

Practice Test Chapter 1

Introduction to Logic

Name _____

Score _____

Determine which of the following sentences are statements.

- | | | |
|---|---------------|---------------------|
| 1. The youngest student passed the exam. | [a] Statement | [b] Not a Statement |
| 2. Socrates was a pilot. | [a] Statement | [b] Not a Statement |
| 3. $2y + 7 = 11$ | [a] Statement | [b] Not a Statement |
| 4. If the forecast is correct, then it will rain. | [a] Statement | [b] Not a Statement |
| 5. Go away from me. | [a] Statement | [b] Not a Statement |
| 6. John is strong. | [a] Statement | [b] Not a Statement |
| 7. $3 + 4 = 12$ | [a] Statement | [b] Not a Statement |
| 8. What a beautiful day! | [a] Statement | [b] Not a Statement |
| 9. John works hard if and only if he will pass. | [a] Statement | [b] Not a Statement |
| 10. The ratio of any two integers is an integer. | [a] Statement | [b] Not a Statement |

Let p denote "Jack committed a crime," and q denote "Jack is 21-years-old."

11. Which of the following denotes the statement "Jack committed a crime and he is not 21-years-old."
- [a] $p \wedge q$ [b] $p \vee q$ [c] $p \vee \neg q$ [d] $p \wedge \neg q$ [e] $\neg(p \wedge q)$
12. Which of the following denotes the statement "Jack committed a crime or he is 21-years-old."
- [a] $p \wedge q$ [b] $p \vee q$ [c] $p \wedge \neg q$ [d] $p \vee \neg q$ [e] $\neg(p \wedge q)$
13. Which of the following denotes the statement "Jack didn't commit a crime and he is not 21-years-old."
- [a] $p \wedge q$ [b] $p \vee q$ [c] $p \wedge \neg q$ [d] $p \vee \neg q$ [e] $\neg(p \vee q)$

Let p denote the statement “The bank is open today” and let q denote the statement “The post office is open today.” Put the following statements into symbolic form.

14. The bank and the post office are open today.

- [a] $p \wedge q$ [b] $\neg p \vee \neg q$ [c] $p \wedge \neg q$ [d] $(p \vee q) \wedge \neg(p \wedge q)$
 [e] None of these.

15. The bank is not open today, or the post office is not open today.

- [a] $p \wedge q$ [b] $\neg p \vee \neg q$ [c] $p \wedge \neg q$ [d] $(p \vee q) \wedge \neg(p \wedge q)$
 [e] None of these.

16. The bank is open, and the post office is not open today.

- [a] $p \wedge q$ [b] $\neg p \vee \neg q$ [c] $p \wedge \neg q$ [d] $(p \vee q) \wedge \neg(p \wedge q)$
 [e] None of these.

17. The bank or the post office is open today but not both.

- [a] $p \wedge q$ [b] $\neg p \vee \neg q$ [c] $p \wedge \neg q$ [d] $(p \vee q) \wedge \neg(p \wedge q)$
 [e] None of these.

Given the following truth table:

p	q	*	@	#
T	T	T	F	F
T	F	T	F	T
F	T	T	T	F
F	F	F	F	F

18. Which of the following statements could replace *?

- [a] $\neg p \wedge q$ [b] $(p \vee q) \wedge \neg q$ [c] $(p \wedge q) \vee \neg p$ [d] $p \vee q$
 [e] None of these.

19. Which of the following statements could replace @?

- [a] $\neg p \wedge q$ [b] $(p \vee q) \wedge \neg q$ [c] $(p \wedge q) \vee \neg p$ [d] $p \vee q$
 [e] None of these.

20. Which of the following statements could replace #?

- [a] $\neg p \wedge q$ [b] $(p \vee q) \wedge \neg q$ [c] $(p \wedge q) \vee \neg p$ [d] $p \vee q$
 [e] None of these.

