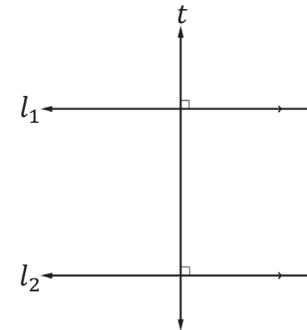## Section 3 – Topic 8
Perpendicular Transversals

Consider the following figure of a transversal cutting parallel lines l_1 and l_2.

What observations can you make about the figure?

A transversal that cuts two parallel lines forming right angles is called a _____ transversal.

*TAKE NOTE!*
Postulates &
Theorems

Perpendicular Transversal Theorem

In a plane, if a line is perpendicular to one of two parallel lines, then it is perpendicular to the other line also.

Perpendicular Transversal Theorem Corollary

If two lines are both perpendicular to a transversal, then the lines are parallel.

Consider the figure below. San Pablo Ave. and Santos Blvd. are perpendicular to one another. San Juan Ave. was constructed later and is parallel to San Pablo Ave.
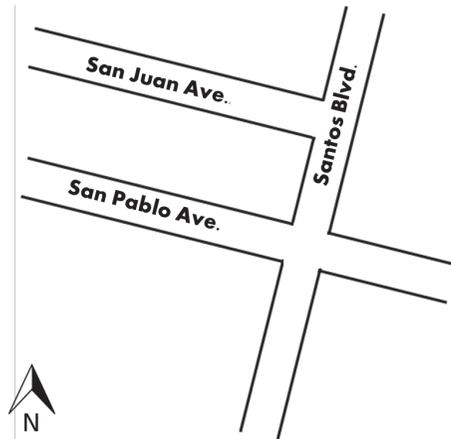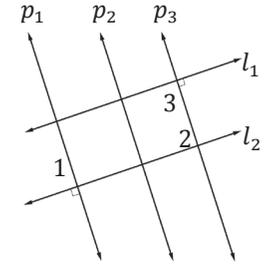

Using the **Perpendicular Transversal Theorem**, what can you conclude about the relationship between San Juan Ave. and Santos Blvd.?

Let's Practice!

1. Consider the following information.

    Given: $p_1 \parallel p_2$, $p_2 \parallel p_3$, $l_2 \perp p_1$, and $l_1 \perp p_3$

    Prove: $l_1 \parallel l_2$

Complete the following paragraph proof.

Because it is given that $p_1 \parallel p_2$ and $p_2 \parallel p_3$, then $p_1 \parallel p_3$ by the_____.

This means that $\angle 1 \cong \angle$ _____, because they are corresponding angles.

If $l_2 \perp p_1$, then $m\angle 1 = 90°$. Thus, $m\angle 2 = $ _____.
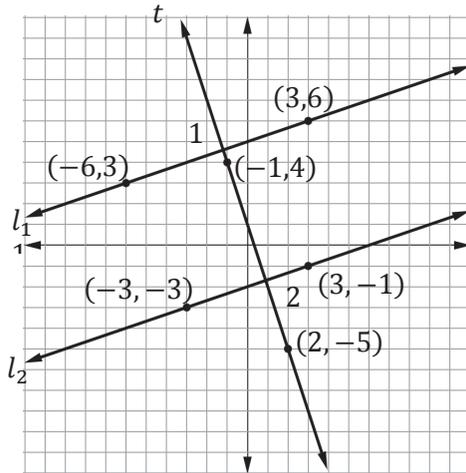
This means $p_3 \perp l_2$, based in the definition of perpendicular lines.

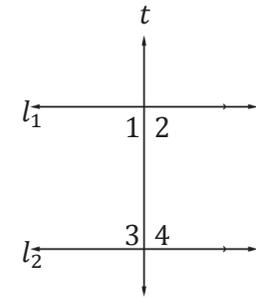It is given that $l_1 \perp p_3$, so $l_1 \parallel l_2$, based on the corollary that states _____.

2. Consider the lines and the transversal drawn in the coordinate plane below.

a. Prove that ∠1 ≅ ∠2. Justify your work.

b. Prove that $m\angle 1 = m\angle 2 = 90°$. Justify your work.

BEAT THE TEST!

1. Consider the figure to the right, and correct the proof of the Perpendicular Transversal Theorem.

Given: $\angle 1 \cong \angle 4$ and $l_1 \perp t$ at ∠2.
Prove: $l_2 \perp t$

Two of the reasons in the chart below do not correspond to the correct statement. Circle those two reasons.

Statements	Reasons
1. $\angle 1 \cong \angle 4$; $l_1 \perp t$ at ∠2	**1.** Given
2. $l_1 \parallel l_2$	**2.** Consecutive Angles Theorem
3. ∠2 is a right angle	**3.** Definition of perpendicular lines
4. $m\angle 2 = 90°$	**4.** Definition of right angle
5. $m\angle 2 + m\angle 4 = 180°$	**5.** Converse of Alternate Interior Angles Theorem
6. $90° + m\angle 4 = 180°$	**6.** Substitution property
7. $m\angle 4 = 90°$	**7.** Subtraction property of equality
8. $l_2 \perp t$	**8.** Definition of Perpendicular Lines