CHAPTER 2 – REASONING AND PROOF

In this chapter we address three **Big IDEAS***:*

1) ***Use inductive and deductive reasoning***
2) ***Understanding geometric relationships in diagrams***
3) ***Writing proofs of geometric relationships***

Section:	**2– 1 Using inductive reasoning**
Essential Question	**How do you use inductive reasoning in mathematics?**

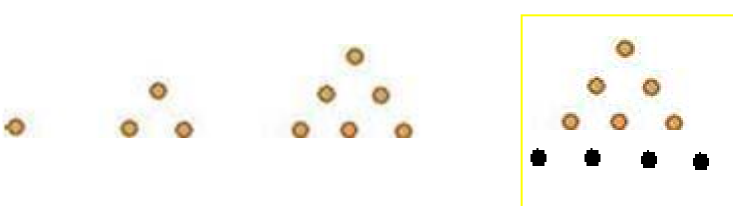
Warm Up:

Key Vocab:

Conjecture	An unproven statement that is based on observations.
Inductive reasoning	A process of reasoning that includes looking for patterns and making conjectures
Counterexample	A specific case that shows a conjecture is false

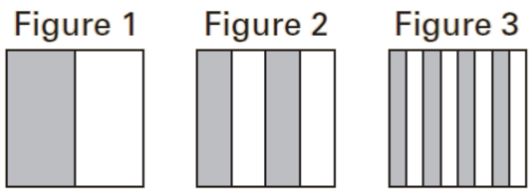
Show:

Ex 1: Describe how to sketch the fourth figure in the pattern



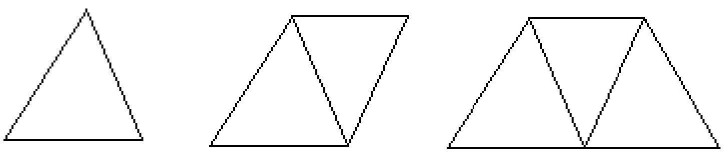
***This number pattern is called the set of Triangular Numbers.**

Ex 2: Describe how to sketch the fourth figure in the pattern.



Each region is divided in half vertically. Figure 4 should have 16 equal-sized vertical rectangles with alternate rectangles shaded.

Ex 3: Given the pattern of triangles below, make a conjecture about the number of segments in a similar diagram with 5 triangles.



7 + 2 + 2 = 11 segments

Ex 4: Describe the pattern in the numbers and write the next three numbers in the pattern.

a) 1000, 500, 250, 125, …

Each number in the pattern is one-half of the previous number: **62.5, 31.25, 15.625**

b) 5.01, 5.03, 5.05, 5.07, …

Each number in the pattern increases by 0.02: **5.09, 5.11, 5.13**

c) $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots$

The denominator and numerator each increase by 1: $\mathbf{\frac{5}{6}, \frac{6}{7}, \frac{7}{8}}$

d) 1, 4, 9, 16, …

These are perfect square numbers: **25, 36, 49**

e) 2, 8, 18, 32, …

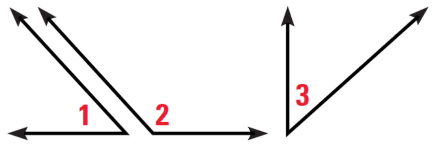
These are the perfect squares times 2: **50, 72, 98**

f) 1, 2, 4, …

Each number in the pattern is doubled: **8, 16, 32**
Each number in the pattern increases by one more than the previous: **7, 11, 16**

Ex 5: Find a counterexample to disprove the conjecture:

Conjecture: Supplementary angles are always adjacent.

Ans. 

Ex 6: Find a counterexample to disprove the conjecture:

Conjecture: The value of x^2 is always greater than the value of *x*.

If $x = \frac{1}{2}$, then $x^2 = \frac{1}{4}$. Since $\frac{1}{4} < \frac{1}{2}$, $x^2 < x$

Closure:

- How many counterexamples do you need to prove a statement is false? Explain your answer.

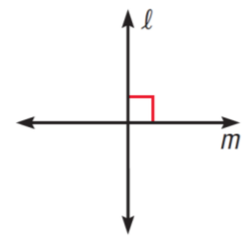
One; in order to be true, a statement must ALWAYS be true.

