

Probability – Binomial Experiments (Expansions)

- **binomial experiments (expansions)** → used to find probabilities where there are ___ possible outcomes where key words to look for to know when to use this technique are _____

Ex: What is the probability of getting exactly 4 questions correct on a 5-question multiple-choice (A – D possible answer choices) quiz if you guess at every question? →

Binomial Exp “Formula” → $\text{total trials } C_{\text{successes}} \cdot (\text{successes prob})^{\text{success power}} \cdot (\text{failure prob})^{\text{failures power}}$

Example 1: Find each probability using the Binomial Experiment “Formula”.

a.) If a family has 4 children, what is the probability that they have exactly 3 boys?	b.) Suppose that a coin is tossed 5 times, what is the probability of getting exactly 2 heads?	
c.) A die is rolled 3 times, what is the probability of getting exactly three 5's?	d.) Tarin and Sam are playing a certain board game, the probability of Tarin will a game is 75%. If they play 5 games, then what is the probability that Sam will win exactly 3 games?	
e.) Suppose that when hockey star Jamarie Jones takes a shot, he has a $\frac{1}{7}$ probability of scoring a goal. He takes 6 shots in a game one night.		
i.) What is the probability that he will score exactly 1 goal?	ii.) What is the probability that he will score at most 2 goals?	iii.) What is the probability that he will score at least 4 goals?

– **Pascal's Triangle** → a special way and technique to expand a binomial expression BUT it can also be used to perform binomial experiments

Let's look at a simple example: $(x + 4)^3$ → Produce the answer through 3 different techniques below.

Box Method	Pascal's Triangle	Binomial Experiments

Example 2: Complete each problem below using binomial experiments.

a.) Expand: $(2x + 5)^4$	b.) Find 3 rd term: $(x^3 - 2)^7$	c.) Find middle term: $(3x^2 - 2)^{10}$