk on which the test was saved. Once the test is returned, keep it until the final grade has been received in case there are problems with your grade.

6. Don't Wait Until the Last Minute:

   Take-home tests are not necessarily easier than in-class essay tests just because you may consult notes and readings. In fact, they are usually more difficult because you have to write more, include more details, and make critical evaluations.

   Take-home tests require a significant time commitment. Begin the test early enough so you have plenty of time to do a first draft, have it proofed, do a final draft, and have it printed.

   Don't wait until the last minute to print. Inevitably, that is when the printers will be occupied or broken. If the printers are down and you have reached the test deadline, ask the instructor if you can turn in a copy of your disk and bring in the printed version as soon as possible. Or, the instructor may accept an e-mailed copy until the printers are fixed.

TRUE-FALSE TESTS:

True-false questions are suited for evaluating students' knowledge of specific facts and concepts. Like multiple choice questions, true-false questions are objective in that there is only one correct answer.

1. Read the Questions Carefully:
   Read each word in the statement, circling or underlining key words and phrases. Break complex sentences into parts, and consider the validity of each part separately. Cross off irrelevant information in the statement. Circle key words listed in the next paragraph.
2. Look for Clue Words:
   Statements with the following words are *usually* false: all, only, never, always, because. Statements with the following words are often *true*: seldom, generally, most, tend to, probably, usually often, none [note that "none" in multiple choice questions usually indicates the choice is incorrect, but the opposite is the case for true-false]. Look for familiar phrases from lecture or the textbook. The content of other questions may provide additional clues.
3. Don't Quibble:
   With true-false questions, it is especially important to resist reading too much into the statements. Don't look for hidden meanings and avoid over-analyzing the questions. Statements that are approximately true often are correct. Don't indicate that a question is false just because it is grammatically incorrect. When in doubt about the meaning of a statement, ask the instructor.
4. Guess:
   Guess at the true-false questions only if no penalties are assessed for incorrect answers. Remember, if part of the statement is incorrect, the entire question is false. As a general rule, there *tend* to be more true than false questions on exams; so, when in doubt, guess "true". Like multiple choice tests, there may be patterns in the answers of true-false questions. But detecting the pattern requires that many of the questions are answered correctly.
5. Don't Change Answers:
   Unlike multiple choice tests, true-false answers should not be changed unless one is absolutely sure of the answer. If one is not sure, it is best to stick with the original impulse and write an explanation in the margin of the test.

VERBAL ANALOGY TESTS:

Verbal analogies are usually found only on standardized tests. They are objective word problems that evaluate students' vocabulary and students' abilities to discern relationships among words. Verbal analogies have one pair of words related in a certain way: students must pick another pair of words related in the same manner. For example:

- "bigotry": hatred
  (a) Sweetness: bitterness
  (b) Segregation: integration
  (c) Equality: government
  (d) Fanaticism: intolerance
- The answer is d.

1. Practice:
   Old tests and study workbooks often contain sample verbal analogies that students may answer for practice. The key is to begin preparation weeks or months before the test. Work for 30 minutes to an hour at a time. It takes considerable time to master the kind of thinking required for verbal analogy questions.

2. Turn the Analogies into Sentences:
   Try putting the analogy into sentences, such as "Bigotry relates to hatred in the same way that sweetness relates to bitterness? Segregation relates to integration? Equality relates to government? Fanaticism relates to intolerance?" Or, "Bigotry is to hatred as sweetness is to bitterness, as segregation is to integration…"

3. Look for Clues to the Relationship:
   Try to determine what the relationship is between the two words given in the question. Are they opposite? Are they related by cause and effect? The following list summarizes types of relationships found in verbal analogies.

- "Purpose": *A* is used for *B* the same way *X* is used for *Y*.
- Cause and Effect: *A* has an effect on *B* the same way *X* has an effect on *Y.*
- Part to Whole: *A* is part of *B* the same way that *X* is part of *Y.*
- Part to Part: *A* and *B* are both parts of something the same way that *X* and *Y* are both parts of something.
- Word Meaning: *A* means about the same as *B* the same way *X* means about the same as *Y.*
- Opposite Word Meaning: *A* means about the opposite of *B* the same way *X* means the opposite of *Y.*
- Grammar: *A* and *B* are parts of speech related to each other – noun to noun, adjective to noun, etc. – in the same way that parts of speech *X* and *Y* are related to each other.

4. Systematically Analyze the Words:
   If the relationship isn't obvious by looking at the first word and then the second, try switching the order. Or, look at the first word in the analogy and the first word in each of the choices. Then look for relationships between the second words and the analogy and the choices.

