

Range Estimation Using a Mil or MOA reticle.

There are a number of tools available for estimating range to a target. One technique is the use of a reticle graduated in miliradians or minutes of angle. The intent of this short article is to introduce shooters, new to using their reticles for range estimation, to the mechanics of reticle range estimation. It is not a comprehensive explanation of all nuances associated with reticle range estimation, nor a replacement for competent instruction with a professional.

To estimate the range to a target using your reticle, you first have to know a dimension on the target. For example, figure one shows a 66% IPSC target, which has a known target width of 12" and height of 20".

Next, you'll use your reticle to measure the known target dimension. To understand the measuring increments in your reticle, simply review the manufactures instruction book. Figure 2 shows a picture from the manufactures instruction manual for the reticle we are using in this example. It is a mil (also referred to as mrad or milliradian) based reticle.

Figure 3 shows the 66% IPSC target on the range at Marksmanship Training Center. Looking through your scope, and measuring the target width with the reticle, the target appears to be 1.18 mils in width.

You can now take the known target dimension, along with the corresponding measurement through your scope, and put these values into a formula that will give you the range to the target.

Before looking at our specific example, here is what the generic formula looks like:

$$\frac{\text{Known target size in Inches} \times 27.77}{\text{Target size in mils}} = \text{Distance to target in yards}$$

Figure 1:

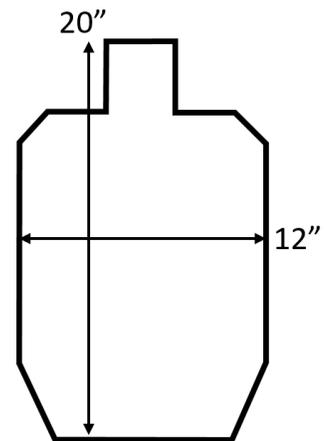
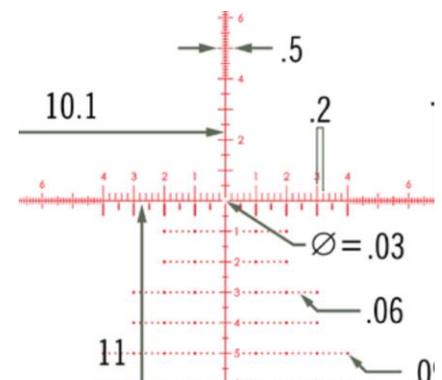


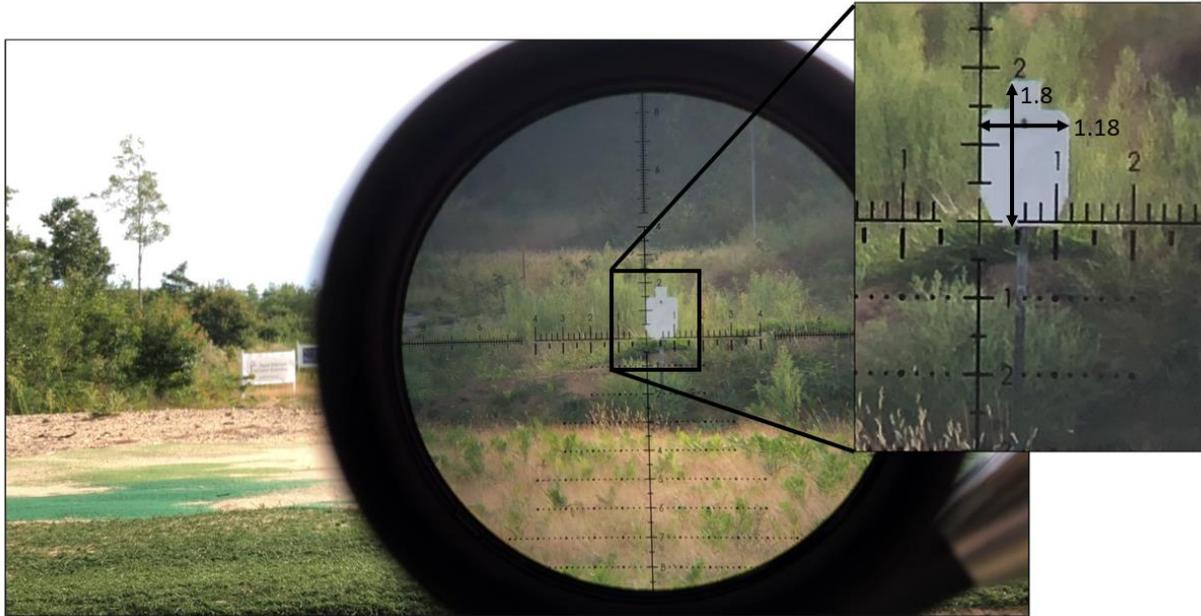
Figure 2:



Plugging our numbers into the formula we have:

$$\frac{12'' \times 27.77}{1.18 \text{ mil}} = 282 \text{ yards}$$

Figure 3:



The actual range to this target is 295 yards. Remember, this is range estimation, so you should expect some margin of error. How much error to expect depends on a number of variables. For reference, the United States Army Sniper School expects a +/-5% accuracy with a rifle scope. A common technique is to range estimate based on the width and then range estimate based on the height and to shoot the average. There are other techniques and guidelines.

If math is not your friend, we understand. Here is another example allowing you to exercise the math:

Considering another 66% IPSC target, again with known dimensions of 20" height, this time the target height is measured in a scope as 1.4 mil. The resulting calculation looks like:

$$\frac{20'' \times 27.77}{1.4 \text{ mil}} = 396 \text{ yards}$$

If you have a MOA based reticle, the application is the same; however, the formula looks slightly different:

$$\frac{\text{Known target size in Inches} \times 95.5}{\text{Target size in MOA}} = \text{Distance to target in yards}$$

This brief article is not intended to be comprehensive or replace instruction from a qualified instructor, but will help get you on the right path to range estimation using a reticle. There are a number of equipment considerations (such as first vs. second focal plane optics) and nuances (such as brightness of the target), and short cuts to reticle based range estimation, so the best approach is to take formal training and **get out and practice.**

At the Marksmanship Training Center, we introduce range estimation in our LR1 class. In LR2 every student goes through range estimation training and then has the opportunity to practice this skill on steel targets. Students are exposed to other techniques as well, including naked eye and laser range finder. MTC: Learn. Practice. Master.

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Here are a couple of additional targets to practice on, each are at the Marksmanship Training Center in Michigan. These humanoid targets are 18" at the widest point and 24" tall. The optic is first focal plane and has the Horus H59 reticle. You can google the reticle dimensions. What ranges do you come up with for these two targets?

