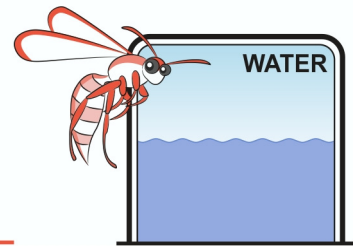


Fair test - Teacher Notes



The concept of “Fair Test” is central to scientific practice. Scientists should only produce data that can be OMRR

- **Observed** Using their five senses. Though students should only ever use their sense of taste if directed by their teacher. E.g. to test for salt in clean salty water.
- **Measured** Using International standard units such as grams or kilometres. Subjective measurements such as “big” vary on the age and experience of the experimenter.
- **Repeated** If only a single measurement is taken it may be an outlier and not represent the most common, mean or average result.
- **Reported** Only when the above criteria are met.

To achieve a “Fair Test” everything should be kept the same except the one thing we will change to find out what results. We call this “reducing everything to one variable”.

The one variable we change is known as the **independent** variable.

The one variable we measure is called the **dependent** variable.

Students are not required to use this terminology until Year 8.



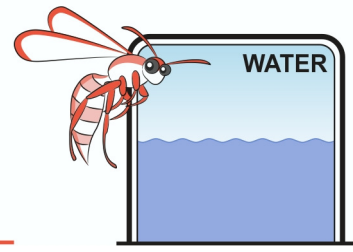
A fun activity to demonstrate the necessity for repetition uses a Pasteur or transfer pipette and a five cent piece. The pipette is named after the famous French microbiologist. These pipettes are inexpensive (less than \$17.00 for 500 in 2012).



If coins are sourced from the school canteen or local hot food shop they will be in different states of preservation, have different patterns having been minted in different years and some will be very greasy from food and human usage.

ASIDE Disease follows money. Medieval merchants used to keep their coins in vinegar in an attempt to ward off plague.

Fair test - Teacher Notes



Materials per student

- Newspaper or paper towel to work on
 - A 5c piece
 - A beaker or other container of water (can be shared)
 - A transfer pipette
1. Students place the towel or old newspaper onto the desk to mop up spillage.
 2. Demonstrate how to load the pipette by placing it into water, squeezing out air and letting it fill with water.
 3. Challenge students to see how many drops of water they can put onto their 5c piece before it overflows.
 4. Table their initial results on the board and there will be a broad range of results.
 5. Ask them which is the correct answer/answers? Because we had not controlled all of the variables none are.

Variables to be controlled

- Head or tails
 - Same year/pattern on surface of coins
 - Clean/dirty coins
 - Damaged/undamaged rims
 - Distance of water drop
 - Pressure on pipette/size of water drop
 - Whether the tip of the pipette penetrates the growing water dome on the coin or not
6. Repeat with as many variables controlled as possible. Results will be closer but not all the same. Scientist report the mean or average reading AND the range of readings. E.g. average 38 drops, range 17 to 84 drops.

Absolute control is rarely obtained and a range of data is not uncommon. Scientists will repeat their measurements many hundreds of times before publishing their data.