Section:	**2 – 2 Analyze Conditional Statements**
Essential Question	How do you rewrite a biconditional statement?

Warm Up:

Key Vocab:

Conditional Statement	A type of logical statement that has two parts, a hypothesis and a conclusion. Typically written in "if, then" form
Hypothesis	The "if" part of a conditional statement
Conclusion	The "then" part of a conditional statement
Negation	The opposite of a statement.
Converse	The statement formed by exchanging the hypothesis and conclusion of a conditional statement. Not always true.
Inverse	The statement formed by negating the hypothesis and conclusion of a conditional statement
Contrapositive	The equivalent statement formed by exchanging AND negating the hypothesis and conclusion of a conditional statement

Equivalent Statements	Two statements that are both true or both false **Ex**. Conditional and Contrapositive; Converse and Inverse	
Biconditional Statement	A statement that contains the phrase "if and only if." Combines a conditional and its converse when both are true. **Ex**. Definitions are biconditionals	
Perpendicular Lines	Two lines that intersect to form right angles **Notation:** $l \perp m$	

Show:

Ex 1: Rewrite the conditional statement in if-then form.

a. All whales are mammals.
If an animal is a whale, then it is a mammal.

b. Three points are collinear when there is a line containing them.
If there is a line containing three points, then the points are collinear.

Ex 2: Write the if-then form, the converse, the inverse, and the contrapositive of the statement, then determine the validity of each statement.

Statement: *Soccer players are athletes*

Conditional: If you are a soccer player, then you are an athlete. True.

Converse: If you are an athlete, then you are a soccer player. False.

Inverse: If you are not a soccer player, then you are not an athlete. False.

Contrapositive: If you are not an athlete, then you are not a soccer player. True.

Ex 3: Use the definition of supplementary angles to write a conditional, a converse, and a biconditional.

Conditional: If the sum of the measures of two angles is 180^o, then the angles are supplementary.

Converse: If two angels are supplementary, then the sum or their measures in 180^o.

Biconditional: The sum of the measures of two angles in 180^o if and only if the angles are supplementary.

Closure:

- Create an example of a conditional statement

Section:	2 – 3 Apply Deductive Reasoning
Essential Question	How do you construct a logical argument?

Warm Up:

Key Vocab:

Deductive Reasoning	A process that uses facts, definitions, accepted properties, and the laws of logic to form a logical argument.

Key Concepts:

Law of Detachment	**If** the hypothesis of a true conditional statement is true, **then** the conclusion is also true.
Law of Syllogism	If **hypothesis p**, then **conclusion q**. If **hypothesis q**, then **conclusion r**. **Therefore,** If **hypothesis p**, then **conclusion r**.

Show:

Ex 1: Use the Law of Detachment to make a valid conclusion in the true situation.

a.) If two angles are right angles, then they are congruent. $\angle C$ and $\angle D$ are right angles.
$\angle C \cong \angle D$

b.) If John is enrolled at Metro High School, then John has an ID number. John is enrolled at Metro High School. John has an ID number.

Ex 2: *If possible*, use the Law of Syllogism to write a new conditional statement that follows from the pair of true statements.

a.) If Joe takes Geometry this year, then he will take Algebra 2 next year. If Joe takes Algebra 2 next year, then he will graduate. If Joe takes Geometry this year, then he will graduate.

b.) If $y^3 = 8,$ then $y = 2$. If $y = 2$, then $3y + 4 = 10$. If $y^3 = 8,$ then $3y + 4 = 10$.

c.) If the radius of a circle is 4 ft, then the diameter is 8 ft. If the radius of a circle is 4 ft, then its area is 16π ft^2. not possible

Ex 3: Tell whether the statement is a result of inductive reasoning or deductive reasoning. Explain your choice.

a.) Whenever it rains in the morning, afternoon baseball games are cancelled. The baseball game this afternoon was not cancelled. So, it did not rain this morning. Deductive reasoning: because it uses the laws of logic.

b.) Every time Tom has eaten strawberries, he had a mild allergic reaction. The next time he eats strawberries, he will have a mild allergic reaction. Inductive reasoning: because it is based on a pattern of events.

c.) Jerry has gotten a sunburn every time he has gone fishing. The next time he goes fishing, he will get a sunburn. Inductive reasoning: because it is based on a pattern of events.

