**Suggested answer question 1**

**(a)[KB0603-measuring using number]**

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| Score | Item | Criteria |
|  3 | 1(a) | Able to record correctly all the mass of 10 tomatoes and average mass for each tomato in Table 1.Sample answer:

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| --- | --- | --- | --- |
| Glass house | Duration tomato plant exposed to the light intensity daily (hour) | Mass of 10 tomatoes (kg) | Average mass of each tomato (kg) |
| A | 12 | **3** | **0.3** |
| B | 6 | **2** | **0.2** |

 |
| 2 |  | Able to record 3 readings correctly |
| 1 |  | Able to record 2 reading correctly |
| 0 |  | Not able to response or wrong response |

**(b) (i) [KB0601 - Observation]**

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| --- | --- | --- |
| Score | Item | Criteria |
| 3 | 1(b)(i) | Able to state the correct observations based on the following criteria:P1: Glass house/Duration tomato plant exposed to the light intensity dailyP2: Mass of 10 tomatoes/ Average mass of each tomatoSample answer:1. When the duration of tomato plant exposed to the light intensity  Daily is12 hours , the mass of 10 tomatoes is 3 kilograms.2. When the duration of tomato plant exposed to the light intensity daily is 6 hours , the mass of 10 tomatoes is 2 kilograms.3. In Glass house A, average mass of each tomato is 0.3kg.4. In Glass house B, average mass of each tomato is 0.2kg. |
| 2 |  | Able to state **any one** observation correctly with *or*Able to state **any two incomplete** observations. |
| 1 |  | Able to state **any one idea** of observation |
| 0 |  | Not able to response or wrong response |

**(b) (ii) [KB0602- Making Inference]**

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| --- | --- | --- |
| Score | Item | Criteria |
| 3 |  | Able to state correct inference for each observation based on **any two** criterias:P1: time exposed to the light/light intensityP2: growth rate of tomatoP3: causes variation on tomatoesSample answer:Inference 1: When time exposed to the light is long/light intensity is high, the growth rate of tomato is high//Light intensity is high, it causes variation on tomatoes.Inference 2:When time exposed to the light is short/light intensity is low, the growth rate of tomato is low//Light intensity is low, it causes variation on tomatoes. |
| 2 |  | Able to state **any one** inference correctly *or*Able to state **any two incomplete** inferencesSample answer:1. High/low light intensity affect growth in tomato plant
2. Variation of tomato influenced by light intensity
 |
| 1 |  | Able to state **any one idea** of inferenceSample answer:1. Light intensity cause growth
 |
| 0 |  | Not able to response or wrong response |

**(c) [KB0610 – controlling variable]**

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| --- | --- | --- |
| Score | Item | Criteria |
| 3 | 1(c) | Able to state **all** the variables and method to handle correctly. [ 6 items]Sample answer:

|  |  |
| --- | --- |
| Variable | Method to handle the variable |
| Manipulated variable:Duration of tomato plant exposed to the light intensity daily//Glass house | Used different duration of tomato plant exposed to the light intensity daily// Planted the tomato plants in different glass house. |
| Responding variable:Mass of 10 tomatoes// Average mass of each tomato//growth rate of tomato | Record the mass of 10 tomatoes using compression balance//Calculate the average mass of each tomato using formula = mass of 10 tomatoes 10 orCalculate the growth rate of tomato using formula= Mass of 10 tomatoes Time taken for planting |
| Constant variable:Duration of planted//amount of water/minerals | Used same duration of planted tomato such as 4 months//fixed same amount of water/minerals. |

 |
| 2 |  | Able to state any 4-5 items correctly |
| 1 |  | Able to state any 1-3 items correctly |
| 0 |  | Not able to response or wrong response |

**(d) [KB0611 – Making hypothesis]**

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| --- | --- | --- |
| Score | Item | Criteria |
| 3 | 1(d) | Able to state **all three**criterias correctly based on : **P1** : state the manipulated variable.**P2** : state the responding variable**R** : relationship between P1 and P2Sample answer:1. The longer the duration tomato plant exposed to the light intensity (daily), the increase the mass of 10 tomatoes / the higher the growth rate of tomato.
2. Glass house A has the highest growth rate of tomato compare to glass house B.
 |
| 2 |  | Able to state any two criterias correctly or any two criterias inaccurately.Sample answer:Different duration of tomato plant exposed to the light intensity(daily), different growth rate of tomato( plant). |
| 1 |  | Able to state any one criteria correctly or at idea level.Sample answer:Growth of tomato is influenced by glass house |
| 0 |  | Not able to response or wrong response |

