Permutation and combination worksheet with answers pdf

3 questions from part **I** and 5 questions from part **II** can be selected in $^{7}C_{3} \cdot {}^{8}C_{5}$ ways.

4 questions from part **I** and 4 questions from part **II** can be selected in $^{7}C_{4} \cdot {}^{8}C_{4}$ ways.

5 questions from part **I** and 3 questions from part **II** can be selected in $^{7}C_{5} \cdot {}^{8}C_{3}$ ways.

Thus, required number of ways of selecting questions

$= {}^{7}C_{3} \cdot {}^{8}C_{5} + {}^{7}C_{4} \cdot {}^{8}C_{4} + {}^{7}C_{5} \cdot {}^{8}C_{3}$

$= \frac{7!}{3!4!} \cdot \frac{8!}{5!3!} + \frac{7!}{4!3!} \cdot \frac{8!}{4!4!} + \frac{7!}{5!2!} \cdot \frac{8!}{3!5!}$

$= 210 + 175 + 35 = 420$

Question 8:

Determine the number of 5-card combinations out of a deck of 52 cards if each selection of 5 cards has exactly one king.

Answer

From a deck of 52 cards, 5-card combinations have to be made in such a way that in each selection of 5 cards, there is exactly one king.

In a deck of 52 cards, there are 4 kings.

1 king can be selected out of 4 kings in $^{4}C_{1}$ ways.

4 cards out of the remaining 48 cards can be selected in $^{48}C_{4}$ ways.

Thus, the required number of 5-card combinations is $^{4}C_{1} \cdot {}^{48}C_{4}$

Question 9:

It is required to seat 5 men and 4 women in a row so that the women occupy the even places. How many such arrangements are possible?

Answer

5 men and 4 women are to be seated in a row such that the women occupy the even places.

The 5 men can be seated in 5! ways. For each arrangement, the 4 women can be seated only at the cross marked places (so that women occupy the even places).

M×M×M×M×M

Therefore, the women can be seated in 4! ways.

Counting Methods: Permutations and Combinations

Permutation of *k* items selected from a set of *n* distinct items
(an ordered sequence of *k* items selected from a set of *n* distinct items)

Notation: $_{n}P_{k} = \frac{n!}{(n-k)!} = n \cdot (n-1) \cdot (n-2) \cdot \ldots \cdot (n-k+1)$

Example: In how many ways could we select a president and vice president from a student council with 12 members?

$_{12}P_{2} = \frac{12!}{(12-2)!} = \frac{12!}{10!} = 12 \cdot 11 = 132$

There are 132 distinct ways in which a president and vice president can be selected from the 12 members.

Explanation: Since the offices of president and vice president are different, our sequence is ordered. For instance, if John is selected as president and Gina is selected as vice president, this arrangement is different from selecting Gina as president and John as vice president.

Combination of *k* items selected from a set of *n* distinct items
(an unordered set of *k* items selected from a set of *n* distinct items)

Notation: $_{n}C_{k} = \frac{{}_{n}P_{k}}{k!}$ or $_{n}C_{k} = \frac{n!}{k!(n-k)!}$

Example: In how many ways could we select from the 12 student council members a two-person team to attend a regional conference?

$_{12}C_{2} = \frac{{}_{12}P_{2}}{2!} = \frac{12 \cdot 11}{2} = 66$

or $_{12}C_{2} = \frac{12!}{2!(12-2)!} = \frac{12!}{2!10!} = \frac{12 \cdot 11}{2} = 66$

Explanation: There is no distinction made between the team members. Therefore, the selection of John and Gina as team members is equivalent to the selection of Gina and John. The set is not ordered, which indicates the situation could be represented using combinations.

