Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Decide whether the statement is compound.

1) I'll go to Mexico or Costa Rica for my next vacation. 1) _____

A) Not compound B) Compound

Write a negation of the inequality. Do not use a slash symbol.

2) $x \leq 20$ 2) _____

A) $x \leq -20$ B) $x > -20$ C) $x > 20$ D) $x \geq 20$

Convert the symbolic compound statement into words.

3) p represents the statement "It's Monday." 3) _____

q represents the statement "It's raining today."

Translate the following compound statement into words:

$\sim p \wedge \sim q$

A) It's Monday or it's raining today.

B) It's not Monday or it's not raining today.

C) It's not the case that it's Monday and raining today.

D) It's not Monday and it's not raining today.

Let p represent the statement, "Jim plays football", and let q represent the statement "Michael plays basketball". Convert the compound statement into symbols.

4) Jim does not play football and Michael plays basketball. 4) _____

A) $\sim p \vee q$ B) $\sim(p \wedge q)$ C) $p \wedge q$ D) $\sim p \wedge q$

Let p represent a true statement and let q represent a false statement. Find the truth value of the given compound statement.

5) $[(\sim p \wedge \sim q) \vee \sim q]$ 5) _____

A) False B) True

6) $\sim[(\sim p \wedge \sim q) \vee \sim q]$ 6) _____

A) False B) True

Let p represent a true statement, while q and r represent false statements. Find the truth value of the compound statement.

7) $\sim(p \wedge q) \wedge (r \vee \sim q)$ 7) _____

A) False B) True

Let p represent $7 < 8$, q represent $2 < 5 < 6$, and r represent $3 < 2$. Decide whether the statement is true or false.

8) $(\sim r \wedge \sim q) \vee (\sim r \wedge q)$ 8) _____

A) True B) False

Give the number of rows in the truth table for the compound statement.

9) $p \wedge (\sim q \wedge r)$ 9) _____

A) 6 B) 9 C) 8 D) 3

10) $\sim(p \wedge q) \wedge (w \wedge \sim s) \vee (r \vee t) \wedge (\sim u \wedge s)$ 10) _____

A) 64 B) 256 C) 16 D) 128

Construct a truth table for the statement.

11) $(p \wedge \sim t) \wedge s$ 11) _____

A)

p	t	s	$(p \wedge \sim t) \wedge s$
T	T	T	F
T	T	F	F
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	T
F	F	T	T
F	F	F	T

B)

p	t	s	$(p \wedge \sim t) \wedge s$
T	T	T	F
T	T	F	F
T	F	T	T
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

12) $\sim(\sim(s \vee q))$ 12) _____

A)

s	q	$\sim(\sim(s \vee q))$
T	F	T
F	T	F

B)

s	q	$\sim(\sim(s \vee q))$
T	T	T
T	F	T
F	T	F
F	F	F

C)

s	q	$\sim(\sim(s \vee q))$
T	T	F
T	F	F
F	T	F
F	F	T

D)

s	q	$\sim(\sim(s \vee q))$
T	T	T
T	F	T
F	T	T
F	F	F

13) $\sim s \vee (\sim p \vee s)$ 13) _____

A)

s	p	$\sim s \vee (\sim p \vee s)$
T	T	T
T	F	F
F	T	T
F	F	T

B)

s	p	$\sim s \vee (\sim p \vee s)$
T	T	T
T	F	T
F	T	T
F	F	T

C)

s	p	$\sim s \vee (\sim p \vee s)$
T	T	F
T	F	T
F	T	T
F	F	T

D)

s	p	$\sim s \vee (\sim p \vee s)$
T	T	F
T	F	F
F	T	T
F	F	T

Use De Morgan's laws to write the negation of the statement.

14) A day late and a dollar short. 14) _____

A) A day late or not a dollar short.
B) Not a day late or not a dollar short.
C) Not a day late and a dollar short.
D) Not a day late and not a dollar short.

15) It is Saturday and it is not raining. 15) _____

A) It is not Saturday or it is not raining.
B) It is Saturday and it is raining.
C) It is not Saturday or it is raining.
D) It is not Saturday and it is raining.

Rewrite the statement using the if...then connective. Rearrange the wording or words as necessary.

16) All chocolate is good. 16) _____

A) If it's chocolate, then it's good.
B) If it isn't chocolate, then it isn't good.
C) Chocolate is good.
D) If it's good, then it's got to be chocolate.

17) A ship can't sail on land. 17) _____

A) If this is a ship, then it can't sail on land.
B) A ship can't sail on land.
C) If this is a ship, then it can sail on land.
D) If this is not land, then a ship can't sail.

Write the compound statement in words.

Let r = "The puppy is trained."
p = "The puppy behaves well."
q = "His owners are happy."

