

**GEOMETRY R**  
**Unit 2: Angles and Parallel Lines**

<i>Day</i>	<i>Classwork</i>	<i>Homework</i>
Friday 9/15	<b>Unit 1 Test</b>	
Monday 9/18	Angle Relationships	HW 2.1
Tuesday 9/19	Angle Relationships with Transversals	HW 2.2
Wednesday 9/20	Proving Lines are Parallel and Constructing Parallel Lines	HW 2.3
Thursday 9/21	Interior and Exterior Angle Theorems <b>Unit 2 Quiz 1</b>	HW 2.4
Friday 9/22	More Unknown Angle Problems with Justifications	HW 2.5
Monday 9/25	Review <b>Unit 2 Quiz 2</b>	Review Packet
Tuesday 9/26	Review	Study!
Wednesday 9/27	<b>Unit 2 Test</b>	

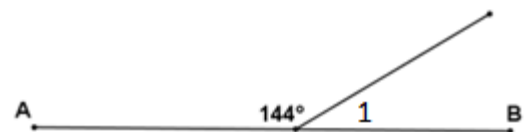
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## Angles [1]

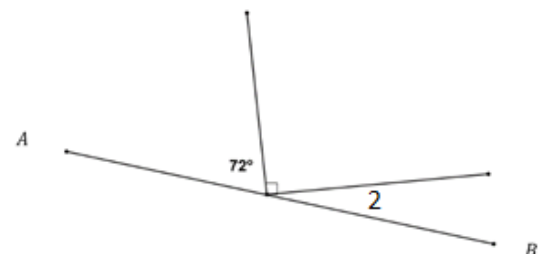
Vocabulary Term	Example
<b>Adjacent Angles</b> - Two angles in the same plane that share a common vertex and a common ray, but share no common interior points.	
<b>Linear Pair</b> - Two adjacent angles with non-common sides that are opposite rays.	
<b>Complementary Angles</b> - Two angles with measures that have a sum of 90 degrees.	
<b>Supplementary Angles</b> - Two angles with measures that have a sum of 180 degrees.	
<b>Angle Addition Postulate:</b> If two adjacent angles combine to form a whole angle, the measure of the whole angle equals the sum of the measures of the two adjacent angles.	
<b>Supplement Theorem</b> - Two angles that form a linear pair are supplementary angles.	

### Examples:

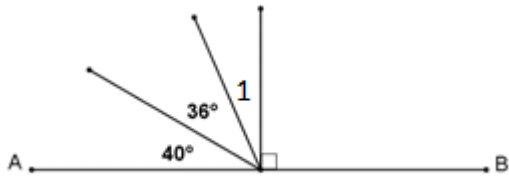
1. Find the measure of  $\angle 1$ .



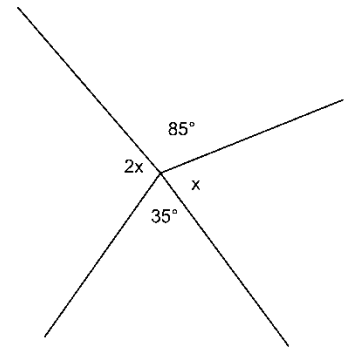
2. Find the measure of  $\angle 2$ .



3. Find the measure of  $\angle 1$ .



4. Find the value of  $x$ .

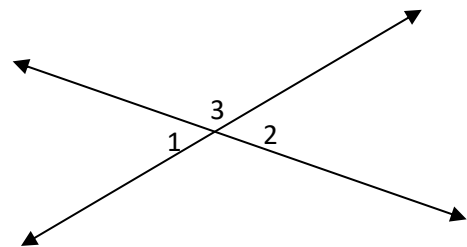


5. Two angles are complementary. One angle is six less than twice the other angle. Find both angles.

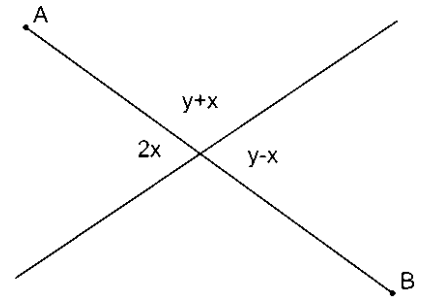
<p><b>Vertical Angles</b> - Two non-adjacent angles formed by two intersecting lines.</p>	
<p><b>Vertical Angles Theorem</b> - Vertical angles are congruent.</p>	

