Unit 2- Day 1 Conditional Statements and Axioms

Agenda

- Go over Bridge
- Guided Notes

HW

- Day2 - p. 77 #19,
- p. 85-86 #32, 34, 61
- p. 100-101 # 11,15, 18, 23-25, 39, 33,36, 40, 53, ~~61~~

Bridge to Unit 2

1. Since we know that the statements "segments with equal measure are congruent" AND "congruent segments have equal measure", what do you think the symbol means when used like the following: "segments with equal measure $\leftrightarrow$ $\cong$ segments"?

   BICONDITIONAL

2. **Inductive reasoning** means that we look at patterns and make a conjecture based on that pattern. I listed the following: A, E, I. What do you think comes next? O Defend your choice: NEXT VOWEL EVERY 4TH

   m

3. Given the algebraic equation, match the **algebraic property** which justifies each step that generates an equivalent equation for $4(x+3)-2=6$

   a. 4 $4x+12-2=6$
   b. 3 $4x+10=6$
   c. 1 $4x=-4$
   d. 2 $x=-1$

   1) Addition or Subtraction Property of Equality
   2) Multiplication or Division Property of Equality
   3) Simplification
   4) Distribution

4. If x=8 and 8=y, then what do you know about x & y? $x=y$ TRANSITIVE

5. If I said that **ALL** Ballston Spa students clean their rooms on Friday night, would you believe me? NO Why or why not?

   KIANA DOESN'T COUNTEREX

6. If I said, "Ballston Spa's mascot is the Scottie Dog, **and** our colors are red & black," was I being truthful? NO Why or why not?

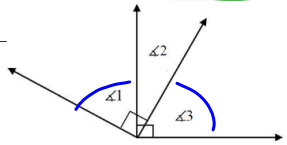
   FALSE CONJUNCTION

7. Look at the drawing at right.

   a. What conclusion can you make about $\angle 1$ & $\angle 3$? $\cong$

   b. Here is the proof; see if you can match the reasons:

      1) B $m\angle 1+m\angle 2=90°, m\angle 3+m\angle 2=90°$
      2) A $m\angle 1+m\angle 2=m\angle 3+m\angle 2$
      3) E $m\angle 2=m\angle 2$
      4) D $m\angle 1=m\angle 3$
      5) C $\angle 1\cong\angle 3$

   $\cong$ COMPLEMENTS THEOREM

   A) Substitution
   B) Definition of Complementary Angles
   C) Definition of Congruency or $=$ measure $\leftrightarrow\cong$ figures
   D) Subtraction Property of Equality
   E) Reflexive Property of Equality

Regents Geometry & Lab Name _____ Date_____

Lesson 2 Day 1 Notes – Definitions and Axioms

CONDITIONAL STATEMENTS

- A conditional statement is an "if-then" (→) statement. It has a hypothesis and a conclusion.

Ex: **If two angles are a linear pair, then the angles are supplementary.** Is this a true statement? YES

Hypothesis *Conclusion*

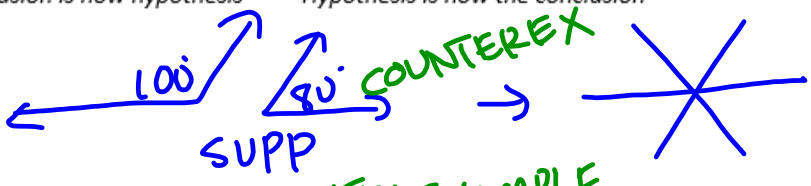
Diagram:

- A conditional statement will not always be true if the hypothesis & conclusion are reversed. This is also called the CONVERSE statement to the original conditional statement.

Ex: **If two angles are supplementary, then the angles are a linear pair.** Is this a true statement? NO

Conclusion is now hypothesis *Hypothesis is now the conclusion*

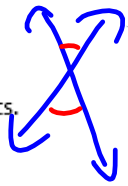
Diagram:

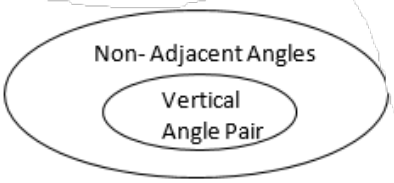


- This diagram/example is called a COUNTEREXAMPLE, which disproves a statement (or shows the statement to be false).