**(e)(i) [KB 0606 – Communicating skill ]**

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| --- | --- | --- |
| Score | Item | Criteria |
| 3 |  | Able to construct a table and record all the data correctly based on :T: Title with correct unitsD: Correct dataS: Correct growth rate of tomatoSample answer:T

|  |  |  |  |
| --- | --- | --- | --- |
| Glass house | Duration tomato plant exposed to the light intensity daily (hour) | Mass of 10 tomatoes (kg) | Growth rate of tomato (kg/months) |
| A | 12 | **3** | **0.75** |
| B | 6 | **2** | **0.50** |

SD |
| 2 |  | Able to state any two criterias correctly |
| 1 |  | Able to state any one criterias correctly |
| 0 |  | Not able to response or wrong response |

**(e) (ii) [KB0607 – Using spatial and time relationship]**

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| --- | --- | --- |
| Score | Item | Criteria |
| 3 |  | Able to draw a bar chart graph based on the following criteria : P :Correct axis label with unit/ uniform scale.T : all points are plotted correctly.B: Correct shape of graph |
| 2 |  | Any two criterias |
| 1 |  | Any one criteria |
| 0 |  | Not able to response or wrong response |

**(e)(iii) [KB0608- Interpreting data ]**

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| Score | Item | Criteria |
| 3 |  | Able to explain the relationship between the growth rate of tomato against duration of tomato plant exposed to the light intensity daily based on:**P1**: correct conclusionThe longer the duration of tomato plant exposed to the light intensity daily, the higher the growth rate of tomato.**P2**: more photosynthesis/more organic substances/glucose produced**P3**:causes mass of tomato increases/variation**Sample answer:**The longer the duration of tomato plant exposed to the light intensity daily, the higher the growth rate of tomato because more organic substance is produced causes variation between the tomatoes. |
| 2 |  | Able to state P1 and P2 / P3 |
| 1 |  | Able to state P1 only |
| 0 |  | Not able to response or wrong response |

**(g) [KB0605 – Predicting]**

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| Score | Item | Criteria |
| 3 |  | Able to predict the mass of 10 tomatoes that will be provided when exposed the tomato plant to the light intensity for 4 hours daily correctly based on :P1: Mass of 10 tomatoes less than 2kgP2: less photosynthesis/less organic substance/glucose producedP3: causes growth rate of tomato decreaseSample answer:Mass of 10 tomatoes less than 2 kg because less photosynthesis causes growth rate of tomato decrease |
| 2 |  | Able to predict any P1 and P2 / P3 |
| 1 |  | Able to predict any P1 only |
| 0 |  | Not able to response or wrong response |

**(h) [ KB060902 - Operational definition]**

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| --- | --- | --- |
| Score | Item | Criteria |
| 3 |  | Able to define continous variation operationally based on :P1: Differences between the tomato plants that have same geneticP2: Shown by the mass of 10 tomatoesP3: Growth rate of tomato is affected by the duration of tomato plant  exposed to the light intensity daily/glass house**Sample answer:**Continuos variation is the differences between the tomato plants that have same genetic and can be shown by the mass of 10 tomatoes.Growth rate of tomato is affected by the duration of tomato plant exposed to the light intensity daily/glass house |
| 2 |  | Able to predict any 2 criterias |
| 1 |  | Able to predict any one criteria |
| 0 |  | Not able to response or wrong response |

**(i) [ KB0602 - Classifying]**

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| Score | Item | Criteria |
| 3 |  | Able to classify correctly based on 3 materials and 3 apparatus ( 6 correct ticks):Sample answer:

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| --- | --- | --- |
| Variable*Pembolehubah* | Apparatus*Radas* | Material*Bahan* |
| Manipulated*Manipulasi*  | Light bulb | Tomato plant |
| Responding*Bergerak balas* | Compression balance | Tomato |
| Controlled *Dimalarkan* | Calendar  | Tomatoes Fertiliser |

 |
| 2 |  | Any 4 to 5 ticks |
| 1 |  | Any 1 to 3 ticks |
| 0 |  | Not able to response or wrong response |

**Suggested answer for Question 2**

**KB061201 – ( Problem statement)**

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| --- | --- | --- | --- |
| **Question** | **Score** | **Explanation** | **Remarks** |
| 2 (i) | 3 | Able to state the problem statement correctly :P1 : Water samples Station A, B and CP2 : Time taken for decolourisation of Methylene blue  Solution // BOD value // Level of water pollution H : Question formSample answer:1. Which of the Station of water samples will be more polluted // give the highest BOD value ?
2. How do water sources /samples from Station A, B and C affect the time taken for decolourisation of Methylene blue solution?
 |  |
|  | 2 | Able to state a problem statement less accurately.Sample Answer:1. Which station will be the most polluted water ?/ have highest BOD value?
2. How do water at station A,B and C affect the methylene blue solution?
 |  |
|  | 1 | Able to state a problem statement at idea levelSample Answer:1. BOD value / water pollution is influenced by different station./ water sources
 |  |
|  | 0 | No response or wrong response |  |

