

Prime Factors Kata



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Generating Prime Factors.

Although quite short, this kata is fascinating in the way it shows how 'if' statements become 'while' statements as the number of test cases increase. It's also a wonderful example of how algorithms sometimes become simpler as they become more general.

I stumbled upon this little kata one evening when my son was in 7th grade. He had just discovered that all numbers can be broken down into a product of primes and was interested in exploring this further. So I wrote a little ruby program, test-first, and was stunned by how the algorithm evolved.

I have done this particular kata in Java 5.0. This should give you a feel for the power and convenience of some of the new features.

The Requirements.

Prime Factors
<u>+ generate (n : int)</u>

- Write a class named “PrimeFactors” that has one static method: generate.
 - The generate method takes an integer argument and returns a List<Integer>. That list contains the prime factors in numerical sequence.

Begin.

- Create a project named PrimeFactors
- Create a package named primeFactors
- Create a unit test named PrimeFactorsTest

```
package primeFactors;  
  
import junit.framework.TestCase;  
  
public class PrimeFactorsTest extends TestCase {  
}
```

No tests found in primeFactors.PrimeFactorsTest

The first test.

```
package primeFactors;

import junit.framework.TestCase;

public class PrimeFactorsTest extends TestCase {
    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }
}
```

The first test.

```
package primeFactors;

import junit.framework.TestCase;

import java.util.List;

public class PrimeFactorsTest extends TestCase {
    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }

    private List<Integer> list() {
        return null;
    }
}
```

The first test.

```
package primeFactors;

import junit.framework.TestCase;

import java.util.List;

public class PrimeFactorsTest extends TestCase {
    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }

    private List<Integer> list() {
        return null;
    }
}
```

```
package primeFactors;

public class PrimeFactors {
}
```

The first test.

```
package primeFactors;

import junit.framework.TestCase;

import java.util.List;

public class PrimeFactorsTest extends TestCase {
    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }

    private List<Integer> list() {
        return null;
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        return new ArrayList<Integer>();
    }
}
```

expected:<null> but was:<[]>

The first test.

```
package primeFactors;

import junit.framework.TestCase;

import java.util.*;

public class PrimeFactorsTest extends TestCase {
    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }

    private List<Integer> list() {
        return new ArrayList<Integer>();
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        return new ArrayList<Integer>();
    }
}
```


The first test.

```
package primeFactors;

import junit.framework.TestCase;

import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list() {
        return new ArrayList<Integer>();
    }
    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }
}
```



```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        return new ArrayList<Integer>();
    }
}
```



The Second Test

The Second test.

```
package primeFactors;


import junit.framework.TestCase;

import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list() {
        return new ArrayList<Integer>();
    }

    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), PrimeFactors.generate(2));
    }
}
```



```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        return new ArrayList<Integer>();
    }
}
```

The Second test.

```
package primeFactors;

import junit.framework.TestCase;

import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) { ← varargs
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), PrimeFactors.generate(2));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        return new ArrayList<Integer>();
    }
}
```

expected:<[2]> but was:<[]>

The Second test.

```
package primeFactors;

import junit.framework.TestCase;

import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), PrimeFactors.generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), PrimeFactors.generate(2));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            primes.add(2);
        }
        return primes;
    }
}
```

The Second test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            primes.add(2);
        }
        return primes;
    }
}
```

The Third Test

The Third test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            primes.add(2);
        }
        return primes;
    }
}
```

expected:<[3]> but was:<[2]>

The Third test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            primes.add(n); ←
        }
        return primes;
    }
}
```

The Fourth Test

The Fourth test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            primes.add(n);
        }
        return primes;
    }
}
```

expected:<[2, 2]> but was:<[4]>

The Fourth test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2,2), generate(4));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            if (n%2 == 0) {
                primes.add(2);
                n /= 2;
            }
            if (n > 1)
                primes.add(n);
        }
        return primes;
    }
}
```

The Fifth Test

The Fifth test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            if (n%2 == 0) {
                primes.add(2);
                n /= 2;
            }
            if (n > 1)
                primes.add(n);
        }
        return primes;
    }
}
```