- Venn Diagrams can also be used to write conditional statements.

EX:



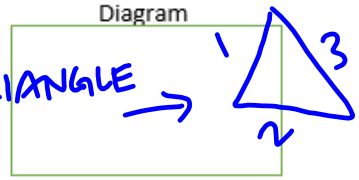


Written as a conditional statement: IF 2 ∠'S ARE A VERTICAL ∠ PAIR, THEN THEY ARE NON-ADJACENT ∠'s.

- A Bicondional Statement is an "if-and –only-if" statement. ↔
  - These statements include both the CONDITIONAL statement AND the CONVERSE statement.
  - A biconditional statement is true only when BOTH the conditional & converse statements are TRUE
  - Bicondional statements are used to write definitions.

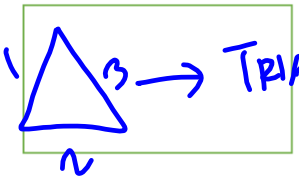
Ex: A polygon is a triangle if and only if it has three sides.

Diagram



Conditional: If a polygon is a triangle, then it has three sides. T

Converse: If a polygon has three sides, then it is a triangle. T



Definition: A TRIANGLE IS A POLYGON WITH 3 SIDES.

Practice. Write the following definition in the appropriate forms.

An angle that measure 90^{o} is a right angle. iff

Conditional IF AN ANGLE MEASURES 90°, THEN IT IS A RIGHT ∠.

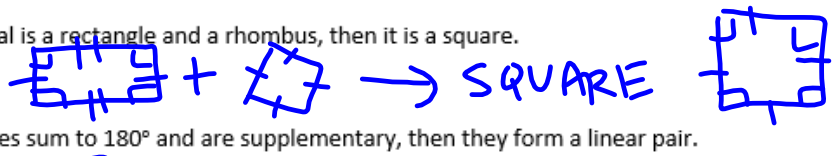
Converse IF AN ANGLE IS A RIGHT ∠, THEN IT MEASURES 90°.

Biconditional AN ANGLE MEASURES 90° IF AND ONLY IF IT IS A RIGHT ∠.

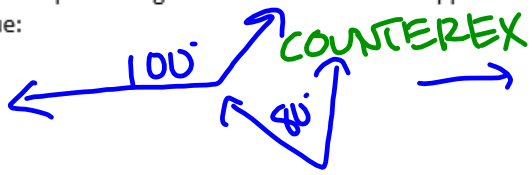
CONJUNCTIONS

A conjunction is a compound sentence formed by combining two sentences (or facts) using the word "and." A conjunction is true only when BOTH sentences (or facts) are true.

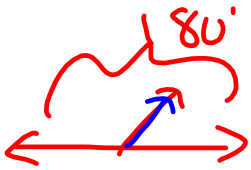
- Example 1: If a quadrilateral is a rectangle and a rhombus, then it is a square.
  Truth value:



- Example 2: If a pair of angles sum to 180° and are supplementary, then they form a linear pair.
  Truth value:

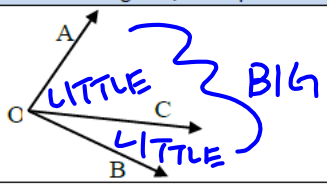
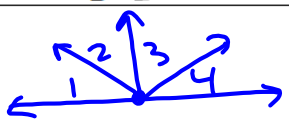
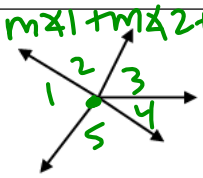
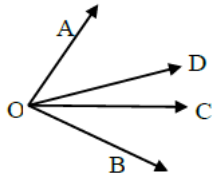


Often, to make a valid conclusion, you will need more than one condition/property. This is immensely important in your logical geometric reasoning. Rewrite example 2 such that it is a true/valid conclusion:

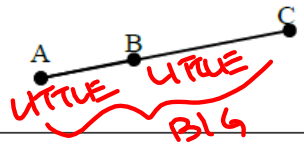
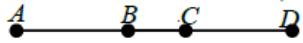


IF A PAIR OF ∠'S ARE SUPP AND ADJACENT, THEN THEY ARE A LINEAR PAIR.