Construct a truth table for the following statement $\neg(p \wedge \neg q)$. Each blank contains a number, which corresponds to the question number. Answer each question either [a] for true or [b] for false.

p	q	$\neg q$	$p \wedge \neg q$	$\neg(p \wedge \neg q)$
T	T	21. _____	25. _____	29. _____
T	F	22. _____	26. _____	30. _____
F	T	23. _____	27. _____	31. _____
F	F	24. _____	28. _____	32. _____

Construct a truth table for the following statement $(p \vee \neg q) \wedge (\neg p \wedge q)$. Each blank contains a number, which corresponds to the question number. Answer each question either [a] for true or [b] for false.

p	q	$(p \vee \neg q)$	$(\neg p \wedge q)$	$(p \vee \neg q) \wedge (\neg p \wedge q)$
T	T	33. _____	37. _____	41. _____
T	F	34. _____	38. _____	42. _____
F	T	35. _____	39. _____	43. _____
F	F	36. _____	40. _____	44. _____

45. In the above problem, the statement $(p \vee \neg q) \wedge (\neg p \wedge q)$ is a _____.

- [a] Tautology [b] Contradiction [c] Contingency

Let p be the statement “The sun is a star” and q be the statement “The moon is a planet.” Determine the truth values of the following based on the truth or falsehood of p and q . [Hint, the moon is not one of the nine planets.]

46. $p \vee q$ [a] True [b] False

47. $\neg(p \wedge q)$ [a] True [b] False

48. $\neg(p \vee \neg q)$ [a] True [b] False

49. $\neg p \wedge \neg q$ [a] True [b] False

50. $(p \wedge \neg q) \vee \neg p$ [a] True [b] False

51. Are the following two statements logically equivalent? $\neg p \vee \neg q$ and $\neg(p \wedge q)$

- [a] Yes [b] No (You may want to construct a truth table.)

Complete the following truth table. Each blank contains a number which corresponds to the question number. Answer each question either [a] for true or [b] for false.

p	q	$p \rightarrow q$	$p \leftrightarrow q$	$(p \wedge q) \rightarrow p$
T	T	52. _____	56. _____	60. _____
T	F	53. _____	57. _____	61. _____
F	T	54. _____	58. _____	62. _____
F	F	55. _____	59. _____	63. _____

Complete the following truth table. Each blank contains a number which corresponds to the question number. Answer each question either [a] for true or [b] for false.

p	q	r	$\neg p \vee q$	$(\neg p \vee q) \rightarrow \neg r$
T	T	T	64. _____	72. _____
T	T	F	65. _____	73. _____
T	F	T	66. _____	74. _____
T	F	F	67. _____	75. _____
F	T	T	68. _____	76. _____
F	T	F	69. _____	77. _____
F	F	T	70. _____	78. _____
F	F	F	71. _____	79. _____

80. In the above problem, the statement $(\neg p \vee q) \rightarrow \neg r$ is a _____.

- [a] Tautology [b] Contradiction [c] Contingency

Let p be the statement "Maine is one of the 50 United States" and q be the statement "Germany is one of the 50 United States." Determine the truth value of the following.

81. $p \rightarrow q$ [a] True [b] False
 82. $p \leftrightarrow q$ [a] True [b] False
 83. $q \rightarrow p$ [a] True [b] False
 84. $\neg q \rightarrow \neg p$ [a] True [b] False

Test the validity of the following argument.

If it is warm, Brenda will go to the park or go shopping.

It is warm and Brenda goes shopping.

Therefore, she does not go to the park.

85. The argument above is _____. [a] Valid [b] Not Valid

86. Is the following argument valid?

If today is Monday, then tomorrow is Tuesday.

Today is not Monday.

Therefore, tomorrow is not Tuesday.

[a] Valid [b] Not Valid

87. Is the following argument valid?

If Beth does not study, then she will fail physics.

She studied.

Therefore, she passed physics.

[a] Valid [b] Not Valid

Complete the following truth table. Each blank contains a number which corresponds to the question number. Answer each question either [a] for true or [b] for false.

p	q	$\neg p$	$\neg p \wedge q$	$(\neg p \wedge q) \rightarrow q$
T	T	88. _____	92. _____	96. _____
T	F	89. _____	93. _____	97. _____
F	T	90. _____	94. _____	98. _____
F	F	91. _____	95. _____	99. _____

100. The statement $(\neg p \wedge q) \rightarrow q$ (worked in the truth table above) is a _____.

[a] Contradiction [b] Tautology [c] Neither.