Nov 16

- something astronomy related - how can I do it at home

Nov 19

- couldn't find a good astronomy related experiment
maybe measuring gravity

Nov 27

- I can measure the acceleration of gravity with every day objects

- I could measure it with a pendulum, water drops and a ball drop

- these would be fun to do but might need more research

Jan 9

- time to start testing things out

- tried counting water drips with a faucet but it didn't work well

- drips weren't consistant
- space between the tap and the sink was too short

- would it be easier to calculate with a longer drop

Hypothesis: if we use a longer drop than we can measure the acceleration of gravity more accurately because it eliminates some of the experimental error due to reaction time

Jan 7

- Bought a burette and retort stand from amazon

Jan 10

- unpacked burette and tested it over a metal bowl

- it seemed to work well

- when I picked up the metal bowl with water it made a funny noise

Jan 19

- Getting ready to test the pendulum

materials
- retort stand
- string
- stopwatch
- calculator
- pen and paper
- measuring tape
- bob / weight

procedure
- set up stand over ledge
- found a tape roll that fits easily to use as a bob
- cut five different lengths of string (measure after tied)
- hold at an angle that works
- time 5 oscillations
- put time in spreadsheet

Variables

Man. Var: length of string
Res. Var: an more accurate result
Con. Var: bob, number of cycles

Jan 21

- doing the pendulum experiment
- set up on the kitchen table
- tried different angles and sometimes it would go in the wrong direction (15° degrees works the best)
- did several trials and put times in a spread sheet
- I had to put it up on a high ledge for the longer strings
- got results and longer string gave a more accurate result

Feb 8

- planning water test

Materials
- burette and stand
- funnel
- water
- calculator
- pen and paper
- Stop watch
- measuring tape
- small bowl

procedure
- Set up stand over table with a bowl underneath
- fill burette using funnel
- measure distance from tip of burette to bottom of bowl
- turn valve so when one water droplet hits the bowl the next starts to drop
- time fifteen drops

variables
Man. Var: Height of burette
Res. var: Calculate acceleration of gravity
Con. Var: Burette, Stopwatch, number of drops per trial

Feb 10
- set up like procedure
- took a while to get drops right
- tried at three different heights
- I put the times in a Spread Sheet
- higher ones were more accurate

Feb 13
- generated charts with my dad

Feb 21

- my hypothesis was half correct as not longer drops I got a more accurate result but the problem was not reaction time but another factor

Feb 22.

- decided not to do a ball drop as it would just waste time.

Feb 26

- maybe teachers can use my experiment to demonstrate how to calculate the acceleration of gravity

- next time I could do the ball drop test also

March 9

- I began to focus on entering my information in online

march 10

I began work on my tri-fold

Research

- The acceleration of gravity was first discovered by Galileo by dropping objects ~~of~~ from the leaning tower of Pisa

- Galileo proves that objects of different masses fall at the same acceleration

- Two of the ways you can measure the acceleration of gravity is by dropping a mass from a certain height and timing it from release to contact with the ground or measuring the period of oscillation with a pendulum

- Average human reaction time is 250 ms

- The period of a pendulum is the amount of time it takes from the starting position to the other side and back to the other side

- The formula for the pendulum ~~experiment~~ experiment is

$T = 2\pi\sqrt{\frac{l}{g}}$ T = time l = length

G = acceleration due to gravity

- The acceleration of gravity on earth is 9.8 m/s/s. The acceleration of gravity is the acceleration of any object under the influence of gravity

- the acceleration of gravity can be used to calculate the net force acting upon an object and obviously its acceleration

Differences between Gravity and acceleration due to gravity:

- Gravity is a force that pulls objects into the center of a mass

related

- The acceleration of gravity is the acceleration on a free falling object because of Earths gravitational pull