**Examples:**

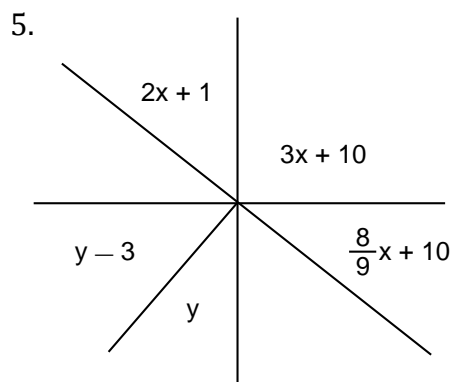
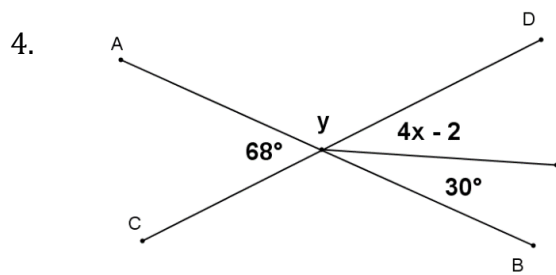
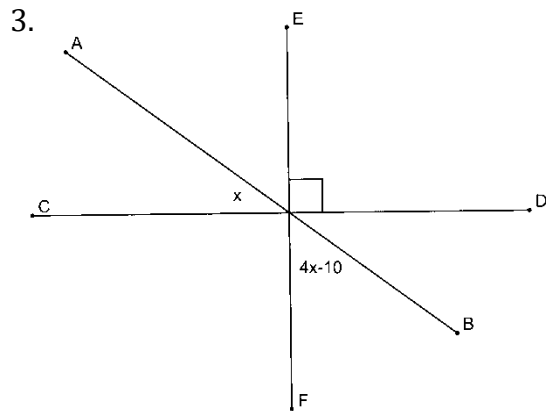
1. If  $m\angle 1 = x^2 - 4x$  and  $m\angle 2 = x + 36$ , find  $m\angle 3$ .



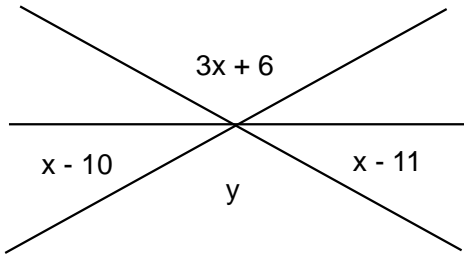
2. Find the value of  $x$  and  $y$ .



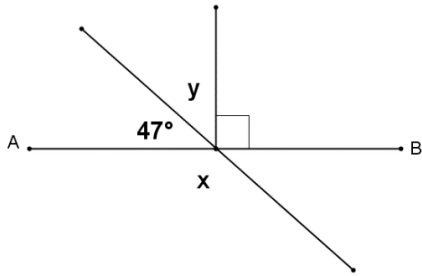
Find the values of the missing variables.



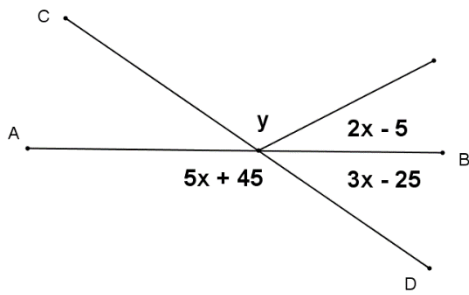
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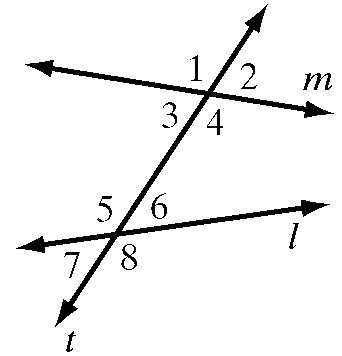


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## ANGLES AND PARALLEL LINES [2]

Vocabulary	Examples
Transversal - A line that intersects two or more coplanar lines.	
Corresponding Angles - Non-adjacent angles that lie on the same side of the transversal, one exterior and one interior.	
Alternate Interior Angles - Non-adjacent interior angles that lie on opposite sides of a transversal.	
Alternate Exterior Angles - Non-adjacent exterior angles that lie on opposite sides of a transversal.	

