

# Vertical Angles and Parallel Lines cut by a Transversal

## Objectives:

Identify vertical angles

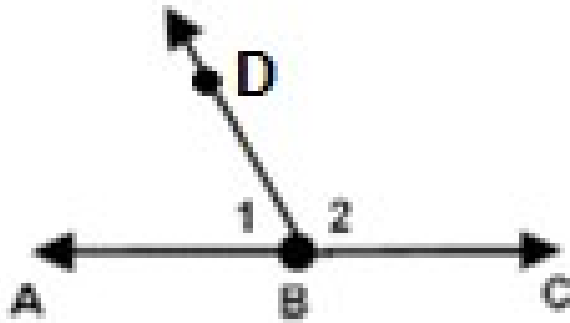
Identify linear pairs

Recognize Parallel Lines cut by a Transversal

- Identify alternate interior angles
- Identify corresponding angles
- Identify alternate exterior angles
- Identify same-side interior angles

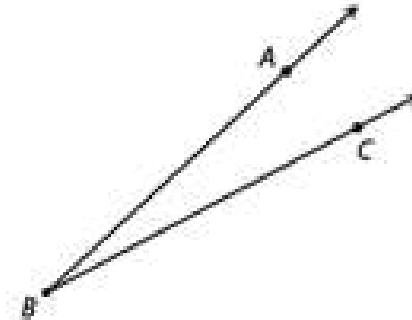
Set up and solve equations using angle relationships

**Review**: Angles can be labeled with one point at the vertex, three points with the vertex in the middle or with numbers.



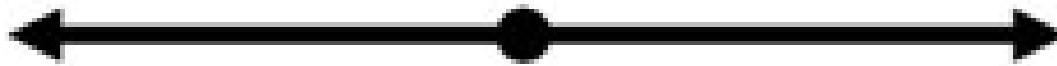
$\angle ABD$

$\angle 1$

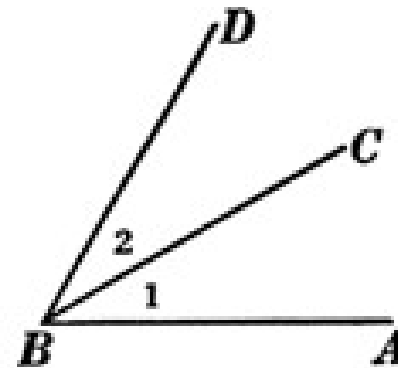


$\angle B$

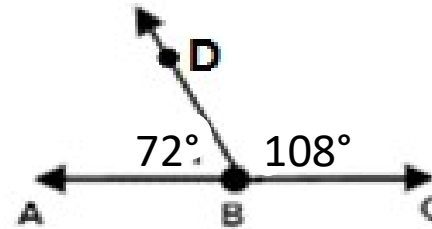
**Straight angles** are angles with rays in opposite directions—in other words, straight angles form a straight line.



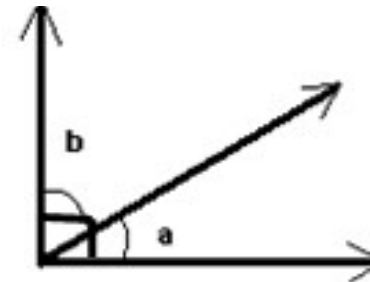
**Adjacent angles** are angles that share a vertex and a common side.



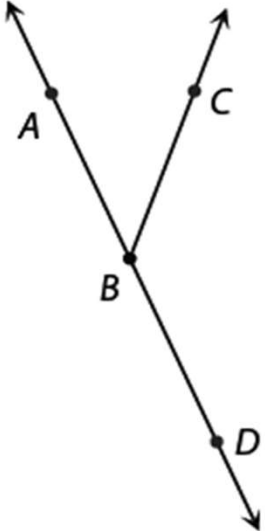
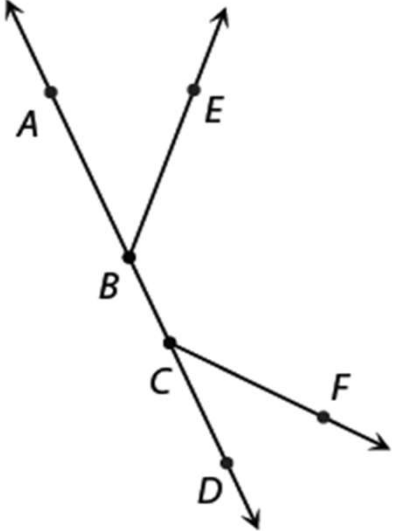
**Supplementary Angles:** Two angles whose sum is  $180^\circ$



