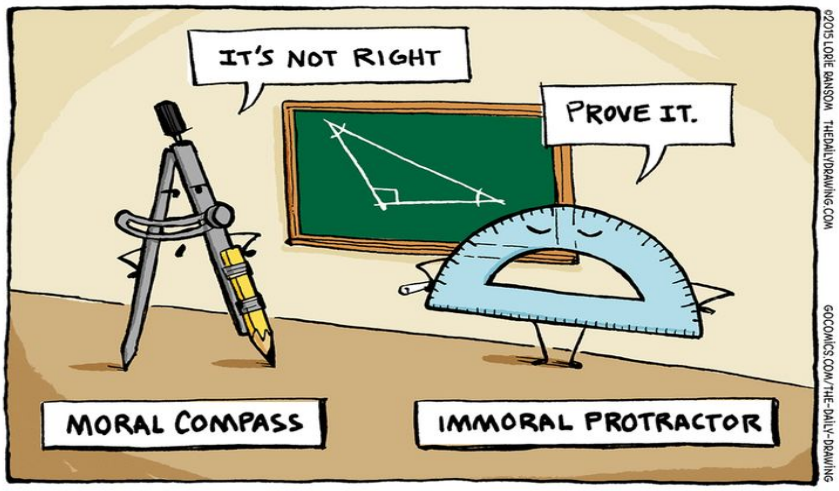
Lesson 1: Angles Associated with Parallel Lines



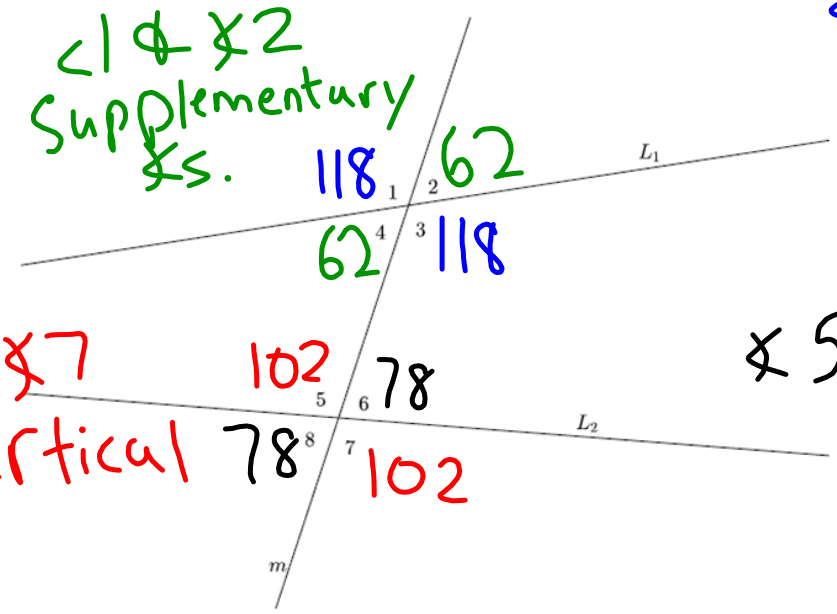
Exploratory Challenge 1

In the figure below, L_1 is not parallel to L_2, and m is a transversal. Use a protractor to measure angles 1–8. Which, if any, are equal? Explain why. (Use your transparency, if needed).

180
-118
62

∠1 & ∠2 Supplementary ∠s.

∠1 & ∠3 vertical ∠s.



