# MATHEMATICS IN THE CLASSICAL SCHOOL

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What does mathematics look like in the classical school? Is there any real difference for us as classical educators or does our instruction in math remain relatively the same as the traditional school? There is a real difference and that difference is this: in the classical school, the teacher will honor both the nature of mathematics and the teaching of math by applying Milton's *Seven Laws of Teaching* to every lesson.

So, what does that look like? In an effort to begin to answer this question, I will describe what it looks like in my classroom. However, I want to state up front that to be "classical" does not mean that it necessarily looks the same. As stated above, to be "classical" in the mathematics classroom, one only needs to honor mathematics by understanding its nature and by honoring the teaching of mathematics by applying Milton's *Seven Laws of Teaching* to your daily lessons.

Here is what a typical day looks like in my classroom. First, I greet students by presenting them with a real and intriguing problem. This problem must be both. But, it must also do one other thing: it must review that which we have already learned and must build a bridge to the idea that I wish to teach. Before students begin, I will ask a few questions of the class to make sure they understand the problem. As students begin working on this new problem individually, I walk around and assess how each are approaching the problem. I will then ask questions of individuals as needed: both to understand their thinking and to provide some insight or direction. After awhile, I will allow students to begin to share ideas and to work together. Then, we will jump back and forth from talking as a large group and going back to work in groups. As we do this, I am constantly asking questions to guide thinking. If I am not needed, I will simply let students run with their ideas. Once we have come to a solution, we will evaluate various methods and then review those that are most advantageous. Finally, we will apply what we have learned in a manner that requires students to articulate the new concept in a slightly different scenario.

So, let us now look at how this honors Milton's *Seven Laws* in math instruction.

**Law #1—A teacher must be one who knows the lesson or truth to be taught.**

The math teacher must begin by posing a problem that appropriately bridges the gap between what is currently known and the truth that the teacher desires to teach. In order to do this well, the math teacher must thoroughly know their field. Many problems will work, but some will be better than others. And, once the problem is posed, the teacher must first be able to

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assess students as they work, recognizing the merits of various approaches. The teacher must also know their content thoroughly enough to be able to guide students of differing strengths and weaknesses by asking appropriate questions. If the teacher is not confident in their own knowledge and the varied solutions to the problem, students will lose their confidence in their teacher and become frustrated.

**Law #2 —A learner is one who attends with interest to the lesson given.**

The math teacher must begin by posing *real and thought-provoking* questions. If the learner must attend *with interest*, the teacher must provide rich ideas that capture the mind of a student. There is no need to dress up math problems with trappings unnecessary to the problem (in the hopes that a student will like math because it references their favorite basketball player). This fails to honor the student and assumes, too, that math is uninteresting and needs to be dressed up. The problem simply needs to be a real problem (note: I did not say it necessarily needs to be practical, although this may help). The problem needs to be genuine and one in which the teacher might delight in, too.

**Law #3—The language used as a medium between teacher and learner must be common to both.**

When a teacher poses a problem that is built upon prior knowledge which leads to new, the language used to discuss the problem is naturally limited to that which is common to both. Math text books are notoriously terrible in accomplishing this. These usually begin by using difficult or intimidating language before introducing the new idea. If the idea is introduced in the problem, both teacher and student can use familiar language to talk about the new idea before attaching the appropriate terminology to the idea. The idea must come first, then the technical language. This is why it is so important for the teacher to be able to either come up with or choose the appropriate problem to begin each day with. The typical textbook is not written with the seven laws in mind, nor is it written from a basic posture of a students ability to think mathematically. So, this is where the teacher must step in to provide the appropriate problem that bridges the gap between what is known and that which is unknown. Teaching in this way communicates to the student that the teacher believes in their ability to think, rather than assuming that every detail needs to be provided for the student.

**Law #4—The lesson to be learned must be explicable in terms of the truth already known by the learner—the unknown must be explained by the known.**

When the teacher provides the class with an appropriate problem to work on, one that bridges the gap between what is known and what the teacher desires to teach, the unknown is naturally explained by the known. For example, in this class the teacher would begin by asking: "What do we know?" This directs the student's attention to the problem and causes them to recognize that which they already know. In explaining what they know, the students both review what they know and set a foundation for exploring the unknown. The teacher brings students to this point by asking questions like: "What do we need to know?" "What is the question asking?" and "What is the unknown?" Using this approach requires students to articulate the new problem using that which is already known. As the class makes progress, students build upon their previous knowledge.

**Law #5—Teaching is arousing and using the pupil's mind to form in it a desired conception or thought.**

Teaching in this way requires the *student's mind* to form the desired thought. First, the teacher poses a real and intriguing question. Then, the teacher proceeds by assessing student needs and giving direction as needed. If students can come to the appropriate solution without the help of the teacher, then so be it. But, when they cannot, it is the teacher's job to begin to ask questions that will guide the students' thinking. The teacher will begin with questions that are less revealing and move on to those that are more revealing. Doing this ensures that the teacher always allows the student's mind to do as much work as possible. As the teacher leads the class, he must constantly affirm the work of the students and give them confidence that he will never leave them to themselves. This will give the students the confidence they need to give themselves to the work of mathematical thinking.

**Law #6—Learning is thinking into one's own understanding a new idea or truth.**

Once a few members of the class have come to a solution (or the class as a whole has come to a solution), the teacher proceeds by having the class discuss and evaluate their own work. This is when students think into their own understanding the new idea or truth. As this discussion occurs, it is the teacher's job to make sure that the class is not neglecting any steps as they look back over their work. It is also the teacher's job to help the students to appropriately articulate what they have learned. In doing so, the teacher assures that each student has thought into their own understanding the new idea.

**Law #7—The test and proof of teaching done—the finishing and fastening process—must be a reviewing, rethinking, re-knowing, and reproducing of the knowledge taught.**

Finally, the teacher tests and proves that which was taught by having students apply what they have learned. They may do this by applying what they have learned to a new problem and articulating both their steps and their rationale. They may do this by simply writing up the lesson learned in such a way as to explain it to a friend who was absent. When students are required to articulate what they have learned the teacher can verify that the lesson has been learned to the appropriate degree.

Again, this may take various forms. But, this is a general overview of how we might seek to cultivate the minds (and hearts) of our students in the math classroom by applying Milton's *Seven Laws* to each day's lesson.

In contrast to applying the *Seven Laws*, the typical math classroom today begins with negative assumptions regarding the student: namely, the student is incapable of thinking for themselves or that students are incapable of finding math interesting and worthy of study. Because of this, the typical math classroom is filled with the teacher and textbook providing answers to questions that the students are not asking. This is no way to learn: no learning is ever done well without genuine questions bubbling up from within the student. When math is approached this way, the student's mind remains in neutral and the students learn that they can simply wait the teacher out to provide what they need. In the classical classroom, however, the teacher elicits questions from the students. There is no waiting by the students. Their minds are set to action by the presentation of a real problem and the engaging questions of a teacher. By engaging their minds and providing an environment in which thinking is encouraged and required, students know that no information will be provided without their effort and that they are free to try, knowing that the teacher will never leave them in their pursuit of understanding. When this partnership happens, real learning takes place. The student not only gains knowledge each day, but they also grow in their own ability to think and confidence in their ability to problem solve.