hp calculators

HP 49G+ Probability – Rearranging items

The MTH (MATH) menu

Rearranging items

Practice solving problems involving factorials, permutations, and combinations

The MTH (MATH) menu

The Math menu is accessed from the GREEN shifted function of the SYMB key by pressing ↰ MTH . When pressed, a CHOOSE box is displayed with a number of choices allowing problems to be solved with different math functions on the HP 49G+ calculator.

Figure 1

The first choice allows for calculations dealing with vectors. The second choice provides access to many functions for working with matrices. The third choice allows for the manipulation of lists and for using lists to apply mathematical functions to a list of numbers, all at the same time. The fourth function provides access to the hyperbolic trigonometric functions. The fifth selection provides a list of many functions that can be applied to real numbers. The sixth choice displays functions dealing with numbers in different bases. Choices seven through eleven are not displayed in the screen above, but deal with probability, fast fourier transformations, complex numbers, constants and a choice dealing with several special functions.

To display the probability menu, press 7 ENTER . The screen displays the first six of 10 functions involving probability.

Figure 2

Rearranging items

There are a great number of applications that involve determining the number of ways a group of items can be rearranged. The factorial function, represented by ! on the 49G+, will determine the number of ways you can rearrange the total number of items in a group. Note that the 49G+ will interpret the factorial function as the gamma function if the argument for the function is a non-integer real number. The Permutation function, PERM, will return the number of ways you can select a subgroup of a specified number of items from a larger group, where the order of each of the items in the subgroup is important. The Combination function, COMB, will return the number of ways you can select a subgroup of a specified number of items from a larger group, where the order of each of the items in the subgroup is not important.

To see the difference between permutations and combinations, consider the set of three items A, B, and C. If we select a subgroup of 2 items, We could select AC and CA as two possible subgroups. These would be counted as different subgroups if computing the number of permutations, but only as one subgroup if computing the number of combinations. Note that the factorial function operates the same in algebraic mode as it does in RPN mode. The number is keyed in and then the factorial function is selected from the probability menu. In algebraic mode, the ENTER key will then need to be pressed.

Factorials show up throughout mathematics and statistics. Permutations and combinations show up in many discrete probability distribution calculations, such as the binomial and hypergeometric distributions.

Practice solving problems involving factorials, permutations, and combinations

Example 1: How many different ways could 4 people be seated at a table?

Solution: In RPN mode: 4 ↰ MTH 7 ENTER 3 ENTER

In Algebraic mode: 4 ↰ MTH 7 ENTER 3 ENTER ENTER

Answer: 24.

Example 2: How many different hands of 5 cards could be dealt from a standard deck of 52 cards? Assume the order of the cards in the hand does not matter.

Solution: Since the order of the cards in the hand does not matter, the problem is solved as a Combination.

In RPN mode: 5 2 ENTER 5 ↰ MTH 7 ENTER ENTER

In Algebraic mode: ↰ MTH 7 ENTER ENTER 5 2 ↱ , 5 ENTER

Answer: 2,598,960 different hands.

Example 3: John has had a difficult week at work and is standing in front of the doughnut display at the local grocery store. He is trying to determine the number of ways he can fill his bag with his 5 doughnuts from the 20 varieties in the display case. He considers the order in which the doughnuts are placed into the bag to be quite important. How many different ways can he put them in his bag?

Solution: Since the order in which the doughnuts are placed in the bag matters, the problem is solved as a permutation.

In RPN mode: 2 0 ENTER 5 ↰ MTH 7 ENTER 2 ENTER

In Algebraic mode: ↰ MTH 7 ENTER 2 ENTER 2 0 ↱ , 5 ENTER

Answer: 1,860,480 different ways. John may be in front of the display case for some time.

Example 4: John has had a difficult week at work and is standing in front of the doughnut display at the local grocery store. He is trying to determine the number of ways he can fill his bag with his 5 doughnuts from the 20 varieties in the display case. He considers the order in which the doughnuts are placed into the bag to be quite important. How many different ways can he put them in his bag?

Solution: Since the order in which the doughnuts are placed in the bag matters, the problem is solved as a permutation.

In RPN mode: 2 0 ENTER 5 ↰ MTH 7 ENTER 2 ENTER

In Algebraic mode: ↰ MTH 7 ENTER 2 ENTER 2 0 ↱ , 5 ENTER

Answer: 1,860,480 different ways. John may be in front of the display case for some time.