5. When in Doubt, Guess:
   Eliminate implausible answers before guessing. For example, if the words in the analogy are both verbs, cross off answers that contain a noun and a verb. Make guesses as long as points are not deducted for incorrect answers.

VOCABULARY TESTS:

Vocabulary tests evaluate the students' abilities to define key terms and, less often, major concepts. One advantage for students is that vocabulary tests are fairly easy to prepare for with practice. Use the vocabulary lists at the end of the textbook chapters, or make up your own vocabulary list using the bold words in the text and key words from the lecture.

1. <u>If You Know the Word, Watch for Word Traps:</u>
   Be wary of words with similar meanings (e.g. hypothesis and theory) and words that look similar (e.g. physiology and psychology, sulfide and sulfate). Pay attention to grammar; for example, if the question makes reference to a noun, the answer should be a noun.

2. <u>If the Word Looks Familiar, But You're Not Sure:</u>
   Try to use the word in a sentence. Picture the word in your notes or book, or remember when it was discussed in lecture. Then try to remember what information was discussed in relation to the word.

3. <u>If You Don't Know the Word, Make an Educated Guess:</u>
   Examine the *word elements* (suffix, prefix and root word) for clues. Look for grammatical clues. Try to associate the unknown word with words you know. Make use of any foreign languages you know, looking for cognates.

AFTER THE TEST:

The learning process does not end when you turn in an exam and walk out of class. Nor does it end when the test is graded and returned to you. Effective learning requires monitoring after the test. Evaluate your performance and your test-taking skills by using the following strategies.

1. Compare How You Prepared with How You Performed:
   What exam preparation strategies were used? When did you start studying? How many hours did you study and did you use that time efficiently? Did extraneous situations distract you or contribute to exam anxiety? Did you get the grade you expected? Why or why not?

2. Talk with the Instructor:
   Resolve all questions shortly after the test has been returned. If answers are not reviewed in class, ask for the correct answers to the questions you missed during or after class. Seek explanations of grades after class or, better yet, during the instructor's office hours. Ask about strengths and weaknesses in your performance. Ask the instructor about his/her grading criteria.

3. Keep All Materials:
   Keep all tests and study materials until you have received your final grade in the class, in case there are disputes or mistakes.

4. Evaluate Answers:
   Tests are scored in one of two ways: norms and explicit criteria. One should evaluate his/her performance with respect to the manner in which it was scored. If one's score is based on the normative approach, one has an idea of how he/she is doing with respect to other students in the class. If one's score is based on explicit criteria, one has a measure of how well one knew the material covered on the test. In this case, be sure to understand the criteria used by the grader to score the questions. If unsure, ask the grader.

5. Self-Referenced Evaluation:

   The most important measure of exam performance is personal knowledge gained by the student. According to Chickering and Schlossber (1995, p. 184-185), "it is the gains in knowledge or competence you have achieved, relative to where you started, that are most important. If you started out totally ignorant, you may have made great strides and still not perform very well on the exam…It is your learning and your standards that are critical for you, not the professor's, not the test maker's. So that should be the basis for your final preparation."

6. If You Blow It:

   What do you do if you blow a test? Try to evaluate your performance as impartially as possible. Were your expectations of the exam met or not? Were your preparation procedures appropriate for the type of test? Was your preparation adequate? Why or why not? Did you understand the test directions? Did you understand what the questions asked? Why or why not?

   Remember to assess preparation in terms of what was done, not how many hours were spent studying. If often helps to talk with someone when one performs poorly on a test. Seek out a friend, roommate, family member, or counselor and discuss your concerns. The instructor may have suggestions for improving your performance on the next test.

Time Management

- Activity Planner
- Determining Time Spent
- Intro to Time Management Planners
- Directions for Creating Weekly Planner
- Managing Your Study Time
- Prioritizing Activities
- Task Orientation, Organization & Prep
- Time Schedule Suggestions
- Time Schedule
- Time Schedule Worksheet

THE OHIO STATE UNIVERSITY MANSFIELD

ACTIVITY PLANNER:

A well-known theory of human learning also holds that people remember information best when they study in frequent, relatively short bouts of time, rather than in last-minute marathon study sessions. Thus, the trick is to balance the need for studying a total of 24 to 36 hours each week with the goal of studying in frequent, short sessions.

One effective way to make time for all your work is to create a weekly activity planner. You can print the weekly planner (example on next page), purchase a similar planner at your local bookstore, or create your own using notebook paper.

