Similarly, an expression of equality involving trigonometric functions of one or more angles which is true for all possible values of the unknown angles is called a trigonometric identity, and if the equality is true for only particular values of the unknowns involved, the expression is called a trigonometric equation.

Thus, \( \sin^2 \theta + \cos^2 \theta = 1 \) is an identity, since it is true for all values of \( \theta \); while \( \sin \theta = \frac{1}{2} \) is an equation, since it is not true for all values of \( \theta \), but only for \( \theta = 30^\circ, 150^\circ \), or any angle coterminal with these two.

Note. By all possible values of the unknowns we shall mean only those values of the unknowns for which both members of the equality have meaning. Any exceptional values of the unknowns for which one or both members of the equality become meaningless because some of the trigonometric functions involved are not defined (see Article 12), or which make a denominator zero, are excluded. Thus, the equality \( \tan \theta = \frac{\sin \theta}{\cos \theta} \) has no meaning when \( \theta = 90^\circ \), since the first member is not defined, and also since the denominator of the second member is zero for this particular value of \( \theta \). In the algebraic case, the equality \( (x^2 - 9)/(x - 3) = x + 3 \) is an identity, although it has no meaning when \( x = 3 \) since the first member involves division by zero when \( x = 3 \).

The eight fundamental relations are identities, since they are true for all possible values of the angles. By means of these relations it is possible to change any expression containing trigonometric functions into a variety of different but equivalent forms. It is often necessary to be able to show that two expressions, although different in form, are nevertheless identical in value. The process of showing this is called "establishing the truth of the identity" or "proving the identity." The truth of an identity is usually established by transforming either member, preferably the more involved member, by means of known identities, to the form of the other; or, if both members appear to be equally involved, by transforming both members to a common third form.

There is no general method of procedure in proving an identity. A thorough knowledge of the fundamental relations in their various forms is, however, essential. The introduction of

\* This method is optional with the instructor.