

rior and interior angles, had he only called attention to the fact or made a corollary of his definitions to the effect that equal inclination of a line to others gives or implies equal angles.

There is not, there can not be the same interest manifested or even felt by any one in the study of a theorem when he does not see just of what use such theorem may be, where it can have its application; but the moment the student sees the trend of the subject under consideration, he immediately takes to it and more especially so if it speed him on his professional work. Take for instance the theorem that "the tangent is a mean proportional between the whole secant and the portion thereof which lies without the circle. This the engineer would look upon as a mere exercise in geometry and likely not trouble himself about its demonstration, if not told how it applies in the solution of the problem of running a railway curve through two points or cities in such a way as to become tangent to and connect with or branch into an existing railway. Here again then you see that while the theorem is the abstract of the thing or proposition, its application to a case in practice, is its concrecion, its embodiment into real life.

Why also is any interest manifested in the demonstration of the fact that the parts of two secants without the circle are reciprocally proportional to the entire secants? Simply because it is instrumental in the solution of the case in trigonometry where the three sides are given to find the angles. See the interest that centres in what is called the square of the hypotenuse, the so called proposition known, the 17th of the first, because of its application to the solution of so many cases in practical engineering, architecture and land surveying, as in the erection of one line perpendicular to another; finding for instance what length of ladder it takes to reach to a certain height on a house or wall, with its foot at a given distance therefrom; how when in a semicircle it shows the perpendicular to the diameter from its apex, to be a mean proportional between the segments of the diameter or base, and how by the use of this fact, it suffices, to get at the radius of a railroad or other curve, to measure any cord of it, and the versed sine or distance at the centre between the cord and arc, then squaring half the cord, dividing by the known portion of the diam. to get the unknown segment which added and the sum halved bring out the sought for radius; for I need hardly remind you one and all that, curves on railways are of such magnitude of radius as to preclude the possibility of laying them out, as a gardener would a flower plot by means of a rope or chain attached to a picket at the centre; though to put it down on paper on a small scale the radius must be known.

Again, what more than mere curiosity would be manifested at the fundamental principle of all geometry, that the three angles of a triangle are together equal to two right angles, were it not that the practical application of the knowledge of this fact enables one,