

Proof in the Classroom

Purpose

Verification

Explanation

Format

Two-column

Paragraph

Timing

Grade Level

Time in the Course

Language

Formal

Informal

CCSSM

Two geometric figures are defined to be congruent if there is a sequence of rigid motions that carries one onto the other.

Similarity transformations (rigid motions followed by dilations) define similarity in the same way that rigid motions define congruence

Consequences for proof in geometry

Some new definitions

Different postulates

Some new strategies for proof

Definition: An *isometry* is a transformation of the plane that preserves distance.

Definition: Two figures are *congruent* if one can be superposed on the other by a sequence of isometries.

Definition: A *reflection* in a line b maps any point on b to itself, and any other point P to a point P' so that b is the perpendicular bisector of PP' .

Assumption:

- Reflections preserve distances and angles

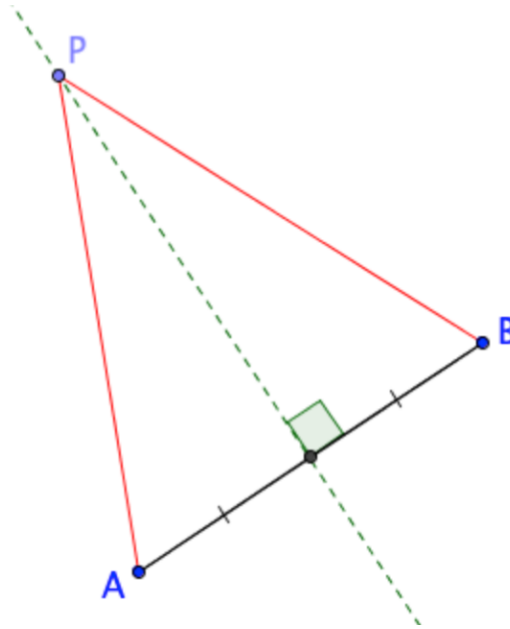
"Construction postulates":

- Two lines meet in at most one point.
- A circle and a line meet in at most two points.
- Two circles meet in at most two points.

The parallel postulate

There is a reflection that maps any given point P
into any given point Q .

Line l is the perp. bisector of AB . Therefore, by the definition of reflection, B is the image of A in a reflection in line l . P is its own image in that reflection. Since reflection preserves distance, $PA=PB$.



Perpendicular bisector theorems

Any point on the perpendicular bisector of a segment is equidistant from the endpoints of the segment.

If a point is equidistant from the endpoints of the segment, it is on the perpendicular bisector of the segment. 🌸

(A point is equidistant from the endpoints of a segment if and only if it lies on the perpendicular bisector of the segment.)

Equal-length segments are congruent 🌟

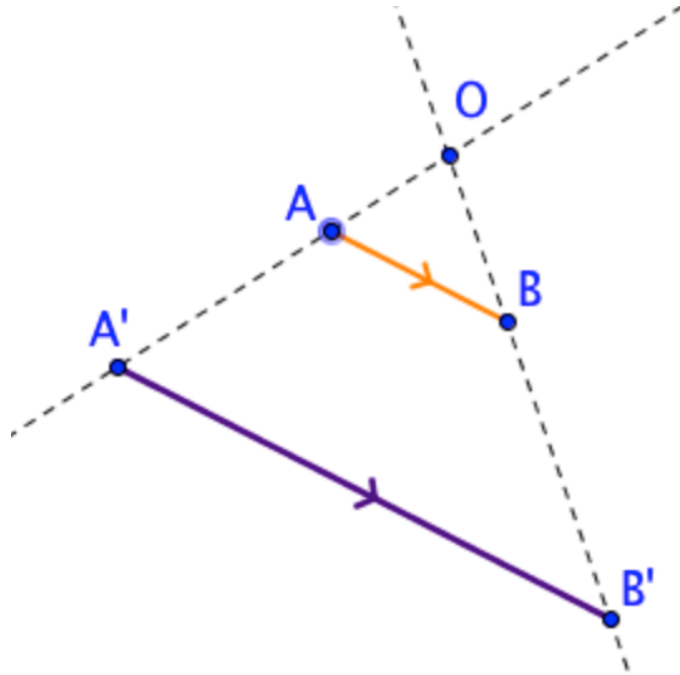


SSS, SAS, ASA 🌟

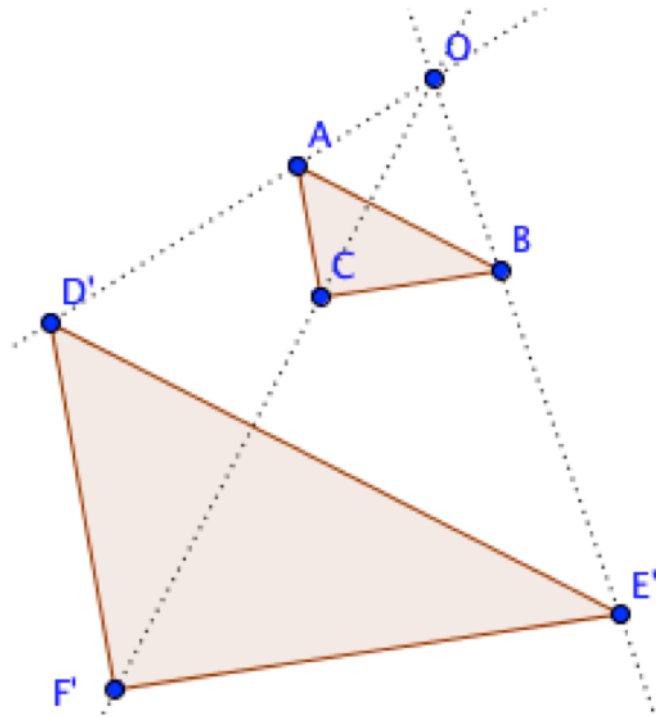
Definition: A dilation with center O and scaling factor r maps O to itself and any other point P to P' so that O , P , and P' are collinear, and the directed segment $OP' = r \cdot OP$.

Definition: Two figures are *similar* if one can be superposed on the other by a sequence of isometries followed by a dilation.

If O , A , and B are not collinear, the image $A'B'$ of the segment AB under a dilation with center O and scaling factor r is parallel to AB , with length $r \cdot AB$.



Similar triangles have angles with equal measure and proportional sides.



If two segments are parallel and unequal,
one is the image of the other under a dilation. 🌸

SSS, SAS, AA 🌟