Schedule

November - choose topic

December - Background research

January - design experiment

Febuary - run experiment and analyze results

march - enter information online and make tri fold

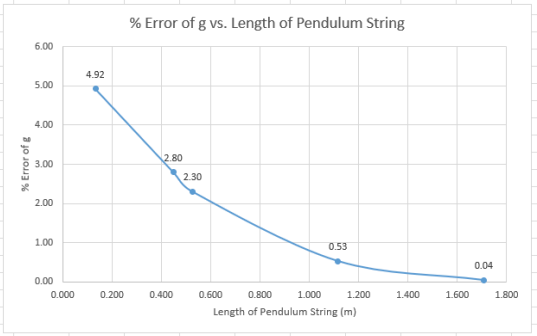
Constants

Pi	3.141593
Actual g (m/s²)	9.80665

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

$L = Length(m)$
$T = Period\ (s)$
$g = Acceleration\ of\ Gravity\ (\frac{m}{s^2})$

Length (m)	0.132	0.448	0.526	1.116	1.707
	Time (s)	Time (s)	Time (s)	Time (s)	Time (s)
	3.69	6.79	7.35	10.6	13.09
	3.75	6.81	7.34	10.5	13.16
	3.72	6.85	7.37	10.66	13.09
	3.75	6.82	7.31	10.6	13.13
	3.75	6.81	7.38	10.62	13.13
	3.75	6.78	7.32	10.59	13.06
	3.69	6.79	7.37	10.47	13.13
	3.71	6.82	7.38	10.56	13.09
	3.79	6.75	7.41	10.53	13.03
	3.78	6.85	7.38	10.57	13.19
Average Time (s	**3.74**	**6.81**	**7.36**	**10.57**	**13.11**
Cycles	**5**	**5**	**5**	**5**	**5**
Period (s)	**0.75**	**1.36**	**1.47**	**2.11**	**2.62**
g (m/s²)	**9.32**	**9.53**	**9.58**	**9.86**	**9.80**
% Error	**4.92**	**2.80**	**2.30**	**0.53**	**0.04**



Constants

Actual g (m/s²)	9.80665

$$g = \frac{2D}{T^2}$$

$D = Distance\ (m)$
$T = Period\ (s)$
$g = Acceleration\ of\ Gravity\ (\frac{m}{s^2})$

Drops	Time (s)	Distance (m)	Period (s)	g (m/s²)	% Error
15	8.69	1.763	0.58	10.51	7.13
15	8.75	1.763	0.58	10.36	5.66
15	8.66	1.763	0.58	10.58	7.87
15	8.81	1.763	0.59	10.22	4.23
15	8.97	1.763	0.60	9.86	0.54
15	8.87	1.763	0.59	10.08	2.82
15	9.17	1.763	0.61	9.43	3.79
15	9.00	1.763	0.60	9.79	0.12
15	8.98	1.763	0.60	9.84	0.32

Average % Error 3.61

Drops	Time (s)	Distance (m)	Period (s)	g (m/s²)	% Error
15	6.75	0.961	0.45	9.49	3.22
15	7.56	0.961	0.50	7.57	22.84
15	6.24	0.961	0.42	11.11	13.25
15	7.00	0.961	0.47	8.83	10.00
15	7.41	0.961	0.49	7.88	19.69
15	7.16	0.961	0.48	8.44	13.98
15	7.50	0.961	0.50	7.69	21.60
15	7.15	0.961	0.48	8.46	13.74
15	6.28	0.961	0.42	10.97	11.81

Average % Error 14.46

Drops	Time (s)	Distance (m)	Period (s)	g (m/s²)	% Error
15	5.97	0.489	0.40	6.17	37.04
15	6.00	0.489	0.40	6.11	37.67
15	5.66	0.489	0.38	6.87	29.96
15	5.50	0.489	0.37	7.27	25.82
15	5.07	0.489	0.34	8.56	12.71
15	5.88	0.489	0.39	6.36	35.10
15	5.67	0.489	0.38	6.84	30.20
15	5.10	0.489	0.34	8.46	13.73
15	5.30	0.489	0.35	7.83	20.12

Average % Error 26.93

Length (m	% Error
1.763	3.61
0.961	14.46
0.489	26.93