18) $p \rightarrow r$ 18) _____

A) If the puppy behaves well then the puppy is trained.
B) The puppy does not behave well or the puppy is not trained.
C) The puppy behaves well or the puppy is trained.
D) If the puppy is trained then the puppy behaves well.

19) $\sim r \rightarrow \sim q$ 19) _____

A) The puppy is not trained and his owners are not happy.
B) If the puppy is not trained then his owners are not happy.
C) It is not the case that if the puppy is trained then his owners are happy.
D) The puppy is trained or his owners are happy.

Write the compound statement in symbols.

Let r = "The food is good."
p = "I eat too much."
q = "I'll exercise."

20) If I exercise, then I won't eat too much. 20) _____

A) $p \rightarrow q$ B) $\sim(p \rightarrow q)$ C) $q \rightarrow \sim p$ D) $r \wedge p$

21) If the food is good and I eat too much, then I'll exercise. 21) _____

A) $r \rightarrow (p \wedge q)$ B) $p \rightarrow (r \wedge q)$ C) $r \wedge (p \rightarrow q)$ D) $(r \wedge p) \rightarrow q$

Given p is true, q is true, and r is false, find the truth value of the statement.

22) $\sim r \rightarrow \sim p$ 22) _____

A) True B) False

23) $(\sim p \wedge q) \rightarrow \sim r$ 23) _____

A) False B) True

24) $[(\sim p \rightarrow r) \wedge (\sim p \vee q)] \rightarrow r$ 24) _____

A) False B) True

Construct a truth table for the statement.

25) $q \nrightarrow p$ 25) _____

A)

q	p	$q \nrightarrow p$
T	T	T
T	F	F
F	T	T
F	F	T

B)

q	p	$q \nrightarrow p$
T	T	F
T	F	F
F	T	T
F	F	T

C)

q	p	$q \nrightarrow p$
T	T	T
T	F	T
F	T	F
F	F	F

D)

q	p	$q \nrightarrow p$
T	T	F
T	F	T
F	T	T
F	F	T

26) $(p \rightarrow q) \rightarrow (\sim p \vee q)$ 26) _____

A)

p	q	$(p \rightarrow q) \rightarrow (\sim p \vee q)$
T	T	T
T	F	F
F	T	T
F	F	F

B)

p	q	$(p \rightarrow q) \rightarrow (\sim p \vee q)$
T	T	F
T	F	T
F	T	F
F	F	F

C)

p	q	$(p \rightarrow q) \rightarrow (\sim p \vee q)$
T	T	T
T	F	F
F	T	T
F	F	T

D)

p	q	$(p \rightarrow q) \rightarrow (\sim p \vee q)$
T	T	T
T	F	T
F	T	T
F	F	T

27) $(\sim p \rightarrow q) \nleftarrow (q \nrightarrow r)$ 27) _____

A)

p	q	r	$(\sim p \rightarrow q) \nleftarrow (q \nrightarrow r)$
T	T	T	F
T	T	F	T
T	F	T	T
T	F	F	T
F	T	T	F
F	T	F	T
F	F	T	T
F	F	F	T

B)

p	q	r	$(\sim p \rightarrow q) \nleftarrow (q \nrightarrow r)$
T	T	T	T
T	T	F	T
T	F	T	T
T	F	F	T
F	T	T	T
F	T	F	T
F	F	T	F
F	F	F	F

C)

p	q	r	$(\sim p \rightarrow q) \nleftarrow (q \nrightarrow r)$
T	T	T	F
T	T	F	T
T	F	T	F
T	F	F	T
F	T	T	F
F	T	F	T
F	F	T	F
F	F	F	T

D)

p	q	r	$(\sim p \rightarrow q) \nleftarrow (q \nrightarrow r)$
T	T	T	F
T	T	F	F
T	F	T	T
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

Write the negation of the conditional. Use the fact that the negation of $p \rightarrow q$ is $p \wedge \sim q$.

28) If you give your jacket to the doorman, he will give you a dirty look. 28) _____

A) If you give your jacket to the doorman he will not give you a dirty look.

B) You give your jacket to the doorman and he will not give you a dirty look.

C) You do not give your jacket to the doorman and he will not give you a dirty look.

D) You do not give your jacket to the doorman and he will give you a dirty look.

Write an equivalent statement that does not use the if ... then connective. Use the fact that $p \rightarrow q$ is equivalent to $\sim p \vee q$.

