

MATH:1260 Pokémath

The Mathematics of Pokémon Go[®]

Week 5 Monday, Spring 24

Popular curve:

Bisharp-like curve



Plan for Today

- CP
 - CP Calculator!
 - Stats and functions in other Pokemon Games
- Work time

Class Reminders

- Work day on Thursday, no GW for this week.
- Project 1 Stage 2: Data Due on Wednesday at midnight

↳ Project / Stage / Redo option

What are the best possible IVs for your Pokemon to have?

15, 15, 15

Pokemon GO has gym battles, raid battles, and one-on-one trainer battles (with different leagues!).


Does the answer change depending on your game mode?

Great - 1,500 CP cap

Ultra - 2,500 CP cap

Master - No CP cap

Let's investigate with Bisharp

0625		Bisharp	163	232	176
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We level up Bisharp as high as we can without going over 1500 CP:

With “perfect” IVs: 15 HP IV, 15 Attack IV, 15 Defense IV

At Level 18:

HP = 100 Attack = 139.99 Defense = 108.25

CP = 1462

With “Zuko47” IVs: 15 HP IV, 0 Attack IV, 15 Defense IV

At Level 19.5:

HP = 105 Attack = 136.85 Defense = 112.67

CP = 1488

HP Difference: 5

Attack Difference: -3.14

Defense Difference: 4.42

Zuko47 gives up 3.14 Attack to gain 5 HP and 4.42 Defense!

Why?

Where did “Zuko47” get this idea?

From the formula!

$$\text{CP} = \frac{\text{Attack} * \sqrt{\text{Defense}} * \sqrt{\text{UnroundedHP}}}{10}$$

What do you notice? Why does Zuko47 gain so much HP and Defense for only a small sacrifice of Attack?

It works in the Ultra League too!

With “perfect” IVs: 15 HP IV, 15 Attack IV, 15 Defense IV

At Level: 31.5

HP = 131 Attack = 182.97 Defense = 141.49

CP = 2499

With “Zuko47” IVs: 15 HP IV, 0 Attack IV, 15 Defense IV

At Level 35.5

HP = 136 Attack = 177.36 Defense = 146.02

CP = 2500

HP Difference: 5

Attack Difference: -5.61

Defense Difference: 4.53

What about other Pokemon games?

$$\text{HP} = \text{floor}(0.01 \times (2 \times \text{Base} + \text{IV} + \text{floor}(0.25 \times \text{EV})) \times \text{Level}) + \text{Level} + 10$$

$$\text{Other Stats} = (\text{floor}(0.01 \times (2 \times \text{Base} + \text{IV} + \text{floor}(0.25 \times \text{EV})) \times \text{Level}) + 5) \times \text{Nature}$$

Note that "floor" denotes the **floor function**. "Base" denotes the base stat for that stat.

These look complicated! What do you recognize? What do you not recognize?

Good thing Pokemon GO keeps things simple!