Blank Example:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7:00							
8:00							
9:00							
10:00							
11:00							
12:00							
1:00							
2:00							
3:00							
4:00							
5:00							
6:00							
7:00							
8:00							

STEPS:

1. Indicate all of your regular academic and social commitments for the entire week ahead. (Examples below).

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7:00							
8:00	Biology	Physics	Biology	Physics	Biology		
9:00							
10:00	English		English		English		Church
11:00							
12:00	Math	Work	Math	Work	Math	Work	
1:00							Sunday Lunch
2:00							
3:00							
4:00	Work		Work		Work		
5:00							
6:00							
7:00							
8:00							

2. Assign specific study tasks to the free time slots identified in Step 1. By doing this, you are ensuring that you study in shorter, more productive bouts and that nothing gets lost in the shuffle.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7:00	Study Biology	Study Physics	Study Biology	Study Physics	Study Biology	Time For Papers & Exam Preparation	
8:00	Biology	Physics	Biology	Physics	Biology		
9:00	Study Biology		Study Biology		Study Biology		
10:00	English	Study Physics	English	Study Physics	English		Church
11:00							
12:00	Math	Work	Math	Work	Math	Work	
1:00	Study Math & English		Study Math & English		Study Math & English		Sunday Lunch
2:00							
3:00							
4:00	Work	Time For Papers & Exam Preparation	Work	Time For Papers & Exam Preparation	Work		Time For Papers & Exam Preparation
5:00							
6:00							
7:00	Finish Leftover Studying		Finish Leftover Studying		Finish Leftover Studying	FREE TIME	
8:00							
9:00							
10:00							
11:00							

DETERMINING TIME SPENT:

In college, as with life in general, there never seems to be enough time to go around. One of the most difficult challenges you will face as you make the transition from high school to college is to recognize and deal constructively with the fact that you, and you alone, are now in charge of determining how your valuable time is spent.

One of the reasons that high school seems so easy in comparison to college is that others manage time for you. In high school, both your teachers and parents actively involved themselves in making sure your day was full, that you got where you needed to go, and that all your work was done on schedule.

INTRODUCTION TO TIME MANAGEMENT PLANNERS:

There are four major types of time management planners: semester (or quarter), monthly, weekly, and daily. Semester and monthly planners allow one to record the due dates of major assignments, while weekly and daily schedules are used to record regular activities as well as due dates of assignments. Each of these is discussed and illustrated in subsequent sections.

In order to be an effective time management strategy, planners must be checked every day or every few days. Make this part of one's routine. Additionally, if is often necessary to update and revise the planners as due dates change or as new tasks are assigned.

It is very important to evaluate periodically how well one is sticking to the schedule. Are tasks completed by the due dates on the planner? Is study time being used for studying?

1. Semester Planners:
    - Give student overall idea of when major school projects and social events are scheduled.
    - Give an overview of the major commitments one has during the course of the term.
    - Help see when student will be the most busy during the term.
    - Help detailed plans be made ahead of time to complete all the assignments and activities in a timely manner.
    - Help reduce the tensions associated with procrastination.
    - Give student a sense of control over their academic and social affairs.
2. Directions for Creating Semester (Quarter) Planners:
   Buy a large calendar or desk blotter. Or make a homemade template to meet personal requirements.

   Write dates and times for major school projects, including:
    - Examinations and quizzes
    - Speeches
    - Research papers
    - Lab assignments
    - Class projects
    - Field trips

3. Monthly Planners:

Monthly planners are similar to semester planners, except that they allow one to plan academic and social events in more detail. More types of information and events can be organized on monthly planners.

- Encourages student to divide major tasks into smaller parts and to develop a schedule for completing each part.
- Help reduce tensions associated with procrastination.
- Portable, unlike most semester planners.
- Gives student a sense of control over their academic and social affairs.

Directions for Creating Monthly Planners:

- Buy a portable notebooks sized monthly calendar with boxes that are large enough to hold several pieces of information. Or make a homemade template.

- Look at the major academic assignments listed on the semester planner. Break each task into smaller parts. For example, a research paper may be divided into these activities:
  a. Choose topic and clear it with the instructor.
  b. Library research.
  c. Write first draft.
  d. Type first draft.
  e. Have first draft proof-read.
  f. Make revisions.
  g. Print final draft.

