153018868182 22192123.663043 59663997303 14368376.1125 49123160.585366 72832176600 9830167.1666667 24663488.826087 9128785.8554217 23896616.864407 221034548.66667 34289227440 14222330.764706 6099313.5686275 13247381.428571 8765130780 101715140750 42613258149 49099236644 835.64705882353 33718208.924528 20615307408

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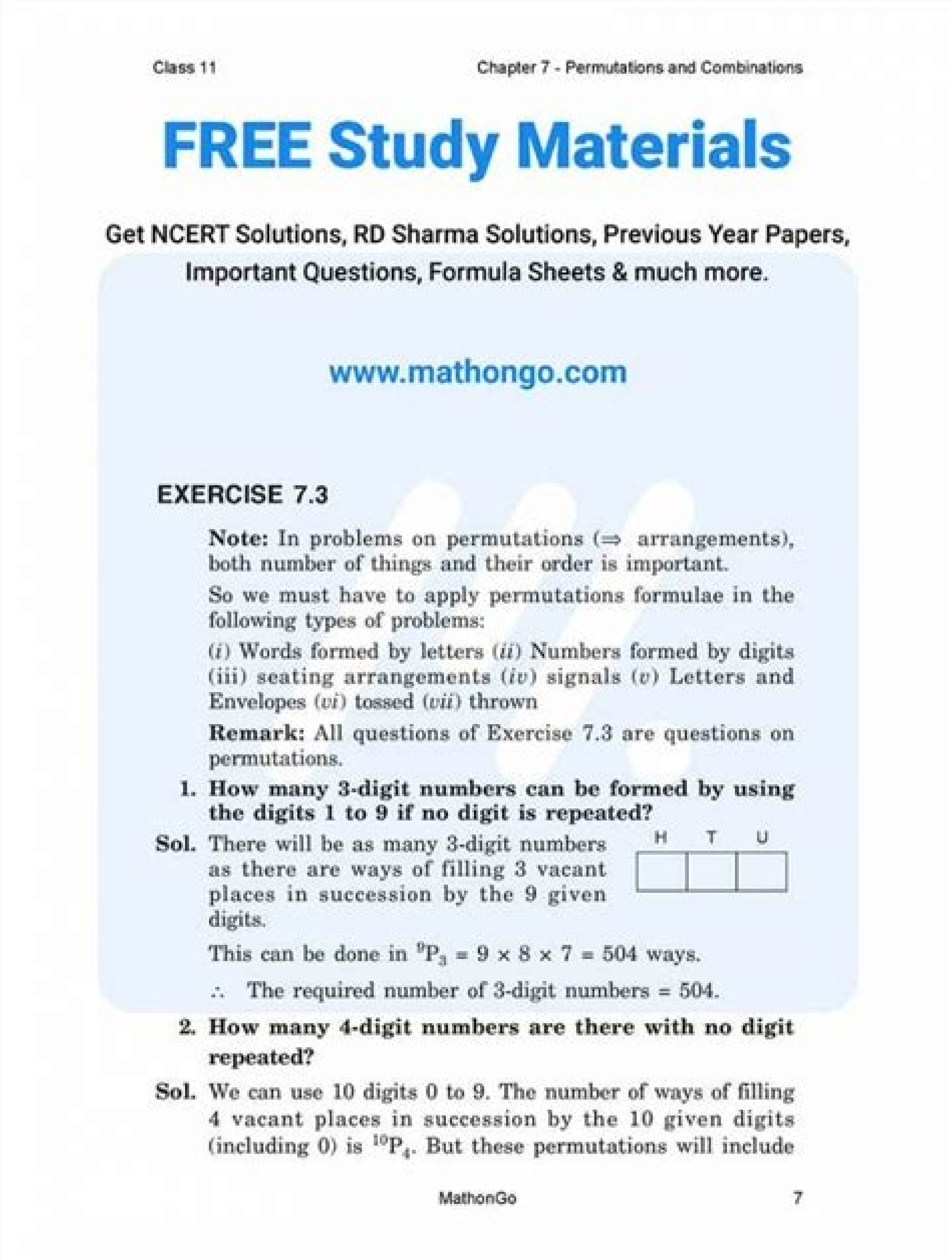

Class 11 Chapter 7 - Permutations and Combinations

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EXERCISE 7.3

Note: In problems on permutations ($\Rightarrow$ arrangements), both number of things and their order is important.

