Unit 1 - Day 13L - Algebraic and Geometric Proofs

Agenda

- Go over HW
- Warm Up Quiz
- Notes - 1.13

HW - Due Monday

Complete Axiom Sheet

Problem Set 1.13

6)

1. The statement $\measuredangle T \cong \measuredangle T$ is an example of the ____________________ property. (circle your answer)

   A) Transitive B) Reflexive C) Substitution D) Biconditional

2. Draw or describe a counterexample to the conditional statement, "If two angles are complementary, then each angle measures 45°."

P. 77: #19 P. 85-86: #32,34;

P.100-101:#11,15,18,23,24,25,29,33,36,40,53,61

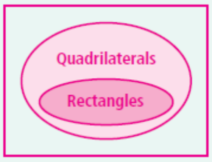
Show that each conjecture is false by finding a counterexample.

19. Every pair of supplementary angles includes one obtuse angle. $m\angle 1 = m\angle 2 = 90°$

Draw a Venn diagram.

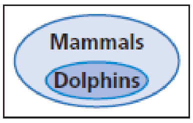
32. All rectangles are quadrilaterals.

32.



Write a conditional statement from each Venn diagram.

34.



34. If an animal is a dolphin, then it is a mammal.

P.100-101:#11,15,18,23,24,25,29,33,36,40,53,61

11. A parallelogram is a rectangle if and only if it has four right angles.

11. Conditional: If a ▱ is a rect., then it has 4 rt. ∠s. Converse: If a ▱ has 4 rt. ∠s, then it is a rect.

15. If a triangle contains a right angle, then it is a right triangle.

Converse: If a triangle is a right triangle, then it contains a right angle.

Biconditional: A triangle is a right triangle ifand only if it contains a right angl

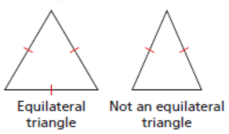
23. If $x > 0$, then $x^2 > 0$.

no; possible answer: $x = -2$

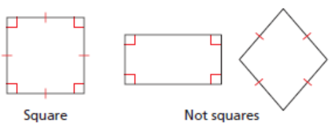
18. A circle is the set of all points in a plane that are a fixed distance from a given point.

Biconditional: A circle is a set of all points in a plane if and only if the points are at a fixed distance from a given point.

24.



25.



24. An equil. △ is a △ with 3 ≅ sides.

25. A square is a quad. with 4 ≅ sides and 4 rt. ∠s.

29. An angle is a geometric object formed by two rays.

29. Possible answer: The definition does not say that the rays have a common endpoint.

Complete each statement to form a true biconditional.

33. The circumference of a circle is 10π if and only if its radius is ___?___. 5

36. **Write About It** Use the definition of an angle bisector to explain what is meant by the statement "A good definition is reversible."

36. Possible answer: If you write the def. as a biconditional, "A ray is an ∠ bisector iff it divides the ∠ into 2 ≅ ∠s," then you can use it either forward or backward. If you know the ray is an ∠ bisector, then you can conclude that the 2 ∠s formed are ≅. If you know that 2 adj. ∠s formed by a ray are ≅, then you can conclude that the ray is an ∠ bisector.

40. Which conditional statement can be used to write a true biconditional?

- Ⓐ If a number is divisible by 4, then it is even.
- Ⓑ If a ratio compares two quantities measured in different units, the ratio is a rate.
- Ⓒ If two angles are supplementary, then they are adjacent.
- Ⓓ If an angle is right, then it is not acute.

53. If x is prime, then $x + 2$ is also prime. 53. F; possible answer: $x = 2$

Geometry + LAB Name:______________________ Date:_______ Section: __________

2-2R/2-3L Notes Algebraic Proofs

In order to prove a conjecture true, we must use **deductive reasoning**, which is using known facts and sound logic with precise definitions, postulates, and theorems to draw conclusions.