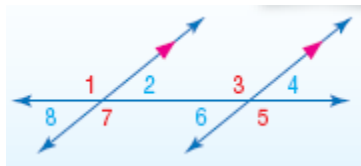


Theorems	Words	Diagram
Corresponding Angles Postulate	If 2 parallel lines are cut by a transversal, then corresponding angles are congruent.	
Alternate Interior Angles Theorem	If 2 parallel lines are cut by a transversal, then alternate interior angles are congruent.	
Consecutive Interior Angles Theorem	If 2 parallel lines are cut by a transversal, then consecutive interior angles are supplementary	
Alternate Exterior Angles Theorem	If 2 parallel lines are cut by a transversal, then alternate exterior angles are congruent.	

## Finding Values of Variables

The special relationships between the angles formed by two parallel lines and a transversal can be used to find unknown values.

1. If  $m\angle 4 = 2x - 17$  and  $m\angle 1 = 85$ , find  $x$ .

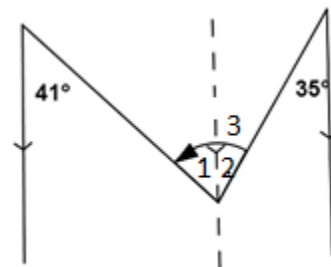


2. Find  $y$  if  $m\angle 3 = 4y + 30$  and  $m\angle 7 = 7y + 6$ .

3. If  $m\angle 1 = 4x + 7$  and  $m\angle 5 = 5x - 13$ , find  $x$ .

4. Find  $y$  if  $m\angle 7 = 68$  and  $m\angle 6 = 3y - 2$ .

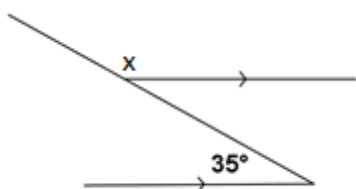
An \_\_\_\_\_ is sometimes useful when solving for unknown angles. In this figure, we can use the auxiliary line to find the measure of  $\angle 3$ . What is the measure of  $\angle 3$ ?



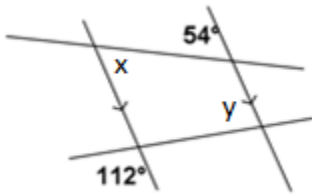
### Exercises

Find the unknown variables that are labeled. **Justify each step.**

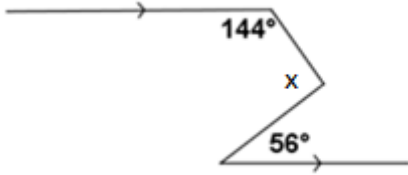
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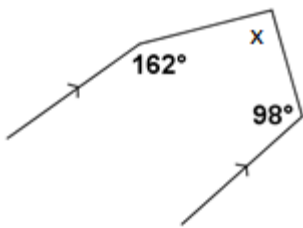
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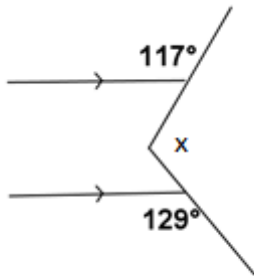
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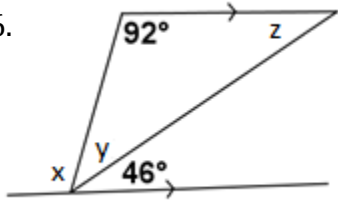


