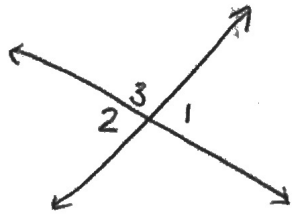
Given: 2 angles are vertical angles

Show: Vertical angles are congruent



① $\angle 1$ and $\angle 2$ are vertical angles — Given

② $\angle 1$ and $\angle 3$ and $\angle 2$ and $\angle 3$ are linear pairs — Def. of linear pairs

③ $\angle 1$ and $\angle 3$ & $\angle 2$ and $\angle 3$ are supplementary — Linear Pair Postulate

④ $m\angle 1 + m\angle 3 = 180$, $m\angle 2 + m\angle 3 = 180$ — Def. of Supplementary

⑤ $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 3$ — Transitive Prop. of Eq

⑥ $m\angle 1 = m\angle 2$ — Sub. Prop. of Eq.

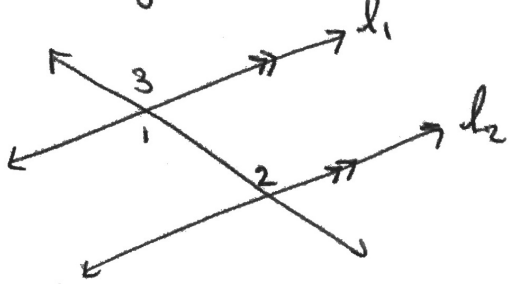
⑦ $\angle 1 \cong \angle 2$ — Def of Congruent Angles

OR TWO-COLUMN PROOF

Step	Reason/Justification
① $\angle 1$ and $\angle 2$ are vertical $\angle$'s	Given ← GIVENS COME FIRST
② $\angle 1$ and $\angle 3$ are a linear pair; $\angle 2$ and $\angle 3$ are a linear pair	Def. of linear pair
③ $\angle 1$ and $\angle 3$ are supplementary; $\angle 2$ and $\angle 3$ are supplementary	Linear Pair Postulate
④ $m\angle 1 + m\angle 3 = 180°$; $m\angle 2 + m\angle 3 = 180°$	Def. of Supplementary
⑤ $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 3$	Transitive Prop. of Equality
⑥ $m\angle 1 = m\angle 2$	Sub. Prop. of Equality
⑦ $\angle 1 \cong \angle 2$	Def. of Congruent Angles

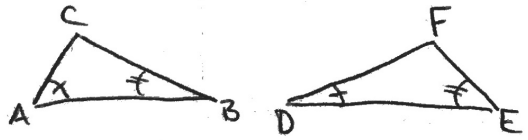
GIVEN: Two parallel lines are cut by a transversal

SHOW: Alternate interior angles are congruent.



Step	Reason
(1) $l_1 \parallel l_2$	Given
(2) $\angle 1$ and $\angle 2$ are alt. int $\angle$'s	Def of Alt. Int. $\angle$'s
(3) $\angle 1 \cong \angle 3$	Vertical $\angle$'s are congruent
(4) $\angle 3 \cong \angle 2$	Corresponding $\angle$'s Postulate
(5) $\angle 1 \cong \angle 2$	Transitive Prop. of Congruence

GIVEN:



SHOW: $\angle C \cong \angle F$

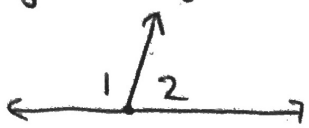
Steps	Reasons
(1) $\angle A \cong \angle D$	Given
(2) $\angle B \cong \angle E$	Given
(3) $m\angle A = m\angle D$ $m\angle B = m\angle E$	Def of Congruent $\angle$'s
(4) $m\angle A + m\angle B + m\angle C = 180$ $m\angle D + m\angle E + m\angle F = 180$	Triangle Sum
(5) $m\angle A + m\angle B + m\angle C =$ $m\angle D + m\angle E + m\angle F$	Transitive Prop. of Eq.
(6) $m\angle A + m\angle B + m\angle C =$ $m\angle A + m\angle B + m\angle F$	Substitution
(7) $m\angle C = m\angle F$	Sub. Prop of Eq.
(8) $\angle C \cong \angle F$	Def of Congruent $\angle$'s

!!

