Combinations II (11.2)

p534 day 4

ex1: We need to select 6 players from our class for a dodgeball tournament.

27 13g 14b

a) How many ways can we pick 6 players?

$_{27}C_6 = 276{,}010$

b) What if we need 2 girls? 2g × 4b

$_{13}C_2 \times {}_{14}C_4 = 78{,}078$

c) what if we need at least one girl? 1 2 3 4 5 6

$_{13}C_1 \times {}_{26}C_5 = 855{,}140$

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ex2: A jury pool consists of 12 women and 8 men. 20

a) How many 12-person juries can be selected?

$_{20}C_{12} = 125{,}970$

b) How many juries with 7 women and 5 men can be selected?

$_{12}C_7 \times {}_8C_5 = 44{,}352$

c) How many juries with at least 10 women can be selected?

$_{12}C_{10} \times {}_{10}C_2 = 2970$

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ex3: Solve

$$_nC_2 = 21$$

$$\frac{n!}{(n-2)!\,2!} = 21$$

$$\frac{n\cdot(n-1)\cdot(n-2)\cdot(n-3)\cdots 3\cdot 2\cdot 1}{(n-2)(n-3)(n-4)\cdots 3\cdot 2\cdot 1\cdot 2!} = 21$$

$$\frac{n(n-1)}{2\cdot 1} = 21$$

$$n^2 - n = 42$$

$$n^2 - n - 42 = 0$$

$$(n-7)(n+6) = 0$$

$$\boxed{n=7} \quad \cancel{n=-6}$$

$$\frac{5!}{3!} = \frac{5\cdot4\cdot\cancel{3}\cdot\cancel{2}\cdot\cancel{1}}{\cancel{3}\cdot\cancel{2}\cdot\cancel{1}}$$

$$\frac{6!}{2!} = \frac{6\cdot5\cdot4\cdot3\cdot\cancel{2}\cdot\cancel{1}}{\cancel{2}\cdot\cancel{1}}$$

$n+1-(n-1)$
$= n+1-n+1$
$= 2$

$$_{n+1}C_{n-1} = 15$$

$$\frac{(n+1)!}{2!\,(n-1)!} = 15$$

$$\frac{(n+1)(n)}{2} = 15$$

$$n^2 + n = 30$$

$$n^2 + n - 30 = 0$$

$$(n+6)(n-5) = 0$$

$$\cancel{n=-6} \quad \boxed{n=5}$$

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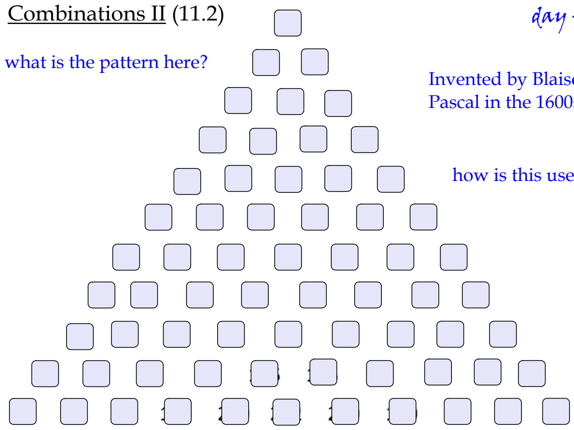
what is the pattern here?



Invented by Blaise Pascal in the 1600s

how is this useful?

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day 4

ex4: If a puck is dropped from the top, how many ways can it reach each of the letters?