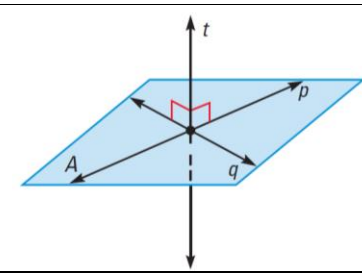
Closure:

- Compare and contrast inductive and deductive reasoning. How are they the same? How are they different?

Section:	**2 – 4 Use Postulates and Diagrams**
Essential Question	How can you identify postulates illustrated by a diagram?

Warm Up:

Key Vocab:

Line Perpendicular to Plane	A line that intersects the plane in a point and is perpendicular to every line in the plane that intersects it at that point. **Notation:** $t \perp$ Plane A	

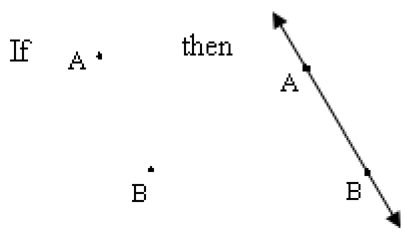
Point, Line, and Plane Postulates:

• Through any two points there exists exactly one line.
• A line contains at least two points.
• If two lines intersect, then their intersection is exactly one point.
• Through any three noncollinear points there exists exactly one plane.
• A plane contains at least three noncollinear points.
• If two points lie in a plane, then the line containing them lies in the plane.
• If two planes intersect, then their intersection is a line.

Show:

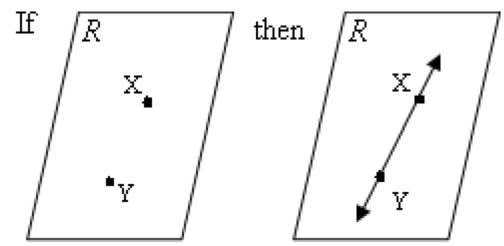
Ex 1: State the postulate illustrated by the diagram.

a)



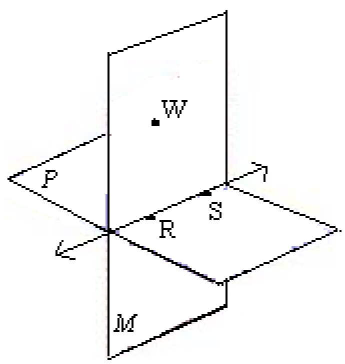
Through any two points there exists exactly one line.

b)



If two points lie in a plane, then the line containing them lies in the plane.

Ex 2: Use the diagram to write examples of the given postulates.



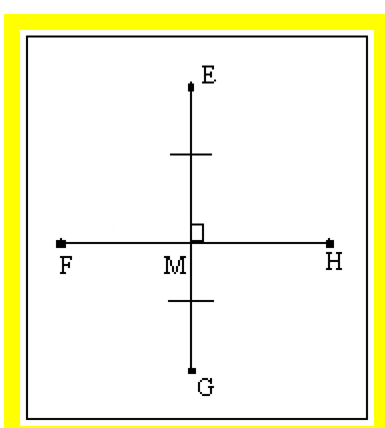
a. If two points lie in a plane, then the line containing them lies in the plane

Sample answer: Points *W* and *S* lie in plane *M*, so $\overleftrightarrow{WS}$ lies in plane *M*.

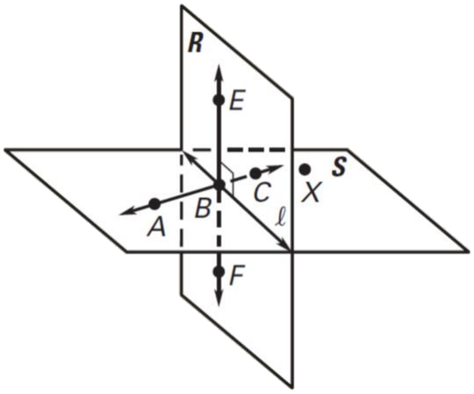
b. If two planes intersect, then their intersection is a line.

