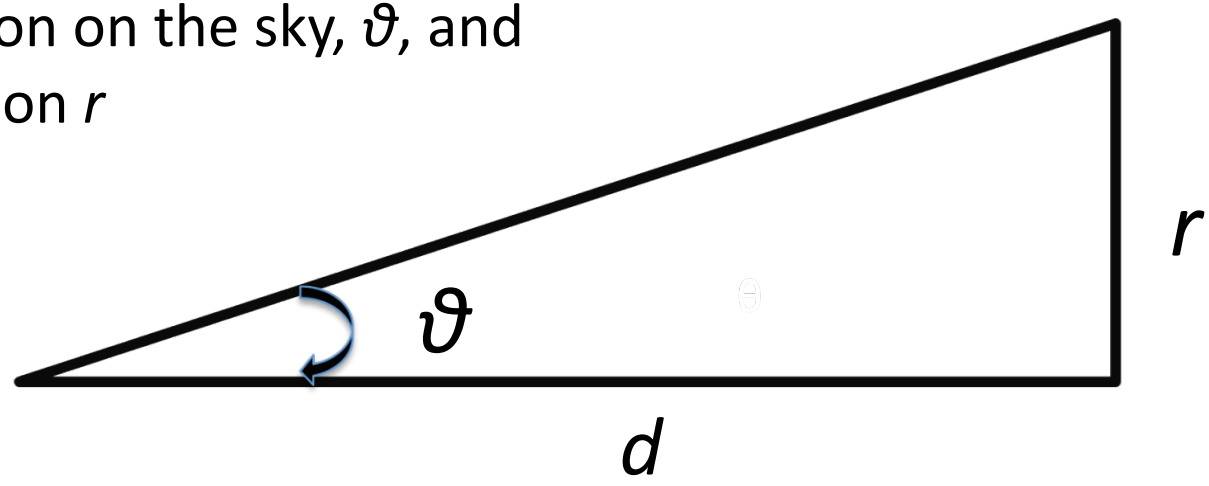
Distances and Angular Sizes

We may rearrange the relation that appeared in Lecture 1 between apparent magnitude *m* and absolute magnitude *M* at some wavelength (or in some wavelength band), and distance *d*, as follows:

$$m - M = 5 \log (d / 10\ pc)$$

The quantity *(m - M)* is called the distance modulus. Some databases include *(m - M)*, or *d*, or in some cases (e.g., ***NED***) *(m - M)* and *d*.

The relationship between distance *d*, angular separation on the sky, ϑ, and physical separation *r*



in the small angle approximation (*r*<<*d*) is simply $\boldsymbol{\vartheta = r/d}$, for ϑ in **radians**, and *r* and *d* in identical units. Since 1 radian = 57.296 degrees = 3,437.8 arcminutes (= 206,265 arcseconds),

$$\mathbf{r = \vartheta d / 3437.8,}$$

where ϑ is measured in arcminutes. On extragalactic scales, *d* is often expressed in Megaparsecs (Mpc); 1 Mpc=10^6 pc.