MATH:1260 Pokémath
The Mathematics of Pokémon Go®

Week 1 Wednesday, Spring 24

Out[•]=

Popular curve:

Plusle-like curve

Plan for Today

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

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)

Online Resources you Need:

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

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 capitol letter such as A

List Notation:

{list, the, elements, of, the, set, separated, by, commas} {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} {Pokemon | 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 = {Plusle, Pikachu}

More Examples of List Notation and Set Builder Notation:

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

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

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

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

depending on your interpretation of "starter"

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

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

$E = \{2, 4\}$

Relationships Between Sets

order does not matter
duplicates do matter

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.

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

$A \subseteq B$ similar to $1 \leq 1$

Not-Subset Notation

$A \not\subseteq B$ similar to $1 \not\leq 0$

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

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

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

$A \subset B$ similar to $1 < 2$

Not-Proper Subset Notation

$A \not\subset B$ similar to $1 \not< 1$

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

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

Some Special Sets

Definition: Empty Set

The empty set is the set with no elements

Notation

$\varnothing$

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

How a word problem might say it...

Intersections

Definition

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

Notation

$A \cap B$

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

$= \{2,4\}$

How a word problem might say it...

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...

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

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