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| Name |  |  |  |
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| **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) |  | | | | | |

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| **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 | |

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| **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) |  |  |

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| **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) |  |  |

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| Total points for experiment I |  |

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| **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 units  0.5 per juice for correct calculation of average values (if necessary disregarding anomalous values); 0.25 if anomalous values are included  0.5 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 | | | |
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| **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: 3:1  Calculation 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 |  |

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| **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 | % |

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| Total points for experiment II |  |

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| **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 |  |

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| **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-3-3-1  Draw 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 | |

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| Total points for experiment III |  |