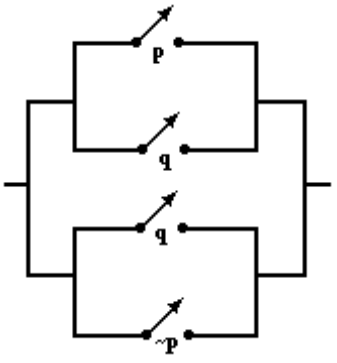
29) If the sun comes out Saturday, the daisies will open. 29) _____

A) The sun does not come out Saturday or the daisies will not open.
B) The sun comes out Saturday and the daisies will not open.
C) The sun does not come out Saturday or the daisies will open.
D) The sun does not come out Saturday but the daisies will not open.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Write a logical statement representing the following circuit. Simplify when possible.

30) 30) _____



Draw a circuit representing the following statement as it is given. Simplify if possible.

31) $[(p \wedge \sim r) \vee q] \wedge (q \wedge \sim r)$ 31) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write the converse, inverse, or contrapositive of the statement as requested.

32) If I pass, I'll party. 32) _____

Contrapositive

A) If I don't party, I didn't pass.
B) If I party, then I passed.
C) If I don't pass, I won't party.
D) I'll party if I pass.

33) All cats catch birds. 33) _____

Inverse

A) If it doesn't catch birds, it's not a cat.
B) Not all cats catch birds.
C) If it's not a cat, it doesn't catch birds.
D) If it catches birds, it's a cat.

34) If I were young, I would be happy. 34) _____

Converse

A) If I were not young, I would not be happy.
B) If I were young, I would not be happy.
C) If I were not happy, I would not be young.
D) If I were happy, I would be young.

Rewrite the statement in the form "if p, then q".

35) I will lose weight if I diet. 35) _____

A) If I lose weight, then I'll diet.
B) If I diet, then I gain weight.
C) If I diet, then I'll lose weight.
D) If I don't diet, then I won't lose weight.

Label the pair of statements as either contrary or consistent.

36) He is an accountant. 36) _____
He loves to dance.

A) Consistent B) Contrary

Given a group of students: G = {Allen, Brenda, Chad, Dorothy, Eric} or G = {A, B, C, D, E}, list and count the different ways of choosing the following officers or representatives for student congress. Assume that no one can hold more than one office.

37) Three representatives, if two must be male and one must be female 37) _____

A) ABC, CDE; 2
B) ACB, ACD, AEB, AED; 4
C) ACB, ACD, AEB, AED, CEB, CED; 6
D) ACB, ACD, AEB, AED, CEB, CED, DEC, BEC, DEA, BEA, DCA, BCA; 12

38) A president, a secretary, and a treasurer, if the president must be a woman and the other two must be men 38) _____

A) ABD, CBD, EBD; 3
B) BAC, BAE, BCE, DAC, DAE, DCE; 6
C) BAC, BAE, BCE, DAC, DAE, DCE, BCA, BEA, BEC, DCA, DEA, DEC; 12
D) BAC, BAE, DAC, DAE; 4

Using the 36 possibilities found in the product table for rolling two dice, list and count the outcomes for which the sum (for both dice) is the following.

39) Equal to 8 39) _____

A) (2,6), (3,5), (4,4), (4,4), (5,3), (6,2); 6 B) (2,6), (3,5); 2
C) (2,6), (3,5), (4,4); 3 D) (2,6), (3,5), (4,4), (5,3), (6,2); 5

40) Between 7 and 10 40) _____

A) (2,6), (3,6), (5,3), (4,4), (4,5); 5
B) (2,6), (6,2), (6,3), (3,6), (5,3), (3,5), (4,5); 8
C) (2,6), (6,2), (3,6), (6,3), (5,3), (3,5), (4,4), (4,5), (5,4), (3,4), (4,3), (6,4), (4,6), (5,5); 14
D) (2,6), (6,2), (6,3), (3,6), (5,3), (3,5), (4,4), (4,5), (5,4); 9

Solve the problem.

41) Construct a product table showing all possible two-digit numbers using digits from the set {1, 2, 6, 7}. 41) _____

A)

	1	2	6	7
1	2	3	7	8
2	3	4	8	9
6	7	8	12	13
7	8	9	13	14

B)

	1	2
6	61	62
7	71	72

C)

	1	2	6	7
1	11	21	61	71
2	12	22	62	72
6	16	26	66	71
7	17	27	67	77

D)

	1	2	6	7
1	11	12	16	17
2	21	22	26	27
6	61	62	66	67
7	71	72	76	77

Use a tree diagram showing all possible results when a die is rolled twice. List the ways of getting the following result.

42) The second die shows a 3. 42) _____

A) (3,3) B) (1,3),(2,3),(3,3),(4,3),(5,3),(6,3)
C) (1,3),(3,3),(5,3) D) (1,3),(2,3),(4,3),(5,3),(6,3)

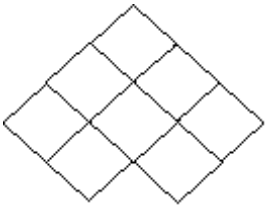
Use a tree diagram showing all possible results when four fair coins are tossed. Then list the ways of getting the indicated result.

