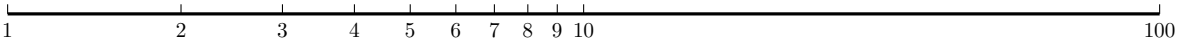
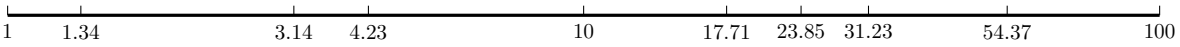
Logarithmic Scales **Math 142 - Workshop**

The number line below is called a *logarithmic scale*. Unlike a normal number line, the numbers are spaced according to multiplication & division instead of addition & subtraction. On this scale, every 3 inches represents a factor of 10.



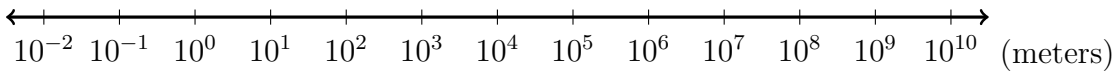
1. Use another piece of paper to mark the place where 20 should be on the log scale.
2. Mark the positions of 36, 54, and 81 on the log scale.
3. Where does the fraction $\frac{5}{4}$ go on the log scale?

The power of the log scale is that it makes multiplication and division much easier.



4. Use the log scale above to mark the position of 1.34^2.
5. Use the log scale above to mark the position of 4.23π.
6. Suppose that a cylindrical barrel has height $h = 4.23$ ft, and radius $r = 1.34$ ft. Use the log scale above to find the volume (remember that $V_{cylinder} = \pi r^2 h$).

7. Place the following values on the logarithmic scale below. Try to find the correct position between the orders of magnitude shown.
   (a) Height of an average person
   (b) Radius of Earth - 6,378 kilometers (be sure to convert to meters first!)
   (c) Radius of the Sun - about 100 times larger than the Earth
   (d) Length of a mouse - 8 centimeters



8. Notice how the two log-scales below line up. Because $\log(\sqrt{x}) = \frac{1}{2}\log(x)$, you can use log-scales like the ones below to estimate square roots. Try estimating $\sqrt{2}$ & $\sqrt{10}$.