Simple Monte Carlo method for determining if a hand has Pokémon inside it, every time the method loops, the deck reshuffles and the hand is completely new.

```
public double monteCarlo() {
        success = 0;

        for (int i = 0; i < trials; i++) {
            fillDeck();
            drawHand();

            if (havePokemon()) {
                success++;
            }
        }
        return success;
    }
```

Compared to the highlighted number of trials, the amount of Charmanders that ended up in the hand are in the console

Card.java | CardGame.java | Tester.java | Charmander.java | Energy.java | Pokemon.java | Trainer.java | RareCandy.java

```java
import java.util.ArrayList;

public class CardGame
{
    private ArrayList <Card> deck;
    private ArrayList <Card> hand;
    public int trials = 1000;
    public double success = 0;

    public CardGame() {
        deck = new ArrayList<>();
        hand = new ArrayList<>();
    }

    //method that fills the deck with pokemon cards

    public void fillDeck() {
        deck.clear();
        for (int i=0; i<5; i++) {
            deck.add(new Energy());
        }
        for (int i = 0; i < 54; i++) {
            deck.add(new Energy());
        }
        deck.add(new Charmander());
    }


    public void drawHand() {
        Random rng = new Random();
        hand.clear();

        for(int i=0; i<7; i++) {
            int cardToTakeIndex = rng.nextInt(deck.size());
            hand.add(deck.get(cardToTakeIndex));
            deck.remove(cardToTakeIndex);
        }
    }

    public void clearHand() {
        hand.clear();
    }

    public boolean havePokemon() {
        //loop through hand. if 1 card is a pokemon, return true, else false
        for(Card singleCard : hand) {
```

Console

<terminated> Tester (7) [Java Application] C:\Users\Jaiden Nunez\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.7.v20230425-1502\jre\bin\javaw.exe (Oct 22, 2024, 8:48:29

```
Number of times Charmander was in the hand: 130.0
```

```java
import java.util.ArrayList;

public class CardGame
{
    private ArrayList <Card> deck;
    private ArrayList <Card> hand;
    public int trials = 10000;
    public double success = 0;

    public CardGame() {
        deck = new ArrayList<>();
        hand = new ArrayList<>();
    }

    //method that fills the deck with pokemon cards

    public void fillDeck() {
        deck.clear();
        for (int i=0; i<5; i++) {
            deck.add(new Energy());
        }
        for (int i = 0; i < 54; i++) {
            deck.add(new Energy());
        }
        deck.add(new Charmander());
    }


    public void drawHand() {
        Random rng = new Random();
        hand.clear();

        for(int i=0; i<7; i++) {
            int cardToTakeIndex = rng.nextInt(deck.size());
            hand.add(deck.get(cardToTakeIndex));
            deck.remove(cardToTakeIndex);
        }
    }

    public void clearHand() {
        hand.clear();
    }

    public boolean havePokemon() {
        //loop through hand. if 1 card is a pokemon, return true, else false
        for(Card singleCard : hand) {
```

Console

<terminated> Tester (7) [Java Application] C:\Users\Jaiden Nunez\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.7.v20230425-1502\jre\bin\javaw.exe (Oct 22, 2024, 8:48:57

```
Number of times Charmander was in the hand: 1095.0
```

Updated Candy distribution method

```
public int[] rareCandyDistribution(int trials) {
    int[] distribution = new int[8];

    for (int i = 0; i < trials; i++) {
        fillDeck();
        drawHand();

        int rareCandyCount = 0;
        for (Card card : hand) {
            if (card instanceof RareCandy) {
                rareCandyCount++;
            }
        }

        distribution[rareCandyCount]++;
    }
    return distribution;
}
```

