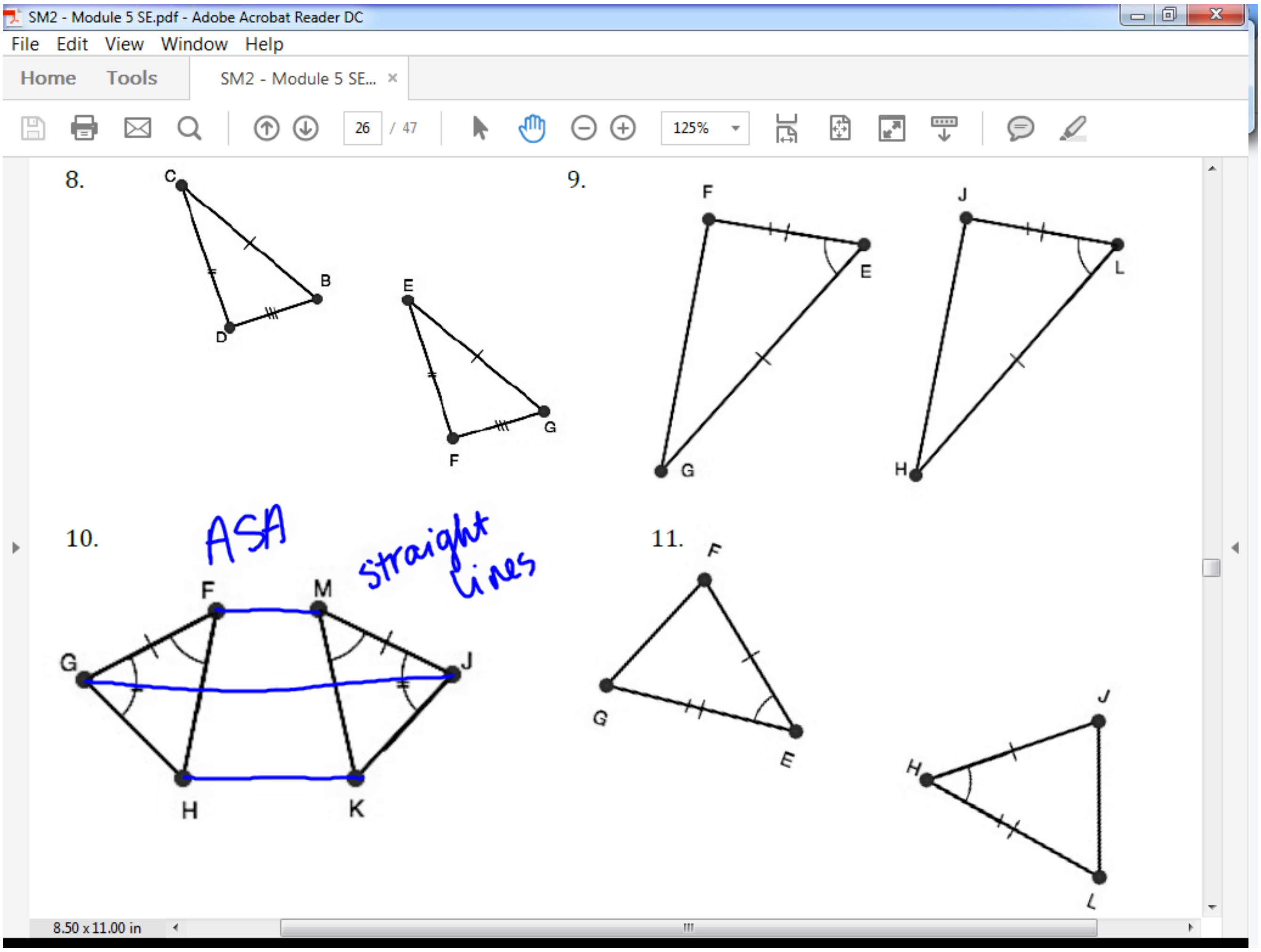
Questions on 5.4 HW?