The intersection of planes *P* and *M* is $\overleftrightarrow{RS}$.

Ex 3: Sketch a diagram showing $\overline{FH} \perp \overline{EG}$ at segment *GE*'s midpoint M.



Ex 4: Which of the following cannot be assumed from the diagram?



- *A*, *B*, and *C* are collinear
- $\overleftrightarrow{EF} \perp$ line *l*
- $\overleftrightarrow{BC} \perp$ plane *R*
- $\overleftrightarrow{EF}$ intersects $\overleftrightarrow{AC}$ at *B*.
- Line $l \perp \overleftrightarrow{AB}$
- Points *B*, *C*, and *X* are collinear

Ex 5: Classify each statement as true or false AND give the definition, postulate, or theorem that supports your conclusion**.**

___**F**___ 1. A given triangle can lie in more than one plane.

Reason: Through any three noncollinear points there exists exactly one plane

___**T**___ 2. Any two points are collinear.

Reason: Through any two points there is exactly one line.

___**F**___ 3. Two planes can intersect in only one point.

Reason: If two planes intersect, then their intersection is a line.

___**F**___ 4. Two lines can intersect in two points.

Reason: If two lines intersect, then they intersect in exactly 1 point.

Section:	**2 – 5 Reason Using Properties from Algebra**
Essential Question	How do you solve an equation?

Warm Up:

Key Concepts:

Algebraic Properties of Equality	
let a, b, and c are real numbers	
Addition Property	If $a = b$, then $a + c = b + c$.
Subtraction Property	If $a = b$, then $a - c = b - c$.
Multiplication Property	If $a = b$, then $ac = bc$.
Division Property	If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.
Substitution Property	If $a = b$, then a can be substituted for b in any equation or expression.
Distributive Property	$a(b+c) = ab + ac$

Reflexive Properties of Equality	
Real Numbers	For any real number a, $a = a$.
Segment Lengths	For any segment AB, $AB = AB$.
Angle Measures	For any angle A, $m\angle A = m\angle A$.

Symmetric Properties of Equality	
Real Numbers	For any real numbers a and b, if $a = b$, then $b = a$.
Segment Lengths	For any segments AB and CD, if $AB = CD$, then $CD = AB$.
Angle Measures	For any angles A and B, if $m\angle A = m\angle B$, then $m\angle B = m\angle A$.

Transitive Properties of Equality	
Real Numbers	For any real numbers a, b, and c, if $a = b$ and $b = c$, then $a = c$.
Segment Lengths	For any segments AB, CD, and EF, if $AB = CD$ and $CD = EF$, then $AB = EF$.
Angle Measures	For any angles A, B, and C, if $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then $m\angle A = m\angle C$.

Show:

Ex 1: Name the property illustrated by each statement.

a. If $m\angle 5 = 80°$, then $80° = m\angle 5$.

Symmetric Property of Equality

b. $MN = MN$.

Reflexive Property of Equality

c. If $m\angle R = 75°$ and $75° = m\angle T$, then $m\angle R = m\angle T$.

Transitive Property of Equality

d. If $AB = RQ$ and $AB = LP$, then $RQ = LP$.

Transitive Property of Equality

e. If $AB = 13$, then $13 = AB$.

Symmetric Property of Equality

Ex 2: Solve $\frac{1}{4}(9-2x)=\frac{1}{8}(3x+4)$. Write a reason for each step.

Steps	Reasons
1. $\frac{1}{4}(9-2x)=\frac{1}{8}(3x+4)$	1. Given
2. $\frac{9}{4}-\frac{2x}{4}=\frac{3x}{8}+\frac{4}{8}$	2. Distributive Prop.
3. $\frac{9}{4}-\frac{x}{2}=\frac{3x}{8}+\frac{1}{2}$	3. Simplify
4. $18-4x=3x+4$	4. Multiplication Prop. of Eq.
5. $14=7x$	5. Add./Subtr. Prop. of Eq.
6. $2=x$	6. Division Prop. of Eq.
7. $x=2$	7. Symmetric Prop. Of Eq.

Ex 3: Solve $14x+3(7-x)=-1$. Write a reason for each step.

