

1. Play the "I'm guessing an integer between 1 and 100" game with a friend or parent. You think of a secret number and ask the other person to guess the number. Tell the player whether each guess is "too high" or "too low". Record the player's guesses **and their signature** on the back of this paper. After they've guessed the number, tell them that they played the game well if they guessed the number correctly within 7 guesses. Explain the binary search algorithm to them and stress that it is much faster than doing a sequential search (e.g. Is your secret number 1?...No...Is your secret number 2?...No....Is your secret number 3?...No...etc.)

2. Trace the code below

```
int mid = 0;
int numbers[] = {13, 15, 32, 48, 60, 74, 91, 93, 99};
boolean found = false;           found           low           high           mid
int key = 65;
int low = 0;
int high = numbers.length - 1;

while (low <= high && !found)
{
    mid = (low + high) / 2;

    if (key > numbers[mid])
    {
        low = mid + 1;
    }
    else if (key < numbers[mid])
    {
        high = mid - 1;
    }
    else
    {
        found = true;
    }
}

if (found)
{
    System.out.println("The value" + key + " was found in position " + mid);
}
else
{
    System.out.println("The value" + key + " was not found");
}
```

3. Trace the algorithm again with the following changes where the key is located in the array, which has an even # of elements.

```
key = 32;           found           low           high           mid
int numbers[] = {13, 15, 32, 48, 60, 74, 91, 93};
```