You need to calculate the number of ways of **choosing r objects from n items**.

Example: From the 26 letters in the English alphabet, you must choose a 3-letter password.

	Sampling WITHOUT replacement (selecting ABA is not possible)	Sampling WITH replacement (selecting ABA is possible)
Order does NOT matter (ABC = BCA)	Combination: $_nC_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$ Example: 1 = ABC (or ACB, BAC, BCA, CAB, CBA) 2 = ABD (or ADB, BAD, BDA, DAB, DBA) (and so on) $_{26}C_3 = \binom{26}{3} = \frac{26!}{3!(26-3)!} = \frac{26 \cdot 25 \cdot 24 \cdot 23!}{3 \cdot 2 \cdot 23!} = 2{,}600$	Formula: $\binom{n+r-1}{r} = \frac{(n+r-1)!}{r!(n-1)!}$ Example: 1 = AAA 2 = AAB (or ABA, BAA) 3 = AAC (or ACA, CAA) 4 = AAD (or ADA, DAA) (and so on) $\frac{(26+3-1)!}{3!(26-1)!} = \frac{28 \cdot 27 \cdot 26 \cdot 25!}{3 \cdot 2 \cdot 25!} = 3{,}276$
Order DOES matter (ABC ≠ BCA)	Permutation: $_nP_r = \frac{n!}{(n-r)!}$ Example: 1 = ABC 2 = ACB 3 = BAC 4 = BCA 5 = CAB 6 = CBA 7 = ABD (and so on) $_{26}P_3 = \frac{26!}{(26-3)!} = \frac{26 \cdot 25 \cdot 24 \cdot 23!}{23!} = 15{,}600$ or slot method: _ _ _ = <u>26</u> <u>25</u> <u>24</u> = 15,600	Formula: n^r Example: 1 = AAA 2 = AAB 3 = ABA 4 = BAA 5 = AAC (and so on) $26^3 = 17{,}576$ or slot method: _ _ _ = <u>26</u> <u>26</u> <u>26</u> = 17,576