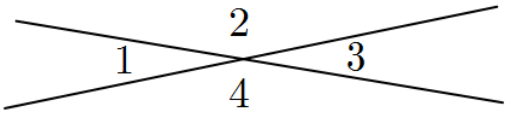
My First Geometry Proof

Prove a conjecture and create the theorem: If two angles are vertical angles, then they are congruent.



Vocab:

Vertical angles: *two angles across from each other in an 'X' shaped pattern*

Congruent: *the same; used for shapes how "equal" is used for numbers*

Given: $\angle 1$ and $\angle 3$ are vertical angles

Prove: $\angle 1 \cong \angle 3$

Statement	Reason
1. <1 and <3 are vertical angles.	1. Given
2. $<1 + <2 = 180^\circ$	2. Supplementary angles
3. $<2 + <3 = 180^\circ$	3. Supplementary angles
4. $<2 = 180^\circ - <3$	4. Subtraction
5. $<1 + 180^\circ - <3 = 180^\circ$	5. Substitution
6. $<1 - <3 = 0$	6. Addition
7. $<1 \cong <3$	7. Addition/Def. of congruence

Now, write your proof in paragraph/written form:

Sample answer:

We are given that <1 and <3 are vertical angles. From the diagram, we see that <1 and <2 are supplementary, so $<1+<2$ total 180 degrees. The same is true for <2 and <3. Since both total the same amount, both are equal to each other, which means that <1 is the same as <3.

Statement: *If two angles are vertical angles, then they are congruent*

Structure: P→Q

Truth Value: *true*

Converse: *If two angles are congruent, then they are vertical angles.*

Structure: Q→P

Truth Value: *false*

Inverse: *If two angles are not vertical angles, then they are not congruent.*

Structure: ~P→~Q

Truth Value: *false*

Contrapositive: *If two angles are not congruent, then they are not vertical angles.*

Structure: ~Q→~P

Truth Value: *true*

Your turn: Write a conditional statement, then write its Converse, Inverse, and Contrapositive. Value each as true or false. It does not have to be math-related. It must be in If-Then form.

Statement: *If it is a tiger, then it has stripes. (T)*

Converse: *If it has stripes, then it is a tiger. (F)*

Inverse: *If it is not a tiger, then it does not have stripes. (F)*

Contrapositive: *If it does not have stripes, then it is not a tiger. (T)*

Biconditional Statements: *A statement whose converse is also true.*

Example:
If two angles are supplementary, then they add up to 180deg. (T)
If they add up to 180degrees, then they are supplementary. (T)

Combined form:

Two angles are supplementary if and only if they add up to 180 degrees.