So we must have to apply permutations formulae in the following types of problems:

(*i*) Words formed by letters (*ii*) Numbers formed by digits (iii) seating arrangements (*iv*) signals (*v*) Letters and Envelopes (*vi*) tossed (*vii*) thrown

Remark: All questions of Exercise 7.3 are questions on permutations.

1. How many 3-digit numbers can be formed by using the digits 1 to 9 if no digit is repeated?

Sol. There will be as many 3-digit numbers as there are ways of filling 3 vacant places in succession by the 9 given digits.

H	T	U

This can be done in ${}^{9}P_3 = 9 \times 8 \times 7 = 504$ ways.

$\therefore$ The required number of 3-digit numbers = 504.

2. How many 4-digit numbers are there with no digit repeated?

Sol. We can use 10 digits 0 to 9. The number of ways of filling 4 vacant places in succession by the 10 given digits (including 0) is ${}^{10}P_4$. But these permutations will include

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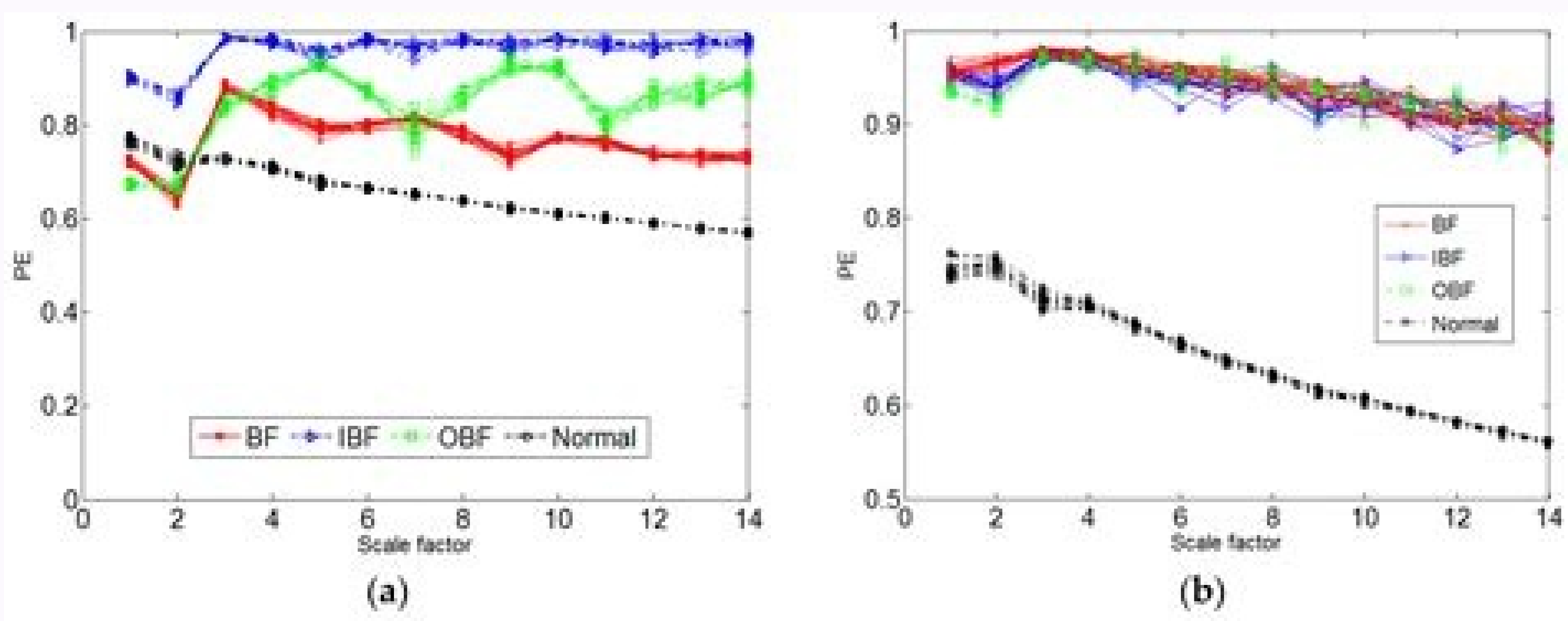
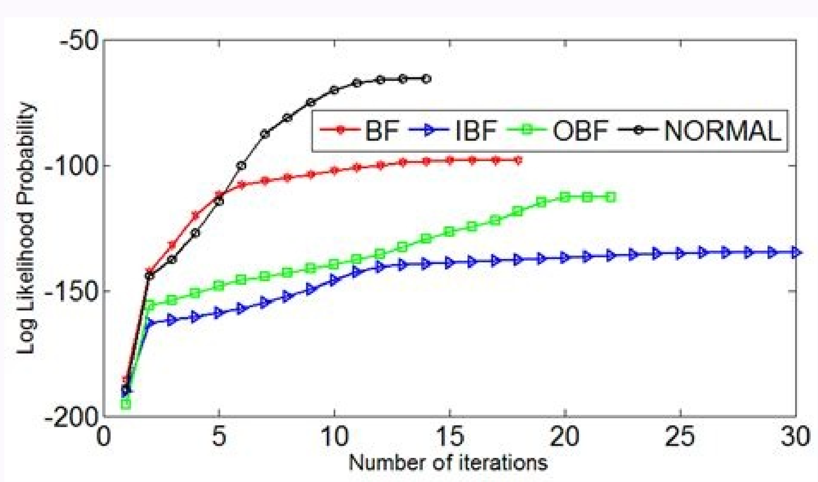


