

Warm-up

A bag has 20 marbles; 2 red, 4 blue, 6 green and 8 black. And one from each color is a large marble.

What is the probability of...

1) ...selecting a red or green marble?

$$\frac{2}{20} + \frac{6}{20} = \frac{2}{5}$$

2) ...selecting a green or large marble?

$$\frac{6}{20} + \frac{4}{20} - \frac{1}{20} = \frac{9}{20}$$

3) ...selecting a blue then a black marble?

$$\frac{4}{20} \cdot \frac{8}{19} = \frac{8}{95}$$

4) ...selecting 3 green in a row?

$$\frac{6}{20} \cdot \frac{5}{19} \cdot \frac{4}{18} = \frac{1}{57}$$

Warm-up

A bag has 20 marbles; 2 red, 4 blue, 6 green and 8 black. And one from each color is a large marble.

What is the probability of...

5) ...selecting a green marble if you know it is a large marble?

$$\frac{\text{Both}}{\text{Known}} = \frac{\frac{1}{20}}{\frac{4}{20}} = \frac{1}{4}$$

6) ...selecting a large marble if you saw that it was blue?

$$\frac{\text{Both}}{\text{Known}} = \frac{\frac{1}{20}}{\frac{4}{20}} = \frac{1}{4}$$

7) ...selecting 4 marbles; 2 green and 2 black?

$$\frac{6C_2 \cdot 8C_2}{20C_4} = \frac{20}{323}$$

Probability

Binomial Theorem

Unit 1 Topics

Consecutive Events

Compound Events

Conditional

Expected Value

Tony went to bat 5 times in a game. He could remember that he got 3 hits, but couldn't remember the order. How many different orders of hits and no hits could Tony have had?

$$\frac{5!}{3!2!} \leftarrow \text{total}$$

Hit \rightarrow 3! 2! \leftarrow Not

10

How many ways could he get 3 hits (no order)?

$${}^5C_3 = \boxed{10}$$

$$(2x + 5)^8$$

$$\underbrace{(2x + 5)(2x + 5)}_{(2x + 5)(2x + 5)} \underbrace{(2x + 5)(2x + 5)}_{(2x + 5)(2x + 5)}$$

$$\begin{array}{l} 2x^8 5^0 \\ 2x^7 5^1 \\ 2x^6 5^2 \\ 2x^5 5^3 \\ (2x)^4 5^4 \\ 2x^3 5^5 \end{array}$$

$$\begin{array}{l} 2x^2 5^6 \\ 2x^1 5^7 \\ 2x^0 5^8 \end{array}$$

Specific Term (Usually Middle)

$$(2x + 5)^8$$

NOTES

Find the middle term.

$${}^8C_4 (2x)^4 (5)^4$$

$$700,000x^4$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ 70 \cdot 16 \cdot 625 x^4 \end{array}$$

To Do:

Find the middle term of $(x + 6)^{12}$

$${}_{12}C_6 (x)^6 (6)^6$$

coefficient



$$\underline{43,110,144x^6}$$

term

Find the middle term of $(3x - 4)^8$

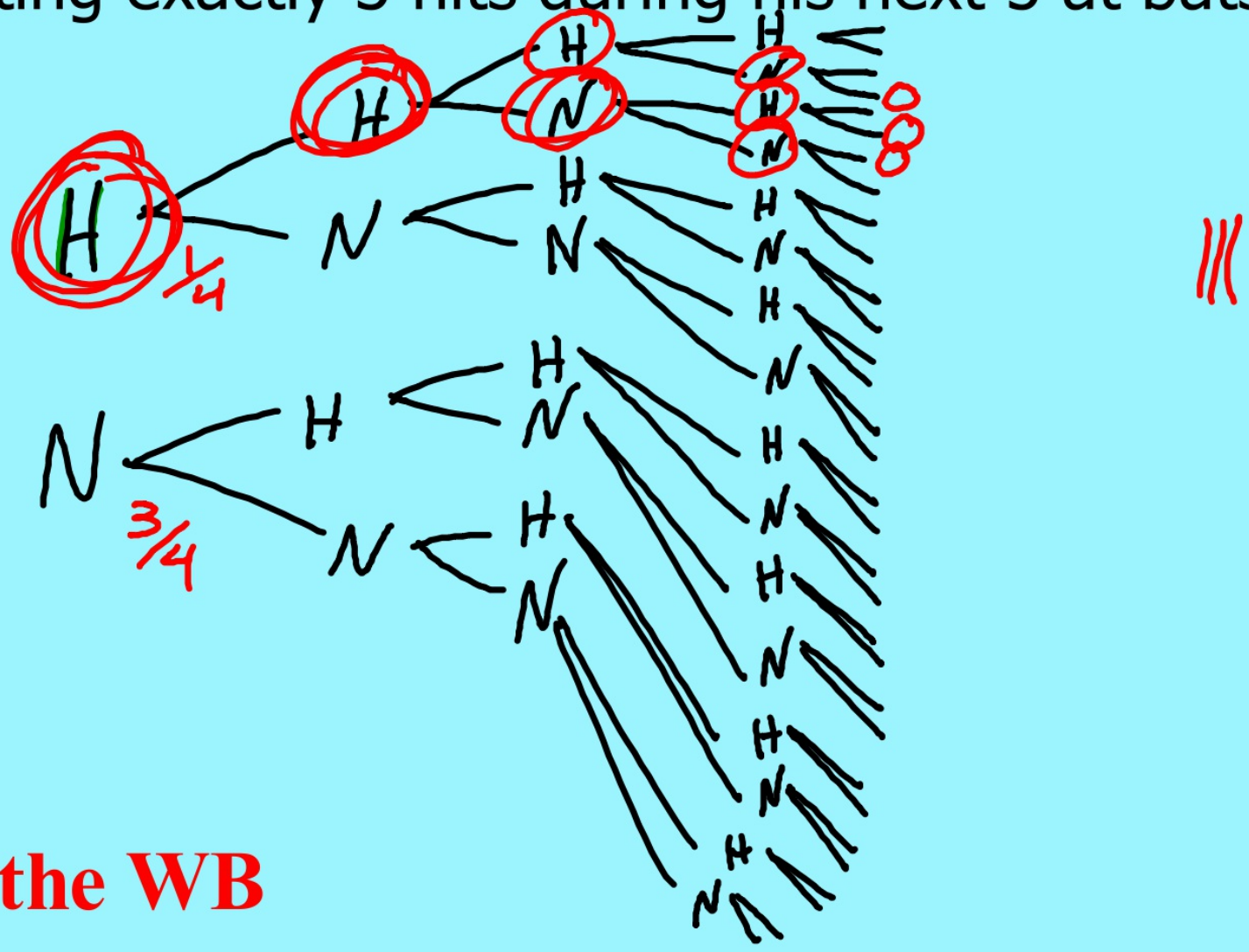
$${}_{8}C_4 (3x)^4 (-4)^4$$

$${}_{8}C_4 \cdot 3^4 \cdot (-4)^4$$

$$1,451,520x^4$$

$$(-4)(-4)(-4)(-4)$$

Example: The probability that Tony gets a hit when at bat is $\frac{1}{4}$. What is the probability of Tony getting exactly 3 hits during his next 5 at bats?



In the WB

Tree

**Now Let's
Make it Easier**

Example: The probability that Tony gets a hit when at bat is $1/4$. What is the probability of Tony getting **exactly** 3 hits during his next 5 at bats?



Time for binomial experiments...

$${}^5C_3 \cdot \left(\frac{1}{4}\right)^3 \cdot \left(\frac{3}{4}\right)^2 = 45 / 512$$

Success Fail

There is a $\frac{3}{5}$ chance for rain each day next week. What is the probability that it rains exactly 4 of the 7 days?

$${}^7C_4 \left(\frac{3}{5}\right)^4 \left(\frac{2}{5}\right)^3$$

or

$7C_3$

0.29

Binomial Experiments

- There have to be exactly 2 outcomes for each trial.
- There is a fixed number of trials.
- The trails are independent.
- The probabilities for each trail are the same.

"Exactly"ⁿ