

# How to Make (Quick and Dirty) Maps

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So you want to make a map? Let's start with three basic ideas before we begin. Then I'll describe a simple process of mapmaking.

## Three Basic Ideas About Mapmaking:

### 1. The Map is Not the Territory

Maps are an abstraction of reality as we think we know it. The map maker is responsible for making the map as "real" as possible. Take care in how you prepare a map, what you put on it and don't put on it, and how you use it. Garbage In, Garbage Out applies to designs based on inaccurate maps as well as computer programming. It also often happens that if something isn't shown on the plan, it "doesn't exist", and so the design is then faulty of damages the environment or whatever. This is one source of the "Memorial Subdivisions" we see all around us, i.e., "Tall Oaks Lane", where the lane now sits where the tall oaks stood, etc. Even a good map is not the territory, and it behooves any map user to know where a map is accurate, where it is inaccurate, what the intention and methods of the mapmaker were, etc, so that the user can know where the limits of reasonable map use lie for any particular plan. If a designer needs to step out of the bounds of reasonable use, s/he better know how to compensate for it down the road. Always read the disclaimers, if shown, on any plan you look at. Try to represent the accuracy of any map you draw either graphically or verbally in some way so that future users can estimate its accuracy.

### 2. Mapmaking is logical, orderly and understandable.

If it weren't, we couldn't make good maps. Don't let your fears get in the way of using a simple process, or a complicated one. Just take the time you need to understand the process, or get someone else to do it for you.

### 3. Triangles are the most stable geometric figure.

Squares, rectangles, hexagons, etc. with given lengths of their sides can change shape. Once a triangle has known lengths on its sides, it cannot. So it will be a process called "Triangulation" that we will use to make maps.

## How to Map Using Triangulation

Tools needed: clipboard, pencil/pen, data forms, compass (magnetic north pointing type), 100 foot or longer tape measure, one or two friends to help, trace paper, engineer's scale, compass (circle-drawing type).

### 1. Start by looking over the site and making a sketch and a list of features you want to show on the map, and select a scale for the map.

This part is critical- it saves you time, helps you get to know the site, and plan your work. You can do this alone and it saves time when two or more folks are working on the map with you later. The sketch (quick and dirty) helps you record general relationships, so that when you are plotting you have a reference to help alleviate confusion. Prioritize the list- which features are more or less important?- so you can plan your work and get at least the most important stuff if you run out of time when measuring.

Selecting a scale is easy. How big is your drawing table? How detailed will the design be? What size paper will you use? How big is the area to be mapped? 1"=10' is a good scale for detail design of a small area, say one acre or less (depending on shape). More general design is good at progressively larger scales as sites and design problems go up in scale, but 1"=20' & 1"=50' are common, though hard to do anything in much detail on, particularly 1"=50'. Amazingly enough, drawing table and paper sizes often play a large role in determining the scale of design drawings. Pace the total dimension of the area you want to map, and determine how much paper you will need for different scales, consider the design you are doing, and then decide. I advocate for 1"=10' if at all possible. This means keep your design problem relatively small in area.

This method of mapmaking takes a fair amount of time in the field. Try to pick the points you are going to measure with an eye towards being able to pace and sketch in other features later. Of course, the areas most difficult to design or likely to undergo the most detailed design should be more accurately mapped than areas to be designed more generally or less intensively. There is always some guess work involved in this aspect, and this is why #2 below is important—so you can go back and add to your map easily.

2. Pick two (2) known recoverable points within sight of each other and all or most of the site features you want to put on the map and describe and mark them well.

Once you have your list and have looked over the site, pick two points to start with. These should be "known and recoverable", within sight of each other and all other points, well-placed and a good distance apart. These are the "reference points" for the whole map, which means you will be measuring from these two points to every other feature you are going to put on the map. "Known and recoverable" means objects that are prominent, easily described and located in writing and on the ground, marked with flagging or paint if necessary, and unlikely to get moved or disturbed in the process of implementing the design you are working on for any reason. Big rocks, house corners, trees with a spike in them, telephone poles, etc. are examples.

Since these are reference points, they will be the basis for the whole map. You will be measuring between reference points and from both reference points to each and every other point you will put on the map using triangulation. This is why they need to be within sight of each other and every other point.

Well-placed means an orientation to the other points such that the angles from reference points to data points is more than 30 to 45 degrees (ideally). If the angles become too acute, accuracy drops off (trust me). Well-placed is also a function of distance between reference points and location of all other data points.

"A good distance apart" is a distance that allows for easy and accurate plotting at the scale at which you will be plotting. For 1"-10' scale, 100 feet apart is only 1" on the plan, so plotting becomes more difficult and less accurate.

Write a description of each reference point in your notes so someone ten years from now could go back to the site and find these points to update your map. This does actually happen, so it's not a useless exercise. Name one point BM 1 (benchmark 1) and the other BM2. Mark them in the field so that you can go back to them in 3-4 weeks and update your map, if need be.

3. Take a compass bearing and measurement between the two reference points.

Make sure you get as accurate a compass bearing as you can, and note from which point it was taken, as this is the basis of map orientation to North (or South, if you prefer). The measurement is also critical, since it is the base leg of all other triangles you will create. Write the bearing and measurement at the top of the notes from the mapping process.

4. Now take your tape measure and measure from both reference points to each feature you want on the map.

By measuring from both reference points, you are describing a triangle unique to each point, since you have a known base leg length between reference points. Write down a description of each point so you know what it is, and each measurement so you know from which reference point it is taken. Make sure you cover your whole list of features from step one, or have a good reason for why not to include something. The description of each point should include enough information to draw the object on the sketch plan when plotting, i.e., "12 in. dia. Sugar Maple. branch spread approx. 30 feet dia."; or "center, of 4 foot dia. boulder"; or "center of 20 ft. wide paved driveway". This is where the friends come in. Two tape measures helps a lot here, too. If you are in a pinch, pacing can work, but it is obviously a lot less accurate.

The person who is going to plot the points on the map should be the one to write down the data. This minimizes communication and memory problems.

5. Before finishing your measuring, go back to your list, check it twice.

It's often not easy to get friends together to do something like this more than once. At least not the same ones.

6. Start plotting by drawing the two reference points to scale.

Use the engineer's scale to draw the two points in their proportional relationship to each other, and label them.

7. Using the compass and the scale, mark the locations of the other points in turn.

Take your circle-drawing type compass and adjust it to the number on the engineer's scale which corresponds to the measurement you took in the field. Put the point of the compass on the appropriate reference point, and scribe part of a circle in the general area where you expect the object to be on the map. Do the same for the second measurement, making an "X" on the spot where the two distances meet. If there are two possible X spots look at your sketch from step 1, relate the object to other points already or about to be drawn and figure out which X marks the spot. If you can't figure it out, save the question for later when more points are drawn on the map which can help you decide. Either that or you leave the object off the map, or go back to the site and measure again.

8. Sketch in other features and fill out the skeleton you have created to create a rough map.

Once you have marked out all the points from your data, you should be able to recognize the site on the map in front of you. (If not, check your numbers. You may have to start over.) You can then fill in the details from your descriptive notes, and can go back to the site and measure or pace from features now shown on your map to get more details.

9. Re-draw the map on a piece of vellum or mylar cleanly and neatly so that you have a reproducible original drawing.

10. Voila! Finished