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JC MATHEMATICS (H2)

STUDY TIPS

THE FUNDAMENTAL PROPERTIES OF A BINOMIAL DISTRIBUTION THAT ARE COMMONLY TESTED IN EXAM

PREPARED BY
Mr Jackie Lee

www.h2maths.com

JC_H2Maths_025

- **Properties**

A Binomial distribution $X \sim \mathrm{B}(n, p)$ has the following properties:

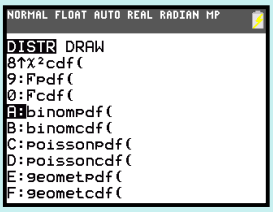
(i) There are n numbers of ___independent___ trials.

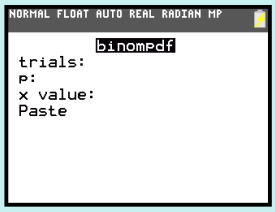
(ii) Each trial has two possible outcomes: "___success___" and "___failure___",
such that ___P(success) + P(failure) = 1___.

(iii) The probability of "success", i.e. p remains ___constant___ in each trial.

Quick GC Reference

- **binompdf** first press 2nd VARS





Given that $X \sim \mathrm{B}(n, p)$,

$$\mathrm{P}(X = x) = \mathrm{binompdf}(n, p, x)$$

All the probabilities ($x = 0, 1, 2, \ldots, n$) are displayed if "*x value*" is left blank.

Example 1

Given that $X \sim \mathrm{B}(8, 0.2)$, find $\mathrm{P}(X = 3 \text{ or } 4)$.

$= P(X=3) + P(X=4)$

$= 0.193$ (3sf)

Example 2

An unbiased dice is thrown five times. Find the probability that

(i) three "4"s are obtained,

(ii) at least one "4" is obtained,

(iii) three "4"s are obtained given that at least one "4" is obtained.

random variable

Let X be the r.v. denoting the no. of '4' obtained out of 5 throws.

$\Rightarrow X \sim B(5, 1/6)$

(i) $P(X=3) = 0.0321505\text{(5sf)} = 0.0322$ (3sf)

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Explanation

A binomial distribution describes a statistical scenario built on a fixed number of separate, independent trials. Independence ensures that the result of one trial never influences any other.

Every single trial must lead to only one of two possible outcomes, typically labeled as success or failure. Because these are the only two choices, the chance of succeeding added to the chance of failing always equals a complete certainty.

Additionally, the likelihood of achieving a success must remain completely unchanged and constant from the start of the experiment to the very end.

When students answer standard exam questions about the assumptions for using this statistical distribution, the required criteria are almost always extracted directly from these core properties.

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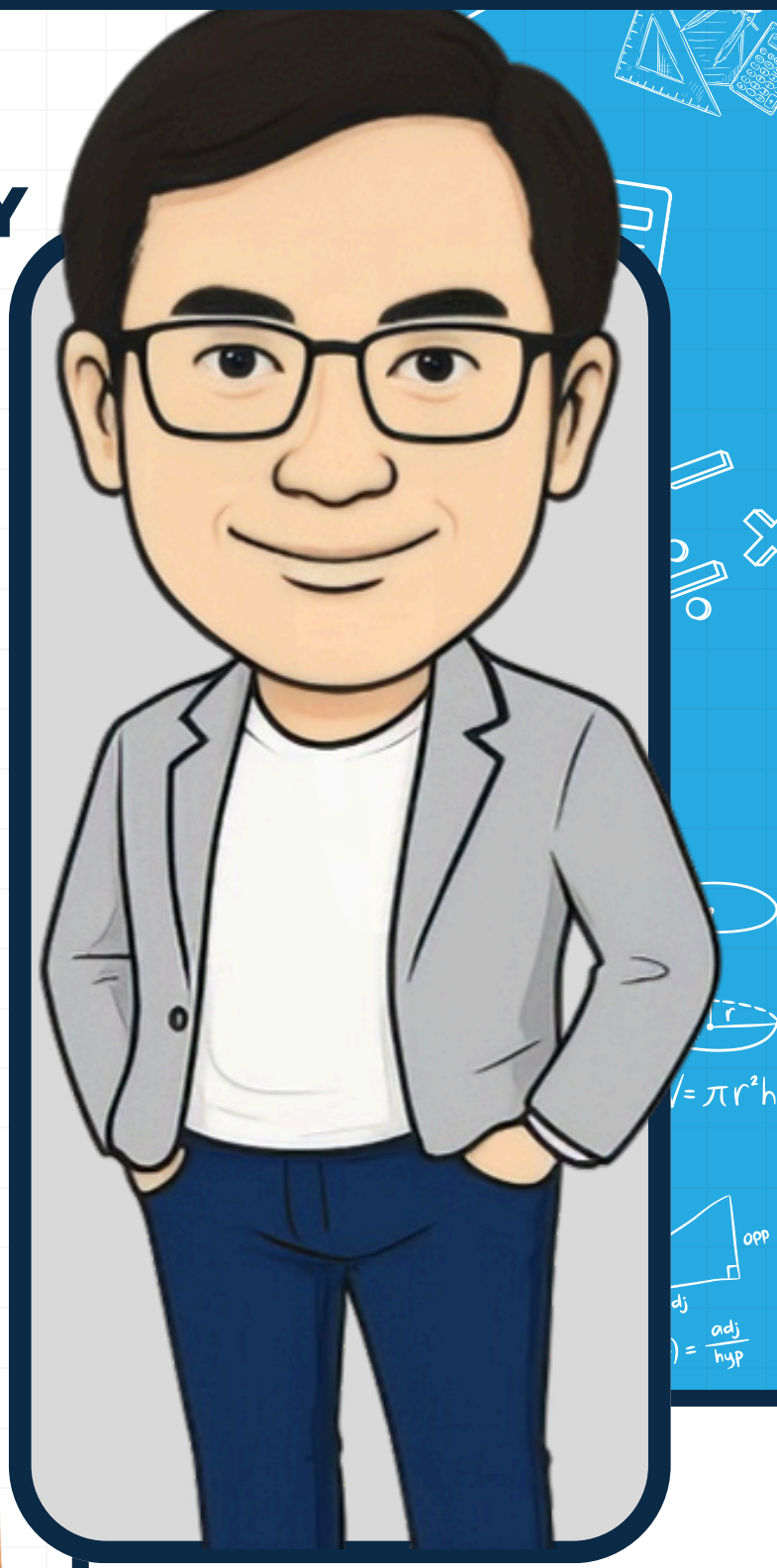
MATHS TUITION BY MR JACKIE LEE

Online • Face-to-Face • 1-to-1 • Group

- Former **MOE Scholar**
- **Winner** of International Mathematics Competitions
- **PGDE** Qualification (NIE) with **Distinction in Mathematics**
- Former **School Maths Teacher** in
  - Nan Hua High School
  - Raffles Institution
  - Anglo Chinese School (Indep)



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