

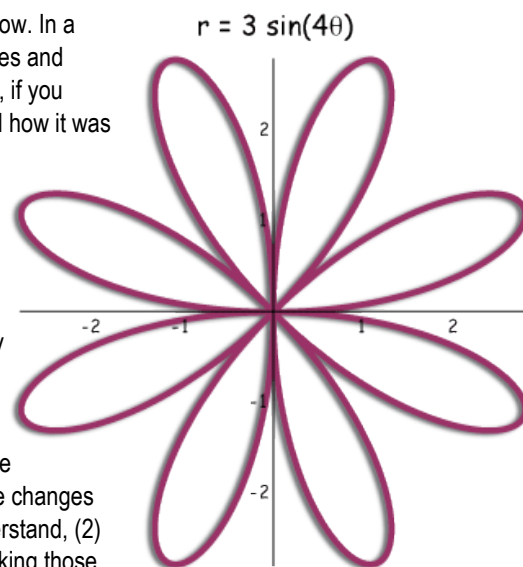


## LEARN TO UNDERSTAND, NOT MEMORIZE

Understanding is the ability to connect or relate something to things you already know. In a mathematical sense, understanding is the ability to take new concepts and structures and connect or relate them to concepts or relationships you already know. For example, if you wanted to understand how to make a gourmet meal, you would need to understand how it was put together. You would need to know the ingredients and how they interacted and related with each other. So it is with mathematics.

When you have an understanding of mathematical concepts "doing" math becomes more than just spitting out formulas and punching numbers in a calculator; it becomes a meaningful and interesting journey. With a good understanding of the structure of mathematics, gone is the need to memorize every formula and process because anything you can't remember can easily be recreated.

Most people learned mathematics by memorizing formulas and algorithms and have never really understood mathematics. If this the case with you, then there are some changes that will help as you take college math classes. (1) Develop a strong desire to understand, (2) know what needs to be changed to understand, and (3) maintain your efforts in making those changes. These changes are not easy and take some time, but be patient and be persistent. Some things to help develop understanding are listed below.



### Study to Understand

As you begin your mathematical studies a key feature to learning understanding is to be inquisitive and ask yourself and others the following types of questions:

- What is this used for?
- Where did this come from?
- How does this follow from . . . ?
- Where is this going?
- Is there an easier way to do this?
- Is this idea related to . . . ?
- How does this fit with what I already know?
- What can I do with this result?
- What are the textbook authors saying at the top of page 124?

In order to really develop an understanding you must look for connections and relationships between mathematical concepts. If they are not obvious you must continue to be inquisitive and ask a lot of questions. No one will make you understand so the desire to understand must come from you.

### Write to Understand

Although not very common in college math courses and even less common in high school math classes, writing about mathematics in your own words is one of the most effective ways to develop and increase an understanding about mathematics.



Since most math teachers don't require students to write about mathematics, this is again something you need to initiate on your own. A couple of ways that you can incorporate writing into your math studies is to (1) look for homework problems that require you to write out descriptions in your own words and (2) write out summaries of covered content. Taking the initiative to write in your own words the mathematical concepts you are learning will help you really know what it is you understand and what you don't. This will allow you to focus your attention to those areas where you lack understanding.

## INCREASING CONFIDENCE AND MOTIVATION

### Believing You Can Succeed

Confidence usually comes with success, but not everyone has had a successful experience with mathematics. Until you do succeed, you must believe that you can succeed. This belief needs to be coupled with taking the steps that will help you succeed, otherwise your belief will be dashed to pieces. Maintaining a positive frame of mind will help you seek out the tools you need to help you achieve success in your mathematical endeavors. On the other hand, if you maintain a belief that you will never be successful in mathematics, then you will probably be right because this frame of mind will not lead you to seek the tools and help you may need to be successful. In the words of Henry Ford, "If you think you can or if you think you can't, you're right."

### Trust Your Instincts

If you have previously experienced unsuccessful attempts in mathematics you may have a tendency not to trust your instincts. It may seem that they lead you astray in the past so you can't trust them now. However, this is a terrible misconception. As you begin to learn and understand mathematics, you will need to rely on those instincts to help solve a problem that may be worded differently or uses a variation on a concept that you already know. If you deny those instincts, you will be denying one of the best chances of success you may have.

### Use Positive and Negative Motivators

If you find yourself struggling to study or completing your homework assignments, you may need to find a different source of motivation. There are two main types of motivators, positive and negative. The positive motivators motivate you because something good or positive will happen as the outcome. Negative motivators motivate due to a fear of what will happen if you are unsuccessful. Both have their uses and some respond better to one over another. Which ever the case, here is a short list of some positive and negative motivators that may help you find a reason to study and finish homework assignments:

Positive Motivators	Negative Motivators
Accepting responsibility.	Repeating the course.
Interest in the subject. Desire to learn.	Loss of financial aid.
Proving to yourself you can succeed.	Receiving a bad grade on your transcript.
Seeing classmates succeed.	Having to change your major.
Knowing that you control your success.	Fear of being left behind. Delay in graduation.
Satisfying a passion to be successful.	Delay in taking courses that have this one as a pre-requisite.
Receiving respect and praise for a good performance.	Performing inadequately in subsequent courses.
Proving to yourself you can overcome adversity.	Disappointing family and friends.
Wanting peace and happiness in your life.	Discomfort at being confused or ignorant.