

Roll of a die ... 6 sides

Odds of rolling a

- ① 1 $\rightarrow \frac{1}{6}$
- ② 4 $\rightarrow \frac{1}{6}$
- ③ 3 or 6 $\frac{2}{6} = \frac{1}{3}$
- ④ odd # $\frac{3}{6} = \frac{1}{2}$

2 dice
⑤ Sum of 2

#1	#2	
1	1	
		$\frac{1}{6} \cdot \frac{1}{6} \rightarrow \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$

⑥ Sum of 5

#1	#2	
1	4	
2	3	}
3	2	
4	1	
		4 $\frac{4}{36} = \frac{1}{9}$

⑦ Sum of 7

#1	#2	
1	6	
2	5	}
3	4	
4	3	
5	2	
6	1	
		6 $\frac{6}{36} = \frac{1}{6}$

⑧ Rolling a 1

	#1	#2	#1	#2
}	1	1	1	1
	2	2	2	1
	3	3	3	1
	4	4	4	1
	5	5	5	1
	6	6	6	1
			12 $\frac{12}{36} = \frac{1}{3}$	

10.1b Permutations

ALC Olympics have 10 teams.

(a) How many diff. ways can teams finish?

$$\underline{10} \quad \underline{9} \quad \underline{8} \quad \underline{7} \quad \underline{6} \quad \underline{5} \quad \underline{4} \quad \underline{3} \quad \underline{2} \quad \underline{1} \text{ or } 10!$$

(b) How many diff. ways can 3 of the teams finish (gold, silver & bronze)

$$\underline{10} \quad \underline{9} \quad \underline{8} = 720 \text{ ways}$$

Part b is a permutation where we have 10 & pick 3.

written as

$${}_{10}P_3 = \frac{10!}{7!} = \frac{10 \cdot 9 \cdot 8 \cdot \cancel{7} \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

$$= \frac{10!}{(10-3)!}$$

$$\text{So } {}_n P_r = \frac{n!}{(n-r)!}$$

where n = total in group
 r = how many you pick from group

Your band, Mötley Crüe, has 12 songs that you've recorded. You need to burn a CD with 4 songs for your demo. How many ways?

$$12 P_4 = 11,980$$

Perms w/repetition

- 6 ways to arrange 3 things $\underline{3 \cdot 2 \cdot 1}$

- How about EEW?

FEW

EEW WEE EWE

If switch E's, get same ~~word~~ word.

Only 3 ways.

E repeats 2 times
 $\underline{w} \text{ } \textcircled{2} \text{ } 2!$

}	ABC		
	ABC	BAC	CBA
	ACB	BAC	CAB

$$\frac{3!}{2!} = 3 \text{ total ways}$$

Repeat

Find # ways for

(a) MIAMI

Letters
5
Repeats?
I-2
M-2

$$\frac{5!}{2! 2!} = 30$$

~~$\frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1 \cdot 2 \cdot 1}$~~

(b) TALLAHASSEE

Letters
11
Repeats
A-3
L-2
S-2
E-2

$$\frac{11!}{3! 2! 2! 2!} = 831,600$$

A L S E