

# Roll of a die ... 6 sides

## Odds of rolling a

- ① 1 →  $\frac{1}{6}$
- ② 4 →  $\frac{1}{6}$
- 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	→ 1 outcome

$\frac{1}{36}$  or 2.7%

⑥ Sum of 5

#1	#2	
1	4	} 4 outcomes
2	3	
3	2	
4	1	

$\frac{4}{36} = \frac{1}{9}$  or 11.1%

⑦ Sum of 7

#1	#2	
1	6	} 6 outcomes
2	5	
3	4	
4	3	
5	2	
6	1	

$\frac{6}{36} = \frac{1}{6}$   
16.7%

## ⑧ Rolling a 1

$\frac{12}{36} = \frac{1}{3}$  12

#1	#2	#1	#2
1	1	1	1
1	2	2	1
1	3	3	1
1	4	4	1
1	5	5	1
1	6	6	1

# Rollin Dice

1	2	3	4	5	6
3	4	3	7	7	6
6	7	4	4	4	5
7	4	2	1	3	3
5	5	6	7	∞	3
<del>8</del>	<del>8</del>	<del>8</del>	<del>8</del>	<del>8</del>	<del>8</del>
2	4	5	4	3	2
9	4	4	7	3	0
2	3	4	5	2	4
2	5	0	3	5	5
36	36	28	38	35	43

## 10.1b Permutations

ALC Olympics have 10 teams.

a) How many diff. ways can teams finish?

$$\begin{array}{cccccccccccc} \text{1st} & \text{2nd} & \text{3rd} & \text{4th} & \text{5th} & \text{6th} & \text{7th} & \text{8th} & \text{9th} & \text{10th} & & \\ 10 & \cdot & 9 & \cdot & 8 & \cdot & 7 & \cdot & 6 & \cdot & 5 & \cdot & 4 & \cdot & 3 & \cdot & 2 & \cdot & 1 & \text{ or } 10! \\ \hline & 3,628,800 \end{array}$$

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

$$\begin{array}{ccc} \text{1st} & \text{2nd} & \text{3rd} \\ 10 & \cdot & 9 & \cdot & 8 \\ \hline & & & & & 720 \text{ ways} \end{array}$$

${}_{10}P_3$

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

written as

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

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

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

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?

$$12P_4 = 11,880 \text{ ways}$$

Perms w/repetition

- 6 ways to arrange 3 things
- How about EEW?

{ ABC }

If switch E's, get same word.

Only 3 ways.

E repeats 2 times

How many ways to arrange letters of HEY

HEY

EHY

YEH

} only

HYE

EYH

YHE

} 6 ways

Have 3 letters

$$\underline{3} \cdot \underline{2} \cdot \underline{1} = 6 \text{ ways}$$

Find # ways for

(a) MIAMI

Letters

Repeats?

(b) TALLAHASSEE

Letters

Repeats