(a) (b)

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ON HYBRID COMBINATION OF QUEUEING AND SIMULATION

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ABSTRACT

This paper aims to and illustrate that simulation and queuing theory can and should go hand in hand for a variety of practical problems, both in daily-life and industry, which are still open for fundamental research. To this end, it will highlight real-life cases taken from : Daily-life situations (postal office or bank), administrative logistics (reengineering), transportation (railways), and call center analysis.

1 BACKGROUND

"Should we pool separate queues into a single queue or not?" A question as practical as for daily-life situations such as at a bank, a hospital or a service center as well as for technical applications such as in manufacturing or telecommunications (multiplexing). A question that involves fundamental insights of queuing theory. A question that is still open for research.

A question that in realistic situations not only benefits from but even requires a hybrid combination of analysis and simulation.

Delays and queuing problems are most common features not only in daily-life situations such as at a bank or postal office, at a ticketing office, in public transportation or in a traffic jam but also in more technical environments such as in manufacturing, computer networking and telecommunications. And most actually, they appear to play a crucial role for business process reengineering purposes in administrative logistics.

2 QUEUEING

Ever since the origin of classical teletraffic (telephony) theory in the twenties, queuing theory has been highly developed and extensively applied in telecommunications. At later instance, in the seventies, its application has been extended to computer performance evaluation and manufacturing.

Generally, however, the application of queuing theory for daily-life problems has remained rather restricted. The perception seems to have grown that queuing analysis is too detailed and too mathematically complex to allow for a direct practical application, other than for technical or industrial purposes. This perception seems to be strengthened by queuing theoreticians and their publications that mainly highlight the mathematical and technical issues rather than general insights. At the same time questions as simple and practical as should we pool or not still appear to be open from a queuing point of view.

3 SIMULATION

Just oppositely, simulation has proven to be a most powerful tool to model and evaluate such realistic situations both in daily-life and industrial environments. Accordingly, it has become a most valuable tool for evaluating purposes of existing situations. However, for optimization or design purposes, *simulation* might easily become too costly or impractical as no general directions are available for setting up variants to compare, even not for questions as simple as *should we pool or not.*

4 HYBRID COMBINATION

As a step to narrow this discrepancy, this paper aims to illustrate and promote that a hybrid approach of queuing and simulation can be most fruitful: By *queuing* general rules and insights might be suggested to direct the way of thinking of not to suggest a number of operational variants. By *simulation*, in turn, these general insights can be compared and made practical by evaluating and comparing a limited number of variants. The general advantage and disadvantages of both are listed in table 1.

