Designing an Investigation and Fair Testing

1a. Pale coloured clothes will remain cooler than dark coloured clothes when exposed to sunlight.

1b. size of the fabric squares, same amount of sunlight / shade, same length of time spent in sunlight, same thickness for each different colour of cotton fabric.

1c. Thermometer not covered in any fabric

1d. By repeating the experiment 5 times (although results are only reliable if they are consistent)

1e. It is difficult to tell since we are not told whether the fabric types and sizes are the same. If we assume that the fabric squares were identical except for colour, then the experiment was a fair test. Each fabric square was placed on the same table for 15 minutes, so these controlled variable were kept the same.

2a. *NB: There are <u>many</u> different ways that this could be written – the sample below is very detailed*
1. Stain seven 10 cm white cotton fabric squares with 1 mL coffee, 2 cm smear of lipstick and 2 cm blue pen.
2. Leave the stains to dry overnight.
3. Prepare six buckets of 2L washing detergent at 25°C (3 different powders and 3 different liquids) according to directions on the detergent packaging.
4. Place one stained cloth into each of the buckets of washing detergent and leave for 1 hour. Leave one cloth unwashed as a control.
5. Remove cloths from the detergent and rinse using the rinse cycle on a washing machine.
6. Hang cloths on a clothesline in the shade to dry for 2 h.
7. Compare the amount of each stain remaining on the washed cloths in comparison to the unwashed control. Record results as a percentage of the stain that has been removed.
8. Repeat steps 1 to 7 four more times and calculate an average for the amount of each stain that was removed by each washing detergent.

2b. temperature of the washing detergent, amount of time spent in washing detergent, whether or not the cloths were agitated (e.g. stirred) in the detergent, type of stain, amount of stain applied, type (e.g. colour, thickness) of cloth used etc

2c. The type of washing detergent

2d. Determine how much of each stain has been removed by each washing detergent compared to the control (unwashed cloth with stains on it)

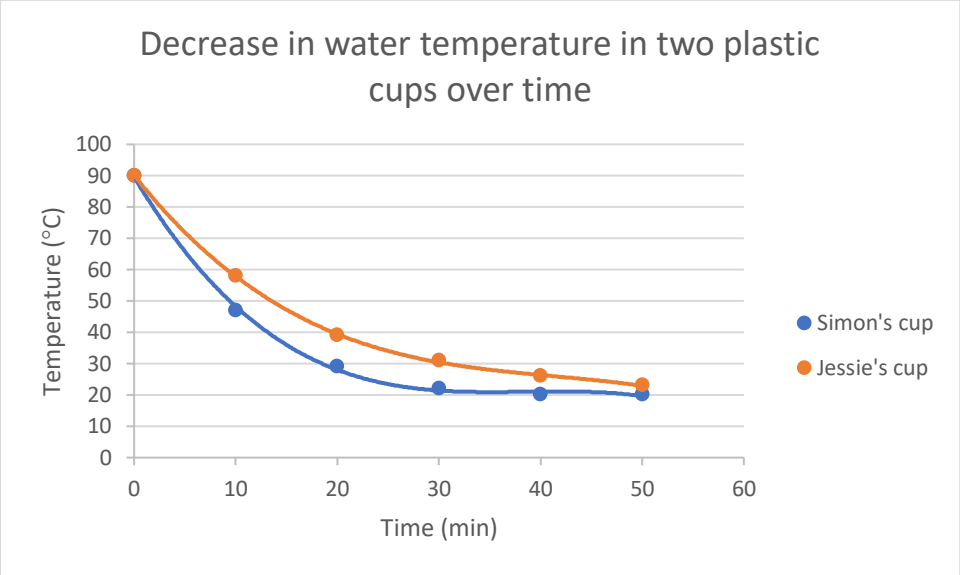
3a. the shape of the mugs is different (one is tall and thin, the other is short and wide), the colour of the mugs is different (one is black, one is white). These should be kept the same since they are controlled variables.

3b. colour of mug, shape of mug, starting temperature of the water, location of mug (e.g. external temperature, amount of wind etc), position of the thermometer in the water, whether or not the water is stirred, amount of time between adding water and measuring the final temperature.

3c. the material the mug is made out of (this is the independent variable)

3d.
1. Add 200 mL of boiling water to each of a white ceramic mug and a white-coloured glass mug and start a stopwatch.
2. Hold a thermometer in each mug using a retort stand.
3. Measure the temperature of the water in each mug every 5 minutes for 30 minutes and record in a table.
4. Remove water from each mug and allow mugs to cool completely.
5. Repeat steps 1 to 3 four more times and calculate averages for both mugs.
6. Compare average results to determine the mug that keeps water hot the longest.

4a.



4b. Jessie's cup

4c. 35°C

4d. 60 minutes (make sure that you extend the line on your graph and annotate the graph to show how you made your prediction)