118 62 118 62

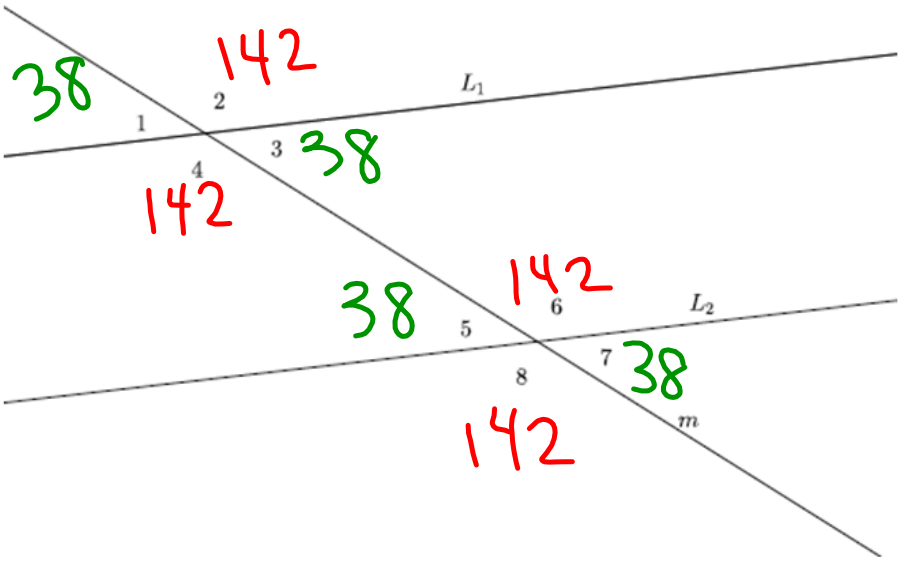
∠5 & ∠7 vertical

102 78 78 102

∠5 & ∠8 Supplementary

Exploratory Challenge 2

In the figure below, $L_1 \parallel L_2$, and m is a transversal. Use a protractor to measure angles 1–8. List the angles that are equal in measure.



a. What did you notice about the measures of ∠1 and ∠5? Why do you think this is so? (Use your transparency, if needed).

Same. Corresponding ∡s.

b. What did you notice about the measures of ∠3 and ∠7? Why do you think this is so? (Use your transparency, if needed.) Are there any other pairs of angles with this same relationship? If so, list them.

Same. Corresponding ∡s. ∡4 ≅ ∡8. ∡2 ≅ ∡6.

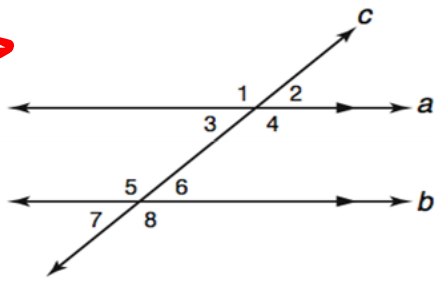
c. What did you notice about the measures of ∠4 and ∠6? Why do you think this is so? (Use your transparency, if needed). Is there another pair of angles with this same relationship?

Same. Alternate Interior ∡s.

Exterior →

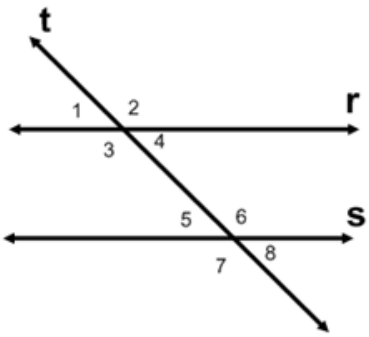
Interior →

Exterior →



Name of Angle	Examples From Figure Above
Alternate Interior ∠s. are formed between the parallel lines and on opposite sides of the transversal. (inside) THEY ARE ALWAYS CONGRUENT.	angle 3 and angle 6 angle 4 and angle 5
Alternate Exterior ∠s. are formed on the outer sides of the parallel lines and on opposite sides of the transversal THEY ARE ALWAYS CONGRUENT.	angle 1 and angle 8 angle 2 and angle 7
Corresponding ∠s. are pairs of nonadjacent angles on the same side of the transversal (in the same position) THEY ARE ALWAYS CONGRUENT.	angle 1 and angle 5 angle 2 and angle 6 angle 3 and angle 7 angle 4 and angle 8

Example: In the diagram below, two parallel lines are intersected by a transversal.



List all sets of corresponding angles in the figure below.

1. m∠1 = m∠5
2. m∠3 = m∠7
3. m∠2 = m∠6
4. m∠4 = m∠8

List all sets of alternate interior angles in the figure below.

1. m∠3 = m∠6
2. m∠4 = m∠5

List all sets of alternate exterior angles in the figure below.

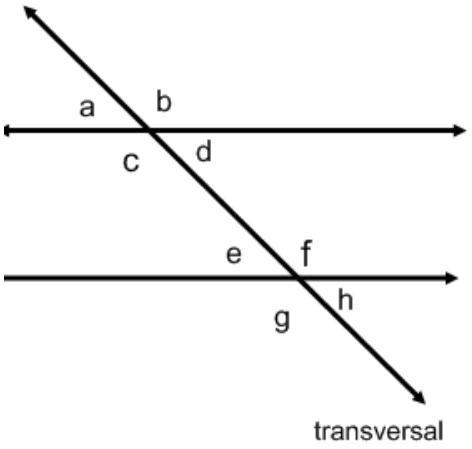
1. m∠2 = m∠7
2. m∠1 = m∠8

If angle 4 = 70°. Find the measure of the following angles:

angle 1 = 70 angle 2 = 110 angle 3 = 110 angle 4 = 70

angle 5 = 70 angle 6 = 110 angle 7 = 110 angle 8 = 70

1. **Angle a = 80º. Find each other angle.**



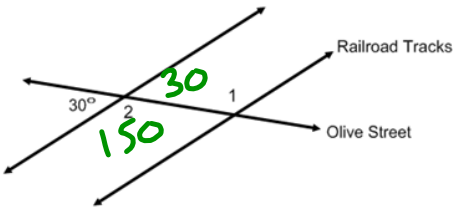
angle a = 80 **angle b =** 100

angle c = 100 **angle d =** 80

angle e = 80 **angle f =** 100

angle g = 100 **angle h =** 80

2. Olive Street crosses two parallel railroad tracks, as shown below (not drawn to scale).



What is the measure of angle 1?