Apr 8-8:30 AM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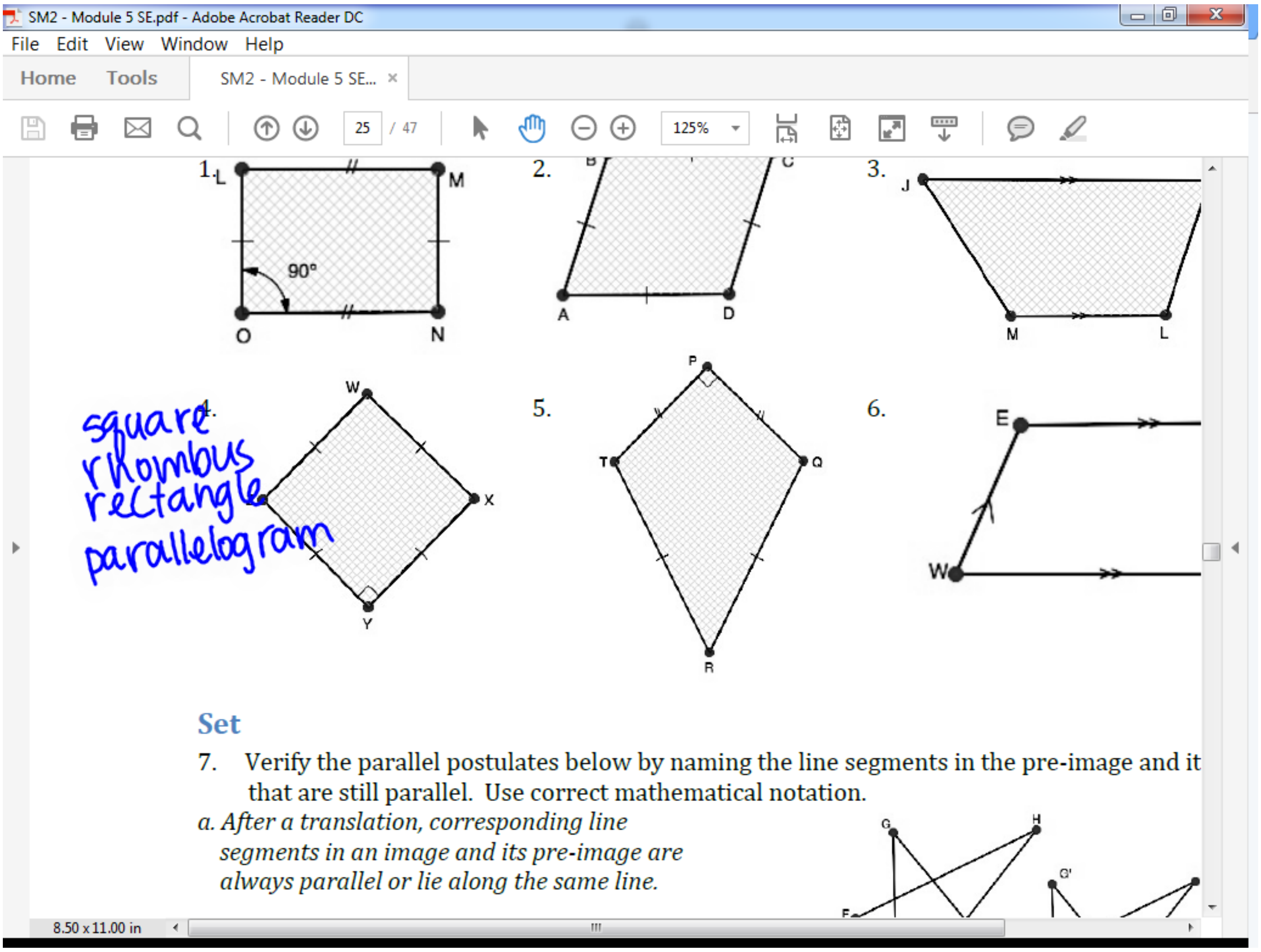


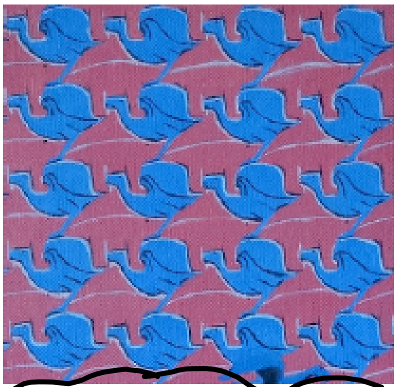
Set

7. Verify the parallel postulates below by naming the line segments in the pre-image and it that are still parallel. Use correct mathematical notation.

