CAPE Unit 1 Physics Mark Scheme

|  |  |  |  |
| --- | --- | --- | --- |
| Labs | Title | Skills Assessed | Graded Practical  |
|  |  |  |  |
| 1 | Measurement and Uncertainty | AI | x |
| 2 | Linear motion  | ORR | x |
| 3 | P&D - Terminal Velocity | P&D | x |
| 4 | Archimedes Principle | AI | x |
| 5 | Properties of a wave on a string | ORR |  |
| 6 | Plane Reflection | MM | x |
| 7 | Plane Reflection  | MM | - |
| 8 | Oscillating Spring Mass  | AI |  |
| 9 | Sound  | P&D | x |
| 10 | Lung capacity  | MM | x |
| 11 | Force and deformation  | P&D | - |
| 12 | Young modulus | ORR | x |
| 13 | Specific heat capacity of aluminium  | P&D | - |
| 14 | Implementation  | AI | x |

Lab 1: measurement and uncertainty (SKILLS)

|  |  |  |
| --- | --- | --- |
|  | Details  | Marks |
| MeasurementsAnd calculation | Measurement diameter with Vernier  | 1 |
| Measured diameter for 5 coins  | 1 |
| Calculate diameter and uncertainty from the five coin for one coin | 11 |
| Which of the diameter measurement is best  | 1 |
| Calculate the magnitude of the densityUncertainty  | 23 |
| Discussion | Explain how to obtain measurement for thickness and mass  | 11 |
|  |  | 12 |

Lab 2: Linear motion

|  |  |  |  |
| --- | --- | --- | --- |
|   |  | Details  | Marks  |
| Method  |  | Clear and in proper sequence  | 1  |
|   |  | Writes in past tense  | 1  |
|   |  | Includes all key steps  | 1  |
| Results  |  | Suitable title  | 1  |
|   |  | Correct SI units for all quantities measured  | 1  |
|   |  | Suitable range of readings  | 1  |
| Graph  |  | Title of graph  | 1  |
|   |  | Plots graph correctly (s vs t2) | 1  |
|   |  | Labels axes  | 1  |
|   |  | Line of best fit  | 1  |
|   |  | Graph size covers more than half the page both ways  | 1  |
| Conclusion  |  | Includes a statement with the results reached  | 1  |
|  | TOTAL  | 12  |

Lab 3: Terminal Velocity – P&D

|  |  |  |
| --- | --- | --- |
|  | Details | Marks |
|  |  |
| (a) Hypothesis  | 1 |
| (b) Aim  | 1 |
| (c) Apparatus | 1 |
| (d) Method  | 2 |
| (e) Manipulating, Responding and Controlled Variable  | 3 |
| (f) Precautions/Assumptions/Possible Sources of Error (2 each) | 2 |
| (g) Expected Results | 2 |
|  |  |
| TOTAL | 12 |

Lab 4: Archimedes Prinicples

|  |  |  |  |
| --- | --- | --- | --- |
|   |  | Details  | Marks  |
| Calculations  |  | Correct moments equation  | 1  |
|   |  | Determines mass of the rubber stopper  | 2 |
|   |  | Determines upthrust on rubber stopper  | 1 |
|   |  | Weight of water displaced for the stopper  | 2 |
| Discussion  |  | Relate the results to Archimedes' Principle of buoyancy  | 2 |
|   |  | Answer questions 1 and 2  | 2  |
|   |  | States at least one error and precaution  | 1 |
|  |  | Conclusion related to the aim | 1 |
|  | TOTAL  | 12 |

Lab 5 Properties of a wave

|  |  |  |  |
| --- | --- | --- | --- |
|   |  | Details  | Marks  |
| Method  |  | Clear and in proper sequence  | 1  |
|   |  | Writes in past tense  | 1  |
|   |  |  |  |
| Results  |  | Suitable title  | 1  |
|   |  | Proper SI units and headings  | 1  |
|   |  | Suitable range of readings  | 1  |
| Graph  |  | Title of graph  | 1  |
|   |  | Plots graph correctly  | 1  |
|   |  | Label axes (x and y) | 2  |
|   |  | Line of best fit  | 1  |
|   |  | Graph size covers more than half the page both ways  | 1  |
| Conclusion  |  | Includes a statement with the results reached  | 1  |
|  | TOTAL  | 12  |