Basic Statistics
Permutation and Combination

Name : _____ Score: _____

Course and Year : _____ Date: _____

I. Write the letter of the correct answer. Use capital letter for your answers. (50 points)

1. Licensure plates are made using 3 letters followed by 3 digits. How many plates can be made if repetition of letters and digits is allowed?
   A. 15,000 C. 456,976
   B. 67,600 D. 8,750

2. There are 25 students. Four of these students are selected to attend four different conferences. The first student selected will go to a conference in Makati city, the second will go to Pateros city, the third to Quezon city and the fourth to Caloocan city. How many such selections are possible?
   A. 256 C. 303,525
   B. 12,650 D. 390,625

3. A computer password is made up of four characters. Each character can be a capital letter (A through Z), a lowercase letter (a through z) or a digit (0 through 9). How many different such computer passwords are there?
   A. 4^{26} C. 948
   B. 14,776,336 D. 903,950

4. If 11 new born babies are randomly selected, how many different gender sequences are possible?
   A. 22 C. 121
   B. 66 D. 2048

5. A college has thirteen instructors qualified to teach a special seminar. Mandatory courses which requires two instructors to be present, How many different pairs of instructors could there be?
   A. 78 C. 26
   B. 156 D. 48

6. A shirt company has 4 designs, each of which can be made with short or long sleeves. There are 3 color patterns available. How many different types of shirts are available from this company?
   A. 11 C. 40
   B. 88 D. 8

7. Given a group of 8 women and 11 men, how many different ways are there of choosing one man and one woman for a committee?
   A. 38! C. 19
   B. 8×11 D. 88

8. Given a committee of 8 women and 11 men, find the different ways of choosing a president, a secretary and a treasurer, if the president must be a woman and the secretary and treasurer must be men. Assume no one can hold more than one position.
   A. 880 C. 696
   B. 3,811 D. 448

Since each collection of three tiles can be arranged 3! ways this leads to the following observation that

$$3! \times {}_5C_3 = {}_5P_3 \quad \text{or} \quad {}_5C_3 = \frac{{}_5P_3}{3!} = \frac{5!}{(5-3)!3!}$$

This expression is a special case of the following formula for determining the number of *combinations* of n things taken r at a time.

Technology Connection

Many calculators have a combinations nCr key. To use this key, enter n, enter nCr, enter r and enter =

Theorem The number of combinations of n objects taken r objects at a time, where $0 \le r \le n$, is

$${}_nC_r = \frac{n!}{(n-r)!r!}$$

Examples J and L show that the number of permutations of 5 objects taken 3 at a time is 6 times the number of combinations of 5 objects taken 3 at a time. In general, for n objects taken r at a time, there will be more permutations than combinations because considering the different orders of objects increases the number of outcomes.

The first step in solving problems involving permutations or combinations is determining whether or not it is necessary to consider the order of the elements. The following two questions in Example M will help to distinguish between when to use permutations and when to use combinations.

EXAMPLE M The school hiking club has 10 members.
(1) In how many ways can 3 members of the club be chosen for the Rules Committee?
(2) In how many ways can 3 members of the club be chosen for the offices of President, Vice President and Secretary?

Solution
(1) There is no requirement to consider the order of the people on the 3-person Rules Committee. So the number of different committees can be found with the formula for combinations.

$${}_{10}C_3 = \frac{10!}{(10-3)!3!} = \frac{10\times9\times8\times7\times6\times5\times4\times3\times2\times1}{(7\times6\times5\times4\times3\times2\times1)\times(3\times2\times1)} = \frac{10\times9\times8}{6} = 120$$

(2) Order must be considered in choosing the three officers because it makes a difference as to whom holds each office. So the number of different possibilities for the three offices can be found with the formula for permutations.

$${}_{10}P_3 = \frac{10!}{(10-3)!} = \frac{10\times9\times8\times7\times6\times5\times4\times3\times2\times1}{7\times6\times5\times4\times3\times2\times1} = 10\times9\times8 = 720$$

Combination vs permutation worksheet. Permutation and combination easy questions. Permutation and combination worksheet with answers pdf. Explain permutation and combination with example. Easy permutations and combinations.