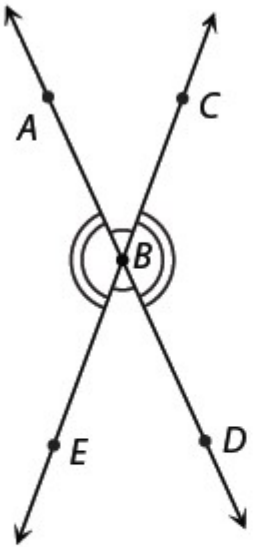
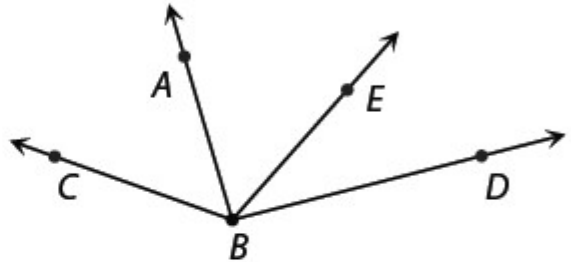
**Complementary Angles:** Two angles whose sum is  $90^\circ$



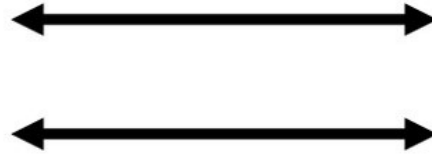
**Linear Pairs:** pairs of adjacent angles whose non-shared sides form a straight angle

Linear pair	Not a linear pair
 <p><math>\angle ABC</math> and <math>\angle CBD</math> are a linear pair. They are adjacent angles with non-shared sides, creating a straight angle.</p>	 <p><math>\angle ABE</math> and <math>\angle FCD</math> are not a linear pair. They are not adjacent angles.</p>

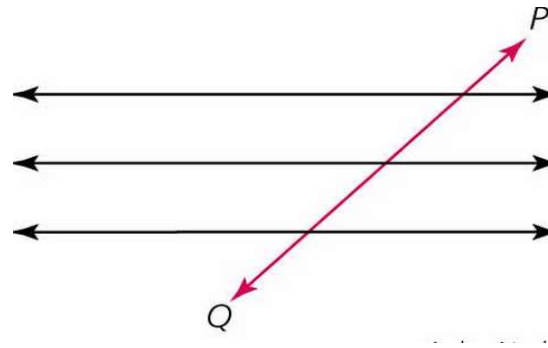
# Vertical Angles: vertical angles are congruent

Vertical angles	Not vertical angles
 <p>The diagram shows two intersecting lines. The top-left ray is labeled A, the top-right ray is labeled C, the bottom-left ray is labeled E, and the bottom-right ray is labeled D. The vertex is labeled B. Two pairs of opposite angles are marked with double arcs: <math>\angle ABC</math> and <math>\angle EBD</math>, and <math>\angle ABE</math> and <math>\angle CBD</math>.</p> <p><math>\angle ABC</math> and <math>\angle EBD</math> are vertical angles. <math>\angle ABC \cong \angle EBD</math></p> <p><math>\angle ABE</math> and <math>\angle CBD</math> are vertical angles. <math>\angle ABE \cong \angle CBD</math></p>	 <p>The diagram shows a vertex B with four rays extending from it: ray BA pointing up-left, ray BE pointing up-right, ray BC pointing left, and ray BD pointing right. Rays BC and BD are not opposite rays as they do not form a straight line.</p> <p><math>\angle ABC</math> and <math>\angle EBD</math> are not vertical angles. <math>\overrightarrow{BC}</math> and <math>\overrightarrow{BD}</math> are not opposite rays. They do not form one straight line.</p>