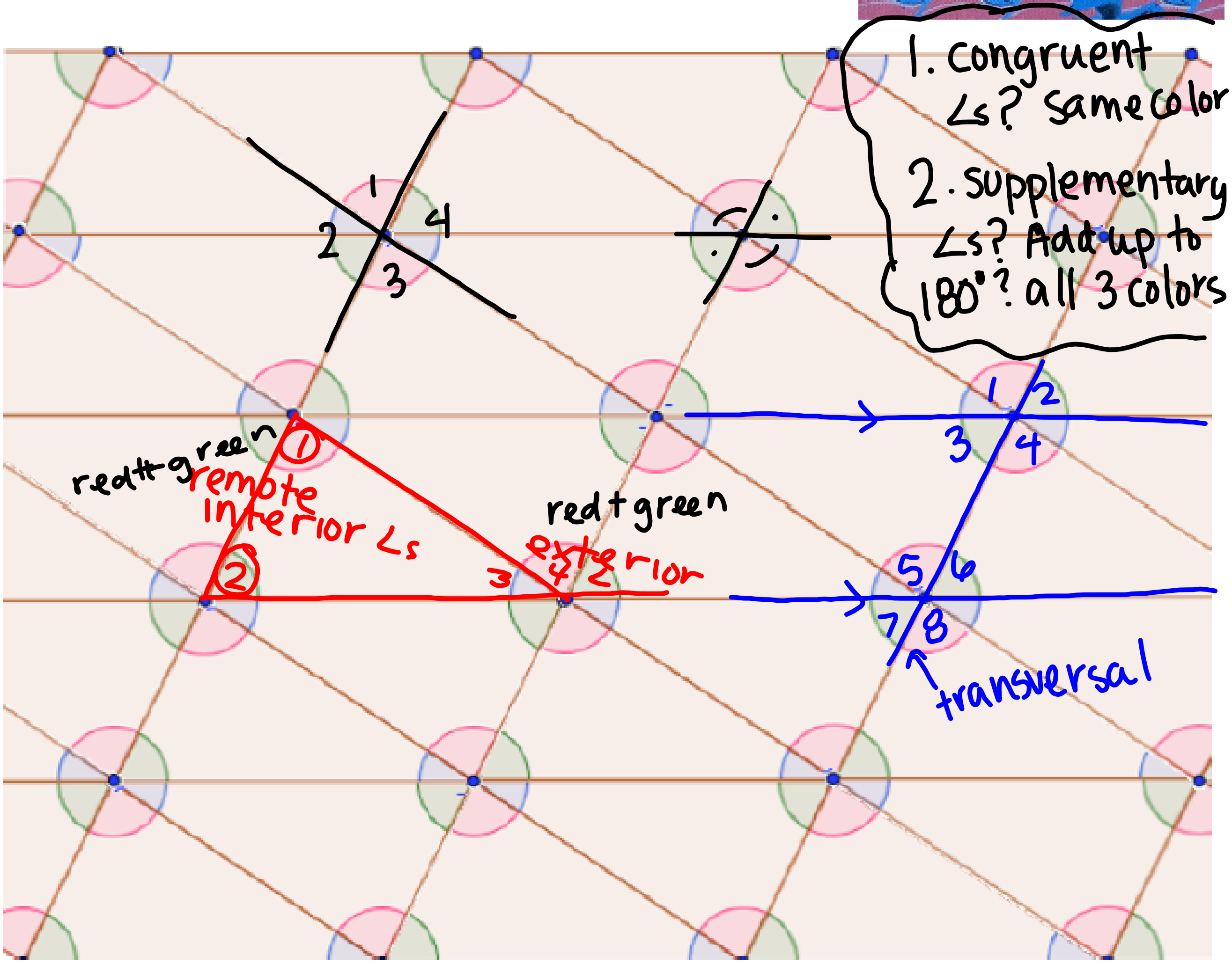
a. After a translation, corresponding line segments in an image and its pre-image are always parallel or lie along the same line.

5.5 Conjectures and Proof

A Practice Understanding Task



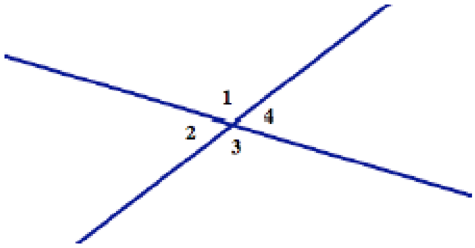
The diagram from *How Do You Know That?* has been extended by repeatedly rotating the image triangles around the midpoints of their sides to form a tessellation of the plane, as shown below.



Using this diagram, we will make some conjectures about lines, angles and triangles and then write proofs to convince ourselves that our conjectures are always true.

Vertical Angles

When two lines intersect, the opposite angles formed at the point of intersection are called *vertical angles*. In the diagram below, $\angle 1$ and $\angle 3$ form a pair of vertical angles, and $\angle 2$ and $\angle 4$ form another pair of vertical angles.