43) at least two tails 43) _____

A) hhtt, htht, htth, thht, thth, tthh
B) hhtt, htht, httt, thht, thth, tthh, ttht, tttt, tttt
C) hhtt, htht, htth, httt, thht, thth, thtt, tthh, ttht, tttt, tttt
D) httt, thtt, ttht, tttt, tttt

Determine the number of figures (of any size) in the design.

44) Squares (of any size) 44) _____



A) 9 B) 8 C) 11 D) 12

Solve the problem.

45) Six strangers arrive at a business seminar and each person shakes hands with every other person. How many handshakes are there? 45) _____

A) 30 B) 15 C) 18 D) 20

Evaluate the factorial expression.

46) $\frac{5!}{7!}$ 46) _____

A) 42 B) $\frac{1}{42}$ C) 2! D) $\frac{1}{2!}$

Solve the problem.

47) At a lumber company, shelves are sold in 4 types of wood, 3 different widths and 3 different lengths. How many different types of shelves could be ordered? 47) _____

A) 10 B) 36 C) 48 D) 21

48) A baseball manager has 11 players of the same ability. How many 9 player starting lineups can he create? 48) _____

A) 362,880 B) 19,958,400 C) 55 D) 99

49) How many ways can a president, vice-president, and secretary be chosen from a club with 10 members? 49) _____

A) 120 B) 30 C) 6 D) 720

50) Four married couples have reserved eight seats in a row at the theater, starting at an aisle seat. In how many ways can they arrange themselves if there are no restrictions on the seating arrangement? 50) _____

A) 5040 B) 40, 320 C) 16,777,216 D) 8

Evaluate the permutation.

51) Determine the number of permutations of 9 things taken 2 at a time. 51) _____

A) 9 B) 1 C) 72 D) 504

Evaluate the expression.

52) Determine the number of combinations of 14 things taken 8 at a time. 52) _____

A) 60,540,480 B) 3003 C) 2,162,160 D) 1440

Solve the problem.

53) How many ways can a president, vice-president, secretary, and treasurer be chosen from a club with 9 members? Assume that no member can hold more than one office. 53) _____

A) 3024 B) 126 C) 24 D) 36

54) The library is to be given 5 books as a gift. The books will be selected from a list of 21 titles. If each book selected must have a different title, how many possible selections are there? 54) _____

A) 4.257578514e+17 B) 5.109094217e+19

C) 2,441,880 D) 20,349

55) A poker hand consists of 5 cards dealt from an ordinary deck of 52 playing cards. How many different hands are there consisting of four hearts and one spade? 55) _____

A) 715 B) 728 C) 9295 D) 13

Provide an appropriate response.

56) Consider the selection of a nominating committee for a club. Is this a combination, a permutation, or neither? 56) _____

A) Combination B) Permutation C) Neither

If two fair dice, one red and one white, are rolled, in how many ways can the result be obtained?

57) The red die shows a 3. 57) _____

A) 6 ways B) 1 way C) 3 ways D) 5 ways

Solve the problem.

58) If a single card is drawn from a standard 52-card deck, in how many ways could it be an ace or a spade? 58) _____

A) 16 ways B) 1 way C) 17 ways D) 4 ways

Find the number of ways to get the following card combinations from a 52-card deck.

59) All diamonds in a five-card hand 59) _____

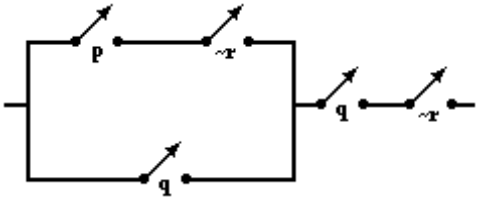
A) 3,861 ways B) 1,287 ways C) 143 ways D) 2,574 ways

Solve the problem.

60) If a license plate consists of four digits, how many different licenses could be created having at least one digit repeated. 60) _____

A) 4960 licenses B) 3024 licenses C) 10,000 licenses D) 5040 licenses

1) B
2) C
3) D
4) D
5) B
6) A
7) B
8) A
9) C
10) D
11) B
12) D
13) B
14) B
15) C
16) A
17) A
18) A
19) B
20) C
21) D
22) B
23) B
24) A
25) D
26) D
27) A
28) B
29) C
30) $(p \vee q) \vee (\sim p \vee q)$; The statement simplifies to T.
31) The statement simplifies to $(p \vee q) \wedge \sim r$.



32) A
33) C
34) D
35) C
36) A
37) C
38) C
39) D
40) D
41) D
42) B
43) C

44) C
45) B
46) B
47) B
48) B
49) D
50) B
51) C
52) B
53) A
54) D
55) C
56) A
57) A
58) A
59) B
60) A