

Physics Investigation 5 Task Sheet

Observation

An antique clock works by having a pendulum swinging from side to side to regulate the movement of the arms of the clock.

Problem

Given that a pendulum is comprised of a weight attached to the end of a metal rod or a piece of string, what determines the time or period of each swing of a pendulum?

Hypothesis

Aim

Principle

When a pendulum is displaced sideways and then released, it swings from side to side. The period is the time needed for the pendulum to make one complete swing.

In this investigation, the following variables are involved :

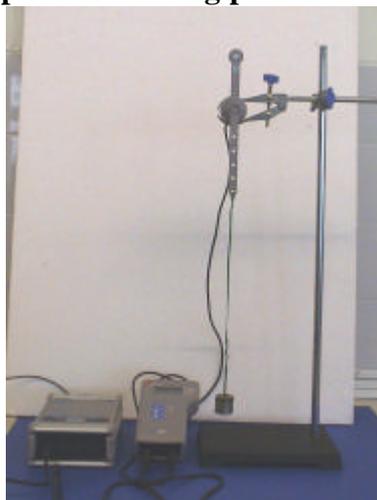
independent variables - _____

dependent variable - _____

Equipment and materials

- Desktop computer x 1
- Datalogging interface x 1
- Position sensormeter x 1
- 10x20g slotted weights
- A piece of string
- Retort stand and clamp x 1

Experimental set-up for measuring period of a swinging pendulum



Procedure

Experiment a (Effect of length)

1. Connect the datalogging interface to the computer;
2. Connect the position sensormeter to the interface. Select the 0° - 30° range on the sensormeter;
3. Set the arm of the position sensormeter vertical;
4. Tie one end of a string to the lowest hole of the arm of the position sensormeter and add 200g to the other end of the string;
5. Adjust the length of the string to 70cm;
6. Displace the weights sideways and release it from rest;
7. Record the movement and transfer the data to the computer;
8. Measure the period of swing from the angle-time graph recorded on the computer;
9. Repeat steps 4 to 8 using lengths of the string set to 60cm, 50cm and 40cm;
10. Measure the time for 5 cycles and calculate the mean period;
11. Compare the periods obtained for different lengths of the string.

Experiment b (Effect of weight)

1. Connect the position sensormeter to the interface. Select the 0° - 30° range on the sensormeter;
2. Set the arm of the position sensormeter vertical;
3. Tie one end of a string to the lowest hole of the arm of the position sensormeter and add 140g to the other end of the string;
4. Adjust the length of the string to 50cm;
5. Displace the weights sideways and release it from rest;
6. Record the movement and transfer the data to the computer using the interface;
7. Measure the period of swing from the angle-time graph recorded on the computer;
8. Repeat steps 3 to 7 with masses of 160g, 180g and 200g;
9. Measure the time for 5 cycles and find the mean period;
10. Compare the periods obtained for the masses used.

Precautions

1. The amplitude of oscillation should not be too large (greater than 15°);
2. The weight added should be large enough to make the string taut;
3. The weight should be released with care, to ensure that the pendulum is oscillating in the same plane.

Results**Interpretation****Possible errors****Improvement****Conclusion**