

# SATPREP

Fundamental Counting Principle:

If an event can happen in  $N$  ways, and another, independent event can happen in  $M$  ways, then both events together can happen in  $N \times M$  ways. (Extend this for three or more:  $N_1 \times N_2 \times N_3 \dots$ )

Permutations and Combinations:

The number of permutations of  $n$  things is  ${}_n P_n = n!$

The number of permutations of  $n$  things taken  $r$  at a time is  ${}_n P_r = n!/(n-r)!$

The number of permutations of  $n$  things,  $a$  of which are indistinguishable,  $b$  of which are indistinguishable, etc., is  ${}_n P_n / (a! b! \dots) = n! / (a! b! \dots)$

The number of combinations of  $n$  things taken  $r$  at a time is  ${}_n C_r = n! / ((n-r)! r!)$

Probability:

$$\text{probability} = \frac{\text{number of desired outcomes}}{\text{number of total outcomes}}$$

The probability of two different events  $A$  and  $B$  *both* happening is  $P(A \text{ and } B) = P(A) \cdot P(B)$ , as long as the events are independent (not mutually exclusive).

If the probability of event  $A$  happening is  $P(A)$ , then the probability of event  $A$  *not* happening is  $P(\text{not } A) = 1 - P(A)$ .