Distribution of the Monte Carlo method for the rare candies

Card.java | CardGame.java | Tester.java | Charmander.java | Energy.java | Pokemon.java | Trainer.java | RareCandy.java

```java
import java.util.ArrayList;

public class CardGame
{
    private ArrayList <Card> deck;
    private ArrayList <Card> hand;
    public int trials = 1000000;
    public double success = 0;

    public CardGame() {
        deck = new ArrayList<>();
        hand = new ArrayList<>();
    }

    //method that fills the deck with pokemon cards

    public void fillDeck() {
        deck.clear();
        for (int i=0; i<7; i++) {
            deck.add(new RareCandy());
        }
        for (int i = 0; i < 52; i++) {
            deck.add(new Energy());
        }
        deck.add(new Charmander());
    }


    public void drawHand() {
        Random rng = new Random();
        hand.clear();

        for(int i=0; i<7; i++) {
            int cardToTakeIndex = rng.nextInt(deck.size());
            hand.add(deck.get(cardToTakeIndex));
            deck.remove(cardToTakeIndex);
        }
    }

    public void clearHand() {
        hand.clear();
    }

    public boolean havePokemon() {
        //loop through hand, if 1 card is a pokemon, return true, else false
```

Console

```
<terminated> Tester (7) [Java Application] C:\Users\Jaiden Nunez\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.7.v20230425-1502\jre\bin\javaw.exe (Oct 22, 2024,
0 Rare Candies: 398619
1 Rare Candies: 416425
2 Rare Candies: 156305
3 Rare Candies: 26459
4 Rare Candies: 2113
5 Rare Candies: 78
6 Rare Candies: 1
7 Rare Candies: 0
```

Addition of Potion. Heals pokemon by 20 HP

```java

public class Potion extends Trainer {


    public Potion() {
        super("Potion");
    }

    public void heal(Pokemon pokemon) {
        int newHP = pokemon.getHP() + 20;
        pokemon.setHP(newHP);
        System.out.println(pokemon.getClass().getSimpleName() + " healed by 20 HP! New HP: " + newHP);
    }
}

```

Console

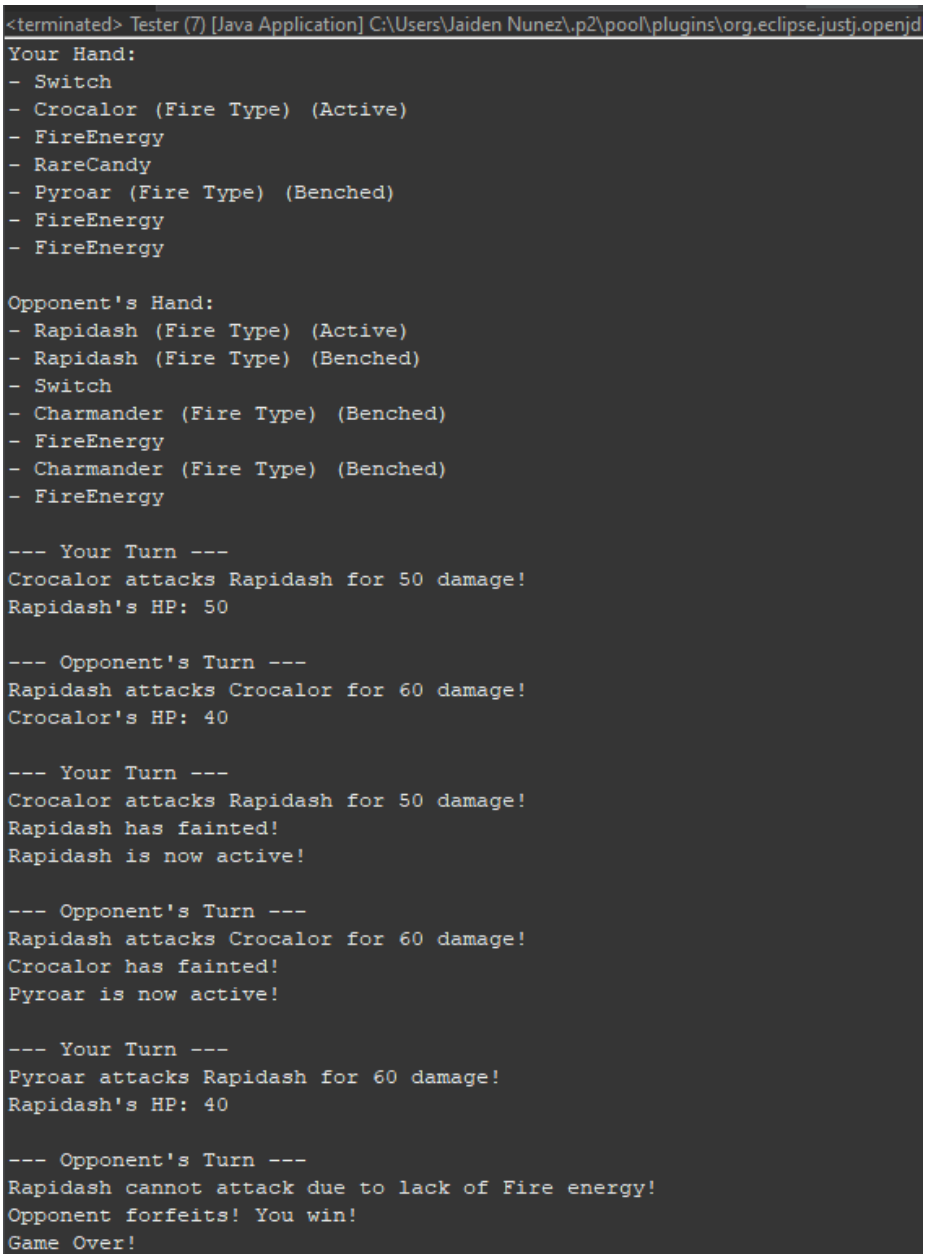
<terminated> Tester (7) [Java Application] C:\Users\Jaiden Nunez\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.7.v20230425-1502\jre\bin\javaw.exe (Oct 22, 2024, 3:45:24 PM – 3:45:24 PM) [pid: 8188]

```
Your Hand:
- Potion
- Potion
- RareCandy
- Bill
- WaterEnergy
- FireEnergy
- RareCandy

Opponent's Hand:
- Bill
- Potion
- FireEnergy
- Bill
- FireEnergy
- LightningEnergy
- Squirtle (HP: 50)
Squirtle healed by 20 HP! New HP: 70
```

