PERMUTATIONS, COMBINATIONS AND PROBABILITY

THERE IS NO NEED TO DO THE FINAL CALCULATION.

1. Evaluate the following:
     a) $_6P_2$ b) $_6C_4$

     c) Determine the value of "x" given: $_{14}C_5 = {_x}C_{27}$

2. PERMUTATIONS:

  a) In how many ways can 7 people be lined up for a picture?

  b) In how many ways can you seat 8 people around a table?

  c) In how many ways can you select a chairperson and recording secretary
     from a group of 9 individuals?

  d) In how many ways can 8 keys be placed on a key ring?

  e) In how many ways can you arrange 6 French texts on a shelf?

  f) How many different arrangements are possible using all the letters
     in the word "arrangement"?

3. COMBINATIONS:

  a) In how many ways can you select a group of 5 individuals from a class of 13?

  b) In how many ways can you select a committee of 4 from a class of 10 students?

  c) How many groups of 4 consonants can be formed from the letters of the alphabet?

  d) How many three letter combinations can be formed from the letters in the
     word "figures"?

  e) How many 4-sided figures can be formed from 12 points, none of which lie in
     a straight line?

4. MIXED:

a) In how many ways can you arrange 4 algebra texts, 5 science texts and 3 social texts on a shelf if:

   i) order of texts is not important?

   ii) texts must remain in its subject group?

   iii) in the order of algebra, social and then science

b) In how many ways can you select 2 vowels from the word "section" and 2 consonants from the word "problem" and arrange them in 4-letter words?

c) In how many ways can you select a group of five people and

   i) arrange them in a line for a picture?

   ii) arrange then so that two people must be together?

d) How many different bridge hands can be formed containing:

   i) 4 spades, 3 hearts, 2 diamonds and 4 clubs?

   ii) 8 red cards and 5 black cards?

   iii) 7 face cards (jack, queen, king) and 6 none face cards

e) If we have 8 red beads, 4 black beads and six blue beads, all alike except for colour, how many different necklaces can be formed?

f) In how many ways can six people arrange themselves at a show if:

   i) a certain person must sit in the left aisle seat?

   ii) if a certain three people must be seated together?

   iii) if after the show they go out for dinner and the same two people must be seated together at a table?

g) How many four digit even numbers can be formed from the digits 0, 1, 2,...,9?

h) In how many ways can you select a committee of six from a class of 20 and select a president, vice president and secretary?

i) In how many ways can you select 4 boys and 4 girls from a group of 8 boys and a group of 10 girls and arrange them around a table so that alternate in arrangement?

j) In how many different ways can a student create their own 5-period timetable selecting from algebra, social, science, French, computer science and welding if:

    i) subject choice does not matter?

    ii) algebra must be in the first period and the rest does not matter?

    iii) spares must occur in the fourth and fifth periods?

5. Binomial Expansion:

1. Determine the first 5 terms of the binomial expansion $(x - 2y)^{11}$.

2. Determine the 7th term of the binomial expansion $(3x + y^3)^{17}$

6. Probability

1. Two dice are rolled, find the probability that the sum is

    a) equal to 5

    b) greater than 5 but less than 9

    c) divisible by 5

    d) sum shown is either exactly 9 or less than 4?

2. A bag contains 3 red beads and 2 blue beads. Two beads are drawn at random without replacement. What is the probability that
      a) both beads are red?

      b) a red and a blue

3. In a shipment of 100 televisions, 6 are defective. If a person buys two televisions from that shipment, what is the probability that both are defective?

4. Among twenty-five articles, nine are defective, six having only minor defects and three having major defects.   Determine the probability that an article selected at random has major defects given that it has defects.

5. If all of the letters of the "THANK" are arranged at random in a line, find the probability that the arrangement will:

      a) spell the word "THANK"

      b) have the A at either end and the K in the middle

      c) not spell the word "THANK"

      d) have three consonants together

6. A set of 2 cards is chosen from a standard deck of 52 cards. Find the probability that both cards are:

      a) tens or queens

      b) black or face cards

      c) red or aces

7. A jar contains 5 blue, 11 green and 7 yellow marbles. If a set of three marbles is chosen at random from the jar, find the probability that your selection contains:

      a) 3 blue

      b) 3 marbles, not all blue

      c) 3 marbles, not all green

      d) 3 yellow

      e) 1 of each color