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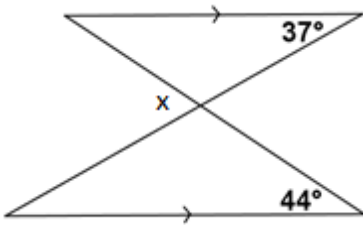




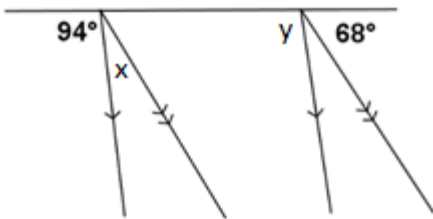
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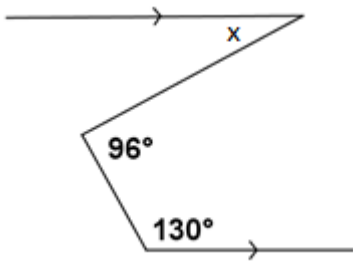
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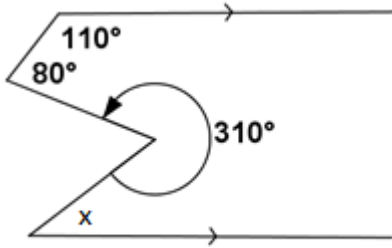


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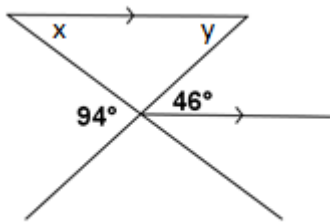


Find the unknown (labeled) angles. Give reasons for your solutions.

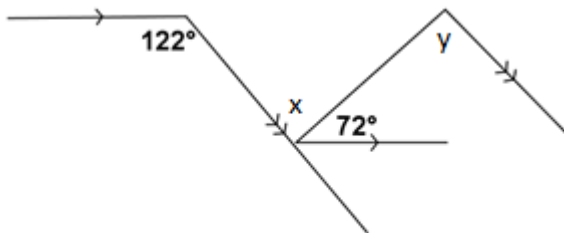
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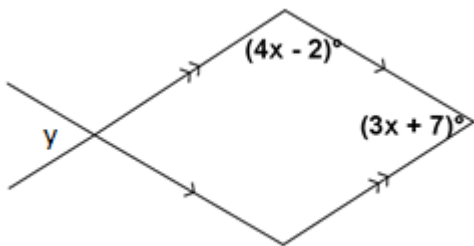
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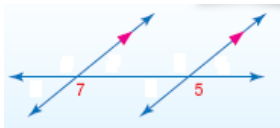
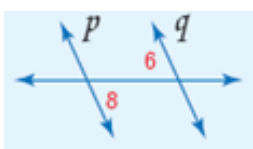
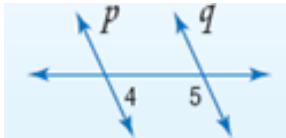
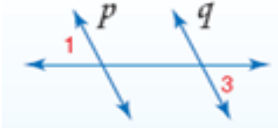
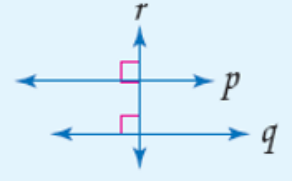
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### PROVING LINES ARE PARALLEL [3]

	Words	Diagram
Converse of the Corresponding Angles Postulate	If 2 lines are cut by a transversal such that corresponding angles are congruent, then the lines are parallel.	
Converse of the Alternate Interior Angles Theorem	If 2 lines are cut by a transversal such that alternate interior angles are congruent, then the lines are parallel.	
Converse of the Consecutive Interior Angles Theorem	If 2 lines are cut by a transversal such that consecutive interior angles are supplementary, then the lines are parallel.	
Converse of the Alternate Exterior Angles Theorem	If 2 lines are cut by a transversal such that alternate exterior angles are congruent, then the lines are parallel.	
Converse of the Perpendicular Transversal Theorem	If 2 lines are perpendicular to the same line, then they are parallel to each other.	

#### Examples

1. Given the following information, is it possible to prove that any of the lines shown are parallel? Justify your reasoning.

