Define each:

1. Statistics
2. Probability
3. Complement

A^c $\sim A$ $\bar{A}$

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Permutations

Permutations – arrangement when order matters.

$$P(n,r) = \frac{n!}{(n-r)!}$$

n - number of objects

r - number taken at a time

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$$P(n,r) = \frac{n!}{(n-r)!}$$

$$P(20,4) = \frac{20!}{(20-4)!} = \frac{20\cdot 19\cdot 18\cdot 17\cdot \cancel{16!}}{\cancel{16!}}$$

$$= 20\cdot 19\cdot 18\cdot 17$$

$$= 116{,}280$$

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$$P(12,5) = \frac{12!}{(12-5)!} = \frac{12!}{7!} = \frac{12\cdot 11\cdot 10\cdot 9\cdot 8\cdot \cancel{7!}}{\cancel{7!}}$$

$$= 95{,}040$$

$$\frac{12!}{7!}$$

12 math prob 4

÷ 7 math prob 4 =

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Permutations with repetition

$$P = \frac{n!}{p!\,q!}$$

MOM $\quad P = \frac{3!}{2!} = \frac{3\cdot \cancel{2}\cdot \cancel{1}}{\cancel{2}\cdot \cancel{1}} = 3$

MOM ~~MOM~~

MMO

OMM

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STEREO $\quad \frac{6!}{2!} = \frac{6\cdot 5\cdot 4\cdot 3\cdot \cancel{2!}}{\cancel{2!}} = 360$

Stereo

Steroe

Steore

combinations $\quad \frac{12!}{2!2!2!} = \frac{12\cdot 11\cdot 10\cdot 9\cdot \cancel{8}\cdot 7\cdot 6\cdot 5\cdot 4\cdot 3\cdot 2\cdot 1}{\cancel{2\cdot 2\cdot 2}}$

$\frac{\cancel{8}\cdot 7\cdot 6\cdot 5\cdot 4\cdot 3\cdot 2}{\cancel{2!2!2!}}$ $\quad 59{,}875{,}200$

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Combinations -

ways to arrange when order doesn't matter.

$$C(n,r) = \frac{n!}{(n-r)!\,r!}$$

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$$C(n,r) = \frac{n!}{(n-r)!\,r!}$$

$$C(52,5) = \frac{52!}{(52-5)!\,5!} = \frac{52\cdot 51\cdot \cancel{50}^{5}\cdot 49\cdot \cancel{48}^{4}\cdot \cancel{47!}}{\cancel{47!}\cdot \cancel{5}\cdot \cancel{4}\cdot \cancel{3}\cdot \cancel{2}\cdot 1}$$

$$\frac{52!}{(47!\,5!)}$$

$52\cdot 51\cdot 5\cdot 49\cdot 4 =$

$2{,}598{,}960$

$\frac{\cancel{50}^{5}}{\cancel{10}}\ \frac{\cancel{48}}{\cancel{12}}$

52 math prob 4

$\div$ (47 math prob 4 $\cdot$ 5 math prob 4) =

$52! \div 47! \times 5!$

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$$C(5,1) = \frac{5!}{4!\,1!} = \frac{5\cdot\cancel{4!}}{\cancel{4!}\cdot 1} = 5$$

$$C(21,2) = \frac{21!}{19!\,2!} = \frac{21\cdot\cancel{20}^{10}\cdot\cancel{19!}}{\cancel{19!}\,\cancel{2}} = 210$$

$C(5,1)\cdot C(21,2)$

$5\cdot 210$

1050

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$$C(30,3) = \frac{30!}{27!\,3!} = \frac{\cancel{30}^{5}\cdot 29\cdot 28\cdot \cancel{27!}}{\cancel{27!}\,\cancel{3\cdot 2}}$$

$= 4{,}060$

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$$P(3,3) = \frac{3!}{(3-3)!} = \frac{3!}{0!} = 3\cdot 2\cdot 1$$

$\boxed{0! = 1}$

$2\cdot 1 =$

$3\cdot 2\cdot 1 =$

$1! = 1$

$0! = 1$

$10^0 = 1$

$\frac{3}{0}$

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$$P(7,2) = \frac{7!}{5!} = \frac{7\cdot 6\cdot \cancel{5!}}{\cancel{5!}} = 42$$

$$C(9,3) = \frac{9!}{6!\,3!} = \frac{\cancel{9}^{3}\cdot \cancel{8}^{4}\cdot 7\cdot \cancel{6!}}{\cancel{6!}\cdot \cancel{3}\cdot \cancel{2}} = 84$$

CANADA $\frac{6!}{3!} = \frac{6\cdot 5\cdot 4\cdot \cancel{3!}}{\cancel{3!}} = 120$

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#20. $P(5,5) \cdot P(5,5)$

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