

2) Arrange a smaller group of objects chosen from a larger group? = \boxed{nPr}

11 pairs of shoes

How many ways can 5 pairs be arranged?

$$nPr = 11P_5 = \boxed{55,440}$$

$$\underline{11} \quad \underline{10} \quad \underline{9} \quad \underline{8} \quad \underline{7}$$

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

$$11P_5 = \frac{11!}{6!} = \frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot \cancel{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}{\cancel{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}$$

3) Alike Objects

$$\frac{\text{total!}}{\text{alike! alike!}}$$

$$\frac{\overrightarrow{\text{BANANA}}}{\text{A N}} = \frac{6!}{3! 2!}$$

$$= \frac{6 \cdot 5 \cdot \overbrace{4 \cdot 3 \cdot 2}^2 \cdot 1}{\cancel{3 \cdot 2 \cdot 1} \cdot \cancel{2 \cdot 1}}$$

$$= 60$$

11 pairs of shoes

$$\frac{22!}{2! 2! 2! 2! 2! 2! 2! 2! 2! 2! 2!}$$

$$= \frac{22!}{2^{11}}$$

4) Repeated objects
or Specific locations

Draw blanks

Radio call letters

- 1st letter must be
W or R

$$\underline{2} \cdot \underline{26} \cdot \underline{26} \cdot \underline{26} = 35,152$$

COMBINATIONS - Select
groups
of objects

$${}^n C_r = \frac{n!}{(n-r)! r!}$$

$${}^{11} C_5 = \frac{11!}{6! 5!}$$

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

$$= \frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

$$= 462$$

$${}^9 C_2 = \frac{9!}{7! 2!} = \frac{9 \cdot 8}{2 \cdot 1}$$

$${}^7 C_3 = \frac{7!}{4! 3!} = \frac{7 \cdot 6 \cdot 5}{3 \cdot 2 \cdot 1}$$

$$= 35$$

How many ways can 3 orange basketballs, 2 black/white soccer balls, + 5 white volleyballs be arranged in a line?

$$\frac{10!}{3! 2! 5!} = 2,520$$

How many ways can 12 cheerleaders stand in a line if the 2 head cheerleaders must be in the middle?

$$\frac{10!}{2!} = 7,257,600$$

How many ways can a 5 member committee of 2 guys + 2 girls be formed from 6 guys + 5 girls?

$${}^6C_2 \cdot {}^5C_2 = 150 \text{ committees}$$

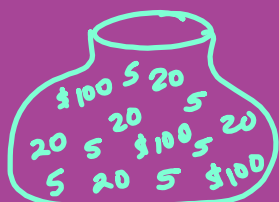
PROBABILITY = $\frac{\text{Ways to succeed}}{\text{total possible outcomes}}$

Odds = $\frac{\text{ways to succeed}}{\text{ways to fail}}$

Prob (black shoes) = $\frac{6}{11}$

Odds(not wearing black
Shoes) = $\frac{5}{6}$

Odds of snow = $\frac{3}{5}$ ^{snow}
 Prob of no snow = $\frac{5}{8}$



3 100
5 20
6 5

If picking more than 1 item, find prob & then change to odds

Birthday - Pick 3.

$$\text{Prob}(3 \text{ 100's}) = \frac{{}_3C_3}{{}_{14}C_3} = \frac{1}{364}$$

$$\text{Odds}(1^s 100 + 2^s 20) = \underline{\hspace{2cm}}$$

$$\text{Prob} = \frac{{}_3C_1 \cdot {}_5C_2}{{}_{14}C_3} = \frac{3 \cdot 10}{364}$$

$$\text{Odds} = \frac{15}{167} \quad 182 - 15 = 167$$