|  |  |
| --- | --- |
| Country |  |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |
| Signature |  |  |  |

|  |
| --- |
| **Experiment I. Determination of the Densities of Fruit Juices** |
| Questions(Points) | Data and Answers |
| I-1(1.0) | Length of spring (cm) |  |
| I-2(6.0) | I-2-1(1.0) | Masses (g) |  0  |  |  |  |  |
| Lengths of spring (cm) |  |  |  |  |  |
| I-2-2(1.0) | Extended lengths of spring (cm) | 0  |  |  |  |  |
| I-2-3(2.0) |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment I. Determination of the Densities of Fruit Juices (Cont’d)** |
| I-2(6.0) | I-2-3(2.0) | (Show your working) |
| <x> |  | <y> |  |
| < x2> |  | <xy > |  |
| Slope, *A* | cm/g | Intercept, *B* | cm |
| I-2-4(2.0) | Spring Constant | N/m |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment I. Determination of the Densities of Fruit Juices (Cont’d)** |
| Questions(Points) | Data and Answers |
| I-3(4.0) | I-3-1(1.0) | Juice | Mandarin | Apple |
| Lengths of spring (cm)  |  |  |
| I-3-2(1.0) | Extended lengths of spring (cm) |  |  |
| I-3-3(2.0) | (Show your working) |
| Juice | Mandarin | Apple |
| Buoyant forces (N) |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment I. Determination of the Densities of Fruit Juices (Cont’d)** |
| Questions(Points) | Data and Answers |
| I-4(1.0) | Volume (cm3) |  |
| I-5(2.0) | (Show your working) |
| Juice | Mandarin | Apple |
| Densities (g/cm3) |  |  |

------------------------------------ DO NOT WRITE BELOW ------------------------------------

|  |  |
| --- | --- |
| Total points for experiment I |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment II. Determination of the Citric Acid Contents in Fruit Juices**  |
| Questions(Points) | Data and Answers |
| II-1**(7.0)** | (Show your working)0.5 per juice for completing all readings to two decimal places and all appropriate units0.5 per juice for correct calculation of average values (if necessary disregarding anomalous values); 0.25 if anomalous values are included0.5 per juice if at least two titers are no more than 0.1 mL apart-----Marks for accuracy compared to **ideal titer**≤ ±0.25 mL [2.0] per juice ± 0.26 – 0.45 mL [1.5] ± 0.46 – 0.65mL [1.0] ± 0.66 – 0.85 mL [0.5] ±0.85 – 0.99 mL [0.2]≥ 1 mL [0.0] |
|  | Juices |
| Mandarin | Apple |
| Trials | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Initial Readings (in ) |  |  |  |  |  |  |  |  |
| Final Readings (in ) |  |  |  |  |  |  |  |  |
| Volumes of NaOH solution consumed for titration |  |  |  |  |  |  |  |  |
| Average volume |  | Average volume |  |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment II. Determination of the Citric Acid Contents in Fruit Juices (Cont’d)** |
| Questions(Points) | Data and Answers |
| II-2(2.0) | (Show your working)n(NaOH) = V(NaOH) \* c(NaOH) [1]Correct values for each juice [0.5] |
| Moles of NaOH | Mandarin | mol | Apple | mol |
| II-3(2.0) | (Show your working)Mole ratio: 3:1Calculation n(acid) = n(NaOH) / 3 [0.5 per juice]Calculation m(acid) = n(acid) \* Mr(acid) [0.5 per juice]0.25 if error in Mr or missing units |
| Moles of citric acid | Mandarin |  | Apple |  |
| Masses of citric acid | Mandarin |  | Apple |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment II. Determination of the Citric Acid Contents in Fruit Juices (Cont’d)** |
| Questions(Points) | Data and Answers |
| II-4(2.0) | (Show your working)Calculation m(juice) = density \* volume = 1.00 g/cm3 \* 10.0 cm3 = 10.0 g [0.5]Calculation Percent Concentration m(acid) / m(juice) \* 100 [0.75 per juice]Or value based on students’ answer of II-3 |
| Percent concentration of citric acid | Mandarin | % | Apple | % |

------------------------------------ DO NOT WRITE BELOW ------------------------------------

|  |  |
| --- | --- |
| Total points for experiment II |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment III. Anatomy and classification of fruits and seeds** |
| Question(Points) | Data and Answers |
| III-1(1.0) | Location of tissues originated from A |  |
| III-2(2.0) | Location of tissues originated from A, B, C and D |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student 1 | Student 2 | Student 3 |
| Name |  |  |  |
| Code |  |  |  |

|  |
| --- |
| **Experiment III. Anatomy and classification of fruits and seeds (Cont’d)** |
| Question(Points) | Data and Answers |
| III-3-1(2.0) |  | fruits |
|  |  |
| Fruits for ① and ② |  |  |
| III-3-2(2.0) | Classification schemes for ‘c’ and ‘d’ | characters |
| c | d |
|  |  |
| III-3-3(6.0) | III-3-3-1Draw branch lines to complete the diagram.(4.0 points) |  |
| III-3-3-2(0.5 points) | A fruit for ③ |
| III-3-3-3(0.5 points) | A fruit for ④ |
| III-3-3-4(0.5 points) | A fruit for ⑤ |
| III-3-3-5(0.5 points) | A fruit for ⑥ |

------------------------------------ DO NOT WRITE BELOW ------------------------------------

|  |  |
| --- | --- |
| Total points for experiment III |  |