**Parallel Lines:** Two or more lines that never intersect.



**Transversal:** A line that intersects two or more lines



**Alternate Interior Angles:** Between the parallel lines on opposite sides of the transversal. These angles are congruent

**Corresponding Angles:** Same side of transversal, same position on parallel lines. These angles are congruent.

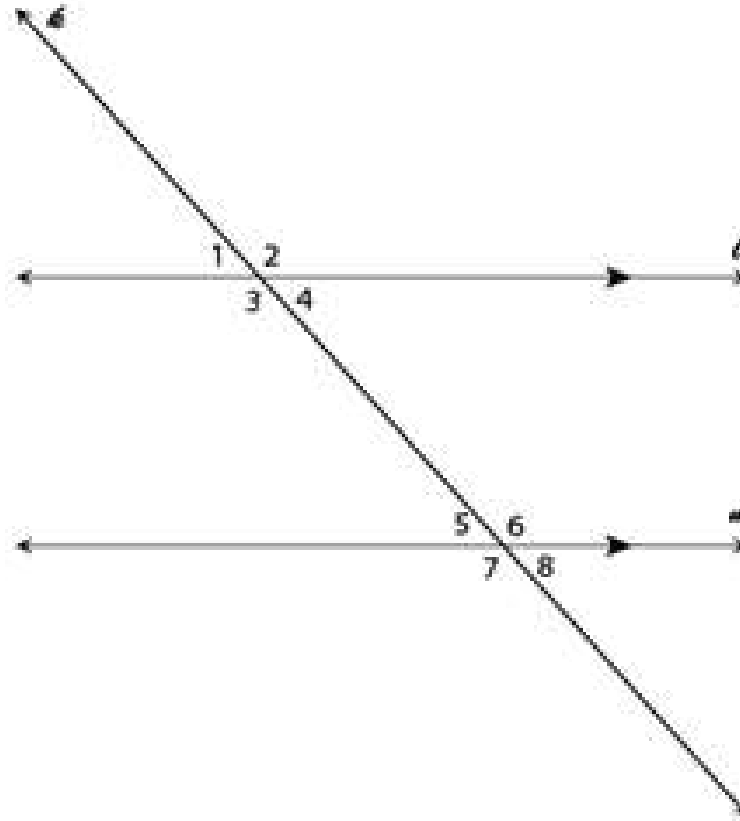
**Alternate Exterior angles:** Opposite sides of transversal. Outside of parallel lines. These angles are congruent



