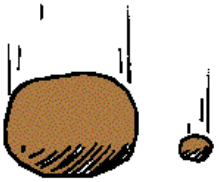
Name _____ Date _____ Period _____



DETERMINING ACCELERATION DUE TO GRAVITY

BACKGROUND: If air resistance is small, the rate at which a body falls is constant, regardless of its mass. The rate at which a body falls is determined by the gravitational force exerted on the body. On the surface of the Earth, acceleration due to gravity is close to 9.8 m/sec^2. In this investigation you will determine acceleration due to gravity using two different methods.

PROBLEM: How can acceleration due to gravity near the surface of the Earth be determined?

MATERIALS:

- String or wire about 1.5 m long
- Hooked weight, 500g
- Timer
- Buret
- Pie plate
- Meter stick
- Beaker
- Ring stand with buret clamp

PROCEDURE

PART A:

Measuring Acceleration Due To Gravity Using A Pendulum.

1. Place the ring stand on a table so that the clamp hangs over the side of the table. See Figure 1. Tie one end of the string to the clamp. Attach the 500g weight to the other end of the string.

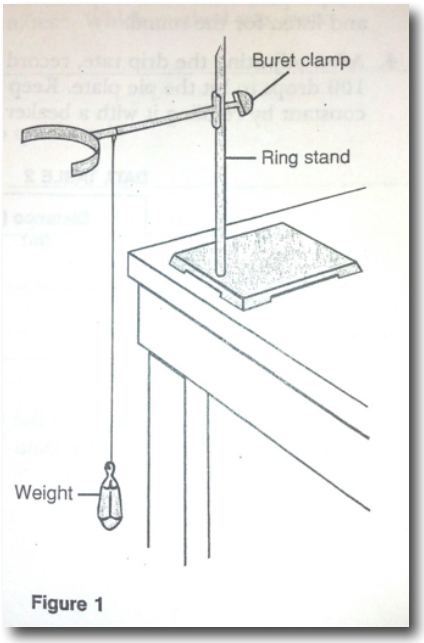


Figure 1

2. Place the weight back about ten degrees from its rest position. Release the weight and record in Data Table 1 the time (T) in seconds it takes to make 20 complete swings. One complete swing is back and forth.

DATA TABLE 1

Length (L) (m)	Time (T) 20 swings (sec)

3. Measure the length (L) of the wire or string from the center of the weight to the ring stand. Record this length to the nearest 0.01 m in the Data Table.

PART B:

Measuring Acceleration of a Drop of Water

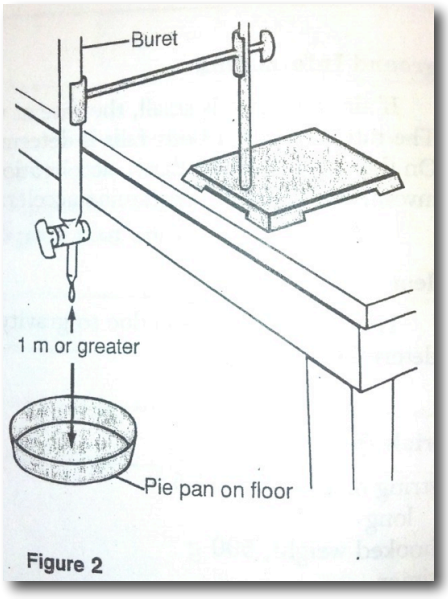


Figure 2

1. Attach the buret to the ring stand with the buret clamp. See Figure 2. Fill the buret about three fourths full of water.
2. Place the pie pan on the floor beneath the buret. The pie pan should be at least 1 m below the base of the buret.
3. Adjust the drip rate so that one drop just leaves the buret when the previous drop hits the pie pan. Watch the drop at the buret and listen for the sound.
4. After adjusting the drip rate, record in Data Table 2 the number of seconds it takes for 100 drops to hit the pie plate. Keep the level of the water in the buret approximately constant by refilling it with a beaker.

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5. Measure the distance (d) from the tip of the buret to the pie plate. Record this distance to the nearest 0.01 m in the Data Table

DATA TABLE 2

Distance (d) (m)	Time (T) 100 drops (sec)

OBSERVATIONS:

PART A

1. Calculate the time (T) for a single swing. (Divide the time for 20 swings by 20.)

2. Calculate the acceleration due to gravity in m/sec^2 using the formula:

   Where A_G = acceleration of gravity, L = length in meters, and T = time in seconds for one swing.

PART B

1. Calculate the time (T) for a single water drop to fall. (Divide the time for 100 drops by 100.)

2. Calculate the acceleration due to gravity using the formula:

   Where A_G = acceleration of gravity, D = distance in meters, and T = time in seconds for one drop.

ANALYSIS/CONCLUSIONS:

1. The acceleration of gravity is approximately 9.8 m/sec^2. Which method was more accurate?

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   _____

   _____

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2. Can you offer possible reasons for your answer to question 1?

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