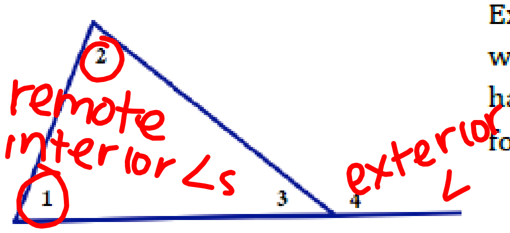
Examine the tessellation diagram above, looking for places where vertical angles occur. (You may have to ignore some line segments and angles in order to focus on pairs of vertical angles. This is a skill we have to develop when trying to see specific images in geometric diagrams.)

Based on several examples of vertical angles in the diagram, write a conjecture about vertical angles.

My conjecture: Vertical $\angle$s are congruent.
$\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$

Exterior Angles of a Triangle

When a side of a triangle is extended, as in the diagram below, the angle formed on the exterior of the triangle is called an *exterior angle*. The two angles of the triangle that are not adjacent to the exterior angle are referred to as the *remote interior angles*. In the diagram, $\angle 4$ is an exterior angle, and $\angle 1$ and $\angle 2$ are the two remote interior angles for this exterior angle



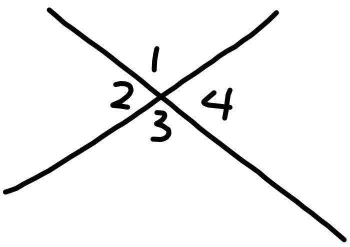
Examine the tessellation diagram above, looking for places where exterior angles of a triangle occur. (Again, you may have to ignore some line segments and angles in order to focus on triangles and their vertical angles.)

Based on several examples of exterior angles of triangles in the diagram, write a conjecture about exterior angles.

My conjecture: The exterior angle of a triangle is equal to the sum of the two remote interior angles. $m\angle 4 = m\angle 1 + m\angle 2$

Vertical $\angle$s

Prove: $\angle 1 \cong \angle 3$*
or
$\angle 2 \cong \angle 4$

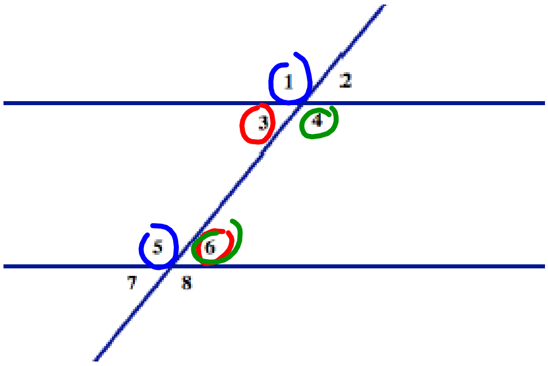


$m\angle 1 + m\angle 4 = 180°$ (Linear pair)
$m\angle 3 + m\angle 4 = 180°$ (Linear pair)
$m\angle 1 + \cancel{m\angle 4} = m\angle 3 + \cancel{m\angle 4}$ (substitution)
$-\cancel{m\angle 4} \qquad -\cancel{m\angle 4}$

$m\angle 1 = m\angle 3$
and $\angle 1 \cong \angle 3$!

Parallel Lines Cut By a Transversal

When a line intersects two or more other lines, the line is called a *transversal* line. When the other lines are parallel to each other, some special angle relationships are formed. To identify these relationships, we give names to particular pairs of angles formed when lines are crossed (or cut) by a transversal. In the diagram below, ∠1 and ∠5 are called *corresponding angles*, ∠3 and ∠6 are called *alternate interior angles*, and ∠4 and ∠6 are called *same side interior angles*.



Examine the tessellation diagram above, looking for places where parallel lines are crossed by a transversal line.

Based on several examples of parallel lines and transversals in the diagram, write some conjectures about corresponding angles, alternate interior angles and same side interior angles.

My conjectures: Corresponding ∠s are ≅.
Alternate interior ∠s are ≅.
Same-side interior ∠s are supplementary and add up to 180°.

Proving Our Conjectures

For each of the conjectures you wrote above, write a proof that will convince you and others that the conjecture is always true. You can use ideas about transformations, linear pairs, congruent triangle criteria, etc. to support your arguments. A good way to start is to write down everything you know in a flow diagram, and then identify which statements you might use to make your case.

Homework

Finish 5.5 "Ready, Set, Go"