

Kater's reversible pendulum

I. Experiment purpose:

In any shape of object surrounds an axis of level (without passing center of mass) to pendulum that we call physical pendulum. This experiment use Kater's pendulum to measure the value of gravitational acceleration.

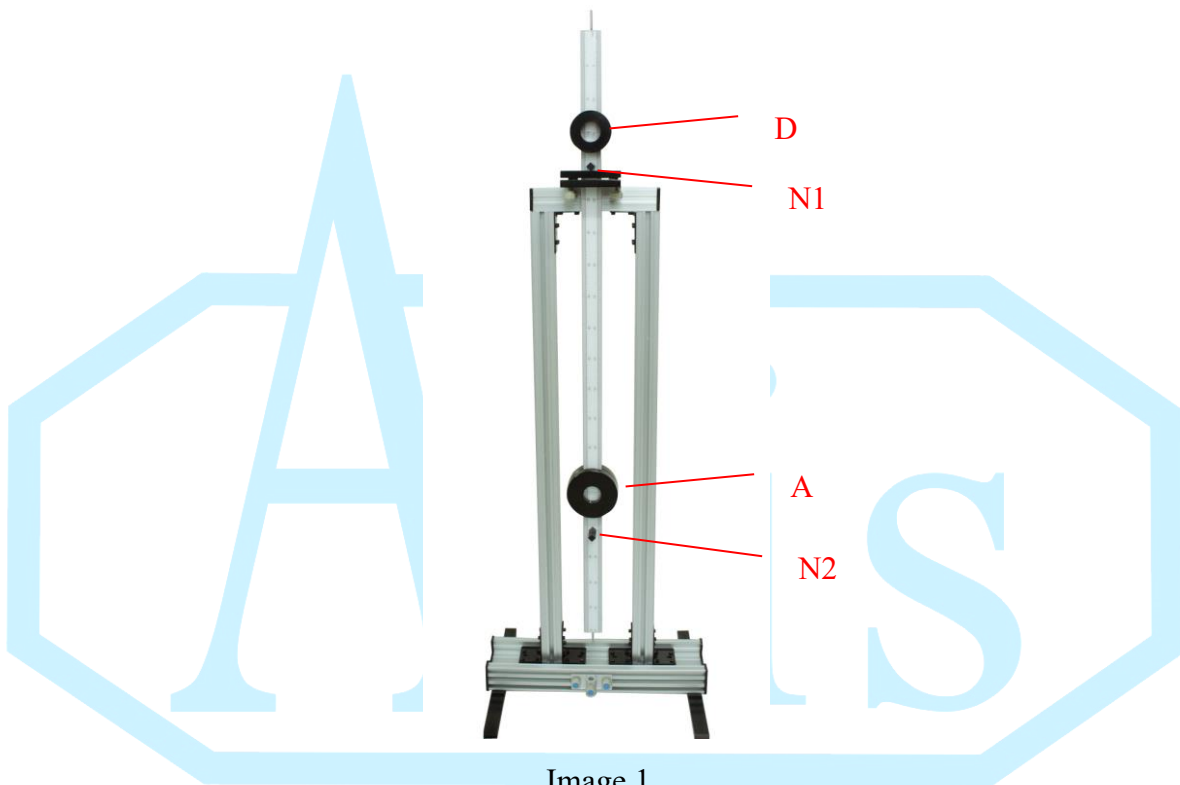


Image 1

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II. Experiment describe

The structure of Kater's pendulum:

There is one metal rod with 100cm scale with knife-edge in end of two sides as a pendant point when swinging. In the one of terminal side of the metal rod attach a heavy hammer A with scale for adjusting the position of center of mass. The other terminal side of the metal rod attach moveable metal D with scale so this position will affect the pendulum period.

(1). $P_1 \neq P_2$

- Fixed heavy hammer A, when normal pendulum and inverted pendulum, ensure that knife-edge can be placed well without interference.
- Clip moveable metal D tightly on a proper position.
- We set N1, and N2 as hitch points on the knife-edge and measure the pendulum period P1 and P2.
- We calculate the center of mass or use balance racket for measuring the distance from center of mass to the hitch point (knife-edge N1 and N2) L1 and L2.
- We use formula : $g = 8\pi^2 / [(P1^2 + P2^2)/(L1 + L2) + (P1^2 - P2^2)/(L1 - L2)]$, calculate the acceleration of gravity of g value.