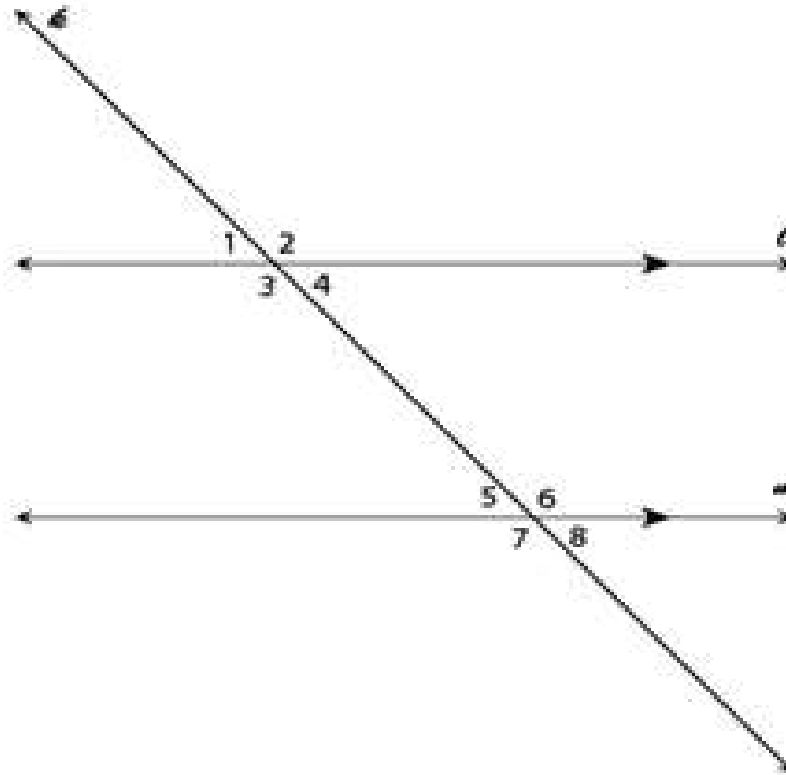
**Alternate Interior:**

**Corresponding:**

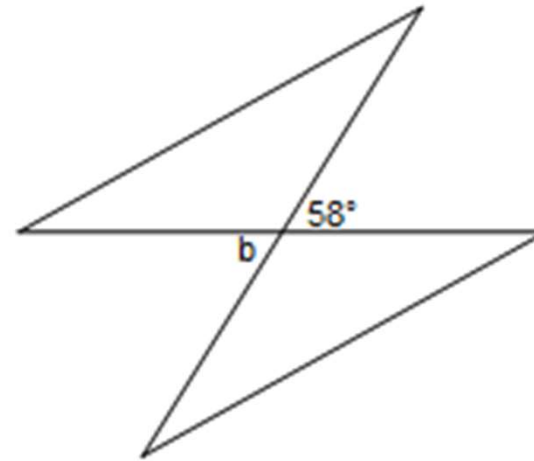
**Alternate Exterior:**



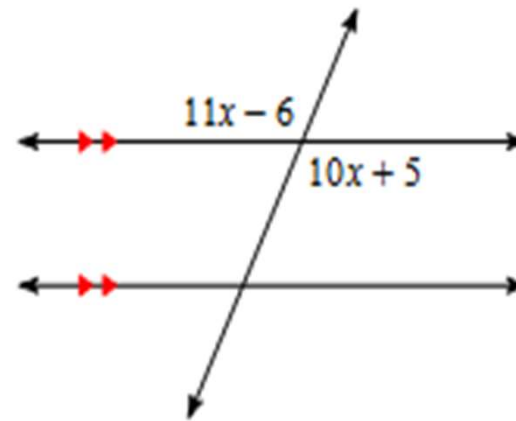
**Same-Side Interior Angles:** Same side of transversal between parallel lines. These angles are supplementary.



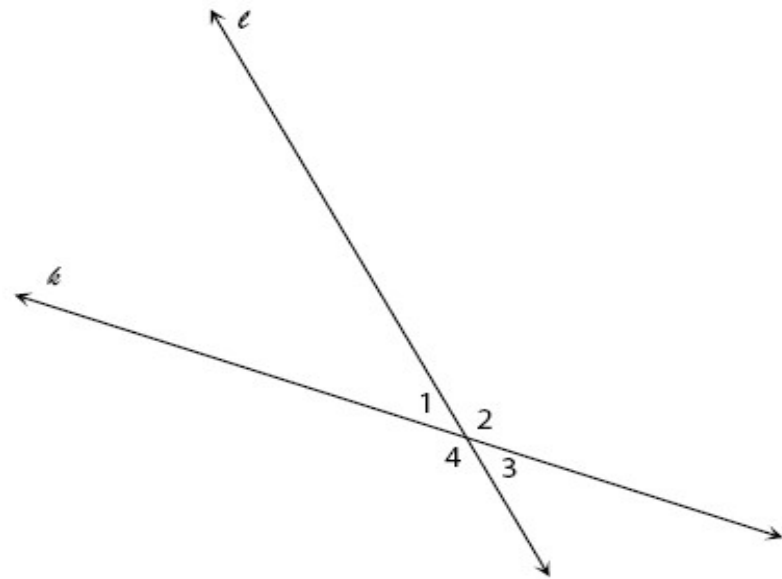
1. Find the measure of  $b$ . What is the angle relationship?