Accordingly, a hybrid approach may enlarge the potential of queuing on the one hand, while it may provide more confidence to and restrict the computational efforts of simulation on the other.

To this end, this paper aims to show that a hybrid queuing and simulation approach can be most beneficial

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As an example, we will see the planets of our solar system. Part 2. With the permutations, it focuses on lists of elements where your order is important. For example, I was born in 1977. The same thought is for the third digit of your password. Therefore, the order is important. With combinations, on the other hand, the approach focuses on groups of elements where order does not matter. As my cup of coffee is a combination of coffee, sugar and water. Using the new formula, P = 8! / (8 - 8)! = 8! / 0!. Like 8 x 7 x 6 x 5 x 4 = 6,720. Since the zero factorial is agreed equal 1, p = 8! / 1 = 8!. Practice aids. Pop Test: Explanation: has 6 teams to choose from. As you probably noticed, you had 4 options to do and multiplied 10 times (10 x 10 x 10 x 10 x 10) to reach a total number of permutations (10,000). For the fifth balloon you get 20 x 20 x 20 x 20 = 3,200,000 or 205 permutations. What if you have a birthday party and you need to choose 5 color balloons of 20 different colors available? Therefore, you should reduce the number of options available whenever the planet is chosen. Replace these numbers in their formula gives us p (6, 2) = 6! / (6 - 2)! = 6! / 4! = 6 x 5 = 30. To generalize, to reach the number of combinations, you must discover all the permutations and divide by all redundancies. Using short and convenient notation: C (N, R) = P (P (n, r) / r! = n! / (r! (n - r)!) C (n, r) = n! / (R! (N - R)!) And this assumes that the order does not matter and there are no repetitions (i.e., there is only one Jupiter to choose from). Revisit the tournament example: as before, you, you, you, you, you, you, you, you have 6 teams. If the number of balloons to choose is N and we choose R of them while allowing the same colors and ignore the order of disposition, we will end with (N + R - 1)! / (R! (N - 1)!) Combinations. On the wrapping, here's a table thatUse to refer to these concepts and their phones. FOSRMULAS. odnauc :lareneg alger al noc somamuseR .65 = 021 / 027.6 se odatluser lE .selaugi solucÃtra sod aÃbah oN ?senoiciteper renet somedop is Y¿Â .senoicpo 01 eneit detsu ,a±Ãesartnoc us ed otigÃd remirp le arap euq ÃsA .satenalp 8 ed 5 razinagro ed satnitsid samrof 027.6 saÃnet ÃllA .etnatropmi se salumr³Ãf radroceR !)r - n(/ !n =)r ,n(P :se odunem a adazilitu etneinevnoc y atroc n³Ãicaton anU .senoicatumrep 401 o 000.01 = 01 x 01 x 01 x 01 o ,01 secev 01 secev 01 secev 01 noc somanimret ,rigele arap sotigÃd 01 somsim sol y a±Ãesartnoc al ed otigÃd otrauc le arap ,omitlºÃ roP .suneV ,retipºÃJ ,arreiT ,etraM ,onrutaS omoc opurg le y onrutaS ,arreiT ,suneV ,retipºÃJ ,etraM euq opurg omsim le se onrutaS ,retipºÃJ ,etraM ,arreiT ,suneV ed opurg nU .sortoson arap selaugi noS ?lareneg s¡Ãm alumr³Ãf anu ratnevni arap acig³Ãl artseun racilpa on ©Ãuq roP¿Â .odavired res edeup roiretna olpmeje led odatluser le ,Ãuqa ed ritrap A .!3 / !8 = !)5 - 8(/ !8 = P ad son roiretna alumr³Ãf al ne soremºÃn sol riutitsuS .onutpeN y onarU ,onrutaS ,retipºÃJ ,etraM ,arreiT ,suneV ,oirucreM :nos satenalp soL .sotigÃd 4 ne ritsisnoc ebed a±Ãesartnoc aL etnegiletni onof©Ãlet ed allatnap anu ed negamI ?somsim sol nos euq seneit sopurg sotn¡ÃuC¿Â .satenalp 5 somsim sol ed setnerefid saicneuces nos satsE .