CS1800 Fall 2025

How many ways are there... ?

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How many ways to spend an evening at Strangehouse if we watch one Laney show and then one Tom show?

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How many ways to spend an evening at Strangehouse if we watch one Laney show **and** then one Tom show?

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How many ways to spend an evening at Strangehouse if we watch one Laney show **and** then one Tom show?

$$3 * 2 = 6$$

How many ways are there...?

$|L| = 3, |T| = 2$

How many ways to spend an evening at Strangehouse if we watch one Laney show and then one Tom show, **or** one Tom show and then one Laney show?

Case 1: Laney, Tom $3 \cdot 2 = 6$

Case 2: Tom, Laney $2 \cdot 3 = 6$

$6 + 6 = 12$

How many ways are there...?

$|L| = 3, |T| = 2$

It's a shorter evening! How many ways to watch a Laney show **or** a Tom show?

add

$3 + 2 = 5$

How many ways are there...?

$|L| = 3, |T| = 2$

→ no repetition

How many ways to watch two *different* Laney shows or two *different* Tom shows?

Ex:

- *archer,fg (Tom)*
- *matlock,wednesday (Laney)*
- *matlock,rookie (Laney)*

Cases:

- Laney, Laney $3 \cdot 2 = 6$
- Tom, Tom $2 \cdot 1 = 2$

$6 + 2 = 8$

How many ways are there...?

|L| = 3, |T| = 2

How many ways to watch a Laney show and then a Tom show and then a *different* Laney show?

L · T · L

3 · 2 · 2 = 12

Ex:

- *matlock,fg,rookie*
- *rookie,archer,wednesday*
- *rookie,fg,wednesday*

How many ways are there...?

|L| = 3, |T| = 2

How many ways to watch a Laney show and then a Tom show and then a Laney show (same show ok!)?

repetition

$L \cdot T \cdot 2$

$3 \cdot 2 \cdot 3 = 18$

Ex:

- *matlock,fg,matlock*
- *rookie,archer,wednesday*
- *rookie,fg,rookie*

How many ways are there...?

no "or", but sum rule

|L| = 3, |T| = 2

How many ways to watch two *different* Laney shows and one Tom show, in any order?

→ order

Ex:

- *laney,laney,tom* — $3 \cdot 2 \cdot 2 = 12$
- *laney,tom,laney* — $3 \cdot 2 \cdot 2 = 12$
- *tom,laney,laney*. — $2 \cdot 3 \cdot 2 = 12$

$12 + 12 + 12 = 36$

How many ways are there...?

|L| = 3, |T| = 2

How many ways to watch two Laney shows (same show ok!) and a Tom show, in any order?

3 cases: L, L, T
L, T, L
T, L, L

} 3 · 3 · 2 each

18 + 18 + 18 = 54

How many ways are there...?

Creating bibs for a 5k: A capital letter following by a positive integer ≤ 100.

How many bibs exist?

chatgpt

no "and", but product rule!

task 1: letter (26)

task 2: number (100)

$26 \cdot 100 = 2600$

How many ways are there...?

535 people run that 5k

How many ways to have a first place, second place, and third place finisher?

$$\underbrace{535}_{1\text{st}} \cdot \underbrace{534}_{2\text{nd}} \cdot \underbrace{533}_{3\text{rd}} = 152,272,770$$

How many ways are there...?

535 people run a 5k; 100 non-binary runners, 200 women, 235 men

How many ways to have a first place, second place, and third place finisher in all three categories?

nb $100 \cdot 99 \cdot 98$

women $200 \cdot 199 \cdot 198$

men $235 \cdot 234 \cdot 233$

multiply nb · m · w

$= 194,749,347,719,176,864,000$

↳ 6 trillion

How many passwords can you make?

(under certain rules)
security = restrictions so you have to make it complicated, but not SO restrictive you have too few

Password Restrictions

1. 5, 6, or 7 characters
2. Alpha (lowercase) or numeric (0-9)
3. Repeats allowed

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How many passwords are there...

- of length 5? $(26+10)^5 = 36^5$
- of length 6? 36^6
- of length 7? 36^7