

## Designing an Investigation and Fair testing

1. The following text describes a scientific investigation. Read the text and then answer the questions.

*Jerry liked to play outside sports in the summer and wanted to know what coloured shirt would be the coolest for him to wear. He decided to conduct a series of experiments to find out the answer.*

*He suspected from watching television that white or pale coloured clothes would be best. He found in his mother's fabric box six different coloured squares of cotton cloth (white, pink, red, black, cream, navy). On a hot sunny day at midday, he placed these six squares of fabric on the table in the backyard and placed the bulb of a thermometer underneath each cloth. He recorded the initial temperature on each thermometer as well as the temperature on a thermometer lying on the table but not covered by any cloth. He waited 15 minutes and then recorded the temperatures on all thermometers. He repeated the experiment five more times and recorded his results in a table for further analysis.*

- (a) State Jerry's hypothesis.

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- (b) Identify all the variables that were controlled.

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- (a) Identify the control that Jerry used in his investigation.

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- (b) How has Jerry improved the reliability of his investigation?

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- (c) Has this been a fair test? Discuss.

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2. Advertisements for washing powders and liquids often claim that they are more effective than others. Imagine you are conducting an experiment to test the effectiveness of a range of washing powders and liquids.

(a) Prepare an outline of a procedure for your experiment.

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(b) List the variables that you will need to control.

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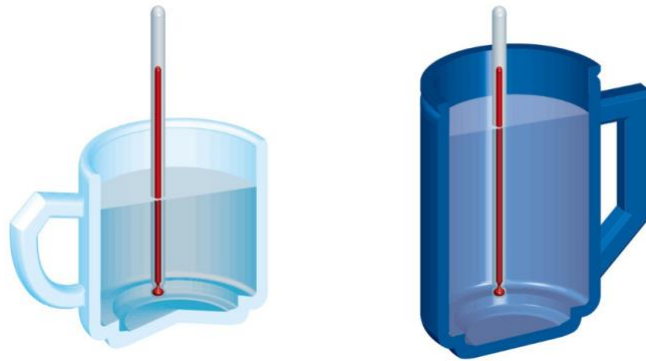
(c) Which variable will you change?

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(d) How will you compare the results of your tests?

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3. Catherine and Celine are trying to find out whether ceramic or glass cups are better for keeping water hot. The illustration below shows their experiment in progress.



(a) Identify at least two errors in their experimental design.

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(b) Identify all the variables that could affect the results of Catherine and Celine's experiment.

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(c) Identify any variables that Catherine and Celine do not need to control.

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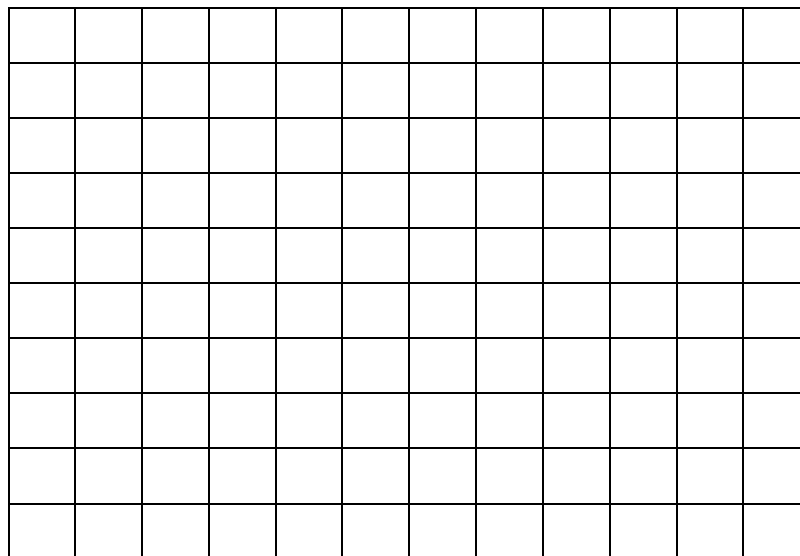
(d) Write a step-by-step outline of the procedure that they could use to find out which cup keeps water hotter.

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4. Simon and Jessie conducted an experiment to find out how effectively two plastic cups maintain the temperature of near boiling water. Their data are shown below.

Time (min)	Temperature (°C)	
	Simon's cup	Jessie's cup
0	90	90
10	47	58
20	29	39
30	22	31
40	20	26
50	20	23

- (a) Construct an appropriate graph to display the data. Include a line-of-best-fit.



- (b) Identify which cup maintained the temperature of the water more effectively.

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- (c) Estimate the temperature of the water in Simon's cup 15 minutes after timing commenced.

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- (d) Use your graph to predict how long it would have taken the water in Jessie's cup to drop to a temperature of 20 °C.....