(2). $P_1 = P_2$

The position of moveable D can affect pendulum period. If we can choice a proper position of D and make pendulum period $P_1 = P_2$, then the formula of g can be simple without measuring the center of mass.

We change the position D gently and measure sequentially the pendulum period P1 and P2:

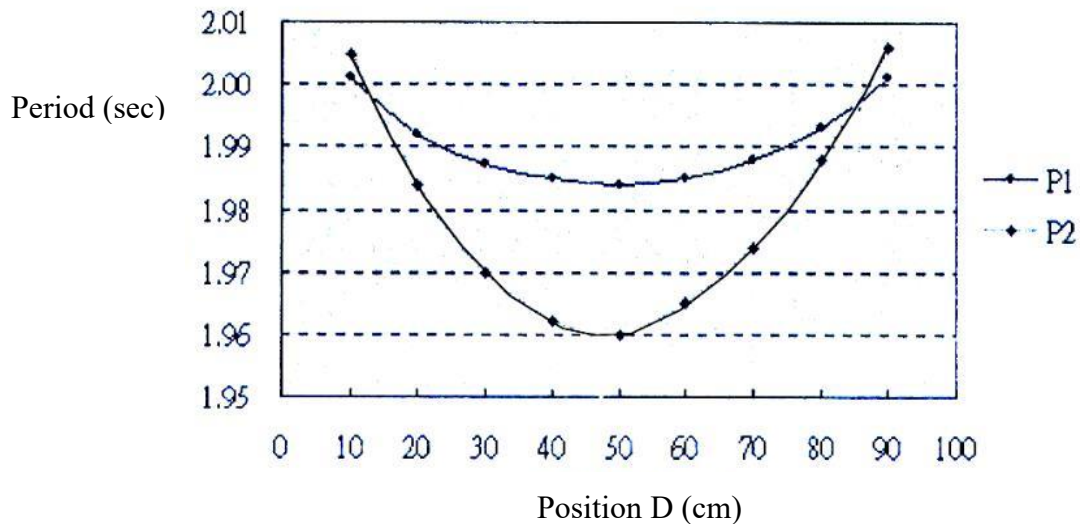
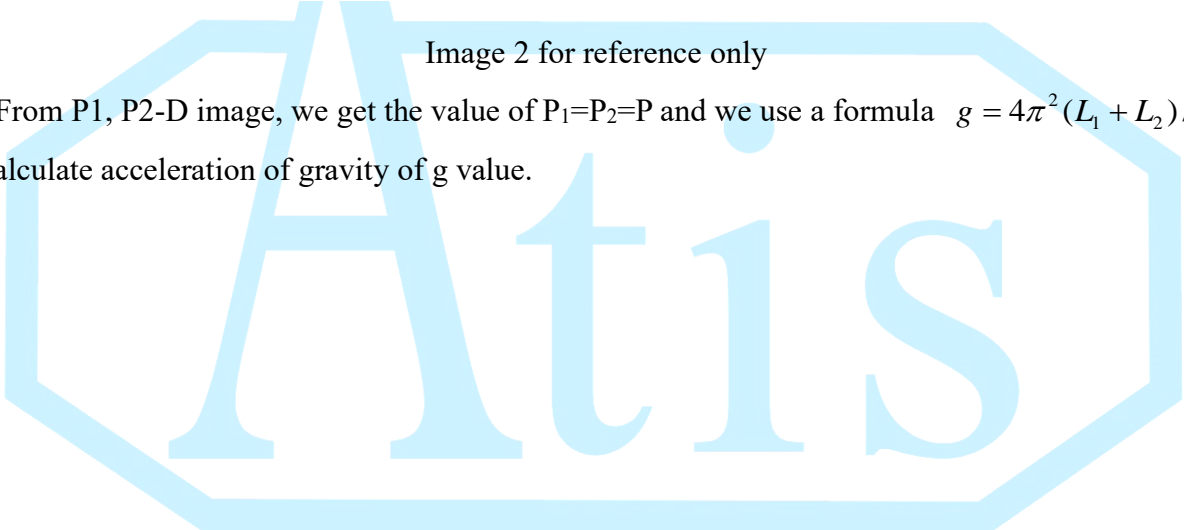


Image 2 for reference only

From P1, P2-D image, we get the value of $P_1=P_2=P$ and we use a formula $g = 4\pi^2(L_1 + L_2) / P_2$ to calculate acceleration of gravity of g value.



