

# Inverse, Converse, and Contrapositive Statements

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# What is an Inverse Statement?

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- ▶ “If not  $p$ , then not  $q$ ”.

# Example 1

Convert each conditional statement to inverse statement.

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Convert each conditional statement to inverse statement.

1. If-then form: If two angles form a linear pair, then they are supplementary.
  - ▶ Inverse: If two angles do not form a linear pair, then they are not supplementary.

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Convert each conditional statement to inverse statement.

1. If-then form: If two angles form a linear pair, then they are supplementary.
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2. If-then form:

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Convert each conditional statement to inverse statement.

1. If-then form: If two angles form a linear pair, then they are supplementary.
  - ▶ Inverse: If two angles do not form a linear pair, then they are not supplementary.
2. If-then form: If a polygon is a triangle, then it has three sides.

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Convert each conditional statement to inverse statement.

1. If-then form: If two angles form a linear pair, then they are supplementary.

- ▶ Inverse: If two angles do not form a linear pair, then they are not supplementary.

2. If-then form: If a polygon is a triangle, then it has three sides.

- ▶ Inverse: If a polygon is not a triangle, then it does not have three sides.

# Example 1

# Example 1

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  - ▶ Converse: If three points determine a plane, then they are non-collinear.

# What is Contrapositive Statement?



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# What is Contrapositive Statement?

- ▶ a statement formed by negating both the hypothesis and conclusion and also then interchanging these negations
- ▶ in symbols,  $\sim q \rightarrow \sim p$
- ▶ “If not  $q$ , then not  $p$ .”
- ▶ The contrapositive of a conditional statement always has the same truth value as the original statement.

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Convert each conditional statement to contrapositive statement.

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  - ▶ Contrapositive: If two angles are not supplementary, then they do not form a linear pair.
2. If-then form:

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6. If-then form: If three points are non-collinear, then they determine a plane.
  - ▶ Contrapositive: If three points do not determine a plane, then they are collinear.

# Forms of Statements

Conditional

If  $p$ , then  $q$ .



# Forms of Statements

Conditional  
Inverse

If  $p$ , then  $q$ .  
If not  $p$ , then not  $q$ .

# Forms of Statements

Conditional  
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If  $p$ , then  $q$ .  
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If  $q$ , then  $p$ .

# Forms of Statements

Conditional

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If  $p$ , then  $q$ .

If not  $p$ , then not  $q$ .

If  $q$ , then  $p$ .

If not  $q$ , then not  $p$ .

# Example 4

Write each conditional statement in the converse, inverse, and contrapositive format.

1. If two lines intersect at right angle, then they are perpendicular.

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1. If two lines intersect at right angle, then they are perpendicular.

**Inverse:**

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Write each conditional statement in the converse, inverse, and contrapositive format.

1. If two lines intersect at right angle, then they are perpendicular.

**Inverse:** If two lines do not intersect at right angle, then they are not perpendicular.

# Example 4

Write each conditional statement in the converse, inverse, and contrapositive format.

1. If two lines intersect at right angle, then they are perpendicular.

**Inverse:** If two lines do not intersect at right angle, then they are not perpendicular.

**Converse:**

# Example 4

Write each conditional statement in the converse, inverse, and contrapositive format.

1. If two lines intersect at right angle, then they are perpendicular.

**Inverse:** If two lines do not intersect at right angle, then they are not perpendicular.

**Converse:** If two lines are perpendicular, then they intersect at right angle.



# Example 4

Write each conditional statement in the converse, inverse, and contrapositive format.

1. If two lines intersect at right angle, then they are perpendicular.

**Inverse:** If two lines do not intersect at right angle, then they are not perpendicular.

**Converse:** If two lines are perpendicular, then they intersect at right angle.

**Contrapositive:**

# Example 4

Write each conditional statement in the converse, inverse, and contrapositive format.

1. If two lines intersect at right angle, then they are perpendicular.

**Inverse:** If two lines do not intersect at right angle, then they are not perpendicular.

**Converse:** If two lines are perpendicular, then they intersect at right angle.

**Contrapositive:** If two lines are not perpendicular, then they do not intersect at right angle.

# Example 5

Write each conditional statement in the converse, inverse, and contrapositive format.

2. If two numbers are odd, then their product is odd.

# Example 5

Write each conditional statement in the converse, inverse, and contrapositive format.

2. If two numbers are odd, then their product is odd.

**Inverse:**

# Example 5

Write each conditional statement in the converse, inverse, and contrapositive format.

2. If two numbers are odd, then their product is odd.

**Inverse:** If two numbers are even, then their product is even.

# Example 5

Write each conditional statement in the converse, inverse, and contrapositive format.

2. If two numbers are odd, then their product is odd.

**Inverse:** If two numbers are even, then their product is even.

**Converse:**

# Example 5

Write each conditional statement in the converse, inverse, and contrapositive format.

2. If two numbers are odd, then their product is odd.

**Inverse:** If two numbers are even, then their product is even.

**Converse:** If the product of two numbers is odd, then the two numbers are odd.

# Example 5

Write each conditional statement in the converse, inverse, and contrapositive format.

2. If two numbers are odd, then their product is odd.

**Inverse:** If two numbers are even, then their product is even.

**Converse:** If the product of two numbers is odd, then the two numbers are odd.

**Contrapositive:**



# Example 5

Write each conditional statement in the converse, inverse, and contrapositive format.

2. If two numbers are odd, then their product is odd.

**Inverse:** If two numbers are even, then their product is even.

**Converse:** If the product of two numbers is odd, then the two numbers are odd.

**Contrapositive:** If the product of two numbers is even, then the two numbers are even.

# Example 6

Write each conditional statement in the converse, inverse, and contrapositive format.

3. If a number is an integer, then it is rational.

# Example 6

Write each conditional statement in the converse, inverse, and contrapositive format.

3. If a number is an integer, then it is rational.

**Inverse:**

# Example 6

Write each conditional statement in the converse, inverse, and contrapositive format.

3. If a number is an integer, then it is rational.  
**Inverse:** If a number is not an integer, then it is not rational.

# Example 6

Write each conditional statement in the converse, inverse, and contrapositive format.

3. If a number is an integer, then it is rational.

**Inverse:** If a number is not an integer, then it is not rational.

**Converse:**

# Example 6

Write each conditional statement in the converse, inverse, and contrapositive format.

3. If a number is an integer, then it is rational.

**Inverse:** If a number is not an integer, then it is not rational.

**Converse:** If a number is rational, then it is an integer.

# Example 6

Write each conditional statement in the converse, inverse, and contrapositive format.

3. If a number is an integer, then it is rational.

**Inverse:** If a number is not an integer, then it is not rational.

**Converse:** If a number is rational, then it is an integer.

**Contrapositive:**

# Example 6

Write each conditional statement in the converse, inverse, and contrapositive format.

3. If a number is an integer, then it is rational.

**Inverse:** If a number is not an integer, then it is not rational.

**Converse:** If a number is rational, then it is an integer.

**Contrapositive:** If a number is not rational, then it is not an integer.



**Thank you for watching.**