Steps	Reasons
1. $14x+3(7-x)=-1$	1. Given
2. $14x+21-3x=-1$	2. Distributive Prop.
3. $11x+21=-1$	3. Simplify (by combining like terms)
4. $11x=-22$	4. Subtr. Prop. of Eq.
5. $x=-2$	5. Division Prop. of Eq.

Ex 4: The cost C of using a certain cell phone can be modeled by the plan rate formula $c = 0.30(m - 300) + 39.99$, when m represents the number of minutes over 300. Solve the formula for m. Write a reason for each step.

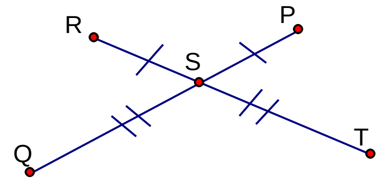
Steps	Reasons
1. $C = 0.30(m - 300) + 39.99$	1. Given
2. $C = 0.30m - 90 + 39.99$	2. Distributive Prop.
3. $C = 0.3m - 50.01$	3. Simplify
4. $C + 50.01 = 0.3m$	4. Add. Prop. Of Eq
5. $\frac{C + 50.01}{0.3} = m$	5. Div Prop of Eq

Ex 5: The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve the formula for b_1.

(Depending on your solution method, you might not fill out all the blanks below.)

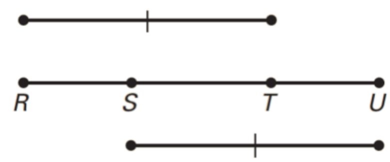
Steps	Reasons
1. $A = \frac{1}{2}h(b_1 + b_2)$	1. Given
2. $A = \frac{1}{2}b_1 + \frac{1}{2}b_2$	2. Distributive Prop.
3. $A - \frac{1}{2}hb_2 = \frac{1}{2}hb_1$	3. Subtraction Prop, of Eq.
4. $2A - b_2 = hb_1$	4. Multiplication Prop. of Eq.
5. $\frac{2A - b_2}{h} = b_1$	5. Division Prop. of Eq.

Ex 6: $\overline{RT}$ and $\overline{PQ}$ intersect at S so that $RS = PS$ and $ST = SQ$. Show that $RT = PQ$



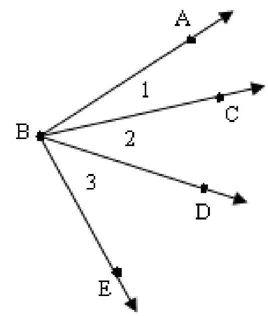
Steps	Reasons
1. $RS = PS$; $ST = SQ$	1. Given
2. $RS + ST = PS + SQ$	2. Addition Prop of Eq.
3. $RS + ST = RT; PS + SQ = PQ$	3. Segment Addition Postulate
4. $RT = PQ$	4. Substitution

Ex 7: The city is planning to add two stations between the beginning and end of a commuter train line. Use the information given. Determine whether $RS = TU$.



Steps	Reasons
1. $RT = SU$	1. Given
2. $RS + ST = RT$; $ST + TU = SU$	2. Segment Addition Postulate
3. $RS + ST = ST + TU$	3. Substitution Prop. of Eq.
4. $ST = ST$	4. Reflexive Property of Eq.
5. $RS = TU$	5. Subtraction Property of Eq.

Ex 8: In the diagram $m\angle ABD = m\angle CBE$.
Show that $m\angle 1 = m\angle 3$.



Statements	Reasons
1. $m\angle ABD = m\angle CBE$	1. Given
2. $m\angle ABD = m\angle 1 + m\angle 2$	2. Angle Addition Postulate
3. $m\angle CBE = m\angle 2 + m\angle 3$	3. Angle Addition Postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Substitution
5. $m\angle 2 = m\angle 2$	5. Reflexive Property of Eq.
6. $m\angle 1 = m\angle 3$	6. Subtraction Property of Eq.

Section:	**2– 6 Prove Statements about Segments and Angles**
Essential Question	How do you write a geometric proof?

Warm Up:

Key Vocab:

Proof	A logical argument that shows a statement is true.
Two-Column Proof	A type of proof written as numbered statements and corresponding reasons that show an argument in a logical order.
Theorem	A true statement that follows as a result of other true statements. Must be proven to be true

Theorems:

Congruence of Segments	
Segment congruence is reflexive, symmetric and transitive	
Reflexive	$\overline{AB} \cong \overline{AB}$
Symmetric	If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$.
Transitive	If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$.