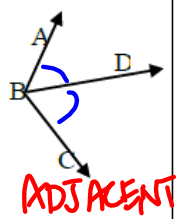
Sum of Parts

Conditional Statement	Diagram / Example	Stated as a Reason in a Proof
If point C is in the interior of $\measuredangle AOB$, then $m\measuredangle AOC + m\measuredangle BOC = m\measuredangle AOB$		ANGLE ADDITION POSTULATE
Given a sequence of ***n*** consecutive adjacent angles whose interiors are all disjoint such that the angle formed by the first ***n – 1*** angles and the last angle are a linear pair, then the angle measures SUM TO 180°	 $m\measuredangle 1 + m\measuredangle 2 + m\measuredangle 3 + m\measuredangle 4 = 180°$ ($\measuredangle$'s on a line)	Consecutive adjacent angles on a line sum to 180°
If the sum of the measures of all angles formed by three or more rays with the same vertex and whose interiors do not overlap, then the angle measures SUM TO 360°	$m\measuredangle 1 + m\measuredangle 2 + m\measuredangle 3 + m\measuredangle 4 + m\measuredangle 5 = 360°$  ($\measuredangle$'s at a point)	Angles at a point sum to 360°
If points C and D are in the interior of $\measuredangle AOB$ AND $\measuredangle AOD \cong \measuredangle BOC$, then _____ *See lesson summaries for 3 step process (can also go ≅ bigs → ≅ littles)*		Common Angle Theorem *Or* Overlapping Angles Theorem

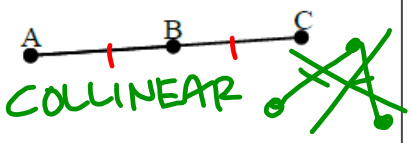
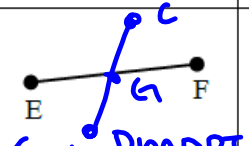
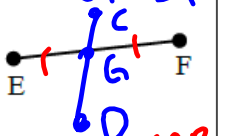
Sum of parts (con't)

If A, B, and C are collinear, then AB + BC = AC		SEGMENT ADDITION POSTULATE
If points $A, B, C,$ AND D are collinear and $\overline{AB} \cong \overline{CD}$, then _____ *See lesson summaries for 3 step process (can also go ≅ bigs → ≅ littles)*		Common Segment Thm *Or* Overlapping Segments Thm

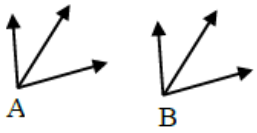
Bisectors

Conditional Statement	Diagram / Example	Stated as a Reason in a Proof
If $\overrightarrow{BD}$ bisects $\measuredangle ABC$, then $\measuredangle ABD \cong \measuredangle CBD$	$\overrightarrow{BD}$ BISECTS $\measuredangle ABC$ ↔ 	Definition of Angle Bisector *Or* Angle Bisector ↔ two congruent adjacent angles
If $\measuredangle ABD \cong \measuredangle CBD$ and they are adjacent, then $\overrightarrow{BD}$ BISECTS $\measuredangle ABC$ *Note conjunction!*		

Bisectors (con't)

