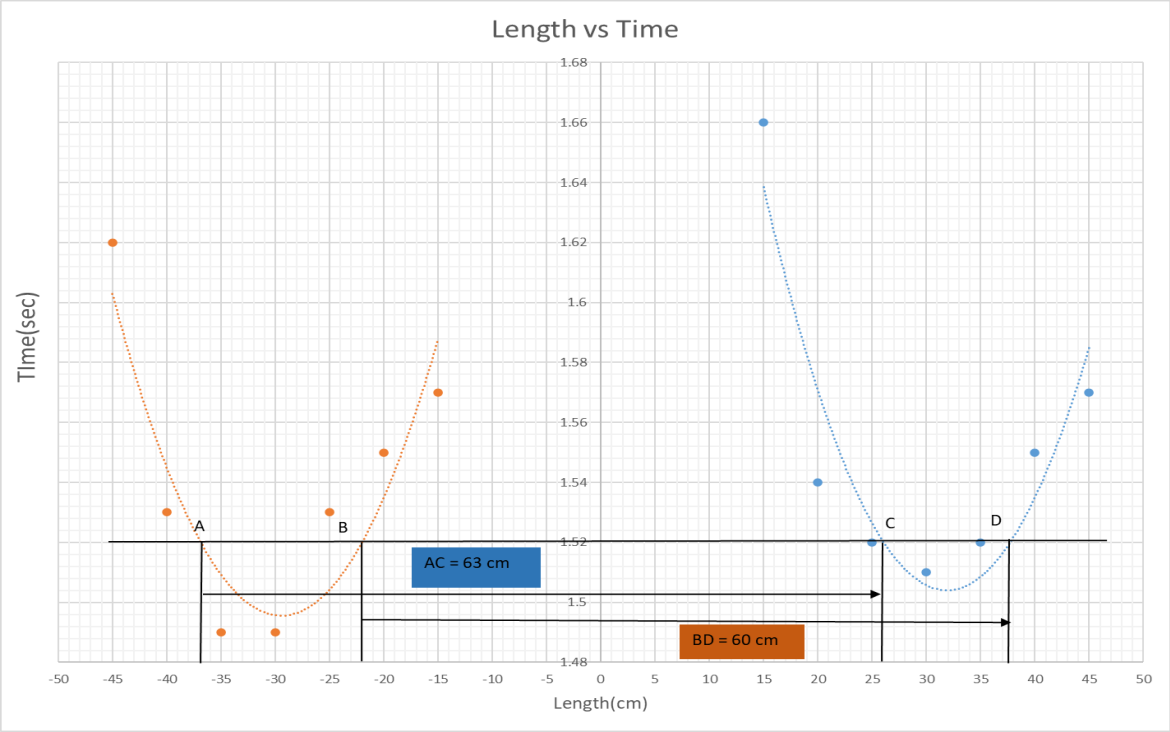
4. Analysis and Calculation



From the T vs L graph

Length AC = 63cm

Length BD = 60 cm

Mean length, $L = \frac{AC+BD}{2}$

$= \frac{63+60}{2} = 61.5$ cm

Equivalent length of compound pendulum, L =61.5 cm

Equivalent time period of compound pendulum, T=1.52 sec

Calculation

$$g = \frac{4\pi^2 L}{T^2}$$

$$= \frac{4 \times (3.1416)^2 \times 61.5}{(1.52)^2}$$

$= 1050.87 \text{ cm/s}^2$

Error calculation: $\frac{1050.87 - 980}{980} \times 100\% = 7.23\%$

5. Result

The acceleration due to gravity is 1050.87 cm/s^2 with an error of 7.23%

Standard value (cm/s^2)	Calculated value (cm/s^2)	Error Percentage
980	1050.87	7.23%

6. Discussion

The main objective of this experiment is to determine the acceleration due to gravity in the laboratory by means of a compound pendulum. There are differences of physical structure between a simple pendulum and a compound pendulum. In a straightforward pendulum, the size of the suspended object is much smaller than the separation between the object's center of gravity and its axis of suspension. This makes it possible to handle the mass as if it were a single point. In a compound pendulum, the dimensions of the body are comparable to the distance between the center of gravity and the axis of suspension of the swinging body. Compound pendulums are used in a variety of applications, such as measuring devices, seismographs, and certain types of clocks. Acceleration due to gravity is a fundamental physical constant and plays an important role in many branches of physics and engineering. It's value is approximately 9.80 m/s^2 but we got 10.50 m/s^2 with a 7.23 error percentage. Before performing the experiment, we ensured that we are using appropriate equipment for the experiment. This include a stopwatch, platform, and a pendulum. The equipment were calibrated and in good condition. When carrying out the experiment small angle oscillations (not more than 10^0) are used to negate the effects of drag. About 10 oscillations used as going above this the pendulum starts to come to a halt. The pendulum must be made to oscillate in a vertical plane and that no rotational motion is present when swinging. The ruler must be parallel when measuring the length so as to avoid incorrect measurements. No air current must be present in the vicinity which would contribute to drag. Systematic error (zero error) of the stopwatch along with human parallax error may contribute to inaccurate time readings. Low-risk experiment so no risk of any significant injury inflicting. Otherwise, rubber boots can be worn in case metallic bar drops and hits foot. So, after completing this experiment, we gained knowledge about acceleration due to gravity, compound pendulum and what is the significance of acceleration due to gravity.