? Chord number

CHORD NUMBER

options : 12 NOTES

repeats: NO

choice: 2, 3, 4, 5, ⋯, 11, 12 .

order matters? NO

- 135
  13
  15
  35

OPTIONS: 3
CHOICE: 2
ORDER? NO
REPEATS? NO

${}^{n}C_{k}$

${}^{3}C_{2} = 3$ OPTIONS

- 1357
  13
  15
  17
  35
  37
  57 THAT IS

${}^{4}C_{2} = 6$

- 135
  13
  15
  31
  35
  51
  53

6

OPTIONS: 3
CHOICE: 2
ORDER? YES
REPEATS? NO

n options
k choices

${}^{n}P_{k}$

${}^{3}P_{2} = 6$

- 135
  11
  13
  15
  31
  33
  35
  51
  53
  55

9

OPTIONS: 3
CHOICE: 2
ORDER? YES
REPEATS? YES

n options
k choices

OPTIONS ^{P} CHOICES

$n^{k} = 3^{2} = 9$

- 135
  11
  13
  15
  33
  35
  55

6

OPTIONS: 3
CHOICE: 2
ORDER? NO
REPEATS? YES

n options
k choices

${}^{k+(n-1)}C_{k}$

${}^{2+(3-1)}C_{2} = {}^{4}C_{2} = 6$

All uses of multiplication principle

	Order	No Order
No repeats:	${}^{n}P_{k}$	${}^{n}C_{k}$
Repeats:	n^{k}	${}^{k+(n-1)}C_{k}$

Combinations no order

${}^{n}C_{k} = \frac{n!}{(n-k)!\,k!}$ ${}^{n}C_{k}$

$\frac{(k+n-1)!}{(n-1)!\,k!}$ ${}^{k+(n-1)}C_{k}$

Permutations order

n^{k} w/ REP n^{k}

${}^{n}P_{k} = \frac{n!}{(n-k)!}$ ${}^{n}P_{k}$

All possible chords with 12 notes

options : 12 NOTES repeats: NO

choice: 2, 3, 4, 5, ⋯, 11, 12 . order matters? NO

$\therefore \sum_{k=2}^{12} {}^{12}C_{k} = {}^{12}C_{2} + {}^{12}C_{3} + {}^{12}C_{4} + {}^{12}C_{5} + {}^{12}C_{6}$

i.e. $+ {}^{12}C_{7} + {}^{12}C_{8} + {}^{12}C_{9} + {}^{12}C_{10} + {}^{12}C_{11}$

$= 66+220+495+792+924+792+495+220+66+12+1$

$= 4083$

4083 chords can be played with 12 different notes

All possible chords with 12 notes

options : 12 NOTES repeats: NO

choice: 2, 3, 4, 5, 6 order matters? NO

$\sum_{k=2}^{6} {}^{12}C_{k} = {}^{12}C_{2} + {}^{12}C_{3} + {}^{12}C_{4} + {}^{12}C_{5} + {}^{12}C_{6}$

$= 66+220+495+792+924$

$= 2497$

2497 chords can be played on a 6 string guitar

knowing that some 5 or 6 note chords would need the help of the right hand fingers