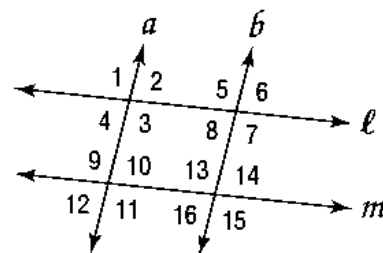
a.  $\angle 2 \cong \angle 8$

c.  $\angle 1 \cong \angle 15$

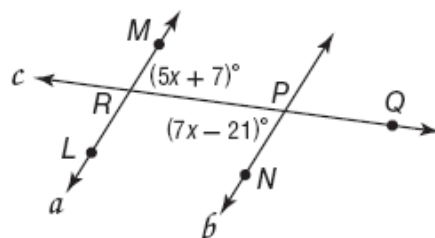
b.  $\angle 3 \cong \angle 11$

d.  $\angle 8 \cong \angle 6$

e.  $\angle 12 \cong \angle 14$

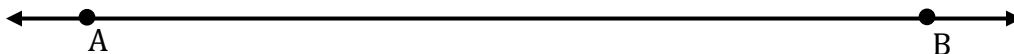


2. Find  $m\angle MRQ$  so that  $a \parallel b$ . Show your work.



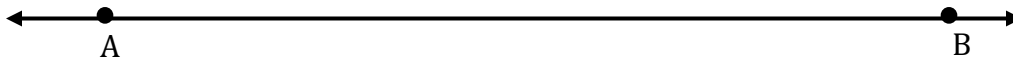
3. Use the converse of the corresponding angles postulate to construct a line parallel to  $\overleftrightarrow{AB}$ , passing through point  $C$ .

$C$



4. Use the converse of the alternate interior angles theorem to construct a line parallel to  $\overleftrightarrow{AB}$ , passing through point  $C$ .

$C$

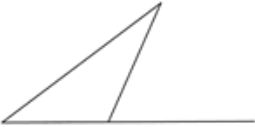


## ANGLES OF TRIANGLES [4 & 5]

The sum of the interior angles of a triangle is 180 degrees.
The acute angles of a right triangle are complementary.
Each angle of an equilateral triangle measures 60 degrees.
The sum of the interior angles of a quadrilateral is 360 degrees.

### Examples

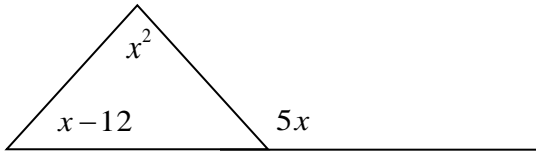
1. The vertex angle of an isosceles triangle exceeds the measure of a base angle by 30. Find the measure of the vertex angle.
  
  
  
  
  
  
  
  
  
  
2. Classify triangle  $ABC$  based on its sides and angles if  $m\angle A = (9x)^\circ$ ,  $m\angle B = (3x-6)^\circ$ , and  $m\angle C = (11x + 2)^\circ$ .

Theorem	Words	Example
The Exterior Angle Theorem	An exterior angle of a triangle equals the sum of its two remote interior angles	

**Proof of Exterior Angle Theorem:**

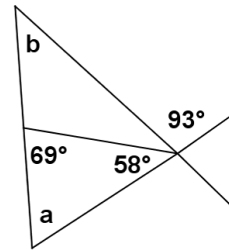
**Examples**

1.



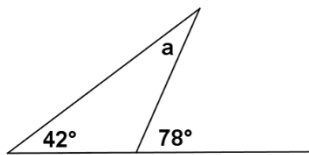
Find  $x$ :

2. Find the values of  $a$  and  $b$  in the figure to the right. Justify your results.

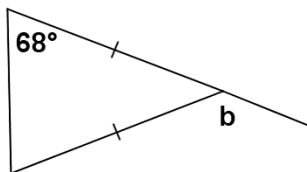


In each figure, determine the measures of the unknown variables. **Give reasons** for each step of your calculations.