**KB061202 ( KB061203 – Making Hypothesis )**

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| --- | --- | --- | --- |
| **Question** | **Score** | **Explanation** | **Remarks** |
| 2 (ii) | 3 | Able tostate the hypothesis based on the following aspects:P1 = Manipulated variable = Water sources / sample from  Station A, B and C.P2 = Responding variable = Time taken for decolourisation of Methylene blue Solution  // BOD value / Level of water pollution  R = Relationship / LinkSampleanswer :1. Station B are the most polluted water sources/ sample compare to Station A and C//.Station B have the highest BOD value compare to Station A and C
 |  |
|  | 2 | Able to write a hypothesis statement less accuratelySample answer:1. Station B is the most polluted water / has higher BOD value.
2. Station C is the least polluted water and low BOD Value.
 |  |
|  | 1 | Able to state a hypothesis at idea levelSample answer:1. Water sources/ samples from different station affects the time taken / the decolourisation of Methylene blue solution
 |  |
|  | 0 | No response or wrong response |  |

**KB061203 ( Variables)**

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| --- | --- | --- | --- |
| **Question** | **Score** | **Explanation** | **Remarks** |
| 2 (iii) | 3 | Able to state all the three variables correctlySample answers :1. Manipulated variable Water sources/ samples from Station A, B and C2 Responding variable Time taken for decolourisation of Methylene blue  Solution // BOD value /Level of water pollution  3 Constant variable 1. Volume of water sources / samples 2. Concentration of Methylene blue solution 3. Temperature |  |
|  | 2 | Able to state any two variables correctly |  |
|  | 1 | Able to state any one variable correctly |  |
|  | 0 | No response or incorrect response |  |

**KB061204 - ( Apparatus and materials)**

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| **Question** | **Score** | **Explanation** | **Remarks** |
| 2(iv) | 3 | Able to list out all the important apparatus and materials correctly.Sample answers:Apparatus:Reagent bottles, syringe, cupboard / black paper, stop watch, label paper / marker pen, measuring cylinder, beakerMaterials:Water sources / sample from Station A, B and CMethylene blue solution |  |
|  | 2 | Able to list 5-6 apparatus and 2 materials correctly  |  |
|  | 1 | Able to list 2-4 apparatus and 2 materials correctly |  |
|  | 0 | No response or incorrect response |  |

**KB061205 ( Experimental Procedure)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Score** | **Explanation** | **Remarks** |
| 2(v) | 3 | Able to describe **all** the steps of the experiment correctlySample answers:1. 150 ml of water sources from Station A, B and C were  taken and brought back to the laboratory. (K2, K1)2. 100 ml of water sources from Station A were measured  by using a measuring cylinder and then poured into the  reagent bottle. (K2, K1)3. By using a syringe, 1 ml of 0.1% methylene solution is  addedto the bottom of each water sources / samples.  (K2/ K1)4. The reagent bottle is closed quickly with a glass stopper  and labeled as A(K5)5. And don’t shake the bottle. (K5)6. Steps 1 to 4 were repeated by using water sources /  samples from Station B and C and labeled as B and C.( K4)7. All the reagent bottles are kept in a dark cupboard / wrap  with black or sugar paper. ( K1) 8. The time taken for decolourisation of methylene blue  solution is recorded using stopwatch (K3)9. At intervals of one hour for a period of four hours, each  reagent bottle is examined. (K1)10.All data are recorded in a table. (K1) Note:K1: Steps 1,2,3,7,9,10 ( Setting apparatus)K2: Step 1,2,3 (Operating fixed variable)K3: Step 8 (Operating responding variable)K4: Step 6 (Operating manipulated variable)K5: Step 4,5 (Precaution) |  |
|  | 3 | All the 5 K’s |  |
|  | 2 | Any 3-4 K |  |
|  | 1 | Any 2 K |  |
|  | 0 | No response or incorrect response |  |

**KB061206 ( Presentation of Data)**

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| **Question** | **Score** | **Explanation** | **Remarks** |
| 2(v) | 2 | Able to present all the data with units correctlySample answer:

|  |  |  |
| --- | --- | --- |
| Water sources / sample Station | Time taken for decolourisation of methylene blue solution / (Hrs) | BOD value and pollution level |
| A |  |  |
| B |  |  |
| C |  |  |

 |  |
|  | 1 | Able to present at least one data without unit or incorrect unit |  |
|  | 0 | No response or incorrect response |  |