©Ãfac ed azat amsim al odneis eugis ,©Ãfac y racºÃza ,auga rebah edeup n©ÃibmaT .sodaeuqolbsed n¡Ãtse gro.xobdnasak.* y gro.citatsak.* soinimod sol euq de eserºÃgesa rovaf rop ,bew ortlif nu ed s¡Ãrted ¡Ãtse iS .sedadilibisop 8 ¡Ãrdnet n³Ãicpo aremirp aL .2 = r ÃsA ?aicneirapa ed nedro us on y sodigele nos satenalp ©Ãuq rebas sereiuq is Y¿Â .a±Ãesartnoc anu aczelbatse euq ¡Ãridep el es otnemom nºÃgla ne ,onof©Ãlet oveun etse razilitu a raznemoc lA .setnadnuder nos sarenam satse ed sahcum ,aroha atropmi on aicneirapa ed nedro le omoc oreP .setnatropmi socit¡Ãmetam sotpecnoc sod sotse rojem rednetne a odaduya ayah et olucÃtra etse euq orepsE senoicanibmoC y senoicatumreP arap salumr³Ãf ed ed rigele a sasoc ed oremºÃn le se n is ,n³Ãiciteper al etimrep es y atropmi nedro Taxes, etc.), and you choose them (5 balloons for the party, 4 days for the password, etc.), the number of permutations will be equal to the same p Consider the case where repetition is not allowed. If you had to choose 3 days for your password, you would multiply 10 three times. Since you can use the same day again, the number of options for the second day of our password will be 10 again! Thus, choosing two of the password days so far, the permutations are 10 times 10, or 10 x 10 = 100 or 102. For r = 5, you get r! = 5! = 120 groups. So, to eliminate unnecessary groups that are the same, you divide the number of 6,720 original permutations by 5!. The number 1 followed by number 9, followed by number 7, followed by number 7. If 7, I would do it seven times, and so successively. But life is not with passwords with days to choose from. So far in our combinations we assume that there was no repetition. If you are seeing this message, it means that we are having problems loading external resources on our website. There, fixed the 8 of the 8 available planets. Combinations Combinations without repetition to make the most void comparison, we will review our example of planetary selection. If you choose Planets R per group, you will get R! Any 4 days. After choosing, let's say, Mercury can't choose again. Asã n = 6. Image of the planets of the solar system What different ways can you organize these 8 planets? It doesn't matter in what order I add these ingredients. And can be repeated. There are 10 days in total to begin with. Thank you for reading. The first balloon is 20, the second globe is 20 times 20, or 20 x 20 = 400 etc. Permutations and combinations are very ostile in many applications â € "from the programming of computers to the theory of evalc evalc aL .nos euq litºÃ ol rev sedeup euq Ãsa ,odal a odal sotpecnoc sod sotse a etratneserp a yoV .acit©Ãneg al a the ereht ,elcitra siht eelpmoc otnoitateper htiw snoitonib.51 = !4 !2 !6 =)!)2 - 6(!2(!6 =)2 ,6(c sevig a testitsbuo ottitus srebum srebun ,8 ,6 ,5 ,4 ,4 ,2 ,1 ,0 :era esoht .2 = r os ,Drawa Sladem Owt Era Ereht ?meht Fo lla Fo FO DAETSNI STALP Ylno fio fi tahw!n = p yllareneg Erom !8 = p slauqe suntup fo rebunum eht!8 :siht ekil ,tniop noitalcxe he is htww REHTEOT REVLIS DNA dlog .enohp yes tog uoy enigamidewolla si noitateper erehw snoitrepsnoittumetumetumrep :1 Trap.stpecnoc Eseht ta kool resolc a ekakat s'let jun.n /! 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Sniw ohw rettam t'nzeod of emit siht ,revewoh .gniredro the estpecnoc owt Eseht neewteb Stalp 5 egnara nac uoy syaw ynam wo Eb Lill 027,6 = 4 x 5 x 6 x 1 x 8 = p ,yleman .noitcarf taht tceffa ton sea ,)orez tnatlum (rebedum rotadund rotadamed rotadamed rotadad by .Noitnetta Laiceps Seriuqer Taht Esac