

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 X Tester.java Charmander.java Energy.java Pokemon.java Trainer.java RareCandy.java
1 import java.util.ArrayList;
2
3
4 public class CardGame
5 {
6     private ArrayList <Card> deck;
7     private ArrayList <Card> hand;
8     public int trials = 1000;
9     public double success = 0;
10
11     public CardGame() {
12         deck = new ArrayList<>();
13         hand = new ArrayList<>();
14     }
15
16     //method that fills the deck with pokemon cards
17
18     public void fillDeck() {
19         deck.clear();
20         for (int i=0; i<5; i++) {
21             deck.add(new Energy());
22         }
23         for (int i = 0; i < 54; i++) {
24             deck.add(new Energy());
25         }
26         deck.add(new Charmander());
27     }
28
29
30     public void drawHand() {
31         Random rng = new Random();
32         hand.clear();
33
34         for(int i=0; i<7; i++) {
35             int cardToTakeIndex = rng.nextInt(deck.size());
36             hand.add(deck.get(cardToTakeIndex));
37             deck.remove(cardToTakeIndex);
38         }
39     }
40
41     public void clearHand() {
42         hand.clear();
43     }
44
45     public boolean havePokemon() {
46         //loop through hand. if 1 card is a pokemon, return true, else false
47         for(Card singleCard : hand) {
```

Console X

<terminated> Tester (7) [Java Application] C:\Users\Uaiden 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

```

1 import java.util.ArrayList;
2
3
4 public class CardGame
5 {
6     private ArrayList <Card> deck;
7     private ArrayList <Card> hand;
8     public int trials = 10000;
9     public double success = 0;
10
11     public CardGame() {
12         deck = new ArrayList<>();
13         hand = new ArrayList<>();
14     }
15
16     //method that fills the deck with pokemon cards
17
18     public void fillDeck() {
19         deck.clear();
20         for (int i=0; i<5; i++) {
21             deck.add(new Energy());
22         }
23         for (int i = 0; i < 54; i++) {
24             deck.add(new Energy());
25         }
26         deck.add(new Charmander());
27     }
28
29
30     public void drawHand() {
31         Random rng = new Random();
32         hand.clear();
33
34         for(int i=0; i<7; i++) {
35             int cardToTakeIndex = rng.nextInt(deck.size());
36             hand.add(deck.get(cardToTakeIndex));
37             deck.remove(cardToTakeIndex);
38         }
39     }
40
41     public void clearHand() {
42         hand.clear();
43     }
44
45     public boolean havePokemon() {
46         //loop through hand. if 1 card is a pokemon, return true, else false
47         for(Card singleCard : hand) {

```

Console X
 <terminated> Tester (7) [Java Application] C:\Users\Vaideen Nunez\AppData\Local\Temp\org.eclipse.justi.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

1 import java.util.ArrayList;
2
3
4 public class CardGame
5 {
6     private ArrayList <Card> deck;
7     private ArrayList <Card> hand;
8     public int trials = 1000000;
9     public double success = 0;
10
11     public CardGame() {
12         deck = new ArrayList<>();
13         hand = new ArrayList<>();
14     }
15
16     //method that fills the deck with pokemon cards
17
18     public void fillDeck() {
19         deck.clear();
20         for (int i=0; i<7; i++) {
21             deck.add(new RareCandy());
22         }
23         for (int i = 0; i < 52; i++) {
24             deck.add(new Energy());
25         }
26         deck.add(new Charmander());
27     }
28
29
30     public void drawHand() {
31         Random rng = new Random();
32         hand.clear();
33
34         for(int i=0; i<7; i++) {
35             int cardToTakeIndex = rng.nextInt(deck.size());
36             hand.add(deck.get(cardToTakeIndex));
37             deck.remove(cardToTakeIndex);
38         }
39     }
40
41     public void clearHand() {
42         hand.clear();
43     }
44
45     public boolean havePokemon() {
46         //loop through hand. if 1 card is a pokemon. return true. else false
47     }
48 }
```

```
<terminated> Tester (7) [Java Application] C:\Users\Jaiden Nunez\.p2\pool\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64.17.0.7.v20230425-1502\jre\bin\javaw.exe (Oct 22, 2024, 10:10:10 AM)
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

```
1 public class Potion extends Trainer {
2
3
4
5     public Potion() {
6         super("Potion");
7     }
8
9     public void heal(Pokemon pokemon) {
10         int newHP = pokemon.getHP() + 20;
11         pokemon.setHP(newHP);
12         System.out.println(pokemon.getClass().getSimpleName() + " healed by 20 HP! New HP: " + newHP);
13     }
14 }
15
```

Console X

<terminated> Tester (7) [Java Application] C:\Users\Jaiden Nunez\p2\pool\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86\_64.17.0.7.v20230425-1502\jre\bin\javaw.exe (Oct 22, 2024, 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

Photos of the Pokémon game in action



```
Tester.java X Charmander.java Squirtle.java Pikachu.java Bulbasaur.java Jigglypuff.java FireEnergy.java LightningEn... »10
1
2 public class Tester {
3
4     public static void main(String[] args) {
5         CardGame game = new CardGame();
6         game.startGame();
7     }
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