

Geometry Info Sheet #8

Conditional Statements and Related Forms

Definitions

Conditional Statement: An "if-then" statement with a hypothesis and a conclusion; a conditional statement is defined to always be true, except in the case where a true hypothesis leads to a false conclusion

Type of Statement	Format	Implication	Description
Conditional	If A, then B	$A \Rightarrow B$	Hypothesis implies conclusion
Converse	If B, then A	$B \Rightarrow A$	Reversal of hypothesis and conclusion
Inverse	If not A, then not B	$\sim A \Rightarrow \sim B$	Negation of hypothesis and conclusion
Contrapositive	If not B, then not A	$\sim B \Rightarrow \sim A$	Reversal & negation of hypothesis & conclusion

A conditional statement and its contrapositive are **truth functionally equivalent**. In other words, if a conditional statement is true, then its contrapositive must also be true, and if a conditional statement is false, then its contrapositive must also be false.

Examples

Type of Statement	Statement	Validity
Conditional	If I am in Dave's Computer Lab (Room 279), then I am at Redwood.	True
Converse	If I am at Redwood, then I am in Dave's Computer Lab (Room 279).	False
Inverse	If I am not in Dave's Computer Lab (Room 279), then I am not at Redwood.	False
Contrapositive	If I am not at Redwood, then I am not in Dave's Computer Lab (Room 279).	True

Type of Statement	Statement	Validity
Conditional	If a triangle is equilateral, then the triangle is isosceles.	True
Converse	If a triangle is isosceles, then the triangle is equilateral.	False
Inverse	If a triangle is not equilateral, then the triangle is not isosceles.	False
Contrapositive	If a triangle is not isosceles, then the triangle is not equilateral.	True

Type of Statement	Statement	Validity
Conditional	If a polygon is a trapezoid, then the polygon has a pair of parallel sides.	True
Converse	If a polygon has a pair of parallel sides, then the polygon is a trapezoid.	False
Inverse	If a polygon is not a trapezoid, then the polygon does not have a pair of parallel sides.	False
Contrapositive	If a polygon does not have a pair of parallel sides, then the polygon is not a trapezoid.	True