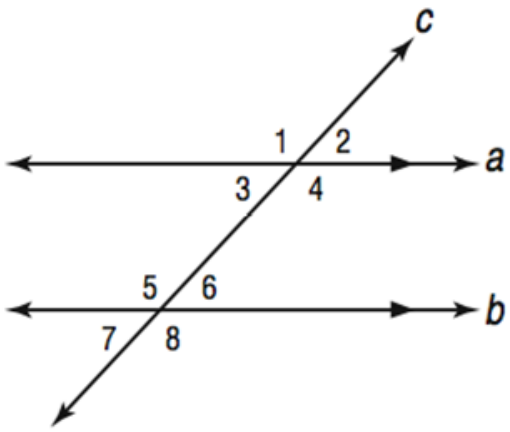
Show your work.

180
- 30
150

∠2 & ∠1 are Alt int. ∠s
So they are congruent

Answer 150 **degrees**

3. The diagram below shows two parallel lines intersected by a transversal. The measure of angle 8 is 125°. Find the measure of each angle in the diagram.



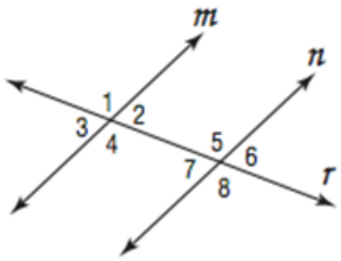
angle 1 = 125 angle 2 = 55

angle 3 = 55 angle 4 = 125

angle 5 = 125 angle 6 = 55

angle 7 = 55 angle 8 = 125

4. The figure below shows two parallel lines intersected by a transversal. If angle 2 is 45º, find the measure of each angle.



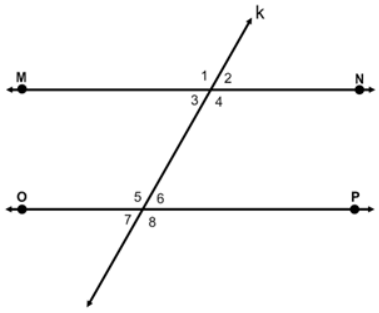
angle 1 = 135 angle 2 = 45

angle 3 = 45 angle 4 = 135

angle 5 = 135 angle 6 = 45

angle 7 = 45 angle 8 = 135

5. In the diagram below, line **MN** and line **OP** are parallel, and transversal ***k*** intersects both lines.



Name two angles in the diagram that are congruent to ∠4.

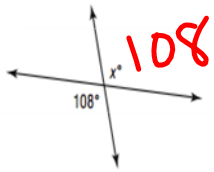
Answer ∠ 1 **and** ∠ 8

On the lines below, explain how you determined these angles are congruent to ∠4.

∠1 is congruent b/c they are vertical ∠s.

∠8 is congruent b/c they are corresponding ∠s.

Find the value of x in each figure.

6. 

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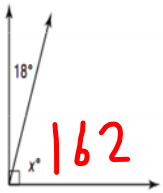
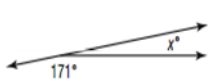
7. 

162

8. 

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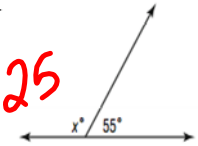
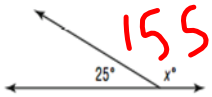
9. 

125

10. 

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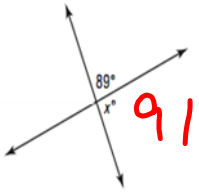
11. 

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12. Angles Q and R are complementary. Find $m\angle R$ if $m\angle Q = 24°$.

90 - 24 = 66° = m∠R

13. Find $m\angle J$ if $m\angle K = 29°$ and $\angle J$ and $\angle K$ are supplementary.

180
- 29
151° = m∠J

Summary: What types of angles do we see?

Vertical, corresponding, Alt int $\measuredangle$s, Alt Ext. $\measuredangle$s, supplementary