

AFM HW 3 - Circular Permutations

① C, R

② C

③ C

④ L, R

⑤ L, R

⑥ C

⑦ L

⑧ L

↑ open means no clasp!

⑨ 7 keys on a key ring circular, reflective

$$\frac{(7-1)!}{2} = 360$$

⑩ 10 campers circular

$$(10-1)! = 362880$$

⑪ 6 charms, no clasp circular, reflective

$$\frac{(6-1)!}{2} = 60$$

⑫ 4 men & women seated alternately
 * remember that our circular permutation formula comes from $\frac{n!}{n}$ ← we'll use this instead of $(n-1)!$ but we must be careful with the numerator since they're alternating...

⑬ 5 hors d'oeuvres circular

$$(5-1)! = 24$$

$$\frac{4 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 1 \cdot 1}{8}$$

$$4! \cdot 3! = 144$$

⑭ 5 dinner guests... 2 married people must stay together

↑ treat them as one person, so we're seating four people around the circular table

$(4-1)! = 6$ * now multiply by 2 b/c the married people could sit wife husband or husband wife

$$6 \cdot 2$$

$$12$$

* ⑮ 20 links, no clasp
 How many ways for 6 colored beads?

no clasp means circular...

but we can't just do $(20-1)!$ because we're not actually using all 20 links we're only attaching it to 6... let's use our formula that $(n-1)!$ is based on $\frac{n!}{n}$

$\frac{20!}{20}$ ← we must change this b/c we're only picking 6!

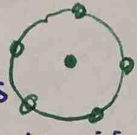
$$\frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16 \cdot 15}{20}$$

$$20$$

$$1,395,360$$

5 basketball players around their coach \star can be interpreted 2 ways \star

\star their formation is circular BUT this is a linear permutation ... if you're standing where the coach is facing then you can see/hear what he's saying... but if you're standing in the spot behind him then you can't really hear!



\star a circular formation, the coach doesn't count as a fixed point b/c he is not actually in the circular formation

$(5-1)!$

24

$5! = 120$

(17) Bride, Groom, & 8 attendants
10 total people

Bride & Groom must sit together

\star treat bride & groom as one b/c it could be one or Groom Bride

$(9-1)!$

$8! \times 2$

80640

(18) 8 pizza toppings on a circular tray
circular

$(8-1)! = 5040$

(19) 6 nautical flags on a vertical pole
linear, reflective

$\frac{6!}{2} = 360$

(20) Laura & 4 friends at a circular table
Linear b/c Laura is a fixed point

$4! = 24$

(21) ABCDE at a circular table

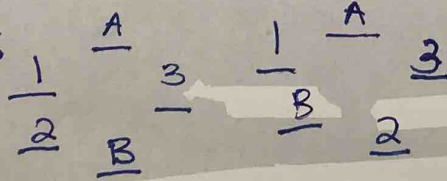
a) AB together treat A & B as one person

$(4-1)! \times 2 = 12$

\uparrow it could be AB or BA

(21) b) A & B can't sit together

\star draw this one out!



\swarrow but A & B could switch!

$3! + 3! = 12$

$12 \cdot 2 = 24$