Intro to Proofs

EX → Given: $4x - 7 = 25$

STEPS ← Prove: $x = 8$ → WHY?

Statements	Reasoning
(1) $4x - 7 = 25$	(1) Given
(2) $4x = 32$	(2) Addition
(3) $x = 8$	(3) Division

EX → Given: $10x + 4 = 34$

Prove: $x = 3$

Statements	Reasoning
(1) $10x + 4 = 34$	(1) Given
(2) $10x = 30$	(2) Subtraction
(3) $x = 3$	(3) Division

- Substitution → replace something, "plug in" for something

* Transitive Property → If $a=b$ & $b=c$, then $a=c$

EX → Given: $2a+b=9$

$a=b$

Prove: $b=3$

Statements	Reasoning
(1) $2a+b=9$	(1) Given
$a=b$	
(2) $2b+b=9$	(2) Substitution
(3) $3b=9$	(3) Addition
(4) $b=3$	(4) Division

EX → Given: $x=y$

$y=z$

$z=4$

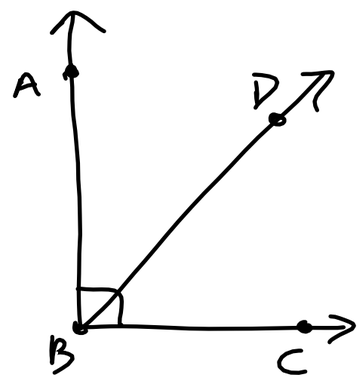
Prove: $x=4$

Statement	Reasoning
(1) $x=y, y=z, z=4$	(1) Given
(2) $x=z$	(2) Substitution / Trans. Prop.
(3) $x=4$	(3) Substitution / Trans. Prop.

What do we know & how do we know it?

- If 2 ∠'s are complementary, then they add to 90°

EX →



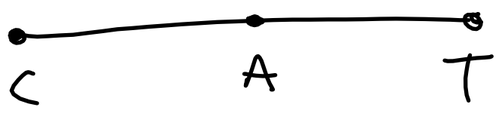
Given: ∠ABD & ∠DBC are complementary

Statement	Reasoning
(1) ☺	(1) Given
(2) m∠ABD + m∠DBC = 90	(2) Def'n of Complementary ∠'s
(3) (Exp. 1) + (Exp. 2) = 90	(3) Substitution

⋮

- If a point is a midpoint, two smaller segments are equal

EX →



Given: A is midpt. of $\overline{CT}$

Statement	Reasoning
(1) ☺	(1) Given
(2) CA = AT	(2) Def'n of Midpoint
(3) (Exp. 1) = (Exp. 2)	(3) Substitution

⋮

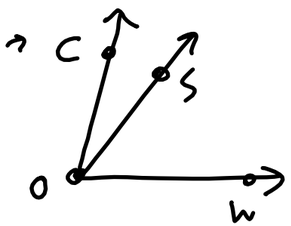
- "Addition"

→ when adding 2 items together, justify by using "(item) addition"

EX →

Statement	Reasoning
⋮	⋮
# BA + AT = BT	# Segment Addition
⋮	⋮

EX →



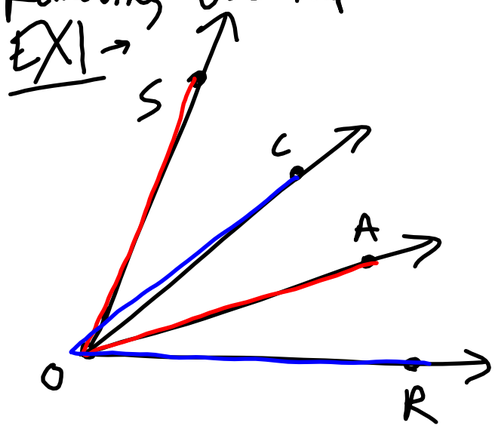
Statement	Reasoning
⋮	⋮
# m∠COS + m∠SOW = m∠COW	# Angle Addition
⋮	⋮

- "Overlap"