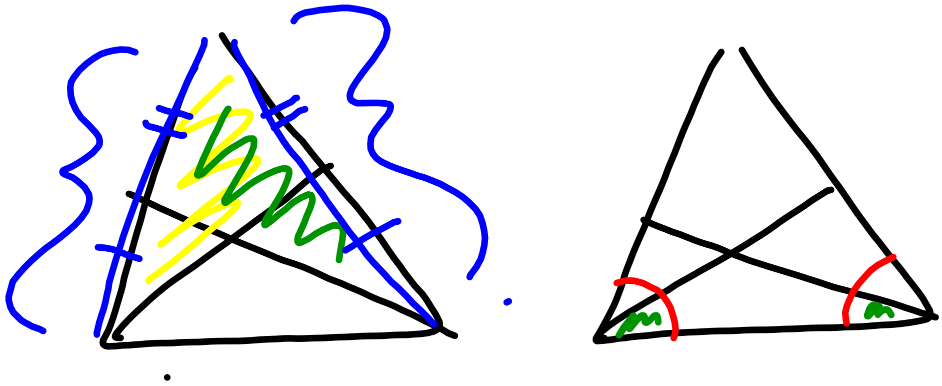
Deductive = USE rules vs. Inductive MAKE rules.

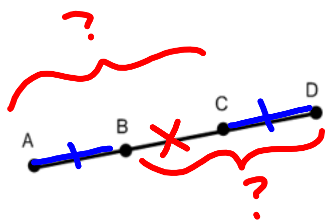
Formal 2-Column Geometric Proof:

Statements	Reasons
• Detailed steps to solve or prove the problem. • Names of angles, segments, lines, rays, etc. • Last statement is always what you are asked to prove SPECIFICALLY.	• The definitions, postulates, properties, and theorems that allow you to make the corresponding statement and link your thinking between steps. **Look at what changes between steps. • Does not include names of figures – be general.

Refer to your lesson summaries and axiom pages for examples of & additional reasons used in proofs.

- Angle Addition Postulate/Segment Addition Postulate
- Reflexive & Transitive Properties
- Algebraic Properties & Substitution





EX 1: Segment Addition Postulate & Addition Property of Equality

Given: $\overline{AB} \cong \overline{CD}$; $\overline{ABCD}$

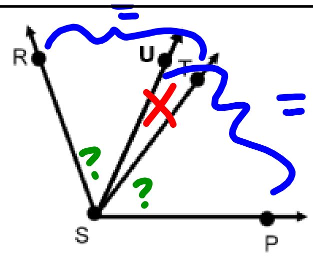
Prove: $\overline{AC} \cong \overline{BD}$

Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$, $\overline{ABCD}$	1. GIVEN
2. $AB = CD$	2. $\cong \Leftrightarrow =$ MEASURE
3. $BC = BC$	3. REFLEXIVE PROPERTY
4. $AB + BC = BC + CD$	4. ADDITION PROPERTY OF EQUALITY
5. $AB + BC = AC$ $BC + CD = BD$	5. SEGMENT ADDITION POSTULATE
6. $AC = BD$	6. SUBSTITUTION (STEP 5 INTO 4)
7. $\overline{AC} \cong \overline{BD}$	7. $\cong \Leftrightarrow =$ MEASURE

EX 2: Angle Addition Postulate & Subtraction Property of Equality

Given: $m\measuredangle RST = m\measuredangle USP$

Prove: $m\measuredangle RSU = m\measuredangle TSP$



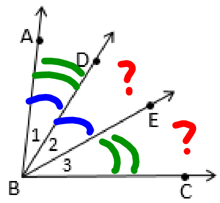
Statements	Reasons
1. $m\measuredangle RSU + m\measuredangle UST = m\measuredangle RST$ $m\measuredangle UST + m\measuredangle TSP = m\measuredangle USP$	1. ANGLE ADDITION POSTULATE
2. $m\measuredangle RST = m\measuredangle USP$	2. GIVEN
3. $m\measuredangle RSU + m\measuredangle UST = m\measuredangle UST + m\measuredangle TSP$	3. SUBSTITUTION (STEP 1 INTO 2)
4. $m\measuredangle UST = m\measuredangle UST$	4. REFLEXIVE PROP.
5. $m\measuredangle RSU = m\measuredangle TSP$	5. SUBTRACTION PROP OF EQ.

