1. One possible solution appears below.

```java
public static void printJumbles(Dictionary words, List<String> options,
                               int numWords) {
    printJumbles(words, options, numWords, "");
}

public static void printJumbles(Dictionary words, List<String> options,
                               int choices, String soFar) {
    if (choices == 0) {
        if (words.contains(soFar)) {
            System.out.println(soFar);
        }
    } else {
        for (String word : options) {
            printJumbles(words, options, choices - 1, soFar + word);
        }
    }
}
```

2. One possible solution appears below.

```java
public static void printJumbles2(Dictionary words, List<String> options) {
    printJumbles2(words, options, "");
}

// pre : words contains the prefix soFar
public static void printJumbles2(Dictionary words, List<String> options,
                                String soFar) {
    if (words.contains(soFar)) {
        System.out.println(soFar);
    }
    for (String word : options) {
        String newString = soFar + word;
        if (words.containsPrefix(newString)) {
            printJumbles2(words, options, newString);
        }
    }
}
```

3. One possible solution appears below.

```java
public static void printJumbles3(Dictionary words, List<String> options) {
    printJumbles3(words, options, "", new TreeSet<String>());
}

public static void printJumbles3(Dictionary words, List<String> options,
                                String soFar, Set<String> used) {
    if (words.contains(soFar)) {
        System.out.println(soFar);
    }
    for (String word : options) {
        String newString = soFar + word;
        if (!used.contains(word) && words.containsPrefix(newString)) {
            used.add(word);
            printJumbles3(words, options, newString, used);
            used.remove(word);
        }
    }
}
```

For students who are interested, the complete code for Dictionary.java and the
sample solution Jumble.java are available along with the data files
dictionary.txt and states.txt.

https://courses.cs.washington.edu/courses/cse143x/20au/lectures/Dictionary.java
https://courses.cs.washington.edu/courses/cse143x/20au/lectures/Jumble.java
https://courses.cs.washington.edu/courses/cse143x/20au/lectures/dictionary.txt
https://courses.cs.washington.edu/courses/cse143x/20au/lectures/states.txt