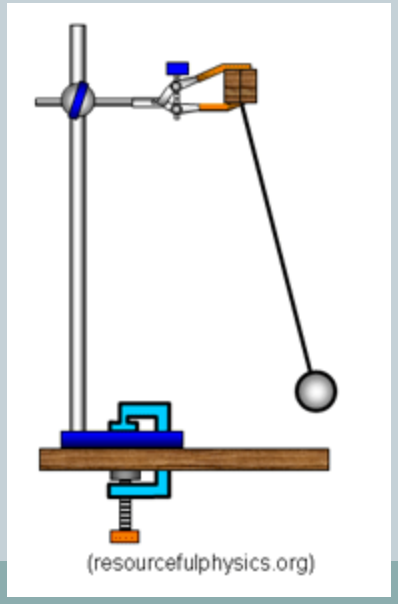
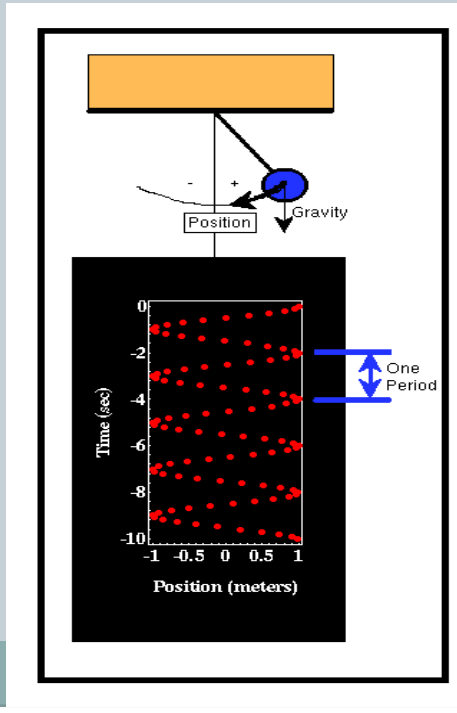
$4(\pi^2 l)/t^2 = gravity\ which = 9.8\ ms^{-2}$

measuring "g" by using a simple Pendulum





Introduction

Apparatus

Partners

Results and Graph

References

END

CONCLUSION AND EVALUATION

Method

Partners and coordinator

- ***We did this practical in our school at the physics lab. By the coordination of our teacher:***
- ***Partners:***
- ***Ahmed Ali***
- ***Alaa Omar***
- ***Alaa Idris***
- ***Ihab Ismael***
- ***Ahmed Alshafai***
- ***Al-Wakra independebnt Secondary School For Boys***

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Introduction

- ***Most of the ways to measure the gravitational acceleration are kind of boring and repetitive, So in order to improve this phenomena we tried to find and innovative a new way to prove this practical by finding the gravitational acceleration using a simple pendulum.***

Introduction

- ***Our question that we'll use is :***
- ***Question:*** *can we find the gravitational acceleration which is equal to 9.8 ms^{-2} by changing the length of the string of a pendulum?*
- ***Our aim from this practical is :***
- ***Aim:*** *to prove that the gravitational acceleration is equal to 9.8 ms^{-2} by using a simple pendulum (by changing the length of the string) whatever the mass of the bob .*
- **And our hypothesis that we built our practical on**
- **Hypothesis :** in the physics book we are told that the gravitational acceleration that affects a simple pendulum is 9.8 ms^{-2} whatever the length of the bob and its mass

Introduction

- ***Variables:***
- ***Dependent:***
- *- time taken to complete one full oscillation*
- ***Independent:***
- *- length of the string*
- ***Controlled:***
- *- The Mass is constant*
- *- Air resistance is neglected*