Lab 6: PLANE REFLECTION - MM

|  |  |
| --- | --- |
| Details  | Marks |
| A. Uses pencil with sharp point  | 1 |
| B. Ensure lens edges are on the positioning lines  | 1 |
| C. Draws normal at 90˚ to mirror line  | 2 |
| D. Measures angles of incidence and reflection from the normal  | 2 |
| E. One Pinhole close to lens, the other close to the edge of paper  | 2 |
| F. Pins straight and vertical  | 1 |
| G. Pins properly aligned  | 2 |
| H. Indicating pinholes by circling them  | 1 |
| Total | 12 |
| Lab 7: PLANE REFRACTION - MM  |
| Details | Marks |
| A. Uses pencil with sharp point  | 1 |
| B. Correctly setup of apparatus (glass block, protractor, and light source) | 1 |
|  C. Draws normal at 90˚ to the boundary at the first boundary and secondary boundary | 2 |
| D. Accurate measurement of at least three different incident angles | 2 |
| E. Accurate measurement of at least three different refracted angles | 2 |
|  F. Clear labelling of the incident ray and refracted ray  | 2 |
| G. Arrows are used to identify incident and refracted rays  | 2 |
|  |  |
| Total | 12 |

Lab 8: Oscillation of a spring - mass

|  |  |  |  |
| --- | --- | --- | --- |
|   |  | Details  | Marks  |
| Calculations  |  | Determine k of 2 springs in series  | 1  |
|   |  | Determine k of 2 springs in parallel  | 1  |
|   |  | Proof of the ratios of k in series to k in parallel is equal to 2  | 2 |
| Discussion  |  | Graphical Analysis in relation to Spring Constant, k  | 3 |
|   |  | Answers all questions  | 3  |
|   |  | States at least one error and precaution  | 2  |
|  | TOTAL  | 12 |

Lab 9: Sound

|  |  |  |
| --- | --- | --- |
|  | Details | Marks |
|  |  |
| (a) Hypothesis  | 1 |
| (b) Aim  | 1 |
| (c) Apparatus | 1 |
| (d) Method  | 2 |
| (e) Manipulating, Responding and Controlled Variable  | 3 |
| (f) Precautions/Assumptions/Possible Sources of Error (2 each) | 2 |
| (g) Expected Results | 2 |
|  |  |
| TOTAL | 12 |

Lab 10: Lung capacity

|  |  |  |
| --- | --- | --- |
| Criteria  | Details  | Marks  |
| Proper technique  | Correct use of Vernier Calliper  | 2 |
|  | Demonstration of correct breathing technique | 2 |
| Consistency  | Perform Multiple trials | 2 |
| Recording  | Records all measurements with appropriate units  | 2 |
|  | Determine the uncertainty measurement | 2 |
| Calculation  | Sample calculation of average lung capacity from multiple trials | 2 |

Lab 11: Forces and Deformation – P&D

|  |  |  |
| --- | --- | --- |
|  | Details | Marks |
|  |  |
| (a) Hypothesis  | 1 |
| (b) Aim  | 1 |
| (c) Apparatus | 1 |
| (d) Method  | 2 |
| (e) Manipulating, Responding and Controlled Variable  | 3 |
| (f) Precautions/Assumptions/Possible Sources of Error (2 each) | 2 |
| (g) Expected Results | 2 |
|  |  |
| TOTAL | 12 |

Lab 12: Young’s Modulus - AI

|  |  |  |
| --- | --- | --- |
|  | Details | Marks |
| Calculation | Find Gradient and n | 1 |
|  | Find Y-intercept and k  | 2 |
|  | Calculate Young’s Modulus | 2 |
|  |  |  |
| Discussion | Relationship Between period of oscillation and length of blade | 2 |
| Describe Graph | 1 |
| At least One source of error and Precaution | 2 |
| Conclusion  | Includes a statement with the results reached | 2 |
|  | Total | 12 |

Lab 13: Specific heat capacity of aluminum

|  |  |  |
| --- | --- | --- |
|  | Details | Marks |
|  |  |
| (a) Hypothesis  | 1 |
| (b) Aim  | 1 |
| (c) Apparatus | 1 |
| (d) Method  | 2 |
| (e) Manipulating Responding Controlled Variable  | 111 |
| (f) Two Precautions and Two Assumptions or Two Possible Sources of Error or Two Limitations  | 11 |
| (g) Expected Results | 2 |
|  |  |
| TOTAL | 12 |

Lab 14: Implementation – The Investigative Report

 