

Logic – Negation, Conjunction & Disjunction Worksheet

1. Tell whether the sentence is true, false or open. If the sentence is open, identify the variable

a. Canada is a country in North America

T

b. He went to California on vacation

O

c. A triangle is a four-sided polygon

F

d. A ray has one endpoint and a segment has two endpoints

T

e. A three-sided polygon is a triangle or is a quadrilateral

T

f. $x + 7 = 10$

O

g. $4 + 7 > 9$

T

2. What is the negation of the statement “The coat is blue”?

(a) the coat is green

(c) the coat is sometimes blue

(b) the coat is not blue

(d) it is not true that the coat is not blue

3. What is the negation of the statement “ $3 + 6 = 7$ ”?

(a) $3 + 6 \neq 7$

(c) $-3 + 6 = -7$

(b) $3 + 6 = 9$

(d) $3 + 6 > 7$

4. Which statement has the same truth value as the statement “ $4 + 7 = 3$ or $3 + 7 = 10$ ”?

(a) $4 + 7 = 3$ and $3 + 7 = 10$

(c) $3 + 7 \neq 10$ or $4 + 7 \neq 3$

(b) $3 + 7 \neq 10$ and $4 + 7 = 3$

(d) $4 + 7 \neq 3$ and $3 + 7 \neq 10$

5. Which statement has the same truth value as the statement “5 is an odd number or $6 + 4 = 12$ ”?

(a) 5 is an odd number and $6 + 4 = 12$

(c) 5 is not an odd number and $6 + 4 \neq 12$

(b) 5 is not an odd number or $6 + 4 \neq 12$

(d) 5 is not an odd number or $6 + 4 = 12$

6. If $p \vee \sim q$ is a false statement, which of the following statements has the same truth value?

(a) $p \vee q$

(b) $\sim p \vee \sim q$

(c) $p \wedge q$

(d) $\sim p \wedge q$

7. Which statement has the same truth value as “Albany is the capital of NY and is located on L.I.”?

(a) Albany is not the capital of NY and is location on L.I.

(b) Albany is the capital of NY and is not located on L.I.

(c) Albany is the capital of NY or it is located on L.I.

(d) Albany is the capital of NY or it is not located on L.I.

8. If “p” is a true statement, “q” is false statement and “r” is a true statement, evaluate the truth value of the following statements:

a.) $\sim p \wedge r$

F

b.) $(p \vee \sim q) \wedge r$

T

c.) $\sim(\sim r \vee q)$

T

In 9 & 10, write the sentence in symbolic form and then determine whether the statement is true or false

9. Let s = "There is school on Labor Day" Let h = "Labor day is a holiday"
Let w = "We work on Labor Day"

(1) We do not work on Labor Day

_____ $\sim w$ _____

(2) Labor Day is not a holiday

_____ $\sim h$ _____

(3) There is school on Labor Day and Labor Day is a holiday.

_____ $s \wedge h$ _____

(4) We work on Labor Day or Labor Day is a holiday.

_____ $w \vee h$ _____

(5) Labor Day is a holiday and we do not work on Labor Day.

_____ $h \wedge \sim w$ _____

(6) There is school on Labor Day or we work on Labor Day.

_____ $s \vee w$ _____

10. (H) Let p = "Six is prime" Let q = "Six is even" Let r = "Seven is prime"

(1) Six is prime and six is even

_____ $p \wedge q$ _____

(2) Six is even and seven is prime

_____ $q \wedge r$ _____

(3) It is false that six is prime or even

_____ $\sim(p \vee q)$ _____

(4) Six is not prime or seven is prime

_____ $\sim p \vee r$ _____

(5) Six is not prime and six is even

_____ $\sim p \wedge q$ _____

(6) It is not true that six is prime or seven is prime

_____ $\sim(p \vee r)$ _____

(7) Six is prime or six is not even

_____ $p \vee \sim q$ _____

(8) It is not true that seven is prime and six is even

_____ $\sim(r \wedge q)$ _____