- Develop a schedule for completing each task. Make one's own due dates for each part and write them on the monthly planner. Using the research paper example:
  a. Topic by week 2;
  b. Research by week 6;
  c. First draft by week 8;
  d. Type by week 9;
  e. Proof-read by week 10;
  f. Turn in final draft by week 11
- Regularly evaluated one's progress on the tasks against the due dates on the monthly planner. A good time to do this is every Sunday night. Treat yourself when a major assignment has been completed according to the schedule.

4. Weekly Activity Grids:

   The purpose of weekly activity grids is to plan activities in a very detailed manner in order to make the most of one's time. The strategy is particularly useful during finals week or before major business activities, when one has "a million things to do" in a short period of time.

   When recording upcoming activities on the weekly grid, be as specific as possible. Each entry should identify two things:

   a. Topics to be studied.
   b. How it will be studied.

   For example:

   - Library research for speech.
   - Write first draft of sociology paper.
   - Read physics chapter 7.
   - Do accounting problems 1-5.
   - Start ceramic project.
   - Identify memory aids for marketing test.

DIRECTIONS FOR CREATING A WEEKLY PLANNER:

Design a weekly activity grid to meet personal requirements, or purchase a bound planner. Arrange the grid blocks on an hourly or half-hourly basis. Label the days of the week, starting with Sunday or Monday.

- The first thing to record on the grid is those regular activities whose times do not change week to week. For example:
  a. Meals.
  b. Sleep.
  c. Class or lab.
  d. Worship services.
  e. Club meetings.
  f. Work.
  g. Tutoring sessions.
  h. Athletic practice, games, or exercise.

- Record all other activities that are not regular events. Consult the monthly planner to determine the due dates of all activities, not just the major ones. Break major assignments into smaller tasks, and identify you own due date for each part. Estimate how long it will take to complete each task. If unsure, err on the side of overestimating. Write short descriptions of each activity in the appropriate places on the weekly chart. For example:
  a. Reading assignments.
  b. Athletic games or exercise.
  c. Study groups.
  d. Listening to lecture tapes.
  e. Reorganizing information.
  f. Club meetings or activities.
  g. Meetings with instructor, coach or advisor.
  h. Lab research.

Keep the completed grid, or copies of it, in a prominent place where one may refer to it often. Make it a habit to check the grid periodically, such as every morning or evening.

DAILY ACTIVITY GRID:

Daily activity grids serve the same function as weekly schedules – to plan in detail the activities to be completed during the day. The only difference between the two is that daily grids show only one day at a time while weekly grids display seven days of activities on one chart.

Various types of information may be recorded on daily charts, for example:

- School work
- Social events
- Appointments
- Work duties

Tasks should be described in as much detail as possible; include the subject of the task and the specific activity to be performed.

MANAGING YOUR STUDY TIME:

There are only so many hours in a day, a week, and a term. You cannot change the number of hours, but you can decide how to best use them. To be successful in school, you must carefully manage your study time. Here is a strategy for doing this.

1. Prepare a Term Calendar.
   At the beginning of a term, prepare a Term Calendar. Update it as the term goes on. Here is what to do to prepare a Term Calendar:
   - Record your school assignments with their due dates and your scheduled tests.
   - Record your planned school activities.
   - Record your known out-of-school activities.
2. Prepare a Weekly Schedule.
   Each Sunday before a school week, prepare a Weekly Schedule. Update it as the week goes on. Here is what to do to prepare a Weekly Schedule:
   - Record your daily classes.
   - Enter things to be done for the coming week from your Term Calendar.
   - Review your class notes from the previous week to see if you need to add any school activities.
   - Ad any out-of-school activities in which you will be involved during the week.
   - Be sure to include times for completing assignments, working on projects, and studying for tests. These times may be during the school day, right after school, evenings, and weekends.
3. Prepare a Daily Organizer.
   Each evening before a school day, prepare a Daily Organizer for the next day. Place an x next to each thing to do as you accomplish it. Here is what to do to prepare a Daily Organizer:
   - Enter the things to do for the coming day from your Weekly Schedule.
   - Enter the things that still need to be accomplished from your Daily Organizer from the previous day.
   - Review your class notes for the day just completed to see if you need to add any school activities.
   - Add any out-of-school activities in which you will be involved the next day.

Your Weekly Schedule should have more detail than your Term Calendar. Your Daily Organizer should have more detail than your Weekly Schedule. Using a Term Calendar, a Weekly Schedule, and a Daily Organizer will help you make the best use of your time.

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PRIORITIZING ACTIVITIES:

You must take studying seriously and make a commitment to your work. This means prioritizing your academic and social activities to ensure that there is adequate time in your schedule to complete all course assignments.