The Sixth Test

The Sixth test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            if (n%2 == 0) {
                primes.add(2);
                n /= 2;
            }
            if (n > 1)
                primes.add(n);
        }
        return primes;
    }
}
```

expected:<[2, 2, 2]> but was:<[2, 4]>

The Sixth test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }


    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            while (n%2 == 0) { 
                primes.add(2);
                n /= 2;
            }
            if (n > 1)
                primes.add(n);
        }
        return primes;
    }
}
```

The Seventh Test

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            while (n%2 == 0) {
                primes.add(2);
                n /= 2;
            }
            if (n > 1)
                primes.add(n);
        }
        return primes;
    }
}
```

expected:<[3, 3]> but was:<[9]>

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            int candidate = 2;
            while (n%candidate == 0) {
                primes.add(candidate);
                n /= candidate;
            }
            if (n > 1)
                primes.add(n);
        }
        return primes;
    }
}
```

expected:<[3, 3]> but was:<[9]>

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        if (n > 1) {
            int candidate = 2;
            while (n % candidate == 0) {
                primes.add(candidate);
                n /= candidate;
            }
        }
        if (n > 1)
            primes.add(n);
        return primes;
    }
}
```

expected:<[3, 3]> but was:<[9]>

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }


    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        
        int candidate = 2;
        if (n > 1) {
            while (n % candidate == 0) {
                primes.add(candidate);
                n /= candidate;
            }
            if (n > 1)
                primes.add(n);
            return primes;
        }
    }
}
```

expected:<[3, 3]> but was:<[9]>

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }


    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        
        int candidate = 2;
        if (n > 1) {
            while (n % candidate == 0) {
                primes.add(candidate);
                n /= candidate;
            }
            if (n > 1)
                primes.add(n);
            return primes;
        }
    }
}
```

expected:<[3, 3]> but was:<[9]>

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }


    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        int candidate = 2;
        while (n > 1) {  !!!
            while (n % candidate == 0) {
                primes.add(candidate);
                n /= candidate;
            }
            candidate++;
        }
        if (n > 1)
            primes.add(n);
        return primes;
    }
}
```

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        int candidate = 2;
        while (n > 1) {
            while (n % candidate == 0) {
                primes.add(candidate);
                n /= candidate;
            }
            candidate++;
        }
        return primes;
    }
}
```

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
import junit.framework.TestCase;
import java.util.*;

public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
        List<Integer> list = new ArrayList<Integer>();
        for (int i : ints)
            list.add(i);
        return list;
    }

    public void testOne() throws Exception {
        assertEquals(list(), generate(1));
    }

    public void testTwo() throws Exception {
        assertEquals(list(2), generate(2));
    }

    public void testThree() throws Exception {
        assertEquals(list(3), generate(3));
    }

    public void testFour() throws Exception {
        assertEquals(list(2, 2), generate(4));
    }

    public void testSix() throws Exception {
        assertEquals(list(2, 3), generate(6));
    }

    public void testEight() throws Exception {
        assertEquals(list(2, 2, 2), generate(8));
    }

    public void testNine() throws Exception {
        assertEquals(list(3, 3), generate(9));
    }
}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();
        int candidate = 2;
        while (n > 1) {
            → for (; n%candidate == 0; n/=candidate)
                primes.add(candidate);

            candidate++;
        }
        return primes;
    }
}
```

The Seventh test.

```
package primeFactors;

import static primeFactors.PrimeFactors.generate;
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public class PrimeFactorsTest extends TestCase {
    private List<Integer> list(int... ints) {
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            list.add(i);
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    public void testOne() throws Exception {
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        assertEquals(list(2,2), generate(4));
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}
```

```
package primeFactors;

import java.util.*;

public class PrimeFactors {
    public static List<Integer> generate(int n) {
        List<Integer> primes = new ArrayList<Integer>();

        for (int candidate = 2; n > 1; candidate++)
            for (; n%candidate == 0; n/=candidate)
                primes.add(candidate);

        return primes;
    }
}
```

The algorithm is three lines of code!

END