# What would *you* do if suddenly there were too many rabbits in your town, and there were more and more each day?

1. Ask students to tell you what they know of the story "The Pied Piper". If students are not familiar with this story, you may want to provide them with a simplified version of the traditional tale. Then, have students write a brief summary on a medium or even small sticky note (This keeps the summaries short).

2. Introduce key vocabulary words and phrases, including math terms from *Rabbits, Rabbits Everywhere: A Fibonacci Tale*. Have students categorize them as story words or math words.

Story Words and Phrases	Math Words and Phrases
• Wizard • Keep me company • Full-grown • Allergic • Rabbit invasion • Enchanted animals • Under a spell	• Pair • Pattern • Tree diagram • Doubling • Increasing number • Sum • Fibonacci sequence

3. Use reading strategies such as these while students read or listen.
   • Predict what will come next
   • Ask a question about the story
   • Summarize what has happened so far
   • Make a connection to your own thoughts or experiences.
   • Give an opinion
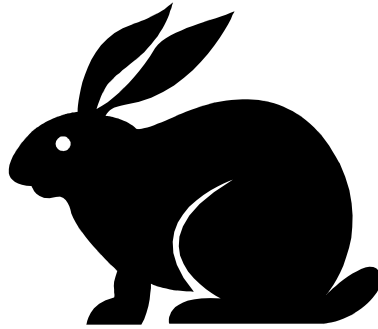
This story was inspired by a real math problem from history. In the 1200's, Leonardo Fibonacci, a mathematician from Italy, was working on the following problem:

Two rabbits, a male and a female, take one month to mature and another month to reproduce two more baby rabbits, another male and female. If all the new babies follow the same pattern (and none die), how many rabbits would there be after one year?

In *Rabbits, Rabbits Everywhere*, the rabbits take just a day to mature and another day to reproduce babies.

How many rabbits would there be after ten days?

- Introduce tree diagrams by examining the number of total rabbits each day

- Tree diagrams can also be used for other things, such as finding the number of options for ice-cream sundaes (I.e. chocolate or vanilla, sprinkles or chocolate chips, whipped cream or plain), or the possible combinations of pizza.

- Explore examples of Fibonacci numbers in real life. (Use the endnotes at the back of the book for guidance). There are also many, many resources for this on the internet or in the library.

- Examine some other number sequences. Determine the next term in the sequence. For example:

  o **Arithmetic sequences-** the difference between any two consecutive terms is the same. 1, 4, 7, 10, 13, 16… (add 3 each time)

  o **Geometric sequences-** the next term is determined by multiplying. 1, 2, 4, 8, 16… (multiply by 2 each time)

  o **Special sequences**
    - **Triangular numbers = 1, 3, 6, 10…**
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      *         *              *
                * *           * *
                             * * *      (etc.)
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    - **Square numbers (these look like…. squares) =1, 4, 9…**
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      *         * *           * * *
                * *           * * *
                              * * *
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    - **Cube numbers (add more dots to make these 3-D)**

<u>**Writing a Summary- Student Worksheet**</u>   Name: _____

<u>Rabbits, Rabbits Everywhere: A Fibonacci Tale</u>

It turns out that words are worth money. And, at 10¢ a word, this 157-word summary is way, way too expensive. *(How much is it worth, exactly??)* Actually, you can only spend $2.00 on today's summary. Using just a few sentences, can you write a 20-word summary of the story? (A summary is when we take a story and make it shorter by focusing on just the main ideas.)

One day the Pied Piper hid the carrots and cabbages away from the wizard of Chee. The wizard was angry and said that the villagers would pay for their fib. Soon, more and more rabbits overran the town. Amanda saw that the rabbits were under a spell. The Pied Piper tried to get rid of the rabbits but it didn't work. Amanda noticed a pattern in the number of rabbits there were. On the first day there was one pair. On the second day there was still one pair. But then, on the next days there were two pairs, then three pairs, then five pairs, then eight pairs and so on. Amanda found a pattern. Amanda told the wizard what the pattern was and that broke the spell. The rabbits followed Amanda out of town to a meadow. The pattern of numbers was known as the Fibonacci sequence, after the first two rabbits named Fibb and Knot.

Write your twenty word summary here:

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

<u>Writing Extension- Student Worksheet</u>　　　Name: _____

<u>Rabbits, Rabbits Everywhere: A Fibonacci Tale</u>

The end of the story states, "As for the Pied Piper, neither hide nor hare of him was ever seen again." Choose one writing prompt below.

*What happened to the Pied Piper? Was he appropriately punished for his actions? What would you have done to him?

*What problems would having too many rabbits (and more and more each day) cause? What would happen if this were to occur near your home?

*Write a story of how something similar happened to you. Maybe there was an ant invasion in your kitchen, a pack of prairie dogs in your backyard, a mob of magpies in the market…. Or even, a bevy of bears in your bedroom.

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