Bill Trainer card (adds 2 cards to deck)

```java
import java.util.ArrayList;

public class Bill extends Trainer{

    public Bill() {
        super("Bill");
    }


    public void useBill(ArrayList<Card> deck, ArrayList<Card> hand) {
        if (deck.size() < 2) {
            System.out.println("Not enough cards in the deck to draw 2 cards.");
            return;
        }

        System.out.println("Using Bill! Drawing 2 cards...");
        for (int i = 0; i < 2; i++) {
            hand.add(deck.remove(0));
        }
    }
    @Override
    public String toString() {
        return "Bill (Draw 2 Cards)";
    }
}
```

Photos of the Pokémon game in action



Example of the trainer card Bill in action

```
Your Hand:
- FireEnergy
- Switch
- Potion
- Heatmor (Fire Type) (Active)
- Bill
- Charmander (Fire Type) (Benched)
- RareCandy

Opponent's Hand:
- RareCandy
- FireEnergy
- Charmander (Fire Type) (Active)
- FireEnergy
- FireEnergy
- FireEnergy
- Switch

--- Your Turn ---
Heatmor attacks Charmander for 20 damage!
Charmander's HP: 40
Heatmor used POTION healed by 20 HP! New HP: 140
Heatmor healed by 20 HP!
Using Bill! Drawing 2 cards...

New Hand After Using Bill:
- Switch
- Heatmor (Fire Type) (Active)
- Charmander (Fire Type) (Benched)
- RareCandy
- FireEnergy
- FireEnergy
```

Example of Running out of energy

```
--- Your Turn ---
Heatmor attacks Heatmor for 20 damage!
Heatmor's HP: 100
Heatmor used POTION healed by 20 HP! New HP: 140
Heatmor healed by 20 HP!

--- Opponent's Turn ---
Heatmor attacks Heatmor for 20 damage!
Heatmor's HP: 120
Heatmor used POTION healed by 20 HP! New HP: 120
Heatmor healed by 20 HP!

--- Your Turn ---
Heatmor attacks Heatmor for 20 damage!
Heatmor's HP: 100

--- Opponent's Turn ---
Heatmor attacks Heatmor for 20 damage!
Heatmor's HP: 100

--- Your Turn ---
Heatmor attacks Heatmor for 20 damage!
Heatmor's HP: 80

--- Opponent's Turn ---
Heatmor attacks Heatmor for 20 damage!
Heatmor's HP: 80

--- Your Turn ---
Heatmor cannot attack due to lack of Fire energy!
You forfeit! Opponent wins!
Game Over!
```