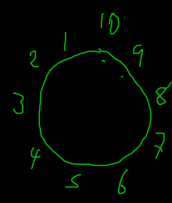
Applications to Combinatorics

Friday, April 10

How many ways could King Arthur and his 9 favorite knights sit around their 10 seat round table?

$\frac{10!}{10}$ vs $9!$



You have 31 flavors of ice-cream to choose from.

1. How many cones can you make using 3 distinct flavors?
2. How many milkshakes can you make using 3 distinct flavors?

1. $\frac{31!}{28!} = 31\cdot 30\cdot 29 = P(31,3) = {}_{31}P_3$

SCV ~ CSV

CSV ~ VSC

2. $\frac{31!}{28!\cdot 3!} = \frac{31\cdot 30\cdot 29}{3\cdot 2\cdot 1} = C(31,3) = {}_{31}C_3 = \binom{31}{3}$

[SCV]

the set of cones that make the same milkshake as SCV.

Equivalence relations

1. reflexive xRx
2. symmetric if xRy then yRx
3. transitive if xRy, yRz, then xRz

G, H $\quad$ G/H set of cosets. $|G/H| = |G|/|H|$

King Arthur wants to put out placemats for his round table. Each of the 10 spots could get a blue or a gold placemat. How many different ways could he arrange the placemats?

2 2 2 2 2 2 2 2 2 2 $\quad 2^{10}$

BBGGBBGGBB
BGGBBGGBBB

$|[BGGGBGBBBG]| = 10$

GGGBGBBBGB

$\frac{2^{10}}{10}$??????

$|[BGBGBGBGBG]| = 2$

GBGBGBGBGB
BGBGBGBGBG

$|[B^{10}]| = 1$

$|[B^5G^5]| = 10$

GGBGGGGBGG