Many new students fail to realize that carrying a full load of college credits is essentially equivalent to having a full-time job. In other words, to understand the material in each of your courses at a level the professor considers adequate**, you should plan on studying between 2 and 3 hours for every hour you spend in lecture. Thus, for a 3 hour lecture course, you should be spending 6-9 hours per week outside of class** studying your notes, doing assigned readings, preparing for exams, and so forth.

TASK ORIENTATION, ORGANIZATION, AND PREPARATION, TIME MANAGEMENT:

TASK ORIENTATION:

Staying on target when completing a task may be difficult for attention deficit students. The following suggestions may help students remain task oriented.

Make the Task Definite:

- Determine what must be done to complete the task.
- Make sure the directions and expectations for the task are fully understood.
- Seek clarification of instructions from the instructor rather than from other students.

Divide and Conquer:

- Break the task into smaller, more manageable parts.
- Develop some sort of structure that makes sense to the student.
- Develop a time schedule for completing each part.
- Work on one part at a time, switching to another part when boredom rears its ugly head.
- Organize each part of the task into separate folders.
- Reward yourself after completing each part of the task.

Feel Strongly the Urge to Do the Task:

- Relate completion of the task to one's academic goals.
- Relate completion of the task to one's short-term goals, long-term goals, and ambitions.

Get Started at All Costs:

- Try to ignore difficulties you anticipate.
- Do not think of things you would rather be doing, or just budget time to do them and get them out of the way.
- If other commitments are fogging your concentration, make a list of things to do later; this will get them off your mind temporarily.

Prepare an Effective Study Area:

Concentrate:

- Work on concentration strategies to help you stay focused.

Reduce Stress:

- Face personal problems and sources of stress directly.

Evaluate:

- Constantly, objectively and realistically evaluate progress toward completing the task.
- If necessary, enlist the assistance of an outside party (instructor, advisor, tutor, counselor, parent, trusted friend) for evaluating progress.

ORGANIZATION AND PREPARATION CONSIDERATIONS:

Being organized and prepared to learn eliminates one strong distraction that may inhibit attending and listening. If you are organized and prepared, it is one less thing to worry about! Being organized and prepared for class and study sessions can enhance attending and listening.

Organization and Preparation for Class:

- Think about the subject matter before class; those five minutes spent walking to class is the perfect time for this.
- Arrive early to class so you can select a seat in the least distracting part of the room.
- While waiting for class to begin, review previous day's notes to get in the frame of mind of the subject.
- Take the appropriate materials to class: note books, books, pens, pencils, calculator, etc.
- Complete assignments in a timely manner.
- Do assigned readings before they are to be covered in class (even for math courses). You have to read them some time, so best to do it before class. If you do not have time to read the assignments thoroughly, at least skim over them to get the main points.
- Take an outline of the readings or summary of the main points with you to class.
- Prepare a list of questions over readings and previous notes; you will be ready to ask intelligent questions when you feel your attention slipping.

- Organize course papers into three-ring notebooks or folders.

Organization and Preparation for Study Sessions:

- Have a specific place to study, or a place that can come to be associated with studying.
- Organize your workspace (desk, books, notes, school supplies) and have everything you will need close at hand.
- Work in a distraction-free area.
- Develop daily activity schedules and weekly planners, and stick to them.
- Make reminders to yourself about assignments and display them in prominent places in your room.
- Break down large projects into more manageable tasks, then set deadlines for completing the smaller tasks.
- Buy your own books and supplies rather than borrowing them.

TIME MANAGEMENT CONSIDERATIONS:

Course schedules:

- The number of classes as well as their content should be carefully considered when scheduling courses.
- A student who has difficulty paying attention might choose not to enroll in classes longer than 50 minutes if possible, especially lecture courses in which little student action occurs.
- A student who has difficulty paying attention might choose not to enroll in back-to-back courses without a break.

Personal Time:

- Daily, weekly, monthly, and semester schedules should be organized to assist in time management.
- Time should be allocated in the schedules for adequate study time as well as leisure time.
- It is very important for students to periodically evaluate how they planned to spend time and how it was actually spent. This helps to develop an awareness of time management practices.

- Students should make class preparation part of their everyday routines.
- Different subjects and activities should always be interspersed during short study periods to avoid boredom.

Tutoring Sessions:

- Divide each session into different tasks, spending 15-20 minutes on each.
- Provide a review at the beginning and end of each session and/or each new activity.
- Consider rescheduling sessions to find the optimal time that is appropriate for the student's interest or activity level.
- Divide assignments into realistic time frames in consultation with daily, weekly, monthly or semester planners.

