**3.6 The Inverse and the Contrapositive Conditional Statements**

**By the end of the lesson you will be able to:**

1. Understand and interpret the contrapositive and inverse of a conditional statement.

**Inverse** is a statement that is formed by negating both the hypothesis and the conclusion of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ statement.

In logic notation, the inverse of “if p, then q” is written as “ if ¬ p then ¬ q”

For example, “*If a number is even, then it is divisible by 2*.”

The inverse states:

**Contrapositive** is a statement that is formed by negating both the hypothesis and the conclusion of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ statement.

Converse statement:

Then the contrapositive would state:



|  |  |  |  |
| --- | --- | --- | --- |
| **Conditional Statement** | **Hypothesis** | **Conclusion** | **Notation** |
| If the Moon is blue, then you’re looking through a blue filter. | *p*The Moon is blue. | *q*You’re looking through a blue filter. | *p ⇒ q* |
| *Converse*If you’re looking through a blue filter, then the Moon is blue. | *q*You’re looking through a blue filter. | *p*The Moon is blue. | *q ⇒ p* |
| *Inverse*If the Moon is not blue, then you are not looking at it through a blue filter. | *¬ p*The Moon is not blue. | *¬ q*You’re not looking through a blue filter. | *¬ p ⇒ ¬ q* |
| *Contrapositive*If you’re not looking through a blue filter, then the Moon is not blue. | *¬ q*You’re not looking through a blue filter. | *¬ p*The Moon is not blue. | *¬ q ⇒ ¬ p* |
| *Biconditional*The Moon is blue if and only if you’re looking through a blue filter. | *p*The Moon is blue.*q*You’re looking through a blue filter. | *q*You’re looking through a blue filter.*p*The Moon is blue. | *p ⇔ q* |

**Example 1**

Examine the conditional statement: “*If x2=49, then x=7.*”

1. Is the statement true? If not, disprove with a counter example.

1. If the **converse** true? If not, disprove with a counter example.

1. Is the **inverse** true? If not, disprove with a counter example.

1. Is the **contrapositive** true? If not, disprove with a counter example.

**Assignment**: P. 215 #5, 6, 7, 9, 12

Hay River is a town in the North West Territories.