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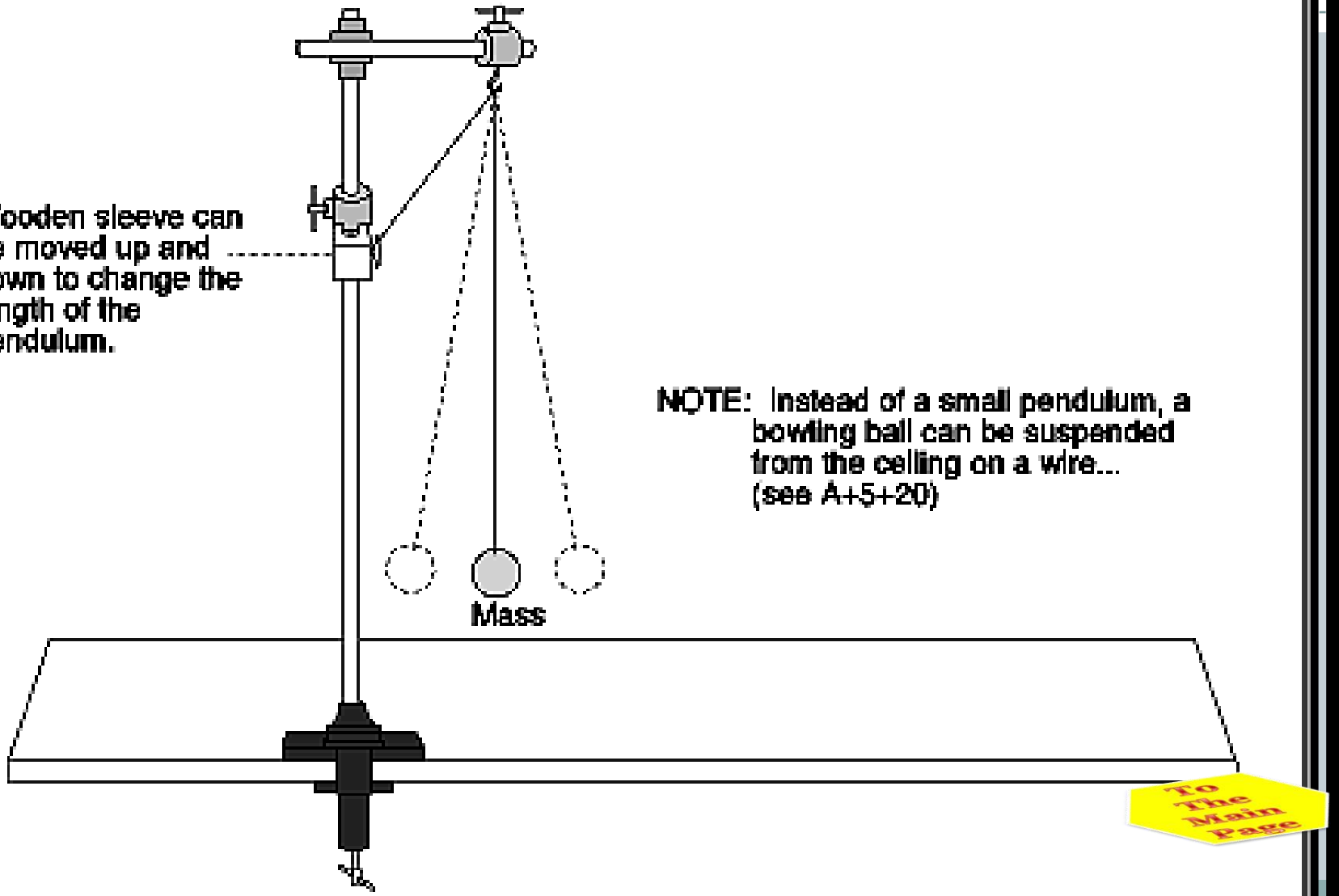
The **Apparatus** you need are:-

- **Simple pendulum**
- **Ruler**
- **String**
- **Balancer (Something so that the pendulum can get tied into it)**
- **Sensor path (photo gate)**
- **Sensor calculator (stopwatch)**
- **Stand**
- **bob**

SIMPLE HARMONIC MOTION.

B+10+1

Oscillations: Simple Pendulum,-Mass on a String.