If B is the midpoint of $\overline{AC}$, then $\overline{AB} \cong \overline{BC}$	B MIDPOINT OF $\overline{AC}$ ↔	Definition of a Midpoint *or* Midpoint ↔ two congruent collinear segments
If $\overline{AB} \cong \overline{BC}$ and A, B, and C are collinear, then B IS MIDPOINT OF $\overline{AC}$ *Note conjunction!*		
$\overline{CD}$ bisects $\overline{EF}$ at G and $\overline{EFG}$ ↔ G is the midpoint.	$\overline{CD}$ BISECTS $\overline{EF}$ @ G ↔  G IS MIDPT OF $\overline{EF}$	SEGMENT BISECTOR ↔ MIDPOINT
$\overline{CD}$ bisects $\overline{EF}$ at G and $\overline{EFG}$ ↔ $\overline{EG} \cong \overline{GF}$. & EFG	$\overline{CD}$ BISECTS $\overline{EF}$ @ G ↔  COLLINEAR	Segment bisector ↔ 2 ≅ collinear segments. *Or* Definition of a Segment Bisector

Bisectors (con't)

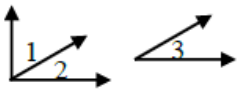
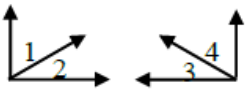
If 2 ≅ angles are bisected, then their _____		Halves of Congruent Angles are Congruent.
If 2 ≅ segments are bisected, then their _____		

Angle Pairs

Conditional Statement	Diagram / Example	Stated as a Reason in a Proof
The sum of two angles = 90° if and only if the angles are COMPLEMENTARY	A, B; ∠A COMP ∠B; $m\angle A + m\angle B = 90°$	DEFN OF COMPLEMENTARY ∠'S
The sum of two angles = 180° if and only if the angles are SUPPLEMENTARY	C, D; ∠C SUPP ∠D; $m\angle C + m\angle D = 180°$	DEFN OF SUPPLEMENTARY ∠'S
If two angles are adjacent and their noncommon sides form opposite rays, then the angles are a LINEAR PAIR	1, 2 (DIAGRAM)	Defn. of a Linear Pair
If two ∠'s form a linear pair, then they are SUPPLEMENTARY ∠'S	1, 2; ∠1 & ∠2 LINEAR PAIR → SUPP ∠'S	Linear pairs of ∠'s are supplementary. Linear Pair → Supp ∠'s

Angle pairs (Con't)

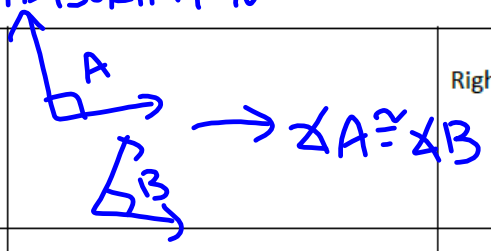
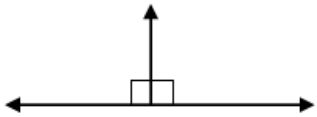
If 2 non-adjacent ∠'s are formed by intersecting lines then they are VERTICAL ∠'S.	3, 4; ∠3 & ∠4 VERTICAL ∠'S	Defn of Vertical Angles
If angles are vertical ∠'s, then the angles are CONGRUENT	3, 4 → 3, 4	Vertical ∠ pairs are equal in measure Vertical ∠ pairs are ≅
If 2 angles are supplementary to the same angle, then they are _____	1, 2, 3	Congruent Supplements Theorem *Or* Supplements of the same angle are congruent
If 2 angles are supplementary to congruent angles, then they are _____	1, 2, 4, 3	Congruent Supplements Theorem *Or* Supplements of congruent angles are congruent

Angle pairs (Con't)		
If 2 angles are complementary to the same angle, then they are _____		Congruent Supplements Theorem *Or* Supplements of the same angle are congruent
If 2 angles are complementary to congruent angles, then they are _____		Congruent Supplements Theorem *Or* Supplements of congruent angles are congruent

Right Angles

A RIGHT ∠ IS AN ANGLE MEASURING 90°

DEFN OF RIGHT ∠

If 2 ∠'*s* are right ∠'*s*, then _____ THEY ARE ≅		Right ∠'*s* are ≅.
If 2 ≅ ∠'*s* are supplementary, then _____ *Note conjunction!*		Congruent & supplementary angles are right ∠'*s*