Measuring Instruments Answers

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| **Term** | **Definition** | **Example** |
| Resolution | The smallest change that your instrument can detect.  For a scale, it’s the value of the smallest scale division.  For digital read outs it’s the value of one unit in the last digit | A micro-ammeter with a range of 100 μA with 50 divisions has a resolution of 2 μA or 2% of the range. |
| Sensitivity | The **ratio** of the change of output to the change of input.  It is used on instruments where a scale is made to represent another range of values.  It can be increased by using an amplifier | A sensor measuring light uses a voltmeter:  “6.0 V per lux”.  A CRO measuring p.d. on a linear scale on a screen: “0.2 V per cm” |
| Calibration | Using one known (standard) measuring device to set the measurements of a second device | Knowing that exactly 1cm3 of water has a mass of exactly 1g, you can use a balance to check the accuracy of a pipette. |
| Stability | A measure of how close together repeat readings are | Examples of things that can affect this   * Pointers that stick slightly * Bad electrical contacts * A clamp that is not rigid * Clumsy use of a micrometre. |
| Zero error | A systematic error that gives the wrong measurement for zero | Not noticing the blank space at the end of a ruler or that a balance does not read zero when there’s nothing on it. |
| Response time | The length of time a sensor takes to reach its final reading following a sharp change in input. | A thermometer is a slow change sensor  A CRO is a fast change sensor |
| Systematic error | A misreading inherent in the experiment or due to human error | A clock running fast, forgetting to account for background radiation or a parallax error |