Group Learning:

- The goals and expectations of the study group should be clearly outlined.
- The group should meet for short periods of time, or should divide the session into smaller tasks, spending 15-20 minutes on each task.
- The group should meet in a distraction-free area.
- If the attention deficit student has poor social skills or impulse control, he/she should be introduced gradually to group learning situations; in addition, supervision by a mediator may be helpful until the student becomes accustomed to the situation.

STUDY SKILLS CONSIDERATIONS:

Study skills may aid in sustaining student attention.

- Strategies such as SQ3R help students attend while reading.
- Color coding and highlighters help the student pay attention to more important information.
- Visual aids such as charts, graphs, flashcards, and timelines may help students to focus.
- Time management strategies, such as spacing reviews and time planners, help students to maintain their attention on the task at hand.

COMPENSATORY CONSIDERATIONS:

Compensatory equipment is often useful to the attention deficit student.

- Textbooks and reading assignments on tape help the student to focus while reading.
- Taping lectures provides a fairly complete, permanent, auditory record of lectures. Students may use tapes to improve the quality of notes if they have trouble paying attention for the entire class.

TIME SCHEDULING SUGGESTIONS:

Time scheduling will not make you a perfectly efficient person. Very few people can rigorously keep a detailed schedule day after day over a long period of time. In fact, many students who draw up a study schedule and find themselves unable to stick to it become impatient and often give up the scheduling idea completely.

The following method of organizing time has been helpful to many students and does not take much time. It is more flexible than many methods and helps the student to establish long term, intermediate, and short term time goals.

1. Long Term Schedule:
   Construct a schedule of your fixed commitments only. These include only obligations you are required to meet every week, e.g., job hours, classes, church, organization meetings, etc.

2. Intermediate Schedule – One per week:
   Now make a short list of MAJOR EVENTS and AMOUNT OF WORK to be accomplished in each subject this week. This may include non-study activities. For example:
   - Quiz Wednesday.
   - Paper Tuesday.
   - Ball game Tuesday night.
   - Finish 40 pages in English by Friday.
   - Finish 150 pages in History by Friday.

These events will change from week to week and it is important to make a NEW LIST FOR EACH WEEK. Sunday night may be the most convenient time to do this.

3. Short Term Schedule – One per day
   On a small note card each evening before retiring or early in the morning make out a specific daily schedule. Write down specifically WHAT is to be accomplished. Such a schedule might include:

Wednesday

- 8:00-8:30 Review history.
- 9:30-10:30 Preview math and prepare for quiz.
- 4:45 Pick up cleaning on way home.
- 7:00-10:15 Chapter 5, 6 (History).
- 10:30 Phone calls.

CARRY THIS CARD WITH YOU and cross out each item as you accomplish it. Writing down things in this manner not only forces you to plan your time but in effect causes you to make a promise to yourself to do what you have written down.

Time Schedule

Below is a time schedule which provides an opportunity to view and organize necessary activities within a weekly time frame. Time allotted for specific activities can be categorized and distributed over an entire week.

Time Schedule

Available Time Per Week	
In a seven day period you have:	**168 hours**
Subtracting 7 hours per day for sleeping, 1.5 hours per day for eating, and 1.5 hours per day for personal grooming. (10 hours per day X 7 days)	**-70 hours**
Total available time=	**98 hours**
Necessities Per Week	
Exercise	**____hours**
Working	**____hours**
Travel to and from work	**____hours**
Travel to and from school	**____hours**
Housekeeping chores	**____hours**
Family obligations	**____hours**
Proper nutrition planning	**____hours**
Relaxation and leisure	**____hours**
Other demands and obligations	**____hours**
Total Available Time For Necessities =	**____hours**
Available time before necessities	**98 hours**
Subtracting time for necessities	**____hours**
Total Available Time For Academic Demands And Extracurricular Activities	**____hours**

Time Schedule Work Sheet

Below is a suggested weekly worksheet for planning. Hours after 6:00 pm can also be scheduled using a similar format.

Time Schedule Worksheet - Semester

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7:00a							
7:30a							
8:00a							
8:30a							
9:00a							
9:30a							
10:00a							
10:30a							
11:00a							
11:30a							
12:00p							
12:30p							
1:00p							
1:30p							
2:00p							
2:30p							
3:00p							
3:30p							
4:00p							
4:30p							
5:00p							
5:30p							
6:00p							