Congruence of Angles	
Angle congruence is reflexive, symmetric, and transitive.	
Reflexive	$\angle A \cong \angle A.$
Symmetric	If $\angle A \cong \angle B,$ then $\angle B \cong \angle A.$
Transitive	If $\angle A \cong \angle B$ and $\angle B \cong \angle C,$ then $\angle A \cong \angle C.$

Key Concept:

Transitive vs. Substitution
When working with equality, substitution and the transitive property are often interchangeable. **However,** when working with congruence, you must ALWAYS use the transitive property. Substitution is NOT applicable for congruence.

Show:

Ex 1: Name the property illustrated by each statement.

a. If $\angle RST \cong \angle MNP,$ then $\angle MNP \cong \angle RST$.

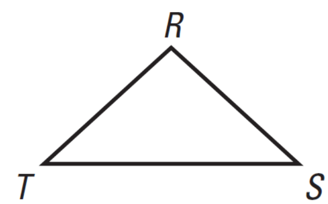
Symmetric Property of Angle Congruence

b. If $\overline{AB} \cong \overline{FG}$ and $\overline{FG} \cong \overline{MN},$ then $\overline{AB} \cong \overline{MN}$.

Transitive Property of Segment Congruence

c. $\angle R \cong \angle R$

Reflexive Property of Angle Congruence



Ex 2: Given: $RT = 5, RS = 5, \overline{RT} \cong \overline{TS}$
Prove: $\overline{RS} \cong \overline{TS}$

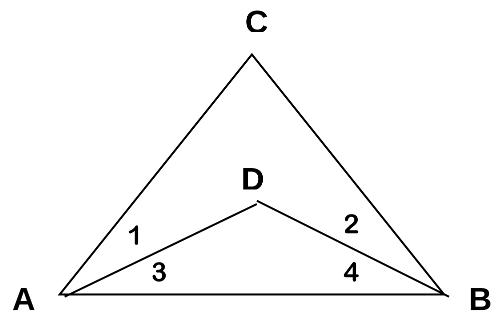
Statements	Reasons
1. $RT = 5, RS = 5, \overline{RT} \cong \overline{TS}$	1. Given
2. $RS = RT$	2. Transitive Prop. of Eq.
3. $\overline{RS} \cong \overline{RT}$	3. Definition of Congruence
4. $\overline{RS} \cong \overline{TS}$	4. Transitive Prop. of Congruence

Ex 3: Given: $\angle 1 \cong \angle 2$;

$\overrightarrow{AD}$ bisects $\angle CAB$;

$\overrightarrow{BD}$ bisects $\angle CBA$

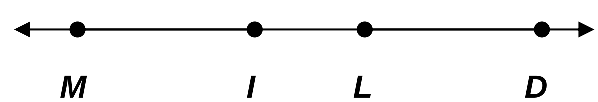
Prove: $\angle 3 \cong \angle 4$



Statements	Reasons
1. $\angle 1 \cong \angle 2$; $\overrightarrow{AD}$ bisects $\angle CAB$; $\overrightarrow{BD}$ bisects $\angle CBA$	1. Given
2. $\angle 1 \cong \angle 3$; $\angle 2 \cong \angle 4$	2. Definition of Angle Bisector
3. $\angle 3 \cong \angle 4$	3. Substitution

Ex 4: Given: $\overline{MI} \cong \overline{LD}$

Prove: $\overline{ML} \cong \overline{ID}$

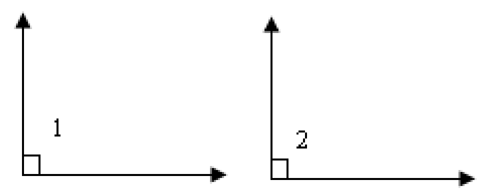


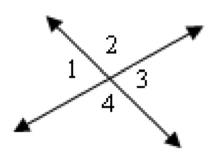
Statements	Reasons
1. $\overline{MI} \cong \overline{LD}$	1. Given
2. $MI = LD$	2. Definition of Congruence
3. $IL = IL$	3. Reflexive Prop. of Eq.
4. $MI + IL = LD + IL$	4. Addition Prop. of Eq.
5. $MI + IL = ML$; $LD + IL = ID$	5. Segment Add. Post.
6. $ML = ID$	6. Substitution
7. $\overline{ML} \cong \overline{ID}$	7. Definition of Congruence

