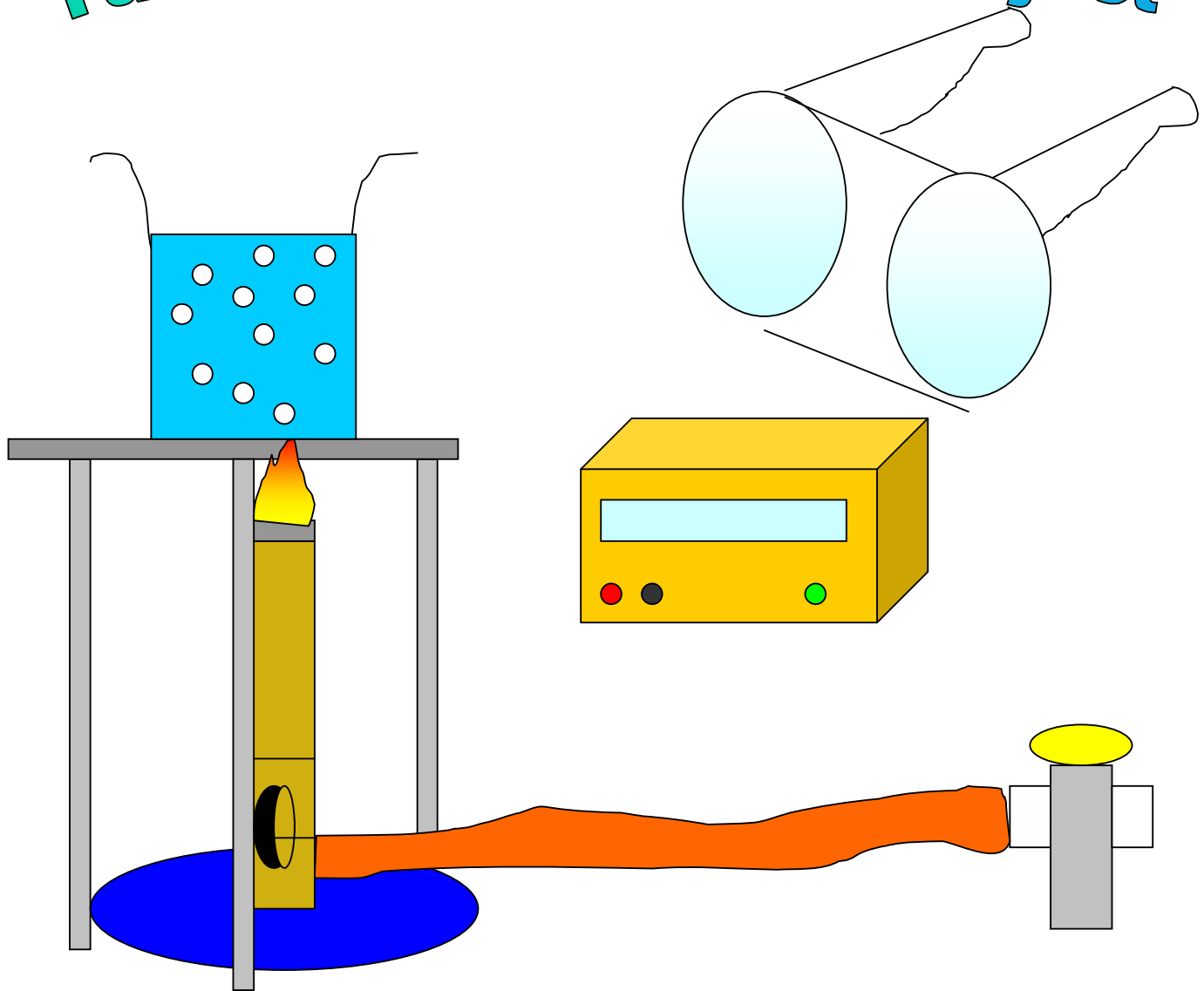


# James Gleeson's Fabulous Chemistry Project

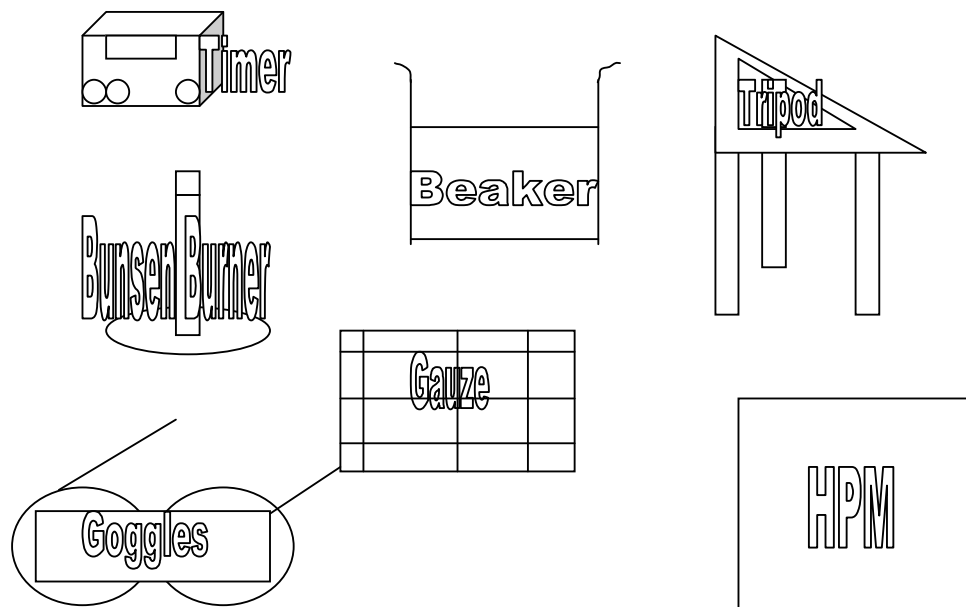


Class Investigation On  
How The Volume Of  
Water Affects The Time  
It Takes To Boil.

## *The Plan*

- Q. What am I trying to find out?
- A. How the volume of water affects the time that it takes to boil.
- Q. What do I think will happen?
- A. The larger the volume the longer the time to boil.
- Q. Why do I think it will happen using scientific ideas?
- A. The larger the volume, the more atoms you need to heat.
- Q. What will I measure?
- A. Time versus volume.
- Q. What will I alter between observations?
- A. The volume of water.
- Q. What will I do to ensure a fair test?
- A. Keep everything the same except the input variable: volume.
- Q. How will I decide on the values of the variables that I will be using?
