

# MATH:1260 Pokémath

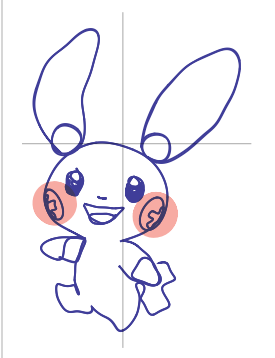
## The Mathematics of Pokémon Go<sup>®</sup>

Week 1 Wednesday, Spring 24

Out[\*]=

Popular curve:

Plusle-like curve



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## Plan for Today

- Introductions
- Check ICON for Syllabus
- Set up your account and start catching
- Intro to Sets

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## Class Reminders

- Make sure you can find the textbook on ICON
- Get your TopHat account working to answer in-class questions. Join code: 955322
- GW1 in discussion Thursday, bring a device and a pencil! (Try to have caught at least 5 Pokémon® before class)
- HW1 is due Wednesday January 24 (just to test a few definitions we'll cover in class today)

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## Online Resources you Need:

- The Syllabus: ICON
- Tophat: invited by email
- Textbook: ICON Direct eTexts on ICON
- Homework and submissions: ICON

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## Pokémon® Stats and Attributes: How do you keep track of this stuff?

Plusle: What are some stats or attributes?

Speed    HP "Health Points"    Attack  
Defense    Type: Electric    IVs    EVs

# Sets

## Definition: Set

A **set** is a collection of objects.

## Definition: Elements

The objects in the set are called **elements**.

## Notation

To define the elements of a set we use **{ }**

Name of a set is usually a capital letter such as **A**

### List Notation:

**{list, the, elements, of, the, set, separated, by, commas}**

$\{ \text{Attack, Defense, HP} \}$

**Set Builder Notation (this can be done in multiple ways! The goal is to be clear about your set)**

**{kind of object | properties}**

$\{ \text{Pokemon} \mid \text{Electric Type} \}$

**You can also combine List and Set Builder to create more interesting sets!**

**{Plusle, Minun, Pikachu} = E**

**{E | Name starts with a P} = F**

How might you write set "F" using List notation instead of Set Builder notation?

$F = \{ \text{Plusle, Pikachu} \}$

## More Examples of List Notation and Set Builder Notation:

$$\{\text{Pokemon} \mid \text{Starter Pokemon}\} = S$$

$$\{S \mid \text{Water Types}\} = W$$

$$\{W \mid \text{Generation 1}\} = G$$

$$G = \{\text{Squirtle}\} \text{ or } \{\text{Squirtle, Wartortle, Blastoise}\}$$

depending on your interpretation of "starter"

$$\{1, 2, 3, 4, 5\} = N$$

$$\{N \mid \text{Even numbers}\} = E$$

$$E = \{2, 4\}$$

## Relationships Between Sets

### Definition: Equality and Not Equality

Two sets,  $A$  and  $B$ , are **equal** if they have the same elements. Two sets are **not equal** if they fail to have the same elements.

order does not matter  
duplicates do matter

### Equality Notation

$$A = B$$

### Not-Equality Notation

$$A \neq B$$

### Definition: Subset and Not-Subset

$A$  is a **subset** of  $B$ , if all of the elements of  $A$  are elements of  $B$ .  $A$  is **NOT** a **subset** of  $B$ , if there is a single element in  $A$  that doesn't appear in  $B$ .

### Subset Notation

$$A \subseteq B \text{ similar to } 1 \leq 1$$

### Not-Subset Notation

$$A \not\subseteq B \text{ similar to } 1 \not\leq 0$$

$$\{\text{Charmander}\} \subseteq \{\text{Charmander}, \text{Charmeleon}, \text{Charizard}\}$$

$$\{7, 8, 9\} \subseteq \{7, 8, 9\}$$

### Definition: Proper Subsets and Not-Proper Subset

$A$  is a **proper subset** of  $B$ , if all of the elements of  $A$  are elements of  $B$  and there are elements of  $B$  that are not elements of  $A$ .  $A$  is **NOT** a **proper subset** of  $B$ , if there is a single element in  $A$  that doesn't appear in  $B$  or  $A$  and  $B$  are equal.

### Proper Subset Notation

$$A \subset B \text{ similar to } 1 < 2$$

### Not-Proper Subset Notation

$$A \not\subset B \text{ similar to } 1 \not< 1$$

$$\{\text{Charmander}\} \subset \{\text{Charmander}, \text{Charmeleon}, \text{Charizard}\}$$

$$\{7, 8, 9\} \not\subset \{7, 8, 9\}$$

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## Some Special Sets

### Definition: Empty Set

The **empty set** is the set with no elements

### Notation

$\emptyset$

### Definition: Universal Set

The **universal set** is the set of all objects of the type being discussed (This can be ambiguous, so be careful).

### Notation

$\mathcal{U}$



## Complements

$$\mathcal{U} = \{ \text{Pokemon} \}$$

### Definition

The **complement** of a set,  $A$  is the set of all elements of  $\mathcal{U}$  which are not elements of  $A$ .

### Notation

$$A' \text{ or } A^c \quad A = \{ \text{Bulbasaur} \} \quad A^c = \{ \text{Pokemon} \mid \text{Not Bulbasaur} \}$$

How a word problem might say it...

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# Intersections

## Definition

The **intersection** of two sets,  $A$  and  $B$ , is the set of elements belonging to both.

**Notation**

$$\{1, 2, 3, 4\} \cap \{2, 4, 6, 8\}$$

$A \cap B$

$$= \{2, 4\}$$

How a word problem might say it...

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## Unions

### Definition

The **union** of two sets,  $A$  and  $B$ , is the set of elements belonging to set  $A$  or set  $B$  or both.

### Notation

$$A \cup B$$

How a word problem might say it...

$$\{1, 2, 3, 4\} \cup \{2, 4, 6, 8\} \\ = \{1, 2, 3, 4, 6, 8\}$$

