

## More permutations: cases and conditions.

Ex: The password for a computer program can consist of digits and letters and is case sensitive. If the password must have a minimum of 4 characters and a maximum of 6, how many passwords are possible?

(Repetition NOT allowed.)

$$\text{Total characters} = 10 + 2(26) = 62$$

$$4 \text{ characters: } {}_{62}P_4 = 13\,388\,280$$

$$5 \text{ characters: } {}_{62}P_5 = 776\,520\,240$$

$$6 \text{ characters: } {}_{62}P_6 = 44\,261\,653\,680$$

All together there are 45 051 562 200

Ex: A car dealership has 4 cars and 2 trucks to put on display in a window. How many ways can they be arranged?

Ans:  $\underline{6} \times \underline{5} \times \underline{4} \times \underline{3} \times \underline{2} \times \underline{1} = 720$

what if the two trucks have to be on the ends?

Ans:  $\underline{2} \times \underline{4} \times \underline{3} \times \underline{2} \times \underline{1} \times \underline{1} = 48$   
 $(2! \cdot 4!)$

What if the two trucks must be kept together?

Ans:

T T	---	}	$5 \times 2! \times 4!$
- T T	---		
-- T T	---		
--- T T	-		
---- T T	-		

$5 \times 2 \times 24 = 240$

Ex: There are 4 trucks and 7 cars, how many ways can they be arranged if the 4 trucks must stay together?

Ans:  $4! \times 8! = 24 \times 40320$   
 $= 967680$

Ex: How many 3 digit odd numbers can be made using the digits 2, 3, 4, 5, 6, if repetition is allowed?

ANS:  $\underline{5} \underline{5} \underline{2} = 50$

what if repetition is NOT allowed?

ANS:  $\underline{4} \times \underline{3} \times \underline{2} = 24$

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