# **Biology – ATAR Year 12**

# **Unit 3 Task 4: Gene pools investigation**

RESULT

/25

# Time allowed:

* 2 periods for planning and conducting
* 1 week for preparation of the report – see assessment below
* 1 period for the assessment

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Your task in this investigation is to demonstrate changes in a gene pool due to TWO different selection pressures such as changing food sources, disease or the introduction of a competitor/ predator

You need to develop a simulation game with **two** different sets of rules to demonstrate how a single gene pool can produce two genetically different populations. For example, you could have one set of game cards with two different sets of playing rules. You can use beads, cards, beetle cards or similar objects to represent individuals in your populations. Chance events can be introduced using a numbered dice or flipping a coin.

As part of the investigation you should practice your game with no selection pressure. You then conduct two more simulation games with a new selection pressure each time – so changing the rules. You should record the changes in the gene pool that occur with each generation until it changes and becomes stable.

You should write a scientific report using the framework provided below.

1. **Simulation game rules** (10 marks)
   * Outline the general conditions for conducting the game, e.g. number of times played, starting population, reproduction rules, death rules, end population
   * Describe the set of rules for each simulation game. Rules should describe what happens to reproduction and death rates from the selection pressure you apply.
2. **Data collection** (5 marks)
   * Give an appropriate record of data for each trial of the game with each set of rules. (2)
   * Represent the data appropriately. (3)
3. **Discussion** (6 marks)
   * Describe the results of each game and comparing the effects of the two selection pressures
4. **Conclusion** (4 marks)
   * To what extent do you simulation games represent the changes in gene pools which occur in nature? (2)
   * Provide supporting evidence to justify your answer. (2)

**ASSESSMENT**

You will be required to write this as a report under test conditions in class. You can only bring this page with nothing written on it and on the back a copy of the results table from your simulation games.

# Unit 3 task 4 Gene pools Marking Key

1. Simulation game rules

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * clearly outlines the selection pressures for each simulation | 1–2 |
| * clearly outlines the fate of selected organisms for each set of instructions, e.g. die, don’t breed, reduced breeding, have more offspring, produce only male offspring, have two litters per year | 1–2 |
| * clearly outlines the death rules for each simulation, e.g. all parents die after one year, females live for two years | 1–2 |
| * clearly outlines the reproduction rules for each simulation | 1–2 |
| * uses rules that clearly relate to selection for each simulation | 1–2 |
| **Total** | **10** |

1. Data collection

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * records data in tables with appropriate headings for each simulation | 1 |
| * graphs data   + uses appropriate scales   + graphs data from each simulation on the same graph   + accurately plots data for simulation 1   + accurately plots data for simulation 2 | 1–4 |
| **Total** | **5** |

1. Discussion

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * clearly states the results for simulation 1, including   + statement of change from the initial gene pool   + relates to the number of generations   + relates to the severity of the selection pressure | 1–3 |
| * clearly states the results for simulation 2, including   + statement of change from the initial gene pool   + relates to the number of generations   + relates to the severity of the selection pressure | 1–3 |
| **Total** | **6** |

1. Conclusion

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * clearly outlines evidence to support data from real population cases, using a named example for simulation 1 | 2 |
| * clearly outlines evidence to support data from real population cases, using a named example for simulation 2 | 2 |
| **Total** | **4** |