Java for Android:

`for` Loops

Code Walk Through 1

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Word Game Score Calculator

- User provides a word entered on their turn of a game
- Our job is to calculate a score
  - Two points awarded per letter
  - Points are doubled if:
    - Word is at least four characters, and
    - The number of vowels is greater than or equal to the number of consonants

Word Game Score Calculator

- To calculate a score we need to:

1. Determine the number of characters
2. Count the number of vowels
3. Compare the number of vowels to the number of consonants

We'll address these one at a time…

Determine the number of characters

- To determine the number of characters, we can simply call the length() method of the String class:

```
//get word from Android UI
String word = out.getWord();
int numChars = word.length();
```

Count the number of vowels

- To determine the number of vowels, we will iterate over all character of the string and for each character determine if it is a vowel
  - Use a for-loop since the number of character is already known
- We can access a single character from the string using the `charAt()` method, indicating the index of the character we want
- Indices of the characters are zero-based

Count the number of vowels

- Loop over all the characters, using zero-based indexing:

```
for (int i=0; i<numChars; i++) {
    char ch = word.charAt(i);
    …
}
```

Count the number of vowels

- To count the number of vowels, we will use a cumulative sum loop:

```
int numVowels = 0;
for (int i=0; i<numChars; i++) {
    char ch = word.charAt(i);
    // if ch is a vowel, increment numVowels
}
```

Count the number of vowels

- To determine if a character is a vowel, we'll convert it to lower case and then compare it to 'a', 'e', 'i', 'o', and 'u':

```
ch = Character.toLowerCase(ch);
if (ch=='a' || ch=='e' || ch=='i' ||
    ch=='o' || ch=='u') {
   numVowels++;
}
```

Code so far...

```
String word = out.getWord(); //get word from Android UI
int numChars = word.length();
int numVowels = 0;
for (int i=0; i<numChars; i++) {
    char ch = word.charAt(i);
    ch = Character.toLowerCase(ch);
    if (ch=='a' || ch=='e' || ch=='i' ||
        ch=='o' || ch=='u') {
       numVowels++;
    }
}
```

Word Game Score Calculator

- Now we can compute the score:
  - Two points awarded per letter
  - Points are doubled if:
    - Word is at least four characters, and
    - The number of vowels is greater than or equal to the number of consonants

Word Game Score Calculator

- Two points are awarded per letter:

```
int score = 2 * numChars;
```

Word Game Score Calculator

- Points are doubled if:
  - Word is at least four characters, and
  - The number of vowels is greater than or equal to the number of consonants

```
if (numChars >= 4 &&
     numVowels >= (numChars-numVowels)) {
    score = 2 * score;
}
```

Here's our final code:

```
String word = out.getWord(); //get word from Android UI
int numChars = word.length();
int numVowels = 0;
for (int i=0; i<numChars; i++) {
   char ch = word.charAt(i);
   ch = Character.toLowerCase(ch);
   if (ch=='a' || ch=='e' || ch=='i' || ch=='o' || ch=='u') {
      numVowels++;
   }
}
int score = 2 * numChars;    // score two points per letter
if (numChars >= 4 && numVowels >= (numChars-numVowels)) {
   score = 2 * score;        // double the score when appropriate
}
out.println("Your score is: " + score);
```