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How do we know the distances from the earth to the sun and moon, from the sun to the other planets, and from the sun to other stars and distant galaxies? Clearly we cannot measure these directly. Nevertheless there are many indirect methods of measurement, combined with basic high-school mathematics, which can allow one to get quite convincing and accurate results without the need for advanced technology (for instance, even the ancient Greeks could compute the distances from the earth to the sun and moon to moderate accuracy). These methods rely on climbing a “cosmic distance ladder”, using measurements of nearby distances to then deduce estimates on distances slightly further away; we shall discuss several of the rungs in this ladder in this lecture. (Received April 03, 2009)