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

Given a group of students: \(G = \{\text{Allen, Brenda, Chad, Dorothy, Eric}\}\) 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.

1) A president, a secretary, and a treasurer, if the president must be a woman and the other two must be men
   - A) BAC, BAE, BCE, DAC, DAE, DCE; 6
   - B) ABD, CBD, EBD; 3
   - C) BAC, BAE, DAC, DAE; 4
   - D) BAC, BAE, BCE, DAC, DAE, DCE, BCA, BEA, BEC, DCA, DEA, DEC; 12

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.

2) Equal to 8
   - A) (2,6), (3,5), (4,4), (5,3), (6,2); 5
   - B) (2,6), (3,5), (4,4), (4,4), (5,3), (6,2); 6
   - C) (2,6), (3,5), (4,4); 3
   - D) (2,6), (3,5); 2

3) Greater than 10
   - A) (6,5), (6,6); 2
   - B) (6,6); 1
   - C) (4,6), (6,4), (5,6), (6,5), (5,5); 5
   - D) (6,5), (5,6), (6,6); 3

Solve the problem.

4) Construct a product table showing all possible two-digit numbers using digits from the set \{1, 2, 6, 7\}. List the even numbers in the table.
   - A) \{12, 16, 22, 26, 62, 66, 72, 76\}
   - B) \{2, 4, 8, 12, 14\}
   - C) \{62, 72\}
   - D) \{12, 26, 26, 62, 66, 72, 76\}

   4) 

5) Construct a product table showing all possible two-digit numbers using digits from the set \{1, 2, 6, 7\}. List the numbers with repeating digits.
   - A) \{11, 22, 66, 77\}
   - B) \{11, 66, 77\}
   - C) \{22, 66\}
   - D) none

   5)
Use a tree diagram showing all possible results when a die is rolled twice. List the ways of getting the following result.

6) Exactly one die shows a 3.
   A) (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (1, 3), (2, 3), (4, 3), (5, 3), (6, 3)
   B) (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (1, 3), (2, 3), (4, 3), (5, 3), (6, 3)
   C) (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)
   D) (3, 3)

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

7) tails on the first coin
   A) thhh, thht, thth, tthh, ttth, tttt
   B) thhh, tthh, thht, ttth, tttt
   C) thhh, thht, thth, tthh, tttt, ttth, tttt
   D) thhh, thht, thht, thth, tthh, ttth, tttt

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

8) Squares (of any size)

![Diagram of squares]

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

9) Triangles (of any size)

![Diagram of triangles]

A) 15  B) 19  C) 16  D) 13

Solve the problem.

10) Six strangers arrive at a business seminar and each person shakes hands with every other person. How many handshakes are there?
   A) 20  B) 18  C) 15  D) 30

11) A sports shop sold tennis rackets in 3 different weights, 3 types of string, and 4 grip sizes. How many different rackets could be sold?
   A) 10 rackets  B) 27 rackets  C) 36 rackets  D) 24 rackets
Evaluate the factorial expression.

12) \(3!\)
   A) 2  B) 6  C) 12  D) 3

13) \(\frac{5!}{4!}\)
   A) 1  B) \(\frac{5}{4}\)  C) 5  D) 5!

14) \(\frac{10!}{(10 - 7)!}\)
   A) 720  B) 1  C) 10  D) 604,800

Solve the problem.

15) A local department store sells carpets in 3 sizes. Each carpet comes in 2 different qualities. One of the sizes comes in 8 colors. The other sizes come in 3 colors. How many choices of carpet are there?
   A) 36  B) 39  C) 28  D) 18

16) A shoe store carries one brand of shoe in 5 different styles, 4 sizes, and 4 colors. How many different shoes are available of this one brand?
   A) 13  B) 100  C) 36  D) 80

17) A baseball manager has 10 players of the same ability. How many 9 player starting lineups can he create?
   A) 3,628,800  B) 362,880  C) 90  D) 10

18) A musician plans to perform 5 selections for a concert. If he can choose from 9 different selections, how many ways can he arrange his program?
   A) 126  B) 45  C) 15,120  D) 59,049

19) How many ways can a president, vice-president, and secretary be chosen from a club with 12 members?
   A) 36  B) 6  C) 220  D) 1320
20) Given a committee of 8 women and 11 men, how many different ways are there to pick a female president, a male treasurer, and a secretary of either gender if one of the men, Pete, says that he cannot be the treasurer? Assume that none can hold more than one office.

A) 1520  B) 1496  C) 1672  D) 1360

21) 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?

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

Evaluate the permutation.

23) 14P2

A) 7  B) 43,589,145,600  C) 91  D) 182

24) 5P5

A) 4  B) 1  C) 120  D) 0

Evaluate the expression.

25) 7C0

A) 2520  B) 1260  C) 1  D) 5040

26) 32C6

A) 29,760  B) 906,192  C) 992  D) 863,040

Solve the problem.

27) In how many ways can the letters in the word PAYMENT be arranged if the letters are taken 6 at a time?

A) 7  B) 5040  C) 42
28) In how many ways can 8 people line up for play tickets?
   A) 40,320   B) 1   C) 8   D) 16,777,216

29) Three noncollinear points determine a triangle. How many different triangles are determined by
    7 points in a plane, no three of which are collinear?
   A) 35   B) 21   C) 840   D) 210

30) Of the 2,598,960 different five-card hands possible from a deck of 52 playing cards, how many
    would contain all clubs?
   A) 2,574   B) 143   C) 1,287   D) 3,861

31) How many 5-card poker hands consisting of 2 aces and 3 kings are possible with an ordinary
    52-card deck?
   A) 288   B) 6   C) 12   D) 24

32) 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?
   A) 13   B) 715   C) 9295   D) 728

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

33) The white die shows a 3.
   A) 5 ways   B) 1 way   C) 3 ways   D) 6 ways

34) The sum of the two dice is at least 6.
   A) 26 ways   B) 21 ways   C) 25 ways   D) 6 ways

   Solve the problem.

35) If a single card is drawn from a standard 52-card deck, in how many ways could it be an ace or
    a spade?
   A) 17 ways   B) 16 ways   C) 1 way   D) 4 ways

36) If subsets are formed using only digits from the set \{1, 2, 3, 4\}, how many subsets can be formed
    with at least two digits?
   A) 11 subsets   B) 6 subsets   C) 5 subsets   D) 16 subsets
37) If a given set has eight elements, how many of its subsets have at most three elements?
A) 92 subsets  B) 93 subsets  C) 56 subsets  D) 163 subsets

Find the number of ways to get the following card combinations from a 52-card deck.
38) No face cards in a five-card hand
A) 319,865 ways  B) 127,946 ways  C) 639,730 ways  D) 658,008 ways

39) Three of one kind and two of another kind (such as three aces and two nines)
A) 3744 ways  B) 24 ways  C) 44,928 ways  D) 1872 ways

Solve the problem.
40) If you toss five fair coins, in how many ways can you obtain at least one head?
A) 31 ways  B) 16 ways  C) 32 ways  D) 15 ways