

SOUTH DAKOTA



SCHOOL OF MINES
& TECHNOLOGY

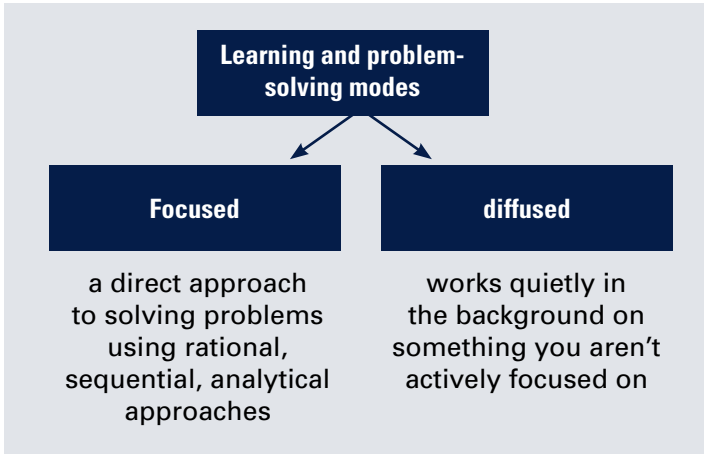


STUDY TIPS

Passages are taken directly from "A Mind for Numbers: How to Excel at Math and Science (Even If you Flunked Algebra)," Barbara Oakley Ph.D. 2014

Learning and problem-solving occur in two different modes: focused or diffuse. Discern between focused mode and diffused mode: **both are very important.**

1



The most effective way to learn math and science: study for a while in focused-mode, and get into diffused mode to think about the “big picture.”

You can't just turn diffused mode on, but you can do some things to jumpstart it-



go for
a walk



take a
nap



go to
the gym



take a
shower

Once you are distracted from the problem at hand, the diffuse mode has access and can begin working on big-picture stuff to settle on a solution. Thomas Edison and Salvador Dali were brilliant at toggling between these two modes.

2



Don't jump into the water before you learn how to swim. E.g., don't start working blindly on problems without reading the text, attending lectures, viewing online lessons, or speaking with someone knowledgeable, like your professor.

3



Edison said, "We learn a great deal from our failures in math and science." Know that with each mistake, you're making progress toward the correct solution. Finding errors should give you a sense of satisfaction. Mistakes are inevitable. Work past them and avoid overheating your brain by keeping your working sessions short.

4



When you're really stumped: force yourself to turn your focused mode off for a while. Then get some insight from a peer, classmate, or the instructor. Getting a different perspective can do wonders to understanding the concept, but only do this after you've struggled with it first.

5



Try to do your mental retrieval outside of your normal study place- take a 5 minute walk instead.



Form “chunks” of information to build a picture of the solution. Try to find sample problems with worked-out solutions- it’s like using a GPS unit when you’re driving on unfamiliar roads in the middle of the night. Having this GPS helps you see key features and underlying principles of a problem.

Steps to forming a chunk:

Focus your attention on the info you want to chunk.

Understand the basic idea you are trying to chunk.

Gain context so you see not just how, but when to use this chunk.

Steps to forming a powerful chunk:

Work a key problem all the way through on paper.

Do another repetition of the problem, paying attention to the key processes.

Take a break.

Sleep.

Do another repetition.

Add a new problem.

Do “active” repetitions (mentally review key problem steps in your mind while doing something active like walking to the library).

7



Practice self-testing or self-retrieval while studying. Highlighting and underlining should be done minimally (one sentence or less per paragraph) or they can mislead you and be ineffective. Try to “mentally retrieve” key ideas rather than passively re-reading.

8



Give yourself mini-tests constantly. This will help prevent choking on tests. Testing in and of itself is a powerful learning experience: it changes and adds to what you know and helps you retain the material.

9



Procrastination: we procrastinate about things that make us uncomfortable. But thinking about it is actually more painful than just doing it- the anticipation of doing math is more painful than just doing it.

It's also like addiction: it offers temporary excitement and relief from boring reality (“If I study too far ahead of a test, I’ll forget the material.” Sounds okay at face value, but you’re just devising irrational excuses.)



If you’re still struggling with procrastination, try doing it first thing in the morning. Doing tasks you like the least when you first get up is incredibly effective. Another effective strategy is rewarding yourself after doing that task, like getting a vanilla latte.



10

Break your work into bite-sized pieces and then work intently for a short time. It's called a Pomodoro. Set a timer for 25 minutes; once it starts, you're on the clock. No IG surfing, no texting. Side benefit: getting used to being mildly under stress gives you greater ability to handle greater stress (like a test) later.



11

Don't be afraid to get help, even before you're really stumped. Go to office hours, supplemental instruction, tutor hours at the Tech Learning Center or Student Success Center, or a faculty member you have a great relationship with. Just a little bit of help might do you a world of good, and nobody gets through college without any help.



12

When you hit the wall: don't stress out. Learning doesn't progress logically so that each day just adds an additional neat packet to your knowledge shelf. "Knowledge collapse" can occur when your mind is restructuring its understanding.

13



In preparing for a test, have your problems and solutions neatly organized so you can go over them quickly. Tape handwritten solutions to problems on the relevant pages of your book so everything is quickly available. Handwriting them also increases the odds that you'll retain it in your memory.

14



Avoid multitasking when you're in focused mode – multitasking is like constantly pulling up a plant. This kind of constant shifting of your attention means that new ideas and concepts have no chance of taking root and flourishing.

15



Deal quickly with any negative feelings you have when you sit down to study. Give yourself a pep talk: "Quit wasting time and just get on with it. Once you get it going, you'll feel better about it."

16



The freedom of a schedule: keep a journal or use Outlook calendar or a whiteboard by your workspace. Write down your assignments as being due one day before they really are due.

The Best Apps and Programs for Studying:

Tasks, Planning, and Flash Cards

30/30- combines timers with a task list:

<http://3030.binaryhammer.com>

Evernote- very popular for noting task lists and random pieces of information:

<http://evernote.com>

Anki-one of the best pure flash card systems, with an excellent spaced repetition algorithm; many excellent pre-made decks are available for a variety of disciplines:

<http://ankisrs.net/>

Limiting Your Time on Time-Wasting Websites

Freedom- many people swear by this program, for MacOS, Windows and Android:

<http://macfreedom.com>

StayFocusd- for Google Chrome:

<https://chrome.google.com/webstore/detail/stayfocusd/laankejkbhbdhmipfmgcngdelahlfoji?hl=en>

Turn off your notifications on your laptop and phone

