

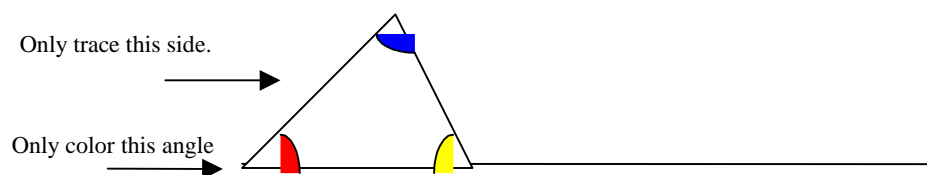
Ladders and Saws

Purpose: For students to discover through a hands-on activity various relationships between angles, segments, and triangles making use of parallel segments.

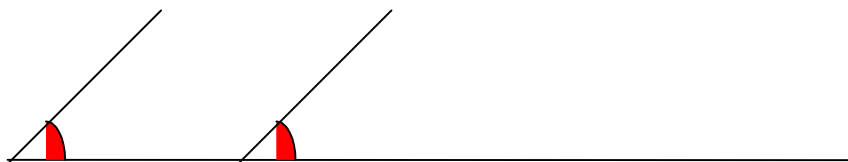
Materials Needed: Each student will need several sheets of unlined paper, three different colored pencils, a protractor or goniometer, a ruler, and a triangle cut from posterboard or tagboard. (Note: The teacher should include a mixture of all types of triangles and if possible every student has a different triangle with no two triangles congruent.)

Ladders

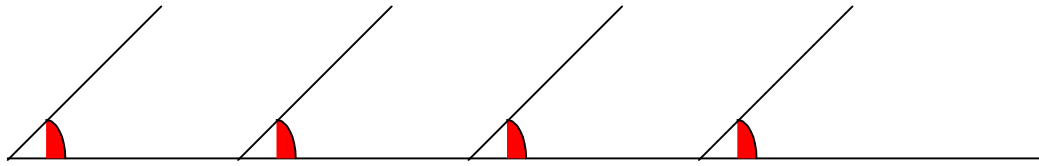
1. Each student should shade /color each angle of the triangle with a different color.
2. Measure and record each angle and segment measure for each triangle.
3. Classify each triangle according to its sides and angles.
4. Use the ruler to draw a segment across a piece of the unlined paper. It does not matter if the segment is horizontal or vertical.
5. Align one side of the triangle at one of the segment. Trace the left side of the triangle and **ONLY** color the red angle.



6. Slide the triangle to the right along the segment until the vertex that was on the left end of the segment is now adjacent to the vertex on the right. Trace only the left side of the triangle again and only color the red angle.



7. Repeat this process across the paper. Remember to color/shade the angles each time.



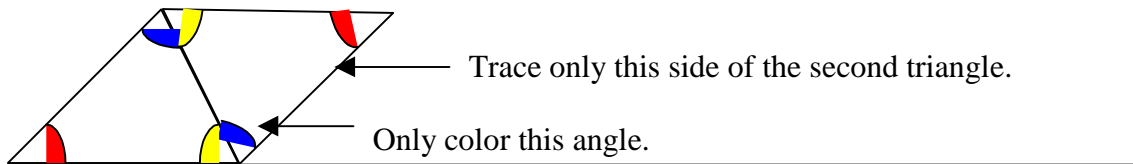
8. Students should work in groups of three or four to compare drawings to see if it made difference having different triangles. Then each person, on their own, list four concepts/properties they observe. Then as a group, develop a list of concepts/principles that are true for all of their drawings. A possible grading rubric could be 10 correct concepts for an A, 7 correct concepts for a B, 5 correct concepts for a C, 4 correct concepts for a D, and less than 4 correct concepts no credit will be given.

Saws

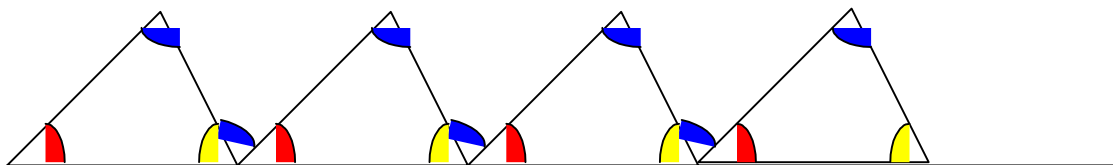
1. Use a new sheet of unlined paper and the ruler to draw a new segment across the paper.
2. Trace the triangle again with one side aligned along the segment starting at the left end of the segment. Shade/color the angles.



3. Rotate one turn and slide the triangle so that the blue angle is adjacent to the yellow angle. Trace only the adjacent side and color ONLY the blue angle.



- Continue to rotate one turn and slide the triangle until the segment is “full.” Again remember to shade/color the angles each time.



- Students should work in groups of three or four to compare drawings to see if it made difference having different triangles. Then each person, on their own, list four concepts/properties they observe. Then as a group, develop a list of concepts/principles that are true for all of their drawings. A possible grading rubric could be 10 correct concepts for an A, 7 correct concepts for a B, 5 correct concepts for a C, 4 correct concepts for a D, and less than 4 correct concepts no credit will be given.

Ladders and Saws

- Using a new sheet of unlined paper, complete the steps to create a ladder.
- Now rotate the triangle 180° to “fill in” the empty spaces. Remember to shade/color each angle as each triangle is traced.
- Using the new segment that should have been created by the above drawings continue until the entire page is covered (tesselated) with the triangles.
- Students should work in groups of three or four to compare drawings to see if it made difference having different triangles. Then each person, on their own, list four concepts/properties they observe. Then as a group, develop a list of concepts/principles that are true for all of their drawings. A possible grading rubric could be 10 correct concepts for an A, 7 correct concepts for a B, 5 correct concepts for a C, 4 correct concepts for a D, and less than 4 correct concepts no credit will be given.

*****Below is a list of some of the possible concepts/principles that students may “discover.”

- The sum of the angle measures of any triangle is equal to 180°.
- Vertical angles are congruent.
- Linear pairs are supplementary.
- Alternate interior angles are congruent when lines are parallel.
- Corresponding angles are congruent when lines are parallel.
- Same-side interior angles are supplementary when lines are parallel.
- The measure of the exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles of the triangle.
- Two lines parallel to a third line are parallel to each other.
- Opposite sides of a parallelogram are parallel and congruent.
- Opposite angles of a parallelogram are congruent.
- Adjacent angles of a parallelogram are supplementary.

12. The segment joining the midpoints of two sides of a triangle is parallel to the third side and has a length equal to half the sum of the third side.
13. The ratio of the perimeters of two similar triangles is the same as the scale factor of the similar triangles.
14. The sum of the exterior angle measures of any convex polygon is 360° .
15. The sum of the angle measures of a quadrilateral is 360° .
16. The sum of the angle measures of a hexagon is 720° .

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