

## Year 10 Exam Investigation.

I will be investigating how different surface areas of water cool at different rates.

### Planning and prediction

My experiment will be safe as I will take care when heating the water and using any equipment that may be hot. I will do this as I may endanger myself and others if I do not take care. I will wear safety goggles to protect my eyes.

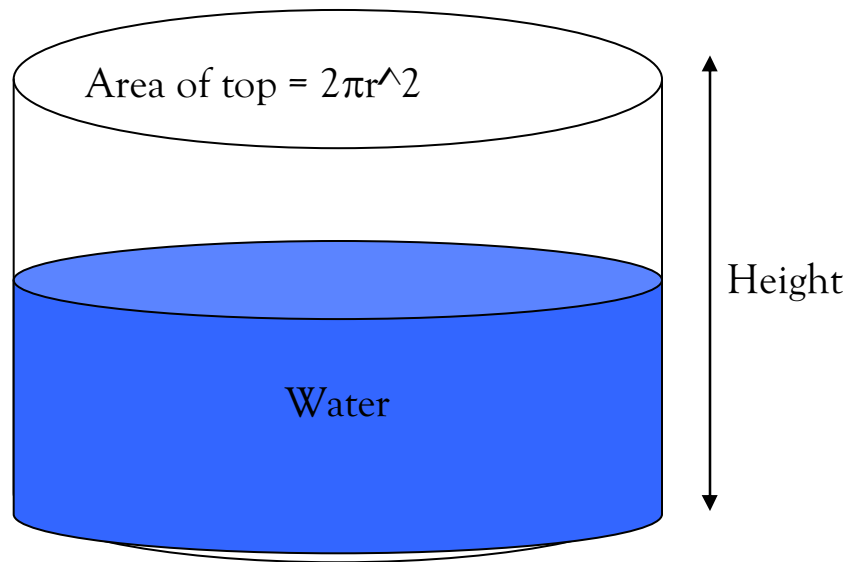
I have chosen to do this experiment, as I believed that it is the most practical and accurate variable to change I had the choice of: **Volume, Surface Area and Insulation.** I think that this is the most practical as when changing volume surface area also changes. I do not think that insulation will produce a very accurate set of results as each time the conditions will be slightly different. This is not what I want as it would become an unfair test. I have not done any preliminary experiments or test but I think that it may have been useful to do so to get some insight into the topic. It may have also been useful to try an experiment using the three different variables to see which produces the best results.

I predict that the larger the surface area of the water used the quicker the rate of cooling will be, and thus the smaller the surface area the slower the rate of cooling. This is because when only a volume of water is used and it has a large surface area a higher percentage of the volume is in contact with the cooler substances around it such as the air and the beaker it is contained in. The heat from the water will disperse through the air via convection and will disperse through the beaker via conduction. I also predict that the greater the difference between the temperature of the water and the room temperature, the greater the rate of cooling will be. The heat disperses more quickly because the temperatures of its surroundings

are colder. In my experiment I shall heat the beaker so that the starting temperature is closer to the temperature of the water. This decreases the margin for error. All the beakers will be made of the same material and heated before the experiment to the same temperature.

I will calculate the surface area of 200mls of water in 5 different sized beakers. I will use the formula ' $2\pi r^2h$ ' to calculate surface area. 'r' and 'h' represent the radius and the height.

E.g.:



### Equipment list

- Bunsen Burner
- Bench Mat
- 5 Different sized beakers
- Water
- Thermometer
- Stopwatch
- Use of a kettle

## Diagram

## Method

I shall heat 200mls of water to 80 degrees Celsius each time. I will place this heated water into one of 5 different sized beakers. I will record the temperature change every minute for five minutes. I shall repeat the test using each beaker three times. This should get rid of any anomalous results. I will only record the average of the three results in the results table, as this will show the rate of cooling better. I will record the temperature to the nearest degree, as this is as accurate as I can measure with the equipment available.