

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 with 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.) which would take 99 guesses in the worst-case scenario.

Answer the following exercises by tracing the variables and printing the displayed output. For this worksheet, ignore the fact that VB follows Banker's Rounding (e.g. assume that 4.5 rounds to 5 even though it would round down to 4 due to Banker's Rounding).

```
Dim scores() As Integer = {5, 13, 29, 31, 44, 53, 66, 75, 87, 99}
Dim low As Integer = 0
Dim high As Integer = scores.Length() - 1           key   found   low   high   mid
Dim key As Integer = 44
Dim mid As Integer = high / 2
Dim found As Boolean = False
```

```
While (Not (found) And low <= high)
```

```
    If (scores(mid) = key) Then
        found = True
    Else

        If (scores(mid) > key) Then
            high = mid - 1
        ElseIf (scores(mid) < key) Then
            low = mid + 1
        End If
```

```
        mid = Math.Round((low + high) / 2)
    End If
```

```
End While
```

```
If (found = True) Then
    lblResult.Text = "Found in position " + Str(mid)
Else
    lblResult.Text = "Not Found"
End If
```

show output here:

2. Trace the code again with key = 45 -----> key found low high mid
45

show output here:

3. Trace the code again with key = 99 -----> key found low high mid
99

show output here: