

TIPS FOR CARRYING OUT SPECIFIED PRACTICAL WORK

- **Measurement of g by freefall**

- This may be carried out in a number of different ways.
- A ticker tape timer may be used.
- A digital camera could be used with freeze frame technology.
- Some people have used light gates successfully.

Use of a g -ball – this is a relatively inexpensive baseball that has a switch on it that starts timing the moment you drop it and stops when it hits the ground -

<http://www.betterequipped.co.uk/g-ball-2179>

- **Investigation of Newton's 2nd law**

This can be investigated using a single light gate at the end of a linear air track (or a track sloped to take into account the effect of friction). If the trolley starts from rest $u = 0$, the length of the track, x , is measured and the final velocity, v , can be calculated using the time from the light gate and the length of the trolley hence $v^2 = 2ax$ could be used to find the acceleration.

- **Investigation of the variation of resistance with temperature for a metal wire**

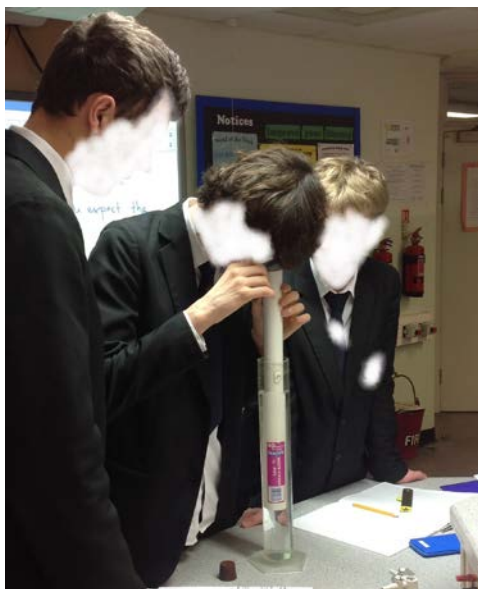
- This has been investigated successfully using an old temperature probe - a PT100 Platinum probe. If you 'google' PT100 plenty of potential sites come up.
- Using platinum temperature sensors is another alternative-available from Rapid electronics – code 50-3679, <https://www.rapidonline.com/heraeus-m1020-pt-100-platinum-temperature-sensor-70-500-c-3850-ppm-k-class-50-3679>.
- It is still possible to buy laminated copper wire if people wish to make up their own coil. A 20m length of 40 gauge enamelled copper wire works well (remember to burn off the enamel at the ends to connect the ohmmeter).

- **Measurement of the intensity variations for polarisation**

- If any old laptop computers are being thrown out it is possible to 'carefully' remove the large polaroid from behind the screen. Two of these then can be used to demonstrate polarisation. This works particularly well on an old overhead projector. If you put strips of sellotape between the polaroid you get some very strange effects.
- You could download a light intensity app from the apple store and take numerical values for one polaroid being rotated over another on an ohp or using another intense light source.

- **Determination of the speed of sound using stationary waves**

- This can be carried out with a tube being moved in a water bath. One teacher sawed off the bottom of an old (large) measuring cylinder as a tube. Others have used plastic tubes such as electrical insulation pipes and measured the inside to get the open length of the tube.
- It is also possible to use a large burette full of water at the start and allow the water level to slowly drain.
- 8 Ω , 5.7 cm (2.2") miniature speaker with waterproofed, transparent Mylar membrane and Neodymium magnet are perfect for the resonance of an air column in a 250 ml measuring cylinder when hooked up to a signal generator. The length of the tube is changed by adding more water to the measuring cylinder. Frequency read off the sig gen. Top tip, turn the volume right down to find the resonance frequency - also stops migraines from 24 students striking tuning forks.
- Use a piece of drain-pipe cut to 50cm with a laminated scale on the side in a plastic measuring cylinder. As shown in photos below:



- Determination of h using LEDs**
 - This experiment works well and gives accurate results. A number of people suggested viewing the LEDs through a black cardboard tube to determine when they 'switched on'. This was set as a PH3 question in 2006.
 - A number of kits are available relatively cheaply Timstar code RA140105 - <http://www.timstar.co.uk/catalogsearch/result/?cat=0&q=RA140105>
- Estimation of absolute zero by use of the gas laws**
 - Measuring absolute zero works with a bead of sulfuric acid in a capillary tube, the tube however needs to be **very hot** before the bead is added. A drop of dark green olive oil works just as well as concentrated sulfuric acid and it is far safer!
 - Joly's bulb is a premade piece of apparatus that investigates the effect of temperature on pressure (the pressure law). This can be used to find absolute zero. It can be purchased from Timstar code HE18753 for £52-42 (other suppliers are available!)_ <http://www.timstar.co.uk/catalogsearch/result/?cat=0&q=HE18753>
- Investigation of the force on a current in a magnetic field**

The old metal 'C' holders from the Westminster electric motor kits along with two side polarised magnets are an excellent way to set this experiment up.
- Investigation of the variation of intensity of gamma radiation with distance**

There are a number of good simulation sites that could be used if equipment is a problem particularly with this practical. Two that were recommended were PHET and virtual physics lab.
- PAST EXAM PH3 and PH6 QUESTIONS**

A number of the practicals have been set as PH3 or PH6 questions. It may be an idea to include some of these into the pupils 'lab book' particularly to help with the teaching of absolute and percentage uncertainties e.g. the density questions on PH3. Relevant past PH3 and PH6 questions are available on the A level Physics web page in a zip folder under the Resources for teachers section. http://www.eduqas.co.uk/qualifications/physics/as-a-level/GCE_Physics_practical_past_examination_questions.zip?language_id=1