1. Compute the sum of all 4 digit numbers which can be formed with the digits 1, 3, 5, 7, if each digit is used only once in each arrangement. 2. The number of 4 digit numbers greater than 5000 can be formed out of the digits 3, 4, 5, 6 and 7 (no digit is repeated). Find the number of such numbers. 3. An examination paper with 10 questions consists of 6 questions in Algebra and 4 questions in Geometry. At least one question from each section is to be attempted. In how many ways can this be done ?4. Find the total number of numbers greater than 2000 can be formed with the digits 1,2,3,4,5, no digit to be repeated in any number. 5. A family of four brothers and three sisters is to be arranged for a photograph in one row. In how many ways can they be seated if no two sisters sit together ? 1. Answer :Number of numbers can be formed with the digits 1, 3, 5 and 7 is4! = 4 · 3 · 2 · 14! = 24Number of digits given = 4 (they are 1,3,5 and 7) Number of times, each digit of (1, 3, 5, 7) will repeat in 1's place, 10's place, 100's place and 1000's place is = (No. of numbers formed)/(No. of digits given) = 24/4= 6So, each of the given digits will occur six times in each of the place.Sum of the digits in 1000's place is= (1 + 3 + 5 + 7) · 6= 16 · 6= 96Similar is the case in 100's place, 10's place and 1's place. So, the sum of 4 digits numbers is 106656.2. Answer : Given digits are 3, 4, 5, 6 and 7 and we form 4 digit numbers greater than 5000. 1000's place ---> 3 choices (one out of 5,6,7)100's place ---> 4 choices (Having 4 out of 5 digits) 10's place ---> 3 choices (Having 3 out of 5 digits)1's place ---> 2 choices (Having 2 out of 5 digits)Number of numbers formed : = 3 · 4 · 3 · 2= 723. Answer :We have two alternatives for each question. That is, either we may attempt or we may not attempt. Therefore, no. of ways to attempt six questions in Algebra is = 26(But it includes the way of not attempting all the questions) So, no. of ways to attempt at least one question in Algebra is= 26 - 1Similarly, number of ways to attempt at least one question in Geometry is= 24 - 1Total number of ways for both the sections is= (26 - 1) · (24 - 1)= (64 - 1) · (16 - 1)= 63 · 15= 9454. Answer :Given digits are 1,2,3,4, 5.It is not mentioned about how many digits can be used. So, we can form either 4 digit no. or 5 digit no. greater than 2000. Case 1 :Forming 4 digit number greater than 20001000's place ---> 4 choices (one out of 2,3,4,5)100's place ---> 4 choices (Having 4 out of 5 digits)10's place ---> 3 choices (Having 3 out of 5 digits)1's place ---> 2 choices (Having 2 out of 5 digits)No. of numbers 4 digit numbers formed is= 4 · 4 · 3 · 2= 96Case 2 :Forming 5 digit number greater than 2000 10000's place ---> 5 choices (1,2,3,4,5)1000's place ---> 4 choices (Having 4 out of 5 digits)100's place ---> 3 choices (Having 3 out of 5 digits)10's place ---> 2 choices (Having 2 out of 5 digits)1's place ---> 1 choice (Having 1 out of 5 digits)Number of numbers 5 digit numbers formed is= 5 · 4 · 3 · 2 · 1= 120Total number of numbers greater than 2000 formed is= 96 + 120= 2165. Answer :Let us consider the following arrangement. __ B1 __ B2 __ B3 __ B4 __ (B1, B2, B3, B4 ---> Brothers)If we make the sisters to be seated in any of the 3 out of 5 blanks in the above arrangement, no two sisters sit together. So, sisters can be seated in 5P3 ways.Brothers can be seated in 4! Thus the total number of ways is= 4! · 5P3= (4 · 3 · 2 · 1) · (5 · 4 · 3)= 1440 Kindly mail your feedback to v4formath@gmail.comWe always appreciate your feedback. ©All rights reserved. onlinemath4all.com Implement this permutations and combinations worksheets proposed for high school students to elevate your understanding on the topic. An assortment of pdf exercises on identifying permutations or combinations, two-level of solving and evaluating permutations and combinations involving word problems are enclosed. Grab some of these worksheets for free! Permutation Worksheets Employ this ideal set of permutation worksheets that consist of an array of exercises on listing possible permutations, finding the number of unique permutations and so on. 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