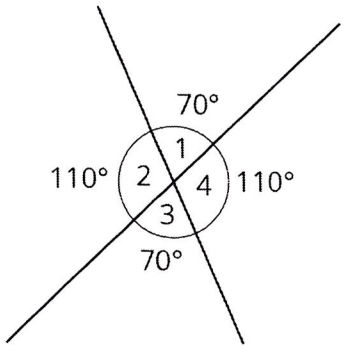
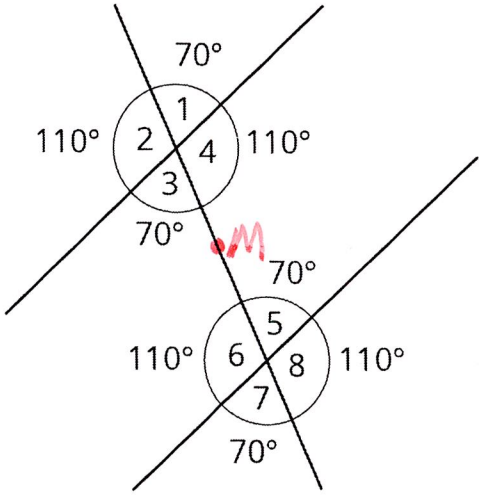
Lesson 14 Summary

When two lines intersect, vertical angles are equal and adjacent angles are supplementary, that is, their measures sum to 180 °. For example, in this figure angles 1 and 3 are equal, angles 2 and 4 are equal, angles 1 and 4 are supplementary, and angles 2 and 3 are supplementary.



∠1 & ∠3 vertical ∠'s
∠2 & ∠4 vertical ∠'s

When two parallel lines are cut by another line, called a **transversal**, two pairs of **alternate interior angles** are created. ("Interior" means on the inside, or between, the two parallel lines.) For example, in this figure angles 3 and 5 are alternate interior angles and angles 4 and 6 are also alternate interior angles.



Alternate interior angles are equal because a $180°$ rotation around the midpoint of the segment that joins their vertices takes each angle to the other. Imagine a point M halfway between the two intersections—can you see how rotating $180°$ about M takes angle 3 to angle 5?

Using what we know about vertical angles, adjacent angles, and alternate interior angles, we can find the measures of any of the eight angles created by a transversal if we know just one of them. For example, starting with the fact that angle 1 is $70°$ we use vertical angles to see that angle 3 is $70°$, then we use alternate interior angles to see that angle 5 is $70°$, then we use the fact that angle 5 is supplementary to angle 8 to see that angle 8 is $110°$ since $180 - 70 = 110$. It turns out that there are only two different measures. In this example, angles 1, 3, 5, and 7 measure $70°$, and angles 2, 4, 6, and 8 measure $110°$.