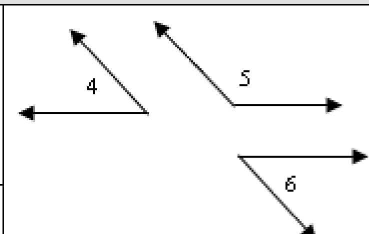
Section:	**2 – 7 Prove Angle Pair Relationships**
Essential Question	What is the relationship between vertical angles, between two angles that are supplementary/complementary to the same angle?

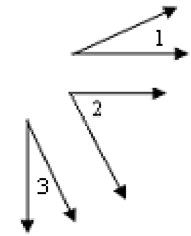
Warm Up:

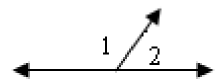
Theorems:

Right Angles Congruence Theorem	
All right angles are congruent	 $\angle 1 \cong \angle 2$

Vertical Angles Congruence Theorem	
Vertical angles are congruent.	 $\angle 1 \cong \angle 3,\ \angle 2 \cong \angle 4$

Congruent Supplements Theorem		
If two angles are supplementary to the same angle (or to congruent angles),	**then** they are congruent.	
$\angle 4$ and $\angle 5$ are supplementary & $\angle 5$ and $\angle 6$ are supplementary	$\angle 4 \cong \angle 6$	

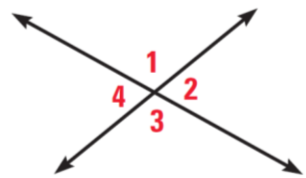
Congruent Complements Theorem		
If two angles are complementary to the same angle (or to congruent angles),	**then** they are congruent.	
$\angle 1$ and $\angle 2$ are complementary & $\angle 2$ and $\angle 3$ are complementary	$\angle 1 \cong \angle 3$	

Linear Pair Postulate		
If two angles form a linear pair,	**then** they are supplementary.	
$\angle 1$ and $\angle 2$ form a linear pair	$m\angle 1 + m\angle 2 = 180.$	

Show:

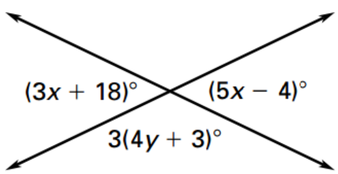
Ex 1: Find the indicated measure.

a) If $m\angle 1 = 112°$, find $m\angle 2, m\angle 3,$ and $m\angle 4$.



$m\angle 3 = m\angle 1 = 112°$ by the vertical angles cong. thm.
$m\angle 2 = m\angle 4 = 180 - 112 = 68°$ by the linear pair post.

Ex 2: Solve for *x* and *y*, then write the theorem or postulate that justifies the initial equation for each variable.



$3x + 18 = 5x - 4$ by the Vertical Angles Congruence Theorem
$2x = 22$
$x = 11$

$(3x + 18) + 3(4y + 3) = 180$ by the Linear Pair Postulate
$3(11) + 18 + 12y + 9 = 180$
$12y + 60 = 180$
$y = 10$

Ex 3: Give a valid conclusion then write the appropriate definition, postulate, or theorem to justify the conclusion.

a. Given: $\angle 6$ and $\angle 7$ are supplementary
$\angle 6$ and $\angle 8$ are supplementary

Conclusion: $\angle 7 \cong \angle 8$

Justification: Congruent Supplements Theorem

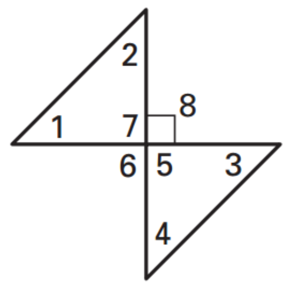
b. Given: $\angle 2$ and $\angle 3$ are complementary
$\angle 4$ and $\angle 5$ are complementary
$\angle 3 \cong \angle 5$

Conclusion: $\angle 2 \cong \angle 4$

Justification: Congruent Complements Theorem

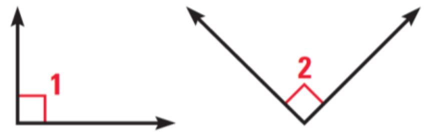
Ex 2: Identify all pairs of congruent angles.