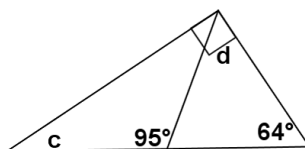
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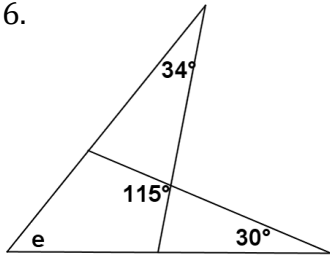
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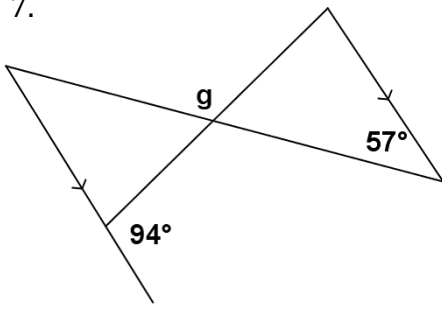
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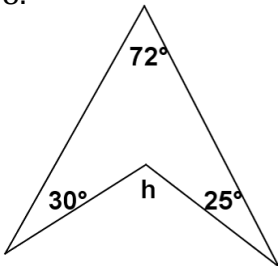
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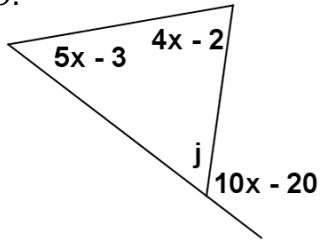
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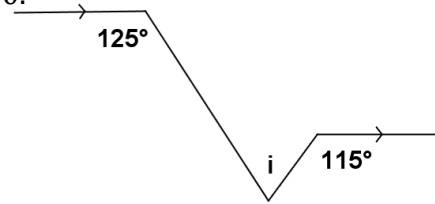
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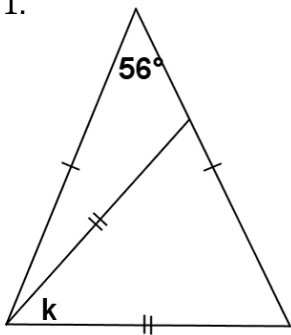
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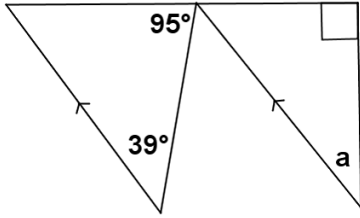


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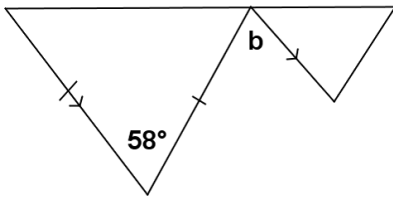




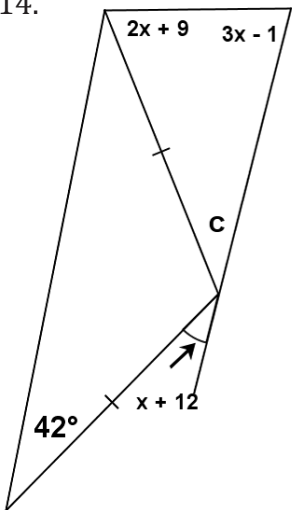
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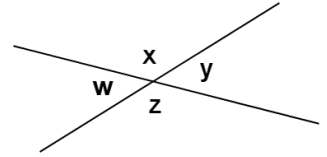


14.



Reasoning that uses a number of specific examples to arrive at a plausible generalization or prediction is called **inductive reasoning**. These conclusions lack logical certainty. The system of reasoning that uses facts, rules, definitions, or properties to reach logical conclusions is called **deductive reasoning**.

15. Angles that form a linear pair are supplementary. Use this fact to prove that vertical angles are equal in measure.



16. Use the theorems involving parallel lines discussed to prove that the three angles of a triangle sum to  $180^\circ$ . For this proof, you will need to draw an auxiliary line, parallel to one of the triangle's sides and passing through the vertex opposite that side. Add any necessary labels and write out your proof.

