Mass in Space Lab

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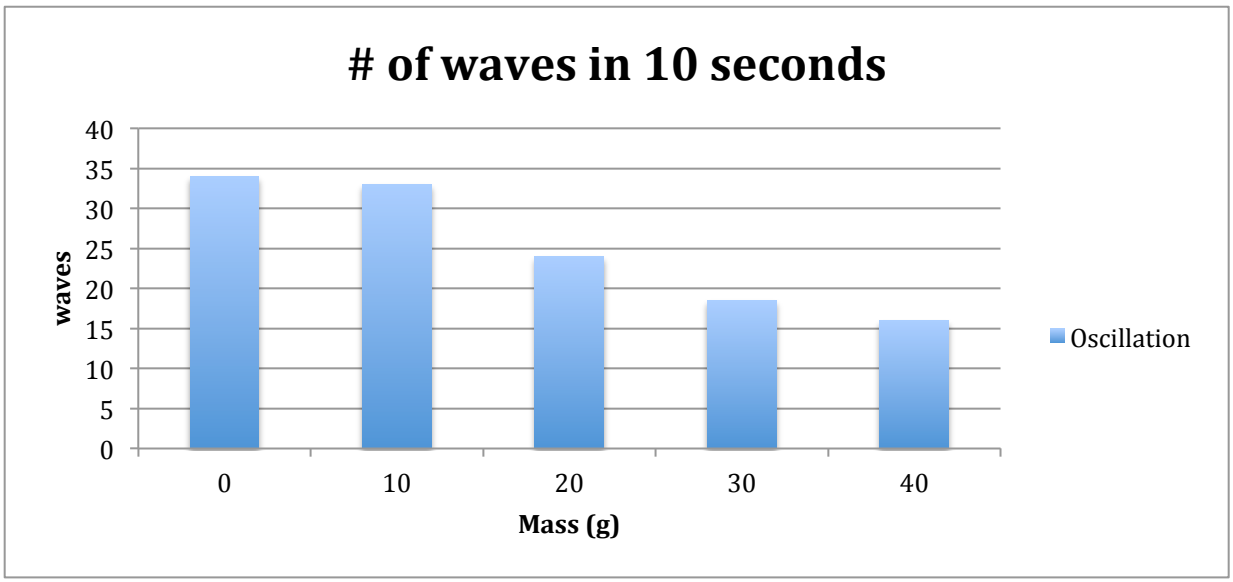
Focus Question: How can we determine mass of an object without using a scale or balance?

Background Information: Everything always has its mass, but it doesn't always have weight. Even though something may be weightless in space because of the lack of gravity, it still has the exact same mass. It is hard to find the mass of something when there isn't any gravity, so instead of using a scale, we use an objects inertia (the tendency of an object to resist a change in its motion) to do so.

Data Pt. 1:

Mass (g)	**# of waves per 10 seconds of oscillation**
0	**34**
10	**33**
20	**24**
30	**18.5**
40	**16**

Analysis Pt. 1:



As the mass increases, the waves decrease.

Data Pt. 2:

Trial	**# of waves per 10 seconds of Ocillation**
1	21.5
2	21.5
3	21.5
Average	**21.5**

Analysis Pt. 2:

Our estimated mas of our unknown weight was 25 grams, our actual mass was 15 grams.

$\frac{(15g-25g)}{15g} = -0.67$ $\quad -0.67 \times 100 = -66.67\%$ error

Synthesis Question:

Before determining an unknown mass in space, I must already know its inertia.

Conclusion:

The waves can be used to see a pattern in mass because you can notice that as the mass of the object goes up, the oscillation tends to go down. The heavier something is, the slower it goes. Astronauts must use this method to determine mass in space because since there isn't any gravity, they can't just set something on a scale to determine the mass. Since our percentage of error was a negative number, I believe that it was actually 66.67% error instead on -66.67% error. We had this percentage of error because we estimated too high on the mass of our unknown object. The motion sensor made this lab much easier to complete because it is difficult to count how many times it sways in a matter of ten seconds accurately.