EX 3: Application of Properties

Given: $\measuredangle 2 \cong \measuredangle 1, \measuredangle 1 \cong \measuredangle 3$

TRANSITIVE PROPERTY OR SUBSTITUTION

Prove: $\measuredangle 2 \cong \measuredangle 3$

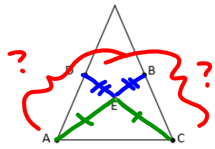


Statements	Reasons
1. $\measuredangle 2 \cong \measuredangle 1, \measuredangle 1 \cong \measuredangle 3$	1. GIVEN
2. $\measuredangle 2 \cong \measuredangle 3$	2. TRANSITIVE PROPERTY

EX 4: Segment Addition Postulate & Addition Property of Equality

Given: $\overline{AE} \cong \overline{CE}$; $\overline{EB} \cong \overline{ED}$; $\overline{AEB}$; $\overline{CED}$

Prove: $\overline{AB} \cong \overline{CD}$



Statements	Reasons
1. $\overline{AE} \cong \overline{CE}$ $\overline{EB} \cong \overline{ED}$ AEB, CED	1. GIVEN
2. AE = CE EB = ED	2. $\cong \longleftrightarrow$ = MEASURE
3. AE + EB = CE + ED	3. ADDITION PROPERTY OF EQ.
4. AE + EB = AB CE + ED = CD	4. SEGMENT ADDITION POSTULATE
5. AB = CD	5. SUBSTITUTION (STEP 4 INTO 3)
6. $\overline{AB} \cong \overline{CD}$	6. $\cong \longleftrightarrow$ = MEASURE

Problem Set 2-2R/2-3L

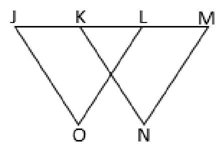
For questions 1-4, identify the property being used:

1. If AB = CD and CD = EF, then AB=EF. ____________________
2. If AB = CD and EF = CD, then AB=EF. ____________________
3. $\measuredangle TRY \cong \measuredangle TRY$ ____________________
4. If $m\measuredangle 1 = m\measuredangle 2$ and $m\measuredangle 3 = m\measuredangle 3$ then $m\measuredangle 1 + m\measuredangle 3 = m\measuredangle 2 + m\measuredangle 3$. ____________________

For questions 5-8, complete the following proofs:

5. Given: $\measuredangle J \cong \measuredangle OLJ$; $\measuredangle OLJ \cong \measuredangle M$

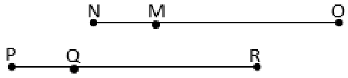
   Prove: $\measuredangle J \cong \measuredangle M$



Statements	Reasons
1. $\measuredangle J \cong \measuredangle OLJ$	1.
2. $\measuredangle OLJ \cong \measuredangle M$	2.
3. $\measuredangle J \cong \measuredangle M$	3.

6. **Given:** $\overline{NMQ}, \overline{PQR}, NO = PR, NM = PQ$

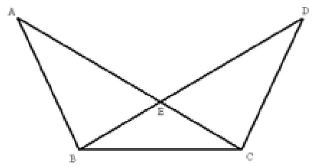
Prove: $MO = QR$



Statements	Reasons
1. $\overline{NMQ}, \overline{PQR}, NO = PR$	1.
2. $NM + MO = NO; PQ + QR = PR$	2.
3. $NM + MO = PQ + QR$	3.
4. $NM = PQ$	4.
5. $MO = QR$	5.

7. **Given:** $m\measuredangle ABD = m\measuredangle DCA; m\measuredangle DBC = m\measuredangle ACB$

Prove: $\measuredangle ABC \cong \measuredangle DCB$

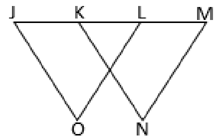


Statements	Reasons
1.	1. Given
2. $m\measuredangle ABD + m\measuredangle DBC = m\measuredangle DCA + m\measuredangle ACB$	2.
3.	3. Angle Addition Postulate
4. $m\measuredangle ABC = m\measuredangle DCB$	4.
5.	5.

8. **Given:** $\overline{JK} \cong \overline{ML}$

Prove: $\overline{JL} \cong \overline{MK}$

(Hint: how is this really just a segment problem?)



Statements	Reasons