Fundamental counting principle & permutation

Lesson 11b: Probability and Independent events.

Permutation - Ordered combination B&Y

Allow repetition: $4 \cdot 4 \cdot 4 = 4^3 = 64$ B&B

No repetition: $4 \cdot 3 \cdot 2 = 24$

Ex.1) A multiple-choice quiz has 8 questions, and there are four possible answers to each. How many permutations of the answers are possible?

$4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^8 = 65,536$

Ex.2) How many 3-letter signs can be made from the letters in the word NUMERAL if no repetition is permitted?

$7 \cdot 6 \cdot 5 = 210$

$$\text{Probability} = P(E) = \frac{\#\text{ of desired outcomes}}{\text{total number of outcomes}}$$

Coin: $P(H) = \frac{1}{2}$

Two dice: $P(\text{sum of } 7) = \frac{6}{36} = \frac{1}{6}$

Die: $P(\text{\# divisible by } 3) = \frac{2}{6} = \frac{1}{3}$ $P(\text{sum} > 9) = \frac{6}{36} = \frac{1}{6}$

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Independent Events

Coin:

$P(\text{Heads, then Tails}) = P(H) \cdot P(T) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

Two dice:

$P(\text{sum} = 7, \text{ then sum} > 9)$

$P(7) \cdot P(>9) = \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$