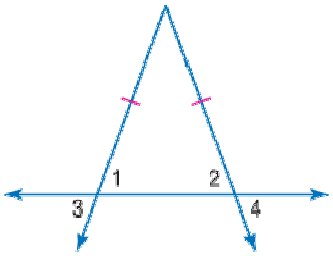
Lesson 12-7

Example 1

Show that $m\angle 3 = m\angle 4$ in the figure shown. Present your reasons in a logical order.



Solution

Since the triangle is isosceles, its base angles are congruent, or $m\angle 1 = m\angle 2$. $\angle 1$ and $\angle 3$ are vertical angles, so $m\angle 1 = m\angle 3$. Also, $\angle 2$ and $\angle 4$ are vertical angles, so $m\angle 2 = m\angle 4$. Therefore, by the transitive property of equality, $m\angle 3 = m\angle 4$.

Example 2

Prove that the statement below is true.

Statement The sum of two even integers is an even integer.

Solution

To prove this statement inductively would require testing possible combinations of even integers. Use a deductive argument to show that the statement is true.

Let n be any integer. Then any even integer can be represented by the expression $2n$.
Let m be another integer such that $m \neq n$. Then another even integer can be represented by the expression $2m$.

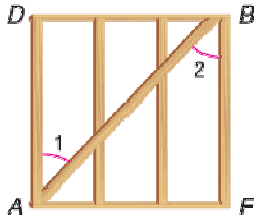
Use these expressions to represent the sum of any two even integers.

$2n + 2m = 2(n + m)$

The expression $2(n + m)$ is in the form of an even integer. So the statement is true for any two even integers.

Example 3

CONSTRUCTION The diagonal board $\overline{AB}$ is being used to hold four vertical studs in position to form part of a wall. Show that $m\angle 1 = m\angle 2$.



Solution

Since the four studs are all vertical, they are parallel to each other. This means that $\overline{AB}$ is a transversal cutting the two parallel outside studs $\overline{AD}$ and $\overline{BF}$. Since $\angle 1$ and $\angle 2$ are alternate interior angles of the two parallel lines cut by a transversal, they are congruent to each other.