→ common angle/segment involved

Removing Overlap

EX1 →



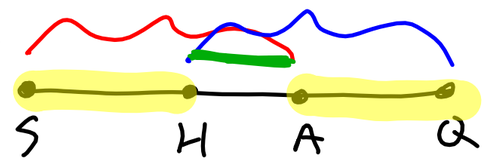
Given: $m\angle SOA = m\angle COR$

Prove: $m\angle SOC = m\angle AOR$

Statement	Reasoning
(1) ∴	(1) Given
(2) $m\angle SOA = m\angle SOC + m\angle COA$	(2) Angle Addition
(3) $m\angle COR = m\angle COA + m\angle AOR$	(3) Angle Addition
(4) $m\angle SOC + m\angle COA = m\angle COA + m\angle AOR$	(4) Substitution → Swap "big" for "small"
(5) $m\angle SOC = m\angle AOR$	(5) Subtraction → Get rid of overlapping piece

→ Break into "smaller" pieces

EX2 →



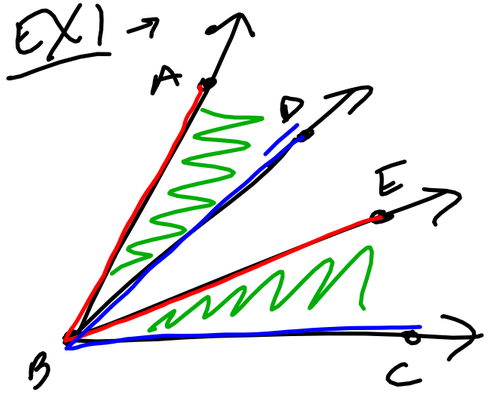
Given: $SA = HQ$

Prove: $SH = AQ$

Statements	Reasoning
(1) ∴	(1) Given
(2) $SH + HA = SA$	(2) Segment Addition
(3) $HA + AQ = HQ$	(3) Segment Addition
(4) $SH + HA = HA + AQ$	(4) Substitution
(5) $SH = AQ$	(5) Subtraction

Adding Overlap

EX1 →



Given: $m\angle ABD = m\angle EBC$

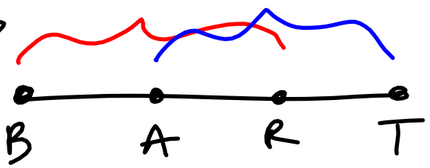
Prove: $m\angle ABE = m\angle DBC$

Statement	Reasoning
(1) ☺	(1) Given
(2) $m\angle ABD + m\angle DBE = m\angle EBC + m\angle DBE$	(2) Angle Addition
(3) $m\angle ABE = m\angle ABD + m\angle DBE$	(3) Angle Addition
(4) $m\angle DBC = m\angle DBE + m\angle EBC$	(4) Angle Addition
(5) $m\angle ABE = m\angle DBC$	(5) Substitution

- Going from = to ≅

→ If 2 items are ≅, then their measures must be =

EX 1 →

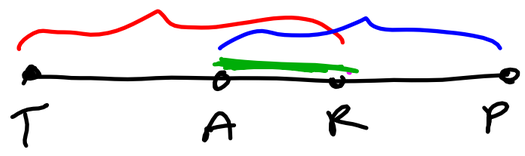


Given: $\overline{BA} \cong \overline{RT}$

Prove: $\overline{BR} \cong \overline{AT}$

Statements	Reasoning
1) $\overline{BA} \cong \overline{RT}$	1) Given
2) $BA = RT$	2) Def. Congruency ←
3) $BA+AR = RT+AR$	3) Segment Addition
4) $BA+AR = BR$	4) Segment Addition
5) $RT+AR = AT$	5) Segment Addition
6) $BR = AT$	6) Substitution
7) $\overline{BR} \cong \overline{AT}$	7) Def. Congruency ←

EX 2 →



Given: $\overline{TR} \cong \overline{AP}$

Prove: $\overline{TA} \cong \overline{RP}$

Statements	Reasoning
1) $\overline{TR} \cong \overline{AP}$	1) Given
2) $TR = AP$	2) Def. Congruency
3) $TR = TA+AR$	3) Segment Add.
4) $AP = RP+AR$	4) Segment Add.
5) $TA+AR = RP+AR$	5) Substitution
6) $TA = RP$	6) Subtraction
7) $\overline{TA} \cong \overline{RP}$	7) Def. Cong.