

Worksheet

Logic with Lewis Carroll



Name _____ ANSWER KEY _____

Lewis Carroll, the author of *Alice's Adventures in Wonderland* and *Through the Looking Glass*, was actually a mathematician. As a hobby, Carroll wrote stories which contained amusing examples of logic and which reflected his passion for mathematics.

Consider this quote from a conversation which occurred during the Mad Hatter's Tea Party in *Alice in Wonderland*.

"Then you should say what you mean." the March Hare went on.

"I do," Alice hastily replied; "at least -- at least I mean what I say
-- that's the same thing, you know."

"Not the same thing a bit!" said the Hatter, "Why, you might just as well say that 'I see what I eat' is the same thing as 'I eat what I see!'"

"You might just as well say," added the March Hare, "that 'I like what I get' is the same thing as 'I get what I like!'"

"You might just as well say," added the Dormouse, who seemed to be talking in his sleep, "that 'I breathe when I sleep' is the same thing as 'I sleep when I breathe!'"

"It is the same thing with you," said the Hatter, and here the conversation dropped, and the party sat silent for a minute.

Examine the last statements made by the Dormouse:

- (1) *I breathe when I sleep.*
- (2) *I sleep when I breathe.*

Answers may vary to some degree.

1. Write each of the statements in "If then" form.

If I sleep, then I breathe.	If I breathe, then I sleep.
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2. Write the converse of each statement.

If I breathe, then I sleep.	If I sleep, then I breathe.
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3. Write the inverse of each statement.

If I do not sleep, then I do not breathe.	If I do not breathe, then I do not sleep.
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4. Write the contrapositive of each statement.

If I do not breathe, then I do not sleep.	If I do not sleep, then I do not breathe.
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5. Examine the truth value of each of your statements (True or False)

	<i>I breathe when I sleep.</i>	<i>I sleep when I breathe.</i>
Original Statement:	T	F
Inverse:	F	T
Converse:	F	T
Contrapositive:	T	F

6. What relationships do you notice between the truth values and the different statements?

Answers will vary. Statements such as “Original and contrapositive have same truth value”, etc.

Let’s examine what the calculator tells us about True or False statements.

7. Examine the truth value of each of the following statements (True or False)

	$5 > 3$	$-1 < -2$
Original Statement:	T	F

8. Enter $5 > 3$ into your graphing calculator and hit ENTER.

TI-83+/84+: The “>” symbol is under the TEST menu. **TI-Nspire:** The “>” is a small round key on the left side.

What does the calculator tell you? **TI-83+/84+ gives a 1.**

TI-Nspire gives “true”.

9. Enter $-1 < -2$ into your graphing calculator and hit ENTER. What does the calculator tell you?

TI-83+/84+ gives a 0. TI-Nspire gives “false”.

10. If you are using a TI-83+/84+, draw a conclusion about how the calculator deals with TRUE and FALSE statements. **When a statement is true, this calculator yields a 1. When a statement is false, this calculator yields a 0. This is called a Boolean check.**