# Game Flow

- Each player sends out a Pokémon to battle the other player's Pokémon

- At each turn, each player's Pokémon attacks the other player's Pokémon or switches to another Pokémon

- Each player starts with 3 Pokémon

- The first player to defeat all of the other player's Pokémon wins

# Pokémon

- Each Pokémon has 6 stats:
  - HP: Health points, the Pokémon Faints if its HP falls to 0
  - Attack: Determines the damage of physical attacks
  - Defense: Determines the damage taken from physical attacks
  - Special Attack: Determines the damage of special attacks
  - Special Defense: Determines the damage taken from special attacks
  - Speed: Determines the order of attack during each turn

- Each Pokémon has up to 4 attacking moves

# Game Flow

- At the beginning of each turn, the player can either:
  - Attack with the Pokémon using one of the attacking moves
  - Switch to another Pokémon (this consumes the turn)
  - End the game by typing -1

- If both Pokémon choose to attack, the Pokémon with a higher speed stat attacks first
  - You do not need to consider speed ties (when they have the same speed)

- If a Pokémon takes damage and faints, it cannot attack that turn, and the player must send out another Pokémon
  - Unlike switching, this does not consume the turn

# Attacking Moves

- Attacking moves are split into 2 <span style="color:red">categories</span>: physical or special
  - Physical moves use my (physical) attack and opponent's (physical) defense
  - Special moves use my special attack and opponent's special defense

- Attacking moves also belong to a certain type
  - Ex)"Fire blast" is a fire type move

- Moves have limited number of uses, called PP (power point)
  - Each move loses 1 PP after being used
  - Moves with 0 PP cannot be used
  - Pokémon without any available moves uses a special weak move named "struggle" with unlimited PP

# Switching

- At each turn, the player can choose to switch their Pokémon

- The player cannot attack if they choose to switch

- Switching always happens first; if the opponent chooses to attack, the Pokémon that gets called takes the damage

- You can only switch to a Pokémon that is alive

- If both players switch, the faster Pokémon switches first

# Damage Calculation

- Initial damage calculation
  - The damage taken from a physical attack is calculated as:

  $$\left( \frac{(Attack\ stat\ of\ attacking\ Pok\acute{e}mon) \times (Power\ of\ attacking\ move)}{(Defense\ stat\ of\ defending\ Pok\acute{e}mon)} \right.$$

  - The damage taken from a special attack is calculated as:

  $$\left( \frac{(Special\ attack\ stat\ of\ attacking\ Pok\acute{e}mon) \times (Power\ of\ attacking\ move)}{(Special\ defense\ stat\ of\ defending\ Pok\acute{e}mon)} \right.$$

# Damage Multiplier: Type Effectiveness

- Each Pokémon and move belongs to a certain type
  - We will consider 4 types: fire, water, grass, normal

- The attack can to extra or less damage depending on the move's (attacking) type and the receiving Pokémon's (defending) type
  - Ex) A grass type Pokémon takes 2x damage from a fire type attack

| | | Defending Type | | | |
|---|---|---|---|---|---|
| Attacking Type | | Normal | Fire | Water | Grass |
| | Normal | 1x | 1x | 1x | 1x |
| | Fire | 1x | 0.5x | 0.5x | 2x |
| | Water | 1x | 2x | 0.5x | 0.5x |
| | Grass | 1x | 0.5x | 2x | 0.5x |

# Damage Multiplier: STAB

- Same type attack bonus (STAB)
- If the type of the attackingPokémon match the type of the attacking move, it will do 1.5x damage
  - Ex) If a fire type Pokémon uses a fire type attack, it will do 1.5x damage

- Final damage calculation
  - $\lfloor (Initial\ damage) \times (damage\ multipliers) \rfloor$
  - Damage multipliersinclude type effectiveness, STAB, and certain effects from held items

# Held Items

- Each Pokémon can have up to one held item

- Each held item has a unique effect, like recovering HP or boosting the damage from an `attack`

- Each held item is either consumable or permanent
    - Consumable held items are consumed after being used
    - Permanent held items are not consumed after being used

# Held Items

- Held items have two key components: condition and effect

- Condition refers to the condition which the item would activate
  - hp_below_threshold:when hp falls below a fraction of max HP
  - end_of_turn:at the end of each turn
  - move_type:when the Pokémon's attacking move is a certain type
  - move_category:when the Pokémon's attacking move is a certain category
  - damage_done:when the Pokémon deals damage

# Held Items

- Held items have two key components: condition and effect

- Effect refers to the effect of the item
  - heal_absolute: heal the HP by a certain value
  - heal_relative: heal a fraction of the max HP
  - boost_move_power: boost the attacking move's power by a certain fraction
  - lifesteal: heal the HP by a fraction of the damage dealt
    - Only heal for the fraction of the actual damage dealt ex) if the defending Pokémon has 100 HP and the move would've dealt 200 damage, only heal for a fraction of 100 HP.

# Held Items

- Examples

  - Heal 20 HP when HP is below 50%

    ```
    name: oran berry
    is consumable: True
    effect type: heal_absolute
    effect: 20
    condition type: hp_below_threshold
    condition: 0.5
    ```

  - Boost the damage of fire type attacks by 20%

    ```
    name: charcoal
    is consumable: False
    effect type: boost_move_power
    effect: 1.2
    condition type: move_type
    condition: fire
    ```

  - Heal 20% of the damage dealt

    ```
    name: shell bell
    is consumable: False
    effect type: lifesteal
    effect: 0.2
    condition type: damage_done
    condition: none
    ```

  - Heal 12.5% of max HP at the end of each turn

    ```
    name: leftovers
    is consumable: False
    effect type: heal_relative
    effect: 0.125
    condition type: end_of_turn
    condition: none
    ```

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# Start of Game

- At the beginning, each player drafts 3 Pokémon from a given list
  - Player 1 picks their 1st Pokémon
  - Player 2 picks their 1st and 2nd Pokémon
  - Player 1 picks their 2nd and 3rd Pokémon
  - Player 2 picks their 3rd Pokémon

- 3 held items are drafted the same way

- Each player assigns a held item to their Pokémon

# Struggle

- Pokémon without any available moves (all of the moves' PP=0) uses a special move called "struggle"

- Struggle is a normal type physical move with 30 power with 999 PP

- Struggle is hardcoded into the game (not from the moves list)

# Special Pokémon: T.S.M.

- T.S.M. has 3 special skills:
  - M.IN.D. Control: Make the opposing Pokémon hit itself the next time it would attack
  - GRIT: The next time where T.S.M. would take fatal damage, it survives with 1 HP
  - Spreading Cs: Make the opponent solve a math problem
    - If the opponent gets the problem right, the damage is halved
    - Details of the problem is explained in following slides