

**Caterpillar Growth Problem**      **B E L O W   L E V E L   1****Teacher’s Notes**

The following is a list of characteristics found in student work that was submitted for this task and assessed at “below level 1”. (Samples of student work are not included.)

Degree of achievement can vary widely in student performance that falls below level 1. Consequently, the following list includes characteristics of achievement at various degrees below level 1. Taken together, some or all of the characteristics outlined below may justify assessment at “below level 1”. Most of the characteristics noted relate to the criteria specified in the task rubric, but some are more broadly defined.

**Knowledge and Understanding**

The student:

- provides population data that are not consistent with descriptions in the task;
- miscalculates population data;
- omits some or all of the population data;
- uses different meanings for year 0 from one model to another;
- includes graphs and/or equations that are not consistent with the data;
- provides only rough sketches of graphs;
- plots points inaccurately on graphs;
- makes errors and/or unnecessary approximations in writing equations.

**Thinking**

The student:

- makes unclear or unreasonable statements in analysing the advantages and disadvantages of the options;
- states very few advantages and disadvantages;
- bases the analysis of the options on unreasonable assumptions;
- uses incorrect or inappropriate numerical data in analysing the options;
- confuses one option with another in the analysis;
- omits an analysis of the advantages and disadvantages.

**Communication**

The student:

- includes tables that are incomplete;
- omits some or all of the tables;
- does not define the variables shown in the tables;
- includes graphs that are not labelled, are partially labelled, or are labelled incorrectly;
- omits some points from the graphs;
- draws curves that are not smooth or that have the wrong shapes;
- omits some or all of the graphs;
- integrates text and mathematical forms ineffectively, so that the entire report, or large parts of it, are difficult or impossible to understand;
- writes a report that is very disorganized and flows poorly;
- writes a report that lacks an introduction and/or other components;
- makes numerous grammatical and typographical errors that make the report difficult to understand;
- makes meaningless or irrelevant statements;
- makes little or no reference to tabulated data, graphs, or equations in the text;
- provides little or no text to explain or justify the mathematical thinking;
- provides little or no mathematical analysis to justify statements made in the text;
- fails to state assumptions that he or she has made.

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## BELOW LEVEL 1

### Application

The student:

- formulates mathematical models that do not agree with the descriptions in the task;
- fails to formulate a model for option 4 by combining other models;
- formulates two or more conflicting models for the same option;
- includes inappropriate equations;
- does not include equations;
- does not formulate mathematical models;
- makes a recommendation that is impractical;
- makes a recommendation that does not solve the problem;
- makes a recommendation that is not supported by the mathematical analysis;
- makes a recommendation that is not one of the options in the task;
- makes no recommendation;
- justifies the recommendation in a way that is unreasonable or unintelligible;
- includes a justification that lacks sufficient detail;
- does not justify the recommendation.

### Comments

The student demonstrates little or no understanding of the task and/or the concept of population growth and decline. If several components of the task are not completed, or are scored below level 1, then the overall score will be below level 1.

### Next Steps

In order to improve his or her performance, the student needs to:

- understand the descriptions in the task;
- calculate data accurately;
- plot accurate, fully labelled graphs;
- write equations that accurately model the data;
- provide a clear, detailed analysis of the advantages and disadvantages of the options;
- write a report that is complete, well reasoned, and well organized;
- integrate text and mathematical forms so that the report is clear and easy to understand;
- edit and proofread the report to eliminate grammatical and typographical errors;
- formulate mathematical models for all options;
- make an appropriate recommendation on the basis of the mathematical analysis;
- justify the recommendation clearly and in detail.