

AH Investigations

Title	Description	Student
1. Light Sensitive Devices – LDR, photodiode comparison	Plot V vs I for each device under the same lighting conditions. Repeat for increase variation in light intensity. Measure response times of each device – Pasco Interface. Variation of response times with light intensity.	
2. LCR Circuits	Behaviour of C in A.C. circuit; ohms law, X_C , C. Behaviour of L in A.C. circuit; ohms law, X_L , L. Series and parallel resonance.	
3. Vibrating Strings	Relationship between frequency and length, tension and mass per unit length using sonometer plus magnet and piece of paper on wire.	
4. Vibrating Strings	Relationship between frequency and length, tension and mass per unit length using sonometer plus Lissajou figures.	
5. Speed of Sound	Comparison of methods Resonance tube – closed and open. Standing waves- reflector plus microphone. Speed of sound in solids, liquids.	
6. Interferometer – Measurement of refractive index of gases	Introduce gas into cell and measure the number of fringe shifts. Relationship between number and the change in refractive index.	
7. Circular Motion	Use rotational air table to prove $F = m\omega^2 r$	
8. Newton’s Rings	Wedge fringe experiment leading to Newton’s rings.	
9. Laser Experiments	Intensity profile across beam Intensity variation with distance. Wavelength of laser beam using diffraction grating. Metal rule interference. Investigation of polarisation of the beam.	
10. Interference	Calibration of diffraction gratings – spectrometer plus lamp. Measure the wavelength of laser light. Diffraction pattern around a hair. Spiral separation of CD.	
11. Interference	Single slit diffraction - pattern Young’s Slits – measurement of λ . Increase in number of slits leading to grating - effect on accuracy.	
12. Measurement of Refractive Index.	Comparison of methods: Real and apparent depth. Hollow triangular prism Snell’s law	
13. Measure of “g”	Simple pendulum Compound pendulum Trolley down a slope – plot a vs $\sin \theta$	

14. Measure of “g”	Simple pendulum Oscillating Spring Ball bearing on concave mirror	
15. Leidenfrost Effect	Calibration of thermocouple. Factors that affect the time for liquid to totally evaporate.	
16. Planck’s constant - LED	Find λ for 4 different colours of LED – spectrometer. Forward bias each – plot I vs V characteristics. Plot R vs V for each Equate $eV = hf$	
17. Moment of Inertia – 1	Find I of flywheel. Cylinders rolling down plane. Fill cylinders with water, sand, jelly. Compare theoretical with experimental values.	
18. Moment of Inertia - 2	Use Pasco sensor to plot α vs T for different shapes of solid objects. Find I for each and compare with theoretical values.	
19. Circular motion – Pasco.	Use rotary sensor to find relationship between T and α . Measure I of rotating system and compare with theoretical value. Demonstrate the conservation of angular momentum.	
20. Magnetic Fields – Hall probe	Current carrying wire – B dependence on I and r. Coil – B at centre dependence on number of turns. B in and around a current carrying slinky.	
21. Young’s Modulus – 1	Add masses to the end of a steel bar – note deflection. Vibrating bar and motion sensor. Add weights to middle measure deflection. Comparison of two methods	
22. Young’s Modulus - 2	Elastic limit and breaking point of copper wire. Determine Young’s modulus using Searle’s apparatus. Repeat using travelling microscope – comparison.	
23. School’s chip	Standard experiments to look at properties of chip.	
24. Radioactivity -1	Geiger Muller tube properties. Coefficient of absorption. Back scattering Inverse square law for γ .	
25. Radioactivity - 2	Relationship between half value thickness and density of materials. Magnetic and electric field deflection of particles. Background radiation.	
26. Light – polarisation – Malus’ Law	Use of polarising filters, light detector. Optical activity of different solutions. Brewster angle – calculation of n.	

27. Surface tension – capillary action – viscosity	Variation in different widths of capillary tubes. Glass slide in contact with liquid surface – top pan balance – raise and lower container using jack.	
28. Study of friction	Coefficient of static / dynamic friction of wooden block on wood by: 1. applying a horizontal force using a plastic bottle 2. tilting the wooden surface. Choose preferred method to investigate the effect of surface area.	
29. Resonance	Resonance in air columns. Frequency of ac mains (Melde's exp) LCR circuits Resonance in springs Sonometer.	
30. Refractive index – factors	Triangular hollow prism plus laser. Relationship between temperature of water, concentration of salt solution or molarity of sulphuric acid.	
31. Damped Oscillations	Use of motion sensor – oscillating spring – variation of amplitude with time. Electromagnetic damping. Aerodynamic damping – use of card Damped oscillations in LCR circuit.	
32. Capacitance - 1	Use large parallel capacitor to investigate effect of plate separation, area of overlap and dielectric. Find ϵ_0 for air – use of coulomb meter and voltmeter	
33. Capacitance – 2	Use large parallel capacitor to investigate effect of plate separation, area of overlap and dielectric. Find ϵ_0 for air – vibrating switch method.	
34. Capacitors	Experimental proof of total capacitance of capacitors in series and parallel. Use of joulemeter to measure energy stored in capacitor arrangement. Plot a graph of E vs V^2 . Slope gives $\frac{1}{2} C$	
35. Speed of light	Find ϵ_0 from parallel plate capacitor, μ_0 from current balance then use Maxwell's equation to find c.	
36. Electromagnetism	Solenoids – fields in and around – use of Hall probe.	