NOTE: Instead of a small pendulum, a bowling ball can be suspended from the ceiling on a wire... (see A+5+20)

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How to set Apparatus (Materials)

- ***First of all reset everything, all the machines you have to zero.***
- ***Consider the height as you want to start your practical and make it your variable***
- ***If you are ready get over with it, Start to work…..***

Method

- First tie the pendulum with a string and insert it to the balancer.
- Take measurements of the string by the ruler
- Hold the pendulum until the end of the string
- Reset the stopwatch and get ready
- Now let the pendulum go and count the time of how much it to go three times (complete one full oscillation).
- Stop the pendulum before it makes too many runs to let the sensor calculator count the time for the pendulum
- Record this trail and repeat it many times

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DATA COLLECTION AND PROCESSING

- **The Data were recorded according to:-**
- ***Time was calculated by sensor calculator***
- ***But position (length of the string) was calculated by a ruler***

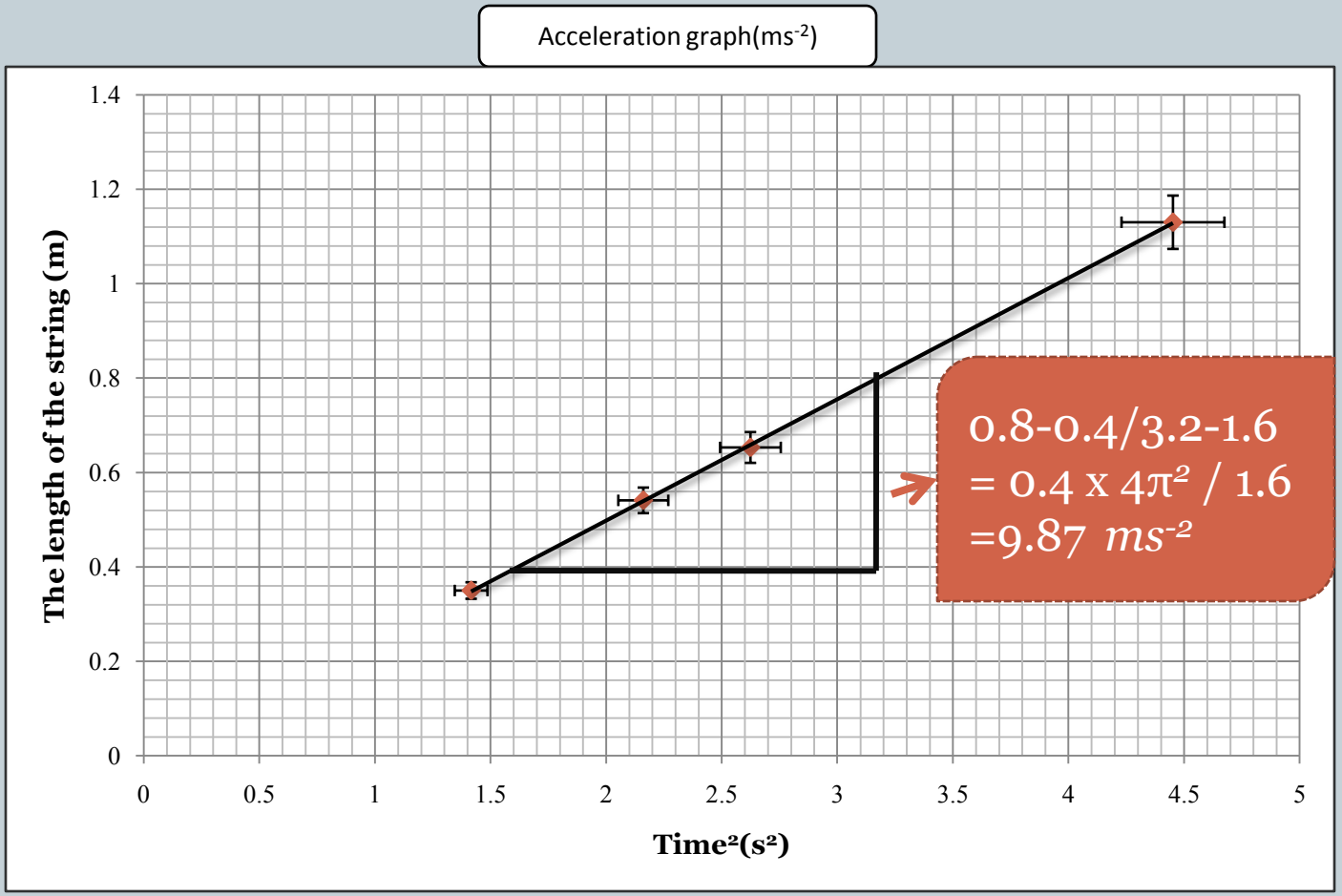
DATA COLLECTION AND PROCESSING

- **However the uncertainties where taken by laws which are:-**
- ***the Distance uncertainties where taken by the law: minimum limit of reading of the ruler\ 2***
- ***So the ruler had a minimum limit of reading which was 1 cm so divided by 2***
- ***= 0.5 cm***
- ***the time uncertainties were taken by an (MAX- Mean) \2***
- ***like 1.22-1.17= 0.025s***

The other time (s) records have been taken using the same method

The length of the string – (0.005 m)	The time to complete one oscillation - (3 sf)				
	Trial 1	Trial 2	Trial 3	Trial 4	Average time "s"
0.350m	1.18	1.17	1.17	1.22	1.19 ±0.025
0.541 m	1.46	1.47	1.48	1.48	1.47 ±0.025
0.653 m	1.58	1.63	1.62	1.64	1.62 ±0.025
1.130 m	2.10	2.11	2.11	2.11	2.11 ± 0.025

Results and Graph



Results and Graph

- **This is our main law**
- $4(\pi^2 l)/t^2 =$ ***gravity which =9.8 ms^{-2}***
- $(0.350)(\pi^2)(4) / (1.17)^2 = 10.09\ ms^{-2} \pm 0.2$
- $(0.541)(\pi^2)(4) / (1.47)^2 = 9.880\ ms^{-2} \pm 0.04$
- $(0.653)(\pi^2)(4) / (1.59)^2 = 10.19\ ms^{-2} \pm 0.04$
- $(1.130)(\pi^2)(4) / (2.11)^2 = 10.02\ ms^{-2} \pm 0.24$