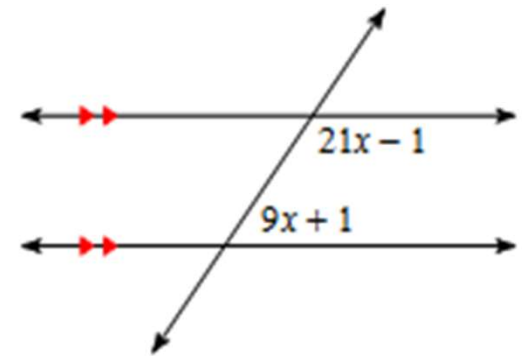
2. Find the value of  $x$ . What is the angle relationship?



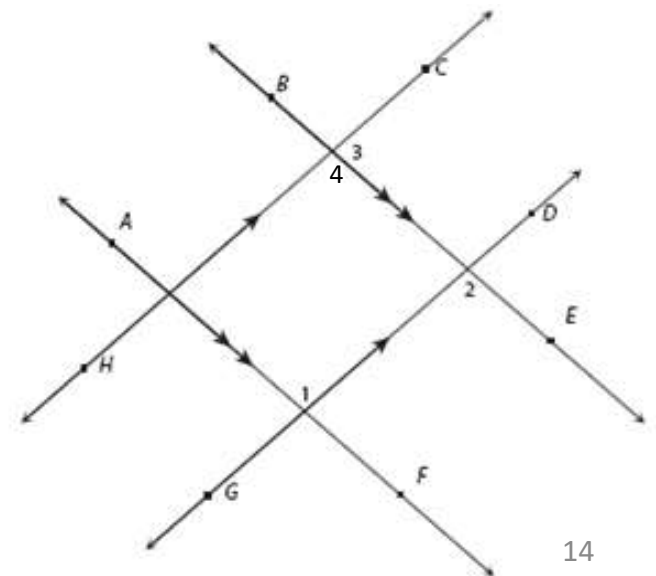
3. If  $m\angle 1 = x - 49$  and  $m\angle 2 = 2x + 1$ , find  $m\angle 4$  given that the lines  $l$  and  $k$  intersect as shown below. What angle relationships did you use?



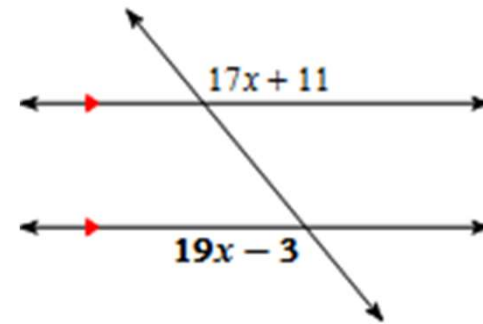
4. Name the angle relationship, then find the value of  $x$ .



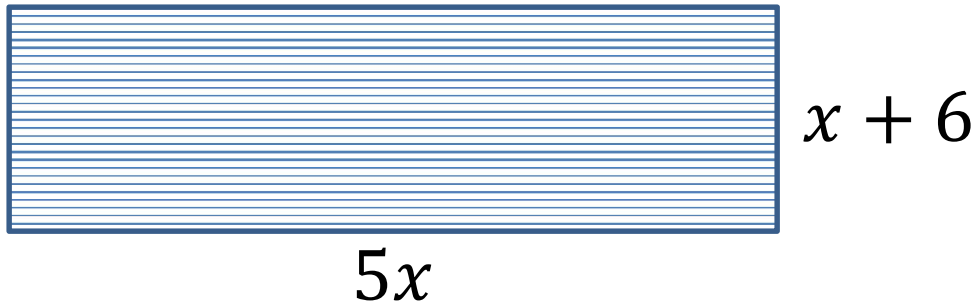
5. There are two sets of parallel lines in the diagram below. Find  $m\angle 1$  given that  $m\angle 4 = 27x - 1$  and  $m\angle 2 = 26x + 2$



6. Identify the angle relationship, then find the measure of the bolded angle.



REVIEW: The area of a garden is 200 square feet. Solve for  $x$ .



$$5x(x+6)=200 \quad \text{or} \quad 5x^2 + 30x = 200$$

Can you....

Identify vertical angles?

Identify linear pairs?

Identify alternate interior angles?

Identify corresponding angles?

Identify alternate exterior angles?

Identify same-side interior angles?

Set up and solve equations using angle relationships?

## **Assignment:**

6.2 handout and XL