Making Measurements

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| Instrument | Input | output |
| Thermometer |  |  |
| Voltmeter |  |  |
| Trundle wheel |  |  |

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| Resolution | The ratio of output to input.  | How long it takes a temperature sensor to respond when you put it in hot water.  |
| Sensitivity | The time interval between a change in input and the corresponding change in output.  | A newtonmeter that reads 0.1N when there is no force acting on it. |
| Stability (repeatability, reproducibility) | Variations, which may be random, superimposed on a signal.  | Always reading a scale at an angle  |
| Response time | Determining the relationship between output and true input value, including the linearity of the relationship. | The change in potential difference across a thermistor when the temperature changes by 1oC. |
| Zero error | An error “built in” to the experiment. This can show up as an intercept on a graph. | The relationship between the resistance of a thermistor (in ) and the temperature (oC) |
| Noise | The smallest detectable change in input. | The change in activity levels over time as a radioactive sample decays. |
| Calibration | The extent to which repeated measurements give the same results, including gradual change with time (drift) | On a standard 30cm ruler this is 1mm |
| Systematic error (bias) | The output for zero input | Changes on to a reading on a temperature sensor as someone opens a door. |

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| Set 1 | Ruler | Micrometer | Trundle wheel |
| Set 2 | Thermometer | 2d.p. electronic balance | Light gate used as a timer |

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Which is most sensitive? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which is most accurate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which is least susceptible to noise? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which has the greatest resolution \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which has the longest response time? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which is easiest to calibrate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which is most precise? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_