History

Mountain dulcimers are attributed to the Scotch-Irish who settled in Appalachia, with drone strings reminiscent of bag pipes. Part of the appeal of the dulcimer is that it could be built from locally available wood with basic hand tools. Traditional designs range from a rough rectangular box held together with nails, bailing wire frets, and 'possum gut strings—to beautifully crafted instruments with graceful curves, inlay, intricate carving, and satin finish.

Special tools

A look through a luthier's catalog will present you with a dizzying array of special saws, clamps, jigs, and other instrument-making tools. A modestly equipped shop has just about all the tools needed. The one exception is the fret saw. It is a fine-tooth narrow kerf back saw designed for cutting slots for frets. It is also a great saw for making fine cuts on other projects, so it is well worth the investment. A special clamp for holding the back and soundboard to the sides can easily be made from 1½" schedule 40 PVC. These are about ¼" wide with a ½" gap. You can make a couple dozen in just a few minutes and, like the fret saw, they will prove useful in other woodworking projects (and make decent shower curtain rings, too).

Hardware

There are a few "store bought" parts (fret wire, tuning pins, and strings) that make the assembly much easier and the playing more user friendly. You might want to order these now, so you won't have to wait when you're ready for them. Here are some sources:
FolkCraft (*www.folkcraft.com*) Specializes in dulcimer wood, parts, plans & kits. You can get everything you need from this source. The dulcimer in this article was built with the Folkcraft hardware kit #7112361. You have the option to add on the fret saw and a special drill bit for the anchor pins.
Steward McDonald (*www.stewmac.com*) Parts, tools, kits, and plans for all types of string instruments.
Elderly Instruments (*www.elderly.com*)
Music Makers (*www.harpkit.com*)
Luthier Supply (*www.lmii.com*) Mostly guitar equipment, but a great web site for wood

Dulcimer Wood

All wood for the dulcimer needs to be kiln dry. Other than that, there are a lot of options. Here are my suggestions:
Back: Typically a hard wood, such as walnut, cherry, or maple. A great place to show off some exotic grain, but a simple grain pattern with a satin finish is beautiful and elegant.
Soundboard: Traditionally quartersawn wood of a softer species. Cedar, cypress, sassafras, sycamore and spruce produce good mellow sound. Harder woods, such as walnut produce a brighter sound, though less volume.
Sides: Usually the same species as the back, but should be straight grain and free of defects so they will bend consistently.
Fretboard: Hard wood (walnut, cherry, maple) absolutely straight grain, as any movement will throw the instrument out of tune.

For the dulcimer in the article, I chose walnut for the back, sides, and fretboard; and quarter sawn sassafras for the soundboard.

Bill of materials

Wood: (Note: this is the wood used for this project—you may wish to substitute other wood based on availability and your preference)

1pc walnut 1x4"x6': Straight grain for back, sides, fretboard, and peg head
1pc sassafras 1"x4"x3' for the soundboard

Hardware: (Note: Folkcraft sells a kit that includes all of the parts listed, plus options for a fret saw and dulcimer case. I highly recommend it!

Frets: medium gauge
Geared tuning pins
Dulcimer strings
Fret wire: Medium gauge
Hitch pins
Nut & bridge: 1⅜" wide (could be made from hardwood)

Tools:

Band saw
Drill press
Sander (belt sander and vibrating or random orbital sander recommended)
Coping saw
Wire cutters
Fret saw
Clothes pins
24" of 1½" schedule 40 pvc pipe (for clamps)

Playing the dulcimer

The dulcimer is more than a wall decoration—it is meant to be played. Dulcimers are one of the easiest string instruments to learn to play. Grab a guitar pick or make a turkey feather quill for a more traditional approach, and start strumming. With a little practice, you will be strumming "Go Tell Aunt Rhodie" and "Bile Them Cabbage Down", but eventually you will likely learn other tunings and complex chorded fingerpicking arrangements for songs like "Amazing Grace" and "Greensleeves". As one dulcimer player explained it, "the dulcimer is simple to play, but difficult to master."

Tuning your dulcimer

There are many tunings for the dulcimer, but let's start out with the "DAA" tuning, in which the lowest string is tuned to "D", and the other three strings are tuned to the "A" above that (they should have the same pitch as the low string at the fourth fret).
The most traditional dulcimer scale for American folk songs is the "Ionian" (DAA), fretting only the top strings and letting the other two serve as drones. "Mixolydian" (D-A-D) is also common for folks with the coordination to play cords. "Dorian (D-A-G)", and "Aeolian" (D-A-C), produce notes in differing combination of major and minor scales. http://*www.wikihow.com/Tune*-a-Dulcimer explains these tuning modes in more detail. Here are some other learning resources online, we recommend… *Homespun.com*, *jcrmusic.com*, *stewmac.com*, and *everythingdulcimer.com*. If you'd like to hear the dulcimer pushed to the limit, check out Youtube videos by Bing Futch... or for serious rock & roll electric dulcimer, listen to Sam Edelston's Contemporary Dulcimer series, also on YouTube. You won't believe what these guys can do with just three or four strings!

Fret spacing

Fret spacing is a combination of math and art. Many of the old-timers simply placed the frets where they sounded right which worked fine, as long as they had a good ear. The frets are spaced to produce whole notes (no sharps or flats—think do, re, mi, fa, so, la, ti, do), starting on the third fret. With the sharps and flats missing, the frets are unevenly spaced. Another method is to measure the distance from the nut to frets on another dulcimer.

The math is intriguing. Working with the distance from the nut to bridge (say, 28"), the fret spacing is a ratio from each fret to the bridge so that when you get to the mid-point (14"— exactly one octave above the un-fretted note on the 28" fretboard), you have twelve frets, each spaced proportionally the same from the previous fret to the bridge. The magic number for this is 17.817. So, if you ran the calculations, the distance from the nut to a guitar's first fret would be 28"/17.817, or 1.572". But you don't put that fret on a dulcimer, since it is a sharp (or flat). Skip it, and calculate the distance from where it would have been to the next fret (which you do use) as (28"-1.572") /17.817 = 1.483". But you don't want to measure from one fret to the next, since you can accumulate error, so add that to the distance to the previous fret to get the total distance to the nut. Continue this for 28 frets for your calculations. Then, eliminate all the frets that give sharps or flats from the 5th calculated fret (the third fret on the dulcimer), up and down the scale. Finally, re-number the frets that you did keep for reference on the dulcimer. For laying out the frets, you need to convert your measurement to the nearest 1/32". Got that?

I set up a spreadsheet to do the calculations, but if you want to do a different length fretboard, take a ratio of your fretboard length to the 28" fretboard in the table, multiply by the inch measurement (in decimal form), and use that. Or you could go to the Stewart McDonald web site (listed in "Resourses") and use their fret position calculator for the dulcimer. Just enter the distance from nut to bridge, and up pops the all the numbers—but you still need to convert them into fractions of an inch.