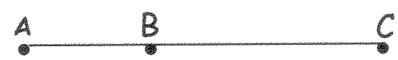
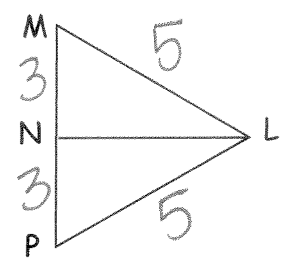
Day 07: 2-7 Proving Segment Relationships

Theorem: A true statement that must be proven. Each theorem can be made into a 2-column proof!

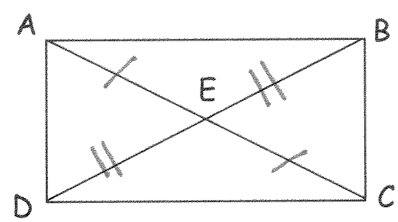
Properties of Equality (POE)	Properties of Segment Congruence (POC) - Theorems
Reflexive Property of Equality: AB = AB	**Reflexive Property of Congruence:** $\overline{AB} \cong \overline{AB}$
Symmetric Property of Equality: If AB = CD, then CD = AB	**Symmetric Property of Congruence:** If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$
Transitive Property of Equality: If AB = CD and CD = EF, then AB = EF	**Transitive Property of Congruence:** If $\overline{AB} \cong \overline{CD}$, and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$
Segment Addition Postulate	**Example:**
If B is between A and C, then AB + BC = AC. If AB + BC = AC, then B is between A and C.	

How to do a proof: *First mark your picture with the given information.*

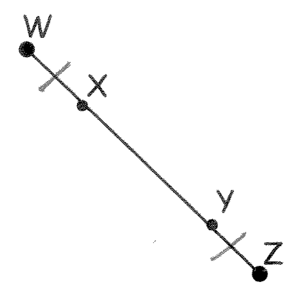
1. LM = 5, LP = 5, MN = 3, & PN = 3



1. E is the midpoint of $\overline{AC}$ and $\overline{BD}$



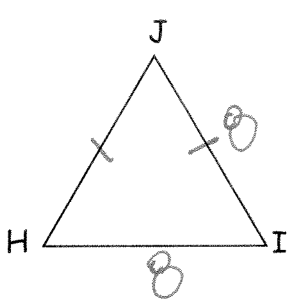
3. $\overline{WX} \cong \overline{YZ}$



Practice Proof: Fill in the statements and reasons in 2-column form using definitions, postulates, properties, or theorems. Don't forget to mark your picture first!

Given: HI = 8, IJ = 8, $\overline{IJ} \cong \overline{JH}$

Prove: $\overline{HI} \cong \overline{JH}$



Statements	Reasons
1. HI = 8	1. Given
2. IJ = 8	2. Given
3. HI = IJ	3. Substitution
4. $\overline{HI} \cong \overline{IJ}$	4. Def. ≅ seg.
5. $\overline{IJ} \cong \overline{JH}$	5. Symmetric POC
6. $\overline{HI} \cong \overline{JH}$	6. Transitive POC

2-6 & 2-7 Practice on Properties & Proofs

1-7: Match the statement with the property of equality.

D 1. If JK = PQ and PQ = ST, the JK = ST.
A 2. If $m\angle S = 30°$, then $5° + m\angle S = 35°$.
G 3. If AB + CD = EF + CD, then AB = EF.
B 4. AB = AB
C 5. If ST + TU = SU & ST = 2, then 2 + TU = SU.
F 6. If $m\angle K = 45°$, then $3(m\angle K) = 135°$.
E 7. If $m\angle P = m\angle Q$, then $m\angle Q = m\angle P$.

A. Addition property
B. Reflexive property
C. Substitution property
D. Transitive property
E. Symmetric property
F. Multiplication property
G. Subtraction property

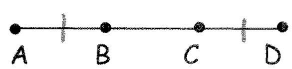
8-13: Use the property of equality to complete the statement.

8. Addition property of equality: If AB = 5, then 10 + AB = 15.
9. Multiplication property of equality: If $m\angle C = 30°$, then $\frac{1}{2}$ $(m\angle C) = 15°$.
10. Reflexive property of equality: AF = AF
11. Symmetric property of equality: If $m\angle DCF = m\angle MJC$, then $m\angle MJC = m\angle DCF$
12. Transitive property of equality: If YZ = DB and DB = JK, then YZ = JK.
13. Substitution property of equality: If MN = 3, then 5(MN) = 15. 5(3) = 15! The 3 was subbed in 4 MN

14-17: Complete the proofs below, giving a reason for each statement.

14. **Given:** 3(2x – 4) = 5x + 2 **Prove:** x = 14	
a. 3(2x – 4) = 5x + 2	a. Given
b. 6x – 12 = 5x + 2	b. Distributive
c. x – 12 = 2	c. Subtraction
d. x = 14	d. Addition

15. **Given:** AB = CD **Prove:** $\overline{CD} \cong \overline{AB}$	
a. AB = CD	a. Given
b. CD = AB	b. Symmetric
c. $\overline{CD} \cong \overline{AB}$	c. Def ≅ seg.

16. **Given:** AB = CD **Prove:** AC = BD	
a. AB = CD	a. Given
b. BC = BC	b. Reflexive
c. AB + BC = CD + BC	c. Addition
d. AB + BC = AC	d. Seg. + Post
e. BC + CD = BD	e. Seg. + Post
f. CD + BC = BD	f. Comm. Prop.
g. AB + BC = BD	g. Substitution a into f
h. AC = BD	h. Substitution d into g

17. **Given:** $\overline{MN} \cong \overline{RS}$ RS = PQ **Prove:** $\overline{MN} \cong \overline{PQ}$	
a. $\overline{MN} \cong \overline{RS}$	a. Given
b. MN = RS	b. Def. ≅ seg.
c. RS = PQ	c. Given
d. MN = PQ	d. Transitive POE
e. $\overline{MN} \cong \overline{PQ}$	e. Def. ≅ seg.