- ***And it can be determined by the slope (gradient)***

Gravitational force $= 0.8-0.4/3.2-1.6$

$= 0.4 \times 4\pi^2 / 1.6$

$= 9.87\ ms^{-2}$

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CONCLUSION AND EVALUATION

- ***The results were precise but not so accurate however, it was true and acceptable, so there were no big uncertainties for the results because we were working in suitable weather and approximately there were no random but some systematic errors.***

CONCLUSION AND EVALUATION

- ***most of our trails were close to the gravitational acceleration which is equal to 9.8 ms^{-2} specially trail 2 (the closest trail) which showed that we can find the 9.8ms^{-2} by changing the length of the string of a pendulum .***

CONCLUSION AND EVALUATION

- ***The experiment was successfully right but there was a problem at the beginning which is that the bob was separated into two parts so the photo gate sometimes took two readings instead of one so it was wrong in addition to some of our photo gates were corrupted and it was so hard to find these problems but we found the solution for this problem and we fixed it. Finally our experiment was successful.***

CONCLUSION AND EVALUATION

- ***So I recommend in order to avoid these problems to add some improvements to make it better:***

1. ***We can make the bob as one part to avoid the system error which was because of the photo gates (as we already did)***
2. ***Get a measureable string were numbers are written on it.***
3. ***Make the string stop when it completes one full oscillation.***

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References

- ***we have done most of the work by ourselves but I have to admit that We referred to our text book (international baccalaureate physics third edition). In addition to our teacher which helped us to solve some of our problems and gave us some instructions and directions to achieve our aim. Finally the whole results that we got is by the experiment that we did and this is the way that we used to achieve our aim and prove our the hypothesis.***

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THE END

Thanks for your attention, And I hope that our show has got your satisfaction. Finally, I repeat my thankfulness.

Now we are ready for your questions.