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St. Patrick's Day

### **The Pot of Gold at the Rainbow's End**

Long ago in Ireland, there lived a husband and wife who were very old and very poor. They mostly lived off of whatever they could grow on their tiny plot of land.

One day, while they were working together in their garden, they thought they heard a tiny voice calling to them.

The old man had just pulled a tiny carrot out of the ground. When he looked down into the hole where the carrot had been, he saw a little fellow dressed in green and wearing a red cap.



"Who are you?" asked the old man.

"Why, I'm a leprechaun, for sure. What else would I be?" said the tiny creature as he jumped out of the hole.

The leprechaun told the couple that he'd come to grant them one wish, anything they wanted.

"Well, what will it be?" asked the magical little man.

It was all so sudden that the couple didn't know what to ask for.

"Let's have him make us young again," said the wife.

"What good would that do us?" said the husband. "We'd still be poor."

"Well, then let's ask for a nice house with a pantry full of food."

"Umm...let me think a minute. How about some special power? We could ask for the power to fly, or to be invisible. What fun we'd have!"

"Maybe, but I think I'd rather have fine clothes and jewels—that sort of thing."

And so it went, on and on. There seemed to be so many possibilities that the couple just couldn't choose among them.

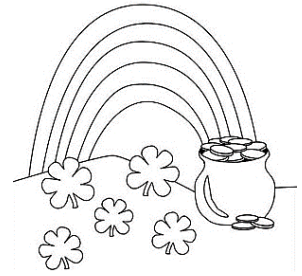
"Tell you what," said the leprechaun at last, "when you make up your minds, let me know. You can find me at the rainbow's end. And I'll have a pot of gold waiting there for you, in case you can't agree on anything else."—And with that he was gone.

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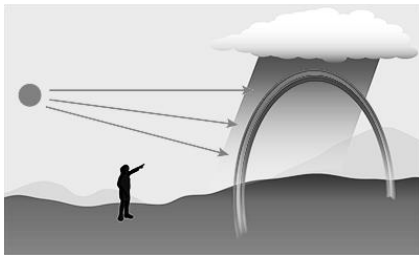
As soon as the leprechaun had vanished, the couple realized how foolish they had been. They immediately decided that a pot of gold would do quite nicely. But now that the leprechaun was gone, they'd have to go find it.

So the couple left their little cottage and went to search for their pot of gold at the end of the rainbow. Of course, they never found it; nor has anyone else. And it's a pretty safe bet that nobody ever will. But that doesn't mean *you* can't still look!



### **Why you can never reach the end of the rainbow:**

A rainbow isn't really a "thing" and it doesn't exist in a particular "place." It is an optical illusion (something that looks different than it really is) that appears when sunlight and conditions in the atmosphere are just right—and your position is just right to see it.



#### When can you see a rainbow?

A rainbow *requires* water droplets to be floating in the air. That's why we see them right after it rains. The Sun *must* be behind you and the clouds cleared away from the Sun for the rainbow to appear.

#### Why is a rainbow a bow—or arc?

A full rainbow is actually a complete circle, but from the ground we see only part of it. From an airplane, in the right conditions, one can see an entire circular rainbow.



#### What happens in the water droplets?

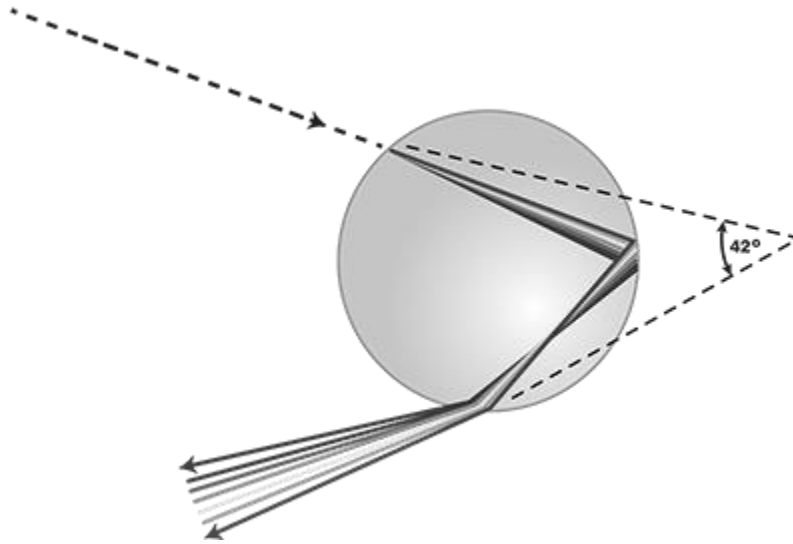
The sunlight shines on a water droplet. As the light passes into the droplet, the light bends, or refracts, a little, because light travels slower in water than in air (because water is denser). Then the light bounces off the back of the water droplet and goes out the way it came, bending again as it speeds up when it leaves the water droplet.

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### Why the colors?

Sunlight is actually made up of different colors of light. It is the combination of all these colors together that make sunlight look white. Some of the colors get bent more than others when the light enters the water droplet. Violet bends the most, red bends the least. So when the light leaves the water droplet, it leaves separated into different colors. When the separated colors of light reach your eyes, what you see is a rainbow of color. Violet (the color that gets bent most) is on the bottom, and red (the color bent least) is on top.



### So why can't you find that pot of gold?

Sunlight is bouncing off of all the water droplets in the sky and being separated into different colors. But you can only see the colored light that comes from droplets that are at exactly the right spot for the light to enter your eye at precisely the right angle. These droplets lie in a circle. This is why the rainbow looks like part of a circle.

As you walk toward what looks like the rainbow's end, the rainbow 'moves' with you. Why?—because when you move, you no longer see colored light from the same droplets as before. (They are no longer in the right spot.) Instead, you see light from other raindrops—the ones that are *now* in the right spot to send light to your eye at the right angle. What you're really seeing is a whole new rainbow, but it looks exactly the same to you.

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What you see as you move is a continuous sequence of different rainbows. It's as if the rainbow is moving with you. This means that you can never reach its end, making it the perfect place for leprechauns to hide their gold.



1. If a leprechaun offered you one wish, what would it be?
2. What conditions are necessary for you to see a rainbow?
3. What is the actual shape of a rainbow?
4. If the rainbow is just sunlight, why do you see different colors?
5. Why can't you reach the end of the rainbow?