

# Tips for Teaching Math to CTE Students



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Career and technical education (CTE) teachers have a lot on their plate when it comes to delivering their core curriculum. With the emphasis on integrating academic math in the CTE curriculum, CTE teachers may be feeling a bit overwhelmed by this new challenge. But fear not! Here are a few techniques that may help you deliver the math component of your lab curriculum in a way that is easier for you to teach and your students to understand. There are a few things to keep in mind when teaching math that will make teaching it less stressful for you and your students. The first is that math is a difficult subject to teach,

even for math teachers. The subject matter itself is challenging. The second is that math is a head trip. By this I mean that unlike other curriculum, math has a built-in fear factor. Many students and teachers have some level of math anxiety.

At the root of this anxiety is a lack of confidence in one's ability to do the math. In order to build your confidence to teach math, take the time to understand the underlying math concepts you will be teaching your students. Instilling confidence in your students that they can learn trade-related math is the first step to success. Developing this confidence is an important part of teaching and learning math. If students are apprehensive about

math, they will not be receptive to your CTE-related math lessons, and teaching them will be difficult if not impossible. Most students who lack confidence in their ability to do math will hide their anxiety by saying "this stuff is useless," or, "why do I have to learn this?" Your number one goal is to build up their confidence. Just as you work with your students to build their trade skills you will need to help build their math skills.

## Skills You Need to Teach Math

First of all, you have become an expert in the math needed to be successful in your trade. You know your math so well that it is now second nature to you. Unfortunately, quite often when one is asked to explain what they are doing, they freeze like a deer in the headlights. I know the math but how do I teach it? One suggestion is to seek out a math teacher in your school or from one of your sending schools and go over the math you will be teaching with that teacher. Ask the math teacher for tricks of the trade in delivering these concepts. Just as a master in your trade showed you the tricks of the trade, so too math teachers can help you learn the tricks in teaching math. We were not born masters of our trade—we had to be taught.

## Skills in Teaching Math to Students

The most important skill in teaching math is to have confidence in your ability to teach it. Many students are apprehensive about math just as you may be. What you project will be picked up by your students. If the student is the least bit anxious about math and their ability to do well in it, they will be looking for an excuse to avoid doing the work. If they have a glimmer that you also do not find it useful or enjoyable, they will exploit this as a justification for them to not put the effort into learning it. They can sense if you are feeling dicey about math. If you feel confident, they will too. The goal is to lower the students' apprehension and

help them feel comfortable and capable. Build up your students' confidence. Help them realize that they can do it, that they have the natural ability to understand the concepts. Do this by showing how they may already be using these math concepts in their lab.

## Pointers to Remember When Teaching Math

1. Assume students may not have the background to do the math.
2. Review basic math concepts with them.
3. Let nothing be overlooked. The devil is in the details. Every step, even the simplest concept, is important. What you take for granted may be a stumbling block to your students.
4. Going over basic math in the context of your trade may allow for greater understanding of the underlying math concepts. Even basic math concepts can be deep. Math is taught in a spiral. Concepts are introduced in elementary school and then revisited in middle school and again in high school, each time going a little deeper. So going over these basic math concepts in the context of your trade may help students reach a deeper understanding of concepts they did not grasp in the academic setting.
5. Honor the student for bringing their questions to the class. Don't put a student down for not knowing how to do basic math. Use a student's lack of understanding as a jumping-off point to re-teach the skill to the class. When one student asks a question or doesn't know a concept you can bet there are others who are in the same boat.
6. Listen to the students' responses to your questions. They may have the right answer but in a form you were not anticipating. Take a moment to analyze their answers. Try to understand where they are coming from and what their reference points are. For example, a student may say the size of the socket wrench needed to do

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a job should be 4/8 instead of the answer you were expecting of 1/2. Be careful when you correct the student. Sometimes when the teacher says the answer is wrong the student may immediately believe the thinking is wrong. Remember students may not have developed the balance that adults have. They may take things to heart and believe they did not grasp the concept or they may think they are "stupid" when in fact their thinking and abilities are on target. In the example above, the student did understand the concept. The student did have the right wrench size but the answer was not presented in standard form. So let students know when their logic is sound but that they may have made a computational mistake.

7. Walk students through every step of the problem or process while checking along the way for comprehension and eliminating any confusion.
8. Remind students that math is hard work and that learning math is a workout for the mind like sports is a workout for the body. Math makes you think and thinking hurts!
9. In order to be successful in math, students need to practice just as practice is needed to master the skills of their trade.
10. When a student finds that he just can't seem to solve a math problem (incidentally this will work for trade-related problems too), instead of having him beat himself up, offer some advice. Have her get up and walk away or do something else.

This allows the mind to relax and let the creative part of the mind take over. While the student has diverted attention to other things, the mind is still working on the problem in the background, perhaps making connections in novel ways. Oftentimes when the student returns to the problem, the solution is right in front of her. If students still cannot find the answer, have them put it aside and ask for help.

## What is the Value of Math?

Students will ask, "Why do I have to learn this stuff? I'll never use it!" You may have to teach more of the concept than just the answer to the problem at hand so that students will be able to generalize the use of the concept in other applications. It may be true that students won't use all of the equations you teach them all of the time. Even if they don't use everything you teach them, the one thing they will get from learning math is the ability to think. Math is difficult; but if students stick with it they will eventually be able to comprehend the concepts and will notice that they are far more capable than they once thought. **I**

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