STELLAR PARALLAX

If $\vartheta$ is small and is expressed in radians, then $d = r\vartheta$, or $r = d/\vartheta$.

But $1.0$ radians $= 3600 \times 180/\pi \approx 206.264.806247''$ (arcseconds), so $\vartheta\text{(rad)} = \vartheta''/206265$, or $r = 206265d/\vartheta''$, and since $d = 1$ AU, $r[\text{AU}] = 206265/\vartheta''$.

Letting $1$ parsec (pc) $= 206265$ AU, $r[\text{pc}] = r[\text{AU}]/206265 = 1/\vartheta''$.

The conventional symbol for parallax measured in arcseconds is $\pi''$, hence $r[\text{pc}] = 1/\pi''$.

One parsec is the distance at which a star would have a parallax of exactly $1.0''$. So

$$1 \text{ pc} = 206265 \text{ AU} = 3.08568 \times 10^{18} \text{ cm} = 3.261633 \text{ l.y.}$$

The angular position of a star will change by a maximum of $2\pi''$ over the course of one year since the diameter of the earth's orbit is $2$ AU.