

Binomial Expansion

1

Permutations and Combinations

- The number of ways of arranging n distinct objects in a line is $n! = n(n-1)(n-2)\dots 3 \times 2 \times 1$
- The number of ways of arranging a selection of r object from n is ${}_nP_r = \frac{n!}{(n-r)!}$
- The number of ways of picking r objects from n is ${}_nC_r = \frac{n!}{r!(n-r)!}$

2

Expansion of $(1+x)^n$

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{1 \times 2}x^2 + \frac{n(n-1)(n-2)}{1 \times 2 \times 3}x^3 \dots \dots \dots + nx^{n-1} + x^n$$

3

Expansion of $(a+b)^n$

$$(a+b)^n = a^n + na^{n-1}b + \frac{n(n-1)}{1 \times 2}a^{n-2}b^2 + \frac{n(n-1)(n-2)}{1 \times 2 \times 3}a^{n-3}b^3 \dots \dots \dots + nab^{n-1} + b^n$$

Binomial Distribution

1

$$P(\text{getting } r \text{ successes out of } n \text{ trials}) = {}_nC_r \times p^r \times (1-p)^{n-r}$$

- 2 possible outcomes probability of success = p
Probability of failure = $(1-p)$
- fixed number of trials n
- The trials are independent
- $E(x) = np$

2

USING CUMULATIVE TABLES

- Check if you can use your calculator for this
- Remember the tables give you less than or equal to the lookup value
- List the possible outcomes and identify the ones you need to include

$P(X < 5)$ 0 1 2 3 4 5 6 7 8 9 10 Look up $x \leq 4$

$P(X \geq 4)$ 0 1 2 3 4 5 6 7 8 9 10 1 – Look up $x \leq 3$

Research has shown that approximately 10% of the population are left handed. A group of 8 students are selected at random.

What is the probability that less than 2 of them are left handed?

X : number of left handed students

$p = 0.1$ $1-p = 0.9$ $n = 8$

Less than 2 : $P(0) + P(1)$

$P(0) = 0.9^8$

$P(1) = {}_8C_1 \times 0.1 \times 0.9^7$

$P(x < 2) = 0.813$

(this can be found using tables or using a calculator function)



How do we use Knowledge Organisers in Mathematics?

How can you use knowledge organisers at home to help us?

- **Retrieval Practice:** Read over a section of the knowledge organiser, cover it up and then write down everything you can remember. Repeat until you remember everything.
- **Flash Cards:** Using the Knowledge Organisers to help on one side of a piece of paper write a question, on the other side write an answer. Ask someone to test you by asking a question and seeing if you know the answer.
- **Mind Maps:** Turn the information from the knowledge organiser into a mind map. Then reread the mind map and on a piece of paper half the size try and recreate the key phrases of the mind map from memory.
- **Sketch it:** Draw an image to represent each fact; this can be done in isolation or as part of the mind map/flash card.
- **Teach it:** Teach someone the information on your knowledge organiser, let them ask you questions and see if you know the answers.

How will we use knowledge organisers in Mathematics?

Knowledge organisers will be used before I complete a Learning Check or Common Assessment. I will spend part of the lesson looking over each of the key topics of the half term before completing the Learning Check or Common Assessment.

I will also use these at home to complete my own independent learning and revision of these key topics.

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