- A. Values will be chosen to enable the experiment to be carried out in a reasonable time, and to give a good range for trend analysis.
- Q. How many measurements will I take and how will they be spaced out?

- A. 50ml to 200ml in intervals of 50ml, i.e. four different measurements.
- Q. What equipment will I need and how will I use it?
- A. Timer; Beaker; Tripod; Bunsen Burner; Gauze; Heat Proof Mat (HPM); Goggles:



- Q. How will I take any safety situations into account?
- A. Wear your goggles at all working times to protect your eyes from boiling water; HPM to prevent ignition and overheating of the desktop.
- Q. How will I ensure that my experiment is reliable?
- A. I will repeat the investigation at least once.
- Q. How will I record the results?
- A. I will record times in whole seconds.

## Obtaining And Presenting Evidence

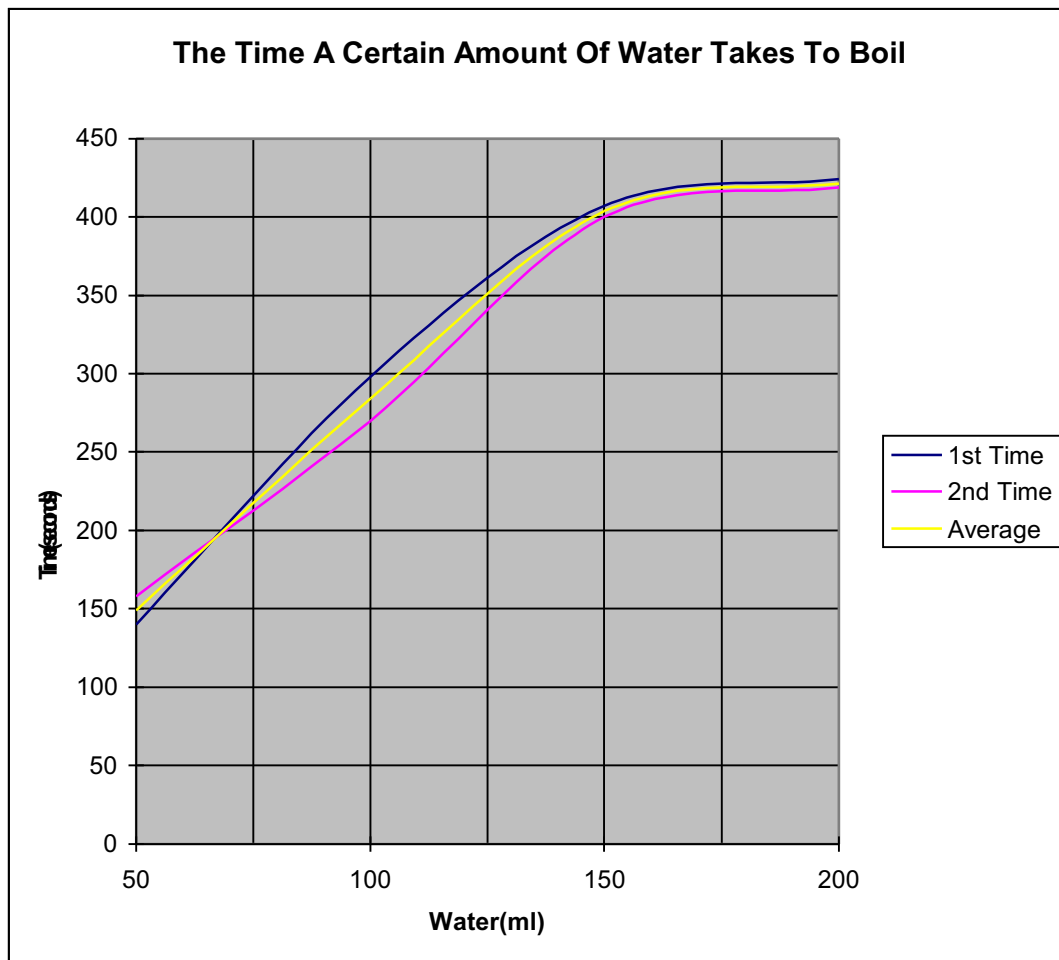
Whilst me and my partner carried out this experiment we:

- Worked safely,
- Made as precise observations as possible,
- Took measures to reduce errors and to ensure that our results were reliable,
- Used suitable methods of presenting our results, e.g. tables and line graphs.



## Results

Water (ml)	1st Time (s)	2nd Time (s)	Average (s)	Average (s) per 50ml of water
50	140	158	149	149
100	298	270	284	142
150	407	400	404	135
200	424	419	422	105



## **Analyzing My Data**

Above you can see that the average line is almost straight until it gets to the 200ml point. Also, the points are very close together showing that there were unlikely to be significant errors in the experiment. Ignoring the fact that the last point is an anomaly the time taken to boil is roughly proportional to the amount of water boiled.

## **Conclusion**

We can see that the time taken for the water to boil is between 105 and 149 seconds for each 50ml of water boiled.

If we had used more heat energy then the process would be a lot quicker but if we had used less energy then it will have been slower.

If we had boiled more water then the time would be longer.

## **Explaining My Conclusion Using Scientific Ideas**

The time taken to boil 200ml of water should take twice the time as boiling 100ml would be if everything else is kept the same.

I.e. if 100ml takes 120 seconds to boil then 200ml should take twice as long to boil (if all other variables are unchanged).

If a variable were changed, however, then would change the results, for example:

- Heat energy,
- The shape of the beaker,
- The height of the beaker from the heat.

In the table you can see that I have added an extra column showing the average time taken per 50ml of water.

## Evaluation

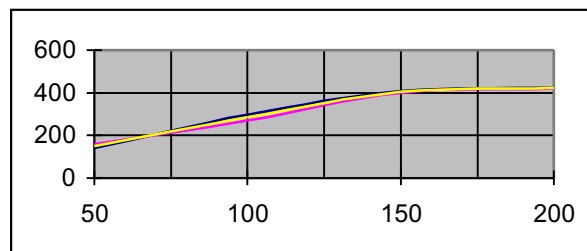
### Anomalies:

I think that there was only 1 anomaly in my investigation, that being the time of 200ml to boil.

Of course, if the 50ml had been slightly higher and the 150ml slightly lower then there would have been no anomalies!

### Explaining My Anomaly:

It is quite hard to explain how the 2 results I took for 200ml turned out to be anomalies! However, I will try to do so:



As you can see, there is probably a great decrease in time to how fast water takes to boil and eventually 50ml is not significant enough to make much significance to a metre-cubed square full of water for example (a tonne of water)!

So I think that the 50ml increase is starting to become more insignificant as the volume goes up.

### How Reliable Are My Results And Do They Support My Conclusions:

I think that my results are quite reliable as me and my partner actually did the test 4 times but 2 of these times the results were a bit haywire!

Also, our results look to be pretty much the same as everyone else's!

I do think that my results are just about good enough to support my conclusion as most things in it roughly fit into the results.

### **Improvements To My Method:**

I think that one way to improve my method would have been to measure the boiling point after each 25mls, not 50mls. This would have been better as the results would then have hopefully been more accurate and reliable.

Another way would be to change the heat energy of the flame so that you can see the variation that would occur between the two types of flame. One quicker, one slower!

### **Other Experiment/s To Validate My Conclusion:**

1. Boil 50mls of water first in a normal sized beaker and then a round one. You should see that the round beaker will take longer than the normal one for its water to boil
2. Boil 50mls of water as accurately as possible. Then boil 100mls. The 2<sup>nd</sup> result should be double the first!

Thank you for reading my investigation. I hope that you understood it all and that you saw all the key points! I eventually managed to do everything from the prompt sheet but it took me over 6hrs!!!! I would like to thank Pearce Gunne-Jones (my partner in the experiment) and Peadar Boyle and Karan Sawhney who made it possible for us to carry out the experiment. Also thanks to Dr. Allen who guided us through the harder parts of the experiment.

Have a gr8 summer holiday!!!!

James Gleeson-8C