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III. Experiment accessory :

No.	Name	Qty.	No.	Name	Qty.
1.	Multifunction aluminum alloy base	1	2.	Feet set (with screw x 4)	1
3.	Moveable plug	1	4.	Big size pendulum	1
5.	Small size pendulum	1	6.	Kater's reversible pendulum	1
7.	reversible pendulum index	2	8.	Knife-edge fixed frame	2
9.	Photogate sensor (with magnetic bar)	1	10.	Dynamic data capture (with power supply 12DCV/1A)	1
11.	Tool	1			

Experiment accessory (For reference only, subject to the actual sample.)

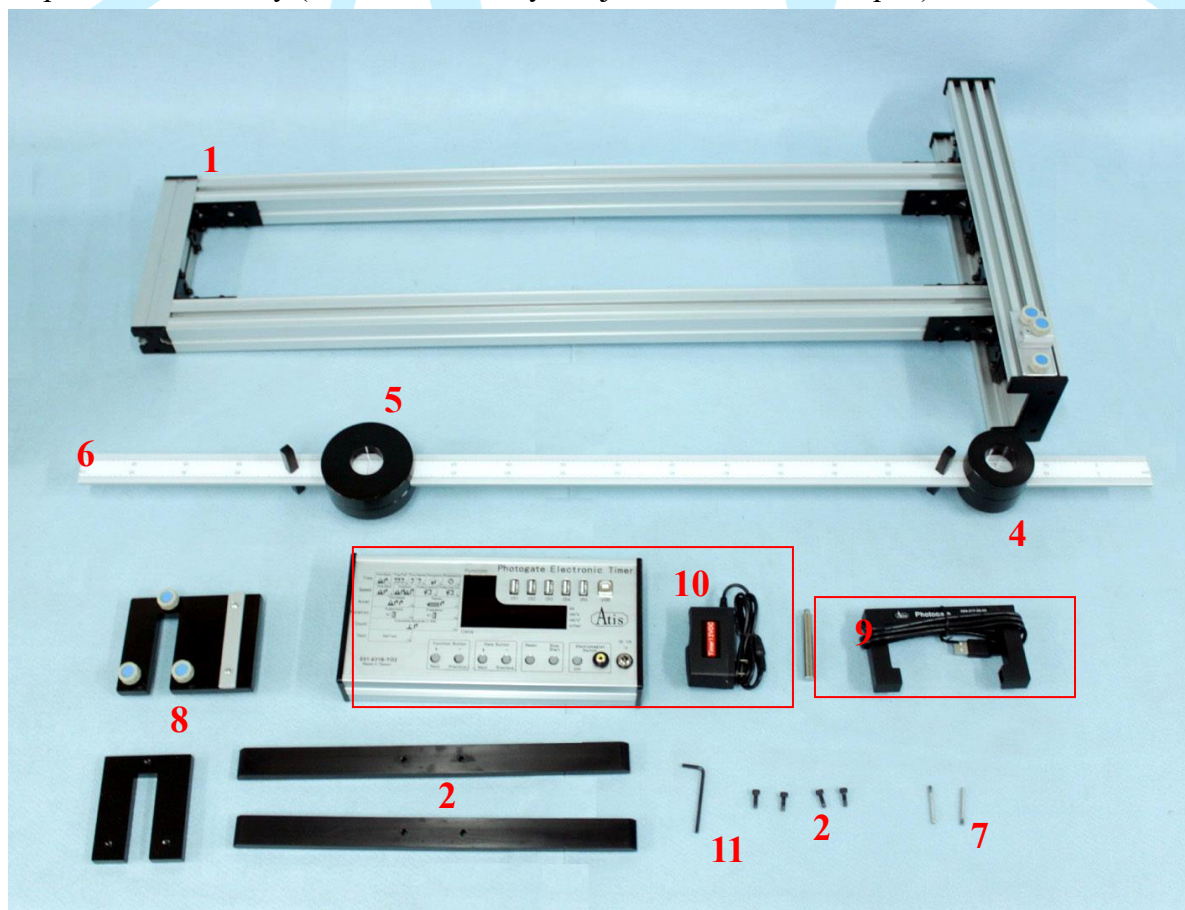


Image 3 Experiment accessory



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