3M

Young Scientist Lab

in partnership with: Discovery EDUCATION

WHELMERS

Pie-Pan Accelerometer

A metal pie pan demonstrates the acceleration of gravity.

WHAT YOU NEED

- two pieces of string, each approximately 60 inches long
- 20 metal hardware nuts
- metal pie pan

WHAT YOU DO

1. On the first string, use firm knots to attach a metal nut approximately every 15 cm.
2. On the second string, attach the nuts at the following positions: 0 cm, 2 cm, 4 cm, 8 cm, 13 cm, 18 cm, 24 cm, 31 cm, and 40 cm.
3. Hold one string at a time, vertically, over the pie pan. When you release each string, the nuts will make a resounding bang as they hit the pan. Can you determine a difference in the noise pattern created by the two sets of falling nuts?

WHAT HAPPENS

The first string has equally spaced hardware nuts. As it falls, you will notice that the time between each bang gets shorter and shorter. The second string generates a regular set of bangs, even though the nuts are separated at larger and larger distances. Both strings fall at the same rate. Why do they create differing sound patterns? The nuts fall faster and faster, or accelerate!

The constant pull of gravity causes objects to fall toward the earth's center at a rate of 9.8 meters per second per second, or 9.8 m/sec^2. Simply stated, the farther an object falls toward the earth, the faster it goes. It accelerates. The relationship between time (t), distance (d), and the acceleration constant of gravity (g) is represented by the formula $d = {}^1/_2\, gt^2$. The value of g for the earth's gravitational pull is 9.8 m/sec^2. This formula was used to determine the positioning of the metal nuts on the second string.