#5 GIVEN: 2 angles are congruent and supplementary

SHOW: Both angles are right angles.

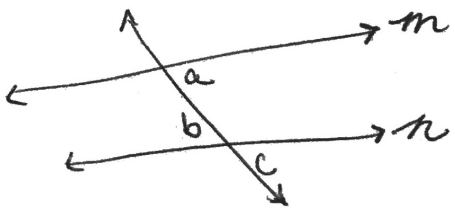
⇒ Draw a diagram!



Steps	Reasons
① $\angle 1 \cong \angle 2$	Given
② $\angle 1$ and $\angle 2$ are supplementary	Given
③ $m\angle 1 = m\angle 2$	Def of Congruent $\angle$'s
④ $m\angle 1 + m\angle 2 = 180°$	Def of Supp. $\angle$'s
⑤ $m\angle 1 + m\angle 1 = 180°$ $2(m\angle 1) = 180°$	Substitution
⑥ $m\angle 1 = 90° = m\angle 2$	Division Prop. of Equality
⑦ $\angle 1$ and $\angle 2$ are right angles	Def of Right $\angle$'s

#8 GIVEN: 2 lines cut by a transversal form congruent alternate interior angles

SHOW: The lines are parallel

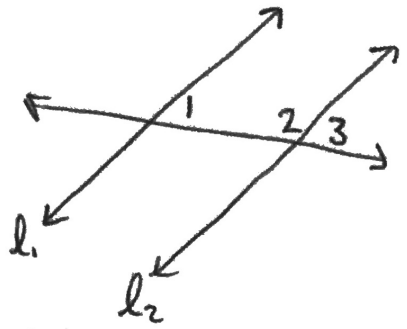


$\angle a \cong \angle b$ (Given) → $\angle b \cong \angle c$ (Vertical $\angle$'s are congruent) → $\angle a \cong \angle c$ (Transitive Prop. of Congruence) → $m \parallel n$ (Corresponding $\angle$'s Postulate)

#11

GIVEN: 2 parallel lines cut by a transversal

SHOW: Interior angles on the same side of the transversal are supplementary

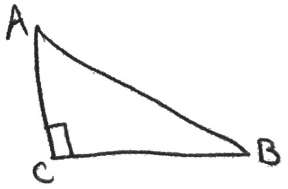


Steps	Reasons
① $l_1 \parallel l_2$	Given
② $\angle 1$ and $\angle 2$ are interior angles on the same side	Given
③ $\angle 1 \cong \angle 3$	Corresponding $\angle$'s Postulate
④ $m\angle 1 = m\angle 3$	Def. of Congruent $\angle$'s
⑤ $\angle 2$ and $\angle 3$ are a linear pair	Def. of Linear Pair
⑥ $\angle 2$ and $\angle 3$ are supplementary	Linear Pair Postulate
⑦ $m\angle 2 + m\angle 3 = 180°$	Def of Supplementary $\angle$'s
⑧ $m\angle 2 + m\angle 1 = 180°$	Substitution
⑨ $\angle 1$ and $\angle 2$ are supplementary	Def of Supplementary $\angle$'s

#15

Given: Right $\triangle ABC$
$\angle A$ and $\angle B$ are acute

Show: $\angle A$ and $\angle B$ are complementary



$\angle C$ is a right $\angle$ (given) → $m\angle C = 90°$ (Def. of Right $\angle$)

$\angle A$ and $\angle B$ are acute angles (given) → $m\angle A + m\angle B + m\angle C = 180°$ (Triangle Sum Theorem) → $m\angle A + m\angle B + 90° = 180°$ (Substitution) → $m\angle A + m\angle B = 90°$ → $\angle A$ and $\angle B$ are complementary (Def. of Complementary $\angle$'s)