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Big Dig Drilling

Why is it such a challenge to drill deep into the Earth? Forces in the ground make it hard to push through. The length of the drill also causes problems, as you will see in this activity.

What You Need

- a raw potato
- several plastic drinking straws

What to Do

1. Cut a thin slice of raw potato (one inch thick or less).
2. Place the slice of potato on a flat surface.
3. Use one of the plastic straws as a drill. Push it into the potato slice, turning it while pressing down. Try drilling one hole while holding the straw in the middle and another while holding the straw at the top.
4. Connect two straws together by pinching the end of one straw and inserting it into the end of the other straw.
5. Hold the connected straws at the top end and try drilling another hole in the potato slice.
6. Keep adding straws until you reach the point where the straws will no longer drill through the potato.

What Happens

When you held the first straw in the center, drilling the hole should have been easy. Holding the straw at the top probably made it a bit shaky. Adding the second straw made drilling more challenging. As you add more straws, it gets harder and harder to drill. Before long, you reach the point where the straws bend instead of making a hole.

Why do the straws bend? As the drill becomes long, the direction of the force gets hard to control. As long as the drill is straight and you push straight down, the force of pushing should be directed down to the potato. But if you push a little to the side, some of the force goes to the side, and it becomes harder to drill. As you add more straws, any force that goes to the side will have a better chance of causing the straws to bend.

When people drill deep underground, they add sections to their drills just like you added straws to your drill. When the boat *Chikyu* adds sections to its drill, the potential for bending gets greater and greater. How does *Chikyu* keep its drill from bending? It has a special positioning system that keeps it carefully positioned directly above the drill, even in rough seas. The riser on the sea floor also works to keep the drill from bending.