Given: $\angle 1$ and $\angle 2$ are complementary
$\angle 2$ and $\angle 3$ are complementary
$\angle 1$ and $\angle 4$ are complementary



$\angle 1 \cong \angle 3$, $\angle 2 \cong \angle 4$ by Congruent Complements Theorem.
$\angle 5 \cong \angle 6 \cong \angle 7 \cong \angle 8$ by the Right Angles Congruence Theorem
$\angle 5 \cong \angle 7$, $\angle 6 \cong \angle 8$ by Vertical Angles Congruence Theorem

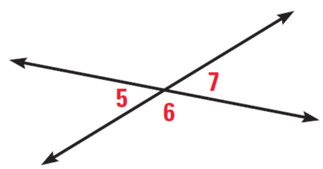
Ex 3: Prove the Right Angles Congruence Theorem.



Given: $\angle 1$ and $\angle 2$ are right angles
Prove: $\angle 1 \cong \angle 2$

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are right angles	1. Given
2. $m\angle 1 = 90°, m\angle 2 = 90°$	2. Def of Right Angles
3. $m\angle 1 = m\angle 2$	3. Transitive Prop. of Eq.
4. $\angle 1 \cong \angle 2$	4. Definition of $\cong \angle$'s

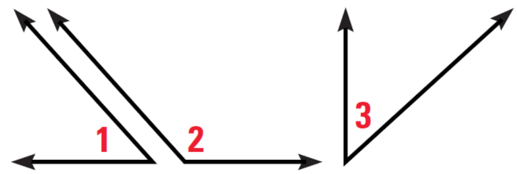
Ex 4: Prove the Vertical Angles Congruence Theorem



Given: $\angle 5$ and $\angle 7$ are vertical angles
Prove: $\angle 5 \cong \angle 7$

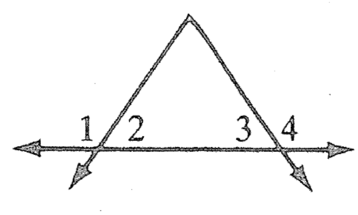
Statements	Reasons
1. $m\angle 5 + m\angle 6 = 180$ $m\angle 6 + m\angle 7 = 180$	1. Angle Addition Post.
2. $m\angle 5 + m\angle 6 = m\angle 6 + m\angle 7$	2. Substitution
3. $m\angle 6 = m\angle 6$	3. Reflexive Prop. of Eq.
4. $m\angle 5 = m\angle 7$	4. Subtraction Prop. of Eq.
5. $\angle 5 \cong \angle 7$	5. Definition of Congruence

Ex 5: Prove the Congruent Supplements Theorem



Given: $\angle 1$ and $\angle 2$ are supplements
$\angle 3$ and $\angle 2$ are supplements
Prove: $\angle 1 \cong \angle 3$

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are supplements $\angle 3$ and $\angle 2$ are supplements	1. Given
2. $m\angle 1 + m\angle 2 = 180$ $m\angle 2 + m\angle 3 = 180$	2. Substitution
3. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	3. Substitution Prop. of Eq.
4. $m\angle 2 = m\angle 2$	6. Reflexive Prop. of Eq.
4. $m\angle 1 = m\angle 3$	4. Subtraction Prop. of Eq.
5. $\angle 1 \cong \angle 3$	5. Definition of Congruence



Ex 6: Given: $m\angle 1 = m\angle 4$

Prove: $m\angle 2 = m\angle 3$

Statements	Reasons
1. $m\angle 1 + m\angle 2 = 180$ $m\angle 3 + m\angle 4 = 180$	1. Linear Pair Post
2. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	2. Subst. Prop. Of Eq
3. $m\angle 1 = m\angle 4$	3. .Given
4. $m\angle 2 = m\angle 3$	4. Subtr. Prop. Of Eq.