7. The diagram below is obtained from measurement of growth in the leaf petiole of pelorgorium plant. The relative growth rate is calculated and the data obtained is as shown below

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time in day | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Relative growth rate (cm / day) | 0 | 0.2 | 0.3 | 0.8 | 2.0 | 4.0 | 4.5 | 3.5 | 0.2 | 0 |

a) Plot a graph of relative growth rate against time 7mks*\*Tso\**

b) Show how the relative growth rate is calculated to obtain the data above . 2mks*\*Tso\**

c) Account for the shape of the curve between the following days.

2 – 5 3mks*\*Tso\**

5 – 6 3mks*\*Tso\**

6 – 8 3mks*\*Tso\**

d) Distinguish between primary growth and secondary growth. 2mks*\*Tso\**

6. The following data represents the development in dry mass of seedlings for a period of 18 weeks.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time in weeks | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| Dry mass in g | 2.8 | 4.0 | 6.0 | 10 | 18 | 32 | 44 | 46 | 44 | 40 |

a) Using a suitable scale, plot a graph of dry mass against time. 6mks*\*TRZ\**

b) With reference to growth explain the changes in dry mass between

(i) Week 0 and week 4. 2mks*\*TRZ\**

(ii) Week 6 and week 12 2mks*\*TRZ\**

(iii) Week 14 and week 18 2mks*\*TRZ\**

c) With a reason state the difference in results that would be expected from the above if the experiment started with the seeds. 2mks*\*TRZ\**

d) Describe how you would carry out the procedure to obtain dry mass in the respective weeks. 4mks*\*TRZ\**

e) State one advantage and one disadvantage of using mass instead of fresh weight in estimating growth of an organism. 2mks*\*TRZ\**

6. In an experiment, 900 viable seeds of a certain species were divided into groups of 100 seeds each. Each group of seeds were placed at different temperatures but same conditions of air and moisture. The percentage germination was determined after 10 days. The table below shows percentage germination at the various temperatures.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Temperature 0C | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| % Germination | 0 | 0 | 2 | 5 | 16 | 50 | 84 | 30 | 2 | 0 |

(a) Using a suitable scale, draw a graph of percentage germination against temperature on the graph paper provided below. (6mks)



1. Account for germination at

(i) 50C (3mks)

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(ii) 300C (3mks)

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(iii) 450C. (3mks)

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c) Explain the role played by each of the following factors in the germination of seeds. (3mks)

(i) Water

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(ii) Air

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1. A biologist carried out a study to investigate the growth of a certain species of herbivorous bony fish and the factors influencing plant and animal life in four small lakes A,B,Cand D. The lakes were located in the same geographical area. Two of the lakes A and B were found contain hard water due to the presence of high content of calcium salts. Lake C and D were found to have soft water with low content of calcium salts. The mean body length of 2years old fish amount of plant life and invertebrate biomass in each lake were determined. The data was recorded as shown in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Lakes** | **Mean body length of 2 year old fish (cm)** | **Type of water** | **Amount of plant life (g/m3of water** | **Invertebrate biomass (g/m3 of water)** | | | |
|  |  |  |  | **worms** | **insects** | **Snails** | **Crustaceans** |
| **A** | 31.2 | Hard | 1050 | 180 | 11 | 300 | 10 |
| **B** | 28.6 | Hard | 950 | 90 | 72 | 100 | 9 |
| **C** | 18.4 | Soft | 1.2 | 20 | 97 | 0 | 2 |
| **D** | 16.3 | Soft | 0.5 | 10 | 99 | 0 | 1 |

(a)**Describe** the procedure that may have been used to determine the mean body length of the fish. (6mks)

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(b) **What** are the likely reasons for the difference in the mean body length of the fish living in lakes **A** and **D** (4mks)

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(c) **Suggest one** reason for the absence of snails in the lakes **A** and **D** (1mk)

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(d) (i) **Name** any **six** abiotic (physical) factors that are likely to influence the plant and animal life in Lake **A**. (3mks)

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(ii) **Explain** how each of the factors named in d(i) above may influence plant animal life in lake

**A** (6mks)

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1. In an experiment, a group of female locust was provided with excess amounts of food from the day they moulted to adult stage up to the 20th day of adulthood. The average weight of dry faeces for each animal was estimated every 2 days. The average fresh weight of each locust was also calculated every second day. It was noted that they all laid eggs between day 12 and day 14 and again between day18 and day 20 of adult life. The data on average dry weight of faeces and weight every two days was presented in the table below.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Days of  Adult life | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| Average dry  wt of faeces in mg. | 240 | 420 | 610 | 740 | 850 | 630 | 540 | 830 | 750 | 620 |
| Average fresh  wt of Locust in mg. | 530 | 750 | 840 | 970 | 1020 | 1160 | 860 | 980 | 1120 | 820 |

(a) Using a suitable scale and appropriate axis, **draw** a graph of the average fresh weight

against time. (7 marks)

(c) **What** is the relationship between food consumption and body weight? **Explain** this

relationship. (2 mark) ......................................................................................................................................

(d) **What** is the relationship between egg production and food consumption? **Account** for

this relationship. (1 mark) ......................................................................................................................................

(e) **What** is the relationship between body weight and food consumption? (1 mark) ......................................................................................................................................

(f) **State two** likely consequences that may happen if the amount of food was reduced to

one half of that required by each locust throughout the study period. (2 marks) ......................................................................................................................................

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(g) **State two** nutrients that must have been present in the locust diet giving a reason for

each. (4 marks)

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(h) If the population of locusts was established by Capture- recapture method, **state** the

formula you would use to get this estimate of population. (3 marks) ......................................................................................................................................

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