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# Teacher Package

## Mathematics Exemplar Task Functions, Grade 11, University/College Preparation (MCF3M) Teacher Package

**Title:** A Financial Report

**Time Requirement:** 5 periods of 75 minutes each

### Expectations Addressed in the Exemplar Task

This task gives students the opportunity to demonstrate achievement of all or part of each of the following overall and specific expectations from two strands: Financial Applications of Sequences and Series, and Tools for Operating and Communicating with Functions.

*Students will:*

1. solve problems involving compound interest and present value;
2. solve problems involving financial decision making, using spreadsheets or other appropriate technology;
3. analyse the effects of changing the conditions of a mortgage;
4. communicate the solutions to problems and the findings of investigations with clarity and justification;
5. communicate solutions to problems and to findings of investigations clearly and concisely, orally and in writing, using an effective integration of essay and mathematical forms;
6. demonstrate the correct use of mathematical language, symbols, visuals, and conventions.

### Description of the Task

Present the following scenario to students:

*The Winters family currently rents a place of residence. The family has decided to purchase a house and has sought advice from a financial adviser. You are to assume the role of a financial adviser and provide a detailed report for the Winters family, outlining your analysis of their financial situation and making recommendations, with supporting rationale, for an appropriate mortgage. (See Appendix: Scenario.)*

### **Final Product**

Each student will submit a financial report that contains:

- an analysis of the Winters family's financial situation;
- one-time costs, such as closing and moving costs, to be considered when buying a house;
- a recommended down payment;
- monthly expenses (e.g., property taxes, utilities, insurance, food, car payments);
- verification of mortgage payments that is based on examination of interest rates and amortization periods;
- calculations that are appropriately labelled and presented in an organized fashion;
- a recommendation for an appropriate mortgage, with supporting rationale;
- a bibliography.

### **Assessment and Evaluation**

The final draft of the financial report will be assessed and evaluated using the task-specific rubric provided.\* Introduce the rubric to the students when you introduce the task. Review the rubric with the students and ensure that each student understands the criteria and the descriptions for achievement at each level. Allow ample time for a thorough reading and discussion of the assessment criteria outlined in the rubric.

Some students may perform below level 1. Although the rubric does not include descriptions of achievement below level 1, the characteristics of these students' work should be reviewed in relation to the criteria outlined in the rubric.

### **Teacher Instructions**

#### **Prior Knowledge and Skills**

To complete this task, students are expected to have some experience in, or some knowledge and skills relating to, the following:

- geometric sequences and series;
- simple interest, compound interest, present value, mortgages, and amortization;
- the relationships between compound interest, geometric sequences, and exponential growth;
- creating amortization tables manually, or using technology (e.g., spreadsheets, graphing calculators).

#### **Accommodations**

Accommodations that are normally provided in the regular classroom for students with special needs should be provided in the administration of this performance task.

*\*The rubric is reproduced on pages 9–10 of this document.*

## Materials and Resources

- selected current mortgage rates
- use of a computer lab (recommended) for locating the amortization tables and for comparing scenarios (Alternatively, teachers may supply amortization tables and students may compare scenarios by using business/graphing/scientific calculators.)
- realty listings for determining housing costs (e.g., MLS via the Internet)

## Plagiarism

It is important that you discuss copyright issues with your students. Their bibliographies must list all sources used for research, and if any quotations are taken directly from a source, they must be appropriately recognized. Copyright applies to text and visual materials taken from both the Internet and print sources. Plagiarism is defined as “using the work (or part of it) of another person and claiming it as your own”.<sup>1</sup>

## Task Instructions

*Note:* Students need access to computers or calculators to *verify* mortgage payments for the Winters family. **Do not submit amortization tables.**

The financial report will integrate narrative and mathematical forms. Correct mathematical language must be used.

### Day 1

- Read through and discuss with the students the section “Description of the Task”, and Appendix: Scenario.
- Discuss the components of the final product and the rubric.
- With the entire class, brainstorm ideas for approaching the task, and discuss the calculations that will be required. Have the students identify the financial assets that the family has acquired.
- Discuss the advantages and disadvantages of the various interest rates, terms, and amortization periods under consideration. Discussion should include economic and personal factors involved in financial decision making.
- Discuss one-time costs that are incurred when purchasing a home.
- Provide materials, or access to materials, that students need for their own analysis (e.g., current mortgage rates, amortization tables).
- Encourage students to develop a systematic and efficient method for examining the task, and discuss how students may wish to record their calculations.
- **Remind students that all calculations are to be included in their final submission.**
- Confer regularly with students as they work through the task.

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1. Canadian Intellectual Property Office, Industry Canada, *A Guide to Copyrights* (Hull, Quebec: Canadian Intellectual Property Office, Industry Canada, 2000), p. 20.

### **Days 2 and 3**

*Note:* Provide discussion time for the whole class or small groups at the beginning or end of each period, for 5 or 10 minutes, to deal with general questions about the process or the final product and to enable students to share ideas.

- As students work through the task, have them record all calculations; these will be included in their financial reports.
- Have each student work on the task individually to:
  - analyse the Winters family’s financial situation (e.g., cash, bonds, credit);
  - determine the minimum down payment required for the house, i.e., 5% of the purchase price;
  - determine one-time costs, such as closing and moving costs, to be considered when buying a house;
  - examine the Winters family’s available assets to determine and justify the most appropriate down payment;
  - suggest types of financial products for any remaining monetary assets (these choices should be related to the financial considerations previously examined);
  - calculate all monthly expenses (e.g., property taxes, utilities, insurance, food, car payments) for the Winters family;
  - calculate various mortgage options using the following variables: down payment, principal, current interest rates, terms, and amortization periods;
  - help the Winters family to decide whether to amortize over 10, 15, 20, or 25 years and to decide on a closed mortgage for a term of one, three, or five years;
  - provide the Winters family with enough options to allow them to make an informed decision about the mortgage they select;
  - from the options that have been provided to the Winters family, recommend and justify one option.

### **Day 4**

- Allow students time to reflect on the calculations they have made over the last two periods.
- Have students organize their calculations and make sure that the Winters family’s assets and their disposition are clearly presented.
- Ask students to begin to write their financial report, integrating both narrative and mathematical forms and using correct mathematical language. The report is to be addressed directly to the Winters family.
- Remind students to include mortgage options (i.e., options involving different amortization periods, amounts of principal, terms, interest rates, payment amounts) and a detailed rationale for the option they are recommending, including all financial considerations that affected their selection. Printouts of entire amortization tables are not to be included.

### **Day 5**

- Review the components of the final product with the students.
- Allow students time to finish and edit their work.
- Ask students to make a final copy of their financial report, including a list of all sources used.

## Appendix: Scenario

Mr. and Mrs. Winters have decided to buy their first home for \$150 000, with a closing date of July 31, 2002. The family consists of two adults and two children under the age of 12. At present, they are renting at \$750 per month, utilities included. The Winters family's financial situation is as follows:

The family's *net* annual income is \$50 000. They currently own two bonds, each valued at \$5000 when purchased in October 1998 and earning 5.9% interest, compounded semi-annually. They also have \$12 000 in a savings account.

Housing costs (e.g., rent, mortgage, utilities, taxes) should not exceed 32% of gross family income, which is \$63 000. The Canada Mortgage and Housing Corporation (CMHC) requires that first-time homebuyers with good credit provide a down payment of at least 5% of the purchase price of the home.

To purchase this home, the Winters family will need to negotiate a mortgage. They have to decide whether to amortize over 10, 15, 20, or 25 years. They are considering one-year closed, three-year closed, and five-year closed terms.