

Mathematics and Building Guitars

You can't build a guitar without using mathematics. Basic math skills are a necessity if you are planning to attend R-V. We use rulers, measuring down to $1/64^{\text{th}}$'s of an inch, and calipers, which measure in thousandths. Don't worry; we'll help you learn to read them. But you have to be able to deal with the numbers once you've got them.

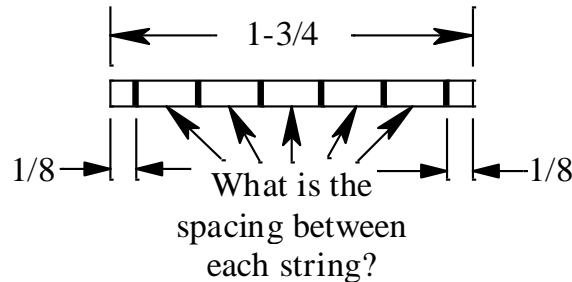
You will be required to take a math assessment test on the first week of class. The following is a sample of a lutherie math test. If you cannot pass this math assessment, you will have a difficult time being successful at Roberto-Venn and in lutherie in general.

1. Your electric guitar fingerboard measures $1-5/8$ " wide at the nut. You have to draw a centerline. What is one half of $1-5/8$ "?
2. Your acoustic fingerboard will be made of ebony, with wood binding on each edge. Each piece of the binding is $1/16$ " thick. If the completed fingerboard is $1-3/4$ " at the nut end, and $2-5/16$ " at the body end, how wide will the ebony center section be?
3. The back of your acoustic guitar is $20-5/8$ " long. You have to divide it into five equal spaces, so that you can locate the back braces. How wide is each space?
4. You are routing the pocket for your neck pickup. It needs to be $3/4$ " deep. After three passes with the router, you measure the depth at $9/16$ ". How much further do you need to go?

The previous examples have dealt with fractions. We also use our calipers, to measure numbers as small as one-thousandth of an inch (.001). The following chart will give you some decimal equivalents.

$1/2$.500
$1/4$.250
$1/8$.125
$1/16$.062
$1/32$.031

1. What is the decimal equivalent of $\frac{3}{8}$? (hint: simply divide the numerator (3) by the denominator (8) with a calculator or by long division).
2. Your electric guitar body consists of a top, glued to the back. The total thickness will be $1\frac{3}{4}$ inches, or 1.750. If the top finishes out to .093", how thick will the back need to be?
3. You need a $\frac{5}{32}$ " drill bit, but you can't read the numbers on the bit. Using your calipers, what size bit are you looking for? (hint: convert to decimal equivalent, divide 5 by 32).
4. This is a drawing of the nut. The overall width is $1\frac{3}{4}$ ". The high and low E-strings are each located $\frac{1}{8}$ " from the ends. You have to fit four more strings into the remaining space. How far apart will they be? (Hint: convert the numbers to decimals!)



So, how did you do? Are you ready to build a guitar? This is real life applied math. It's the sort of thing that you will deal with almost every day. If you had trouble with these examples, we strongly encourage you to review a basic math book, or get some help and practice before you come to R-V. We want you to succeed. We'll give you as much coaching as we can, and we even have a math teacher come in for a special session. But remember, the more time you spend struggling with the numbers, the less time you'll have to build guitars.