**Year 12 Biology**

**Task 12 Competitive Exclusion Principle**

**Investigation**

**Miss Cunningham**

**Weighting 5%**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **Investigation Total Marks** | **Validation Total Marks** | **Combined Total Mark** | **Total %** |
| / 27 | / 20 | / 47 | % |

The competitive exclusion principle is a highly renowned proposition in ecology and biology.

In this investigation, you are to research the following areas of this principle answering in full sentence answers over the course of 2 lessons, and complete an in class validation of second hand data analysis of this principle in test conditions.

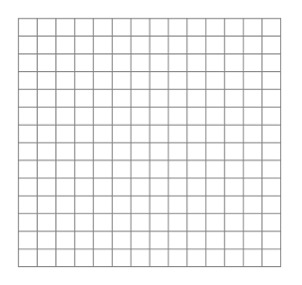
Ensure to reference all sources used for the research investigation in APA format.

Please refer to the marking rubric at the end of this investigation booklet to understand success criteria and achieve optimum marks.

**Research Investigation Task**

Use your device to research the following points below, being sure to answer in full sentences and reference all credible sources in APA format.

1. What it is the Competitive Exclusion Principle?
2. Who proposed this theory and when?
3. Outline and explain 3 forms of evidence for this principle.
4. Explain 3 outcomes of this over a long period of time.
5. Discuss how this principle relates to Darwin’s theory of Natural Selection.
6. Describe the findings of this principle when experimenting with Paramecium.
7. Outline the effect this principle has on niche biodiversity.
8. Draw how this principle is represented quantitatively on a graph in the area below (ensure to use pencil and ruler).



1. APA referencing

**Marking Rubric (27 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **1 mark** | **2 marks** | **3 marks** |
| **What is it** | Identifies what principle is. | Identifies what principle is with brief description. | Identifies and explains what principle is. |
| **Who and When** | Identifies either who or when it was discovered. | Identifies both who and when discovered. | Identifies and discusses who and when discovered. |
| **Evidence** | Provides 1 form of evidence. | Provides 2 forms of evidence. | Provides 3 forms of evidence. |
| **Outcomes** | Provides 1 outcome. | Provides 2 outcomes. | Provides 3 outcomes. |
| **Natural Selection** | Mention on theory of Natural Selection. | Related to theory of Natural Selection. | Explains in detail how interrelated to Natural Selection. |
| **Paramecium** | Identifies example of Paramecium. | Describes how this principle is related to example of Paramecium. | Explains in detail this principle in Paramecium examples. |
| **Niche Biodiversity** | Identifies niche biodiversity. | Identifies and discuss how principle effects niche biodiversity. | Identifies and explains in detail how principle effects niche biodiversity. |
| **Graph** | Graph of two species correctly aligned with principle with 2 or more errors. | Graph of two species correctly aligned with principle with one error. | Graph of two species correctly aligned with principle with no errors. |
| **APA Referencing** | 3 or more references correct in APA format. | 5 or more references correct in APA format. | 7 or more references correct in APA format. |

**TOTAL: \_\_\_\_ / 27**

**Year 12 Biology**

**Task 12 Competitive Exclusion Principle**

**Validation**

**Miss Cunningham**

**Weighting 5%**

**Total Marks: / 20**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A student in their Biology class wanted to investigate the competitive exclusion principle by recreating the *Paramecium* experiment. The student planned their experiment below, completed it and included their results and findings. Using your knowledge on the competitive exclusion principle and the information below, you are to complete this validation in test conditions and answer the following questions in full sentence answers.

Aim

To investigate the competitive exclusion principle using two different strains of Paramecium to see if they can both survive simultaneously.

Hypothesis

One strain of Paramecium will drive the other strain of Paramecium to extinction, so they both won’t survive simultaneously.

Method

1. On agar plate, place small sample of Paramecium strain 1 and Paramecium strain 2 on separate ends.
2. Leave agar with samples covered in warm place to grow over 17 days.
3. Record number of colonies of each strain each day in the results table.

Results Table

|  |  |  |
| --- | --- | --- |
| **Day** | **Paramecium Strain 1 colonies** | **Paramecium Strain 2 colonies** |
| 0 | 0 | 0 |
| 1 | 2 | 2 |
| 2 | 10 | 9 |
| 3 | 35 | 24 |
| 4 | 51 | 59 |
| 5 | 52 | 67 |
| 6 | 43 | 60 |
| 7 | 46 | 111 |
| 8 | 48 | 102 |
| 9 | 38 | 110 |
| 10 | 25 | 111 |
| 11 | 23 | 118 |
| 12 | 12 | 123 |
| 13 | 14 | 125 |
| 14 | 10 | 142 |
| 15 | 11 | 156 |
| 16 | 7 | 151 |
| 17 | 0 | 154 |

1. **Using the information above, identify the following variables (5 marks).**

**Independent:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Dependent:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

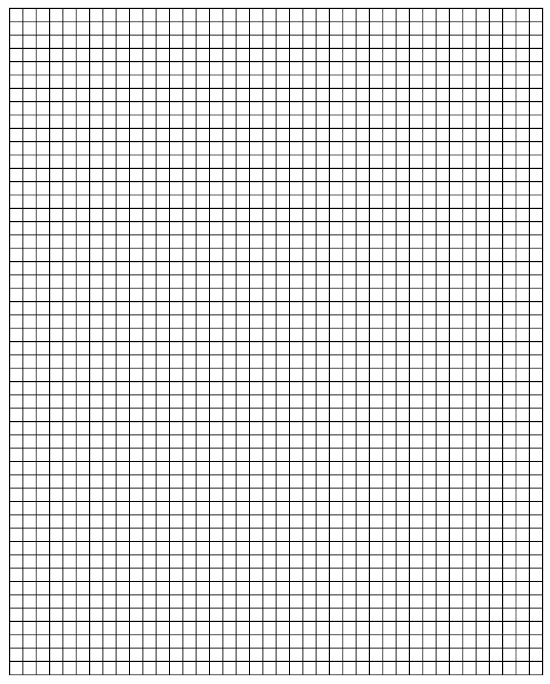
**3 Controlled:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. **Graph the data in the area below from the results table (5 marks).**

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1. **Discuss the trend in the results for both strains, being sure to refer to data in your answer (2 marks).**

1. **Does the data support or disprove the student’s hypothesis? Explain your reasons why or why not (2 marks).**
2. **Does the data support the competitive exclusion principle? Explain your reasons why or why not (2 marks).**
3. **Identify two potential errors that the student may have encountered with his experiment to effect the validity of it (2 marks).**
4. **Identify two potential improvements that the student may implement to improve the validity of this experiment for next time (2 marks).**

**End of Assessment**