

What is an Angle?

Give some possible definitions of angle.

For each definition...

- Discuss if the definition works for both the sphere and the plane.
- What are some advantages/disadvantages for each definition?
- With the definitions in mind, what would it mean for two angles to be congruent?

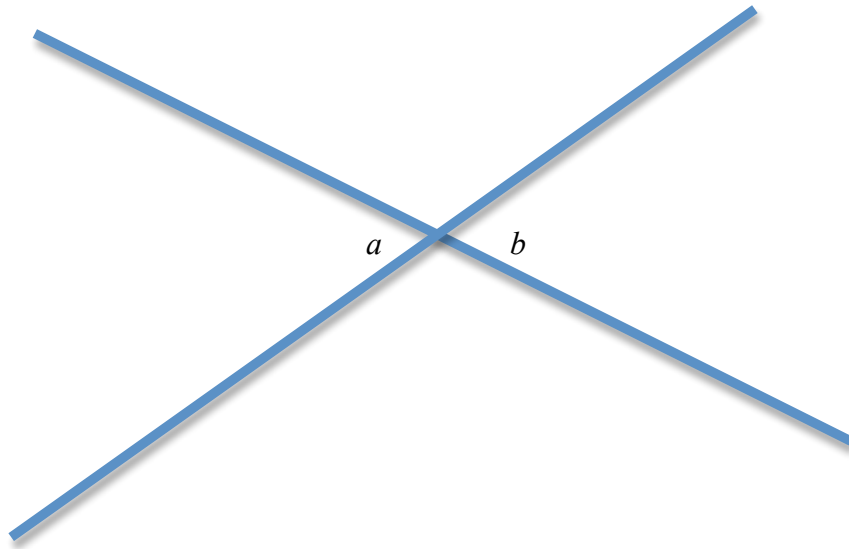
Common Ways to Conceptualize Angle

- 1) Angles can be thought of as a movement as you take one line and rotate it about a point.

- 2) Angles can be thought of as a numerical measure representing how many degrees are between two lines that intersect.

- 3) Angles can be thought of as a geometric shape made up of two lines (or line segments) that intersect at a point.

Vertical Angle Theorem



Vertical Angle Theorem: Opposite angles (angles a and b) formed by two intersecting lines are congruent.

Each group will be assigned one of the definitions of angle and will need to present a proof that angle a is congruent to angle b .

The proof will need to be based on your definition of angle and what it means for angles to be congruent given that definition.

David W. Henderson & Daina Taimina, *Experiencing Geometry: Euclidean and Non-Euclidean with History* (Third Edition).

Rectangles, Euclidean Rectangles

In your group come up with as many characteristics of Euclidean Rectangles as you can.

If we know that parallel lines implies congruent alternate interior angles and that alternate interior angles implies parallel lines, then what is the minimum amount of criteria needed in order to ensure a quadrilateral is a rectangle?

Common conjectured criteria:

Three right angles

Two right angles and one set of parallel line

Two sets of parallel lines and one right angle

Opposite sides equal and one right angle

Opposite sides equal and one set of parallel lines

Each group will be assigned some of the conjectured criteria and either have to prove that the criteria is enough to ensure the quadrilateral is a rectangle (two sets of parallel lines, two sets of congruent sides, four right angles) or find a counterexample to the conjecture.

The groups will then share their proof/counterexample with the class.