# Parallel lines, Transversals, and Angles

Introduction

Just as right triangles are ubiquitous, parallel lines, and studies of their properties, are found all over the world. While I am quite certain that perpendicularity is a result of direct, tangible human experience, I am not clear on the genesis of parallelism. One of my colleagues has suggested floor tiling with bricks, stones, or blocks of wood.

Without getting either too technical or avoiding the issue entirely we may safely declare, for the moment, that lines that go in the same direction on your quadrille paper are parallel lines. Later we will explore the idea more carefully. On quadrille paper, pick two parallel lines separated by about 5 cm. Avoid placing your lines near the edges.

Now draw a line that crosses your parallel lines at some oblique angle. A line that crosses/cuts through/intersects parallel lines is a transversal. Your transversal should not be parallel to any gridline on the quadrille paper. Your lines may look something like this:
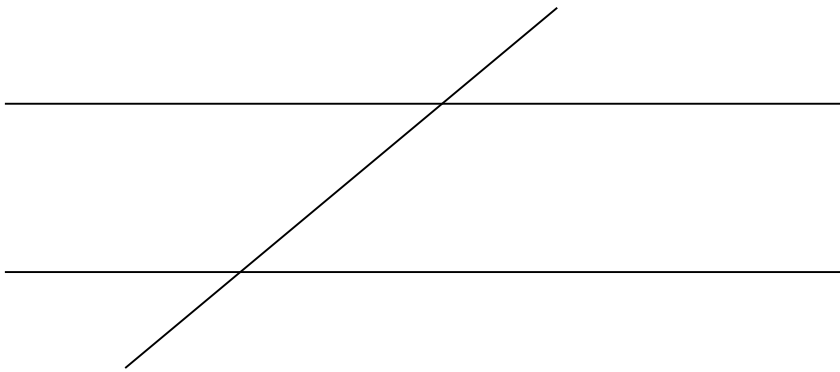

Angles are formed when two lines intersect. For our purposes, an angle is the point of intersection of two lines and the two lines radiating from the point of intersection. By convention, angles are measured in a counter-clockwise direction. A point of intersection and two lines radiating from it actually determine two angles, depending from which line the angle is measured. Conventionally, an arrow is used to specify which angle the lines and point determine.
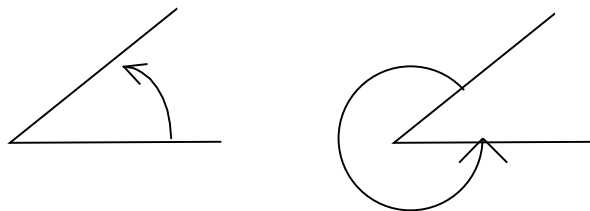
Investigation

Your parallel lines and transversal determine eight angles. Label and measure each angle and enter your results in the table on the other side.
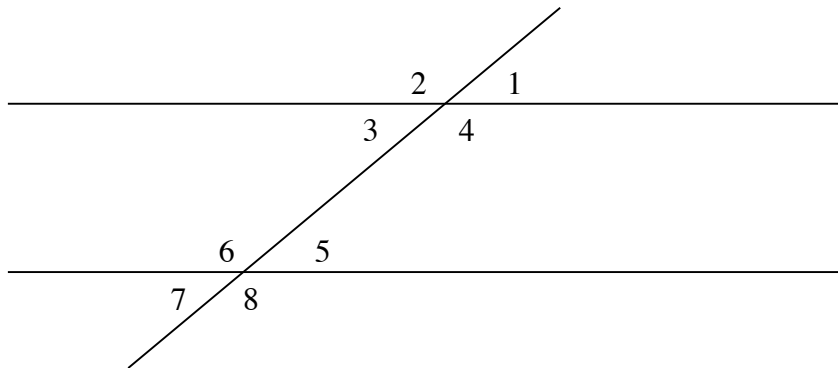
Angle 1	Angle 2	Angle 3	Angle 4	Angle 5	Angle 6	Angle 7	Angle 8

1. Based on your data, which angles are equal? Identify equal angles with identically colored arcs. For example, all of your blue arcs will correspond to equal angles, all of your red arcs to equal angles (but each of the red arcs will have different measures than the blue ones), and so on.

2. When discussing parallel lines and transversals, certain equal angle pairs are identified as:

    *   alternate interior angles – interior refers to the parallel lines
    *   alternate exterior angles – exterior refers to the parallel lines
    *   corresponding angles
    *   vertical angles

    Figure out from the titles (or check online or any geometry book) which angle pairs are:

    *   alternate interior angles   _____

    *   alternate exterior angles   _____

    *   corresponding angles   _____

    *   vertical angles   _____

3.   Based on your data, make some conclusions about

    *   alternate interior angles
    *   alternate exterior angles
    *   corresponding angles
    *   vertical angles.