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CHAPTER 4. THE BASIC CONCEPTS OF TRIGONOMETRY

55. Introduction.

Trigonometry is a branch of mathematics that serves as a tool of the surveyor who measures land and computes the heights of a mountain without scaling them, and also the navigator who sets courses and determine speeds. Trigonometry means "Triangle measurement", and it might well be called science of getting from here to there, especially when there is inacessible. The problem of going from here to there resolves itself into two fundamental components: How far is it, and in what direction? From this it can be seen that trigonometry deal with lines (which measure distance) and angles (which indicate direction). The lines and angles are formed into the simplest polygon, the triangle, hence the name trigonometry. Trigonometry is one of the oldest branches of science and it is associated with the surveying of land in Ancient Egipt as well as with the development of both, astronomy and physics.

56. Similar Right triangles.

One of the basic principles in trigonometry is that of determining the height of an inacessible object. For example if we wish to determine the height of a tree without climbing it, we can measure a convenient distance, say 40 feet, from the foot of the tree and, at this point, sight the top of the tree so that the line of sight completes a triangle that looks like Figure 1.

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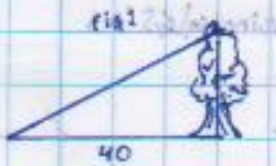

If a six-foot pole (Figure 2) is placed in such away that its top lies along the line of sight when its foot is perpendicular to the ground, we can compare the small triangle with the large, and use this comparison to find the height of the tree, as we shall now show. Suppose that the foot of the pole touches the ground at a distance of eight feet from the observer. It is apparent that the base of the small triangle

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