Adult Basic Education
Mathematics

Mathematics 3109A

Income and Debt
Owning and Operating a Vehicle

Study Guide

Prerequisites: Mathematics 2105A, 2105B, 2105C

Credit Value: 1

Text: *Essentials of Mathematics 11*, Baron, Celia; Pacific
Educational Press, 2003.

Mathematics Courses [General College Profile]

Mathematics 2105A
Mathematics 2105B
Mathematics 2105C
Mathematics 3107A
Mathematics 3107B
Mathematics 3107C
Mathematics 3109A
Mathematics 3109B
Mathematics 3109C

Table of Contents

To the Student

I.   Introduction to Mathematics to 3109A

In Unit 1, Income and Debt, you will calculate income using salary and hourly wages. You will also calculate income which is based on commission and piecework. In these cases, the more that you sell or make, the more money you earn. Later in the chapter you will compare and contrast the effects of compound interest and simple interest. You will also consider whether or not a particular promotion offered by a retail store is actually a good deal. You will look at credit cards, loans and the effects of exchange rates on the actual costs of purchases.

The second unit explores all of the steps in obtaining a vehicle. You will consider buying versus leasing and the costs of maintaining and running a car.

II.   Resources

You will require the following:
   • 	*Essentials of Mathematics 11*
   • 	scientific calculator

Notes concerning the textbook:

Glossary: Knowledge of mathematical terms is essential to understand concepts and correctly interpret questions. Written explanations will be part of the work you submit for evaluation, and appropriate use of vocabulary will be required.

Your text for this course includes a Glossary where definitions for mathematical terms are found. Be sure you understand such definitions and can explain them in your own words. Where appropriate, you should include examples or sketches to support your definitions.

Examples: You should study the **Examples** in each section carefully and see your instructor if you have any questions. These **Examples** have full solutions to problems that will be a great help when answering assigned questions from **Notebook Assignment**.

Chapter Project: Unless your instructor directs you differently, you should omit all **Chapter Projects** and **Project Activity**.

To the Student

Notes concerning technology:

You should have a scientific calculator (the word "scientific" should be written on it) and the instruction booklet that belongs with it. Scientific calculators are fairly inexpensive. Even though your calculator will be a useful tool, you should be able to solve most exercises by using paper and pencil.

III.   Study Guide

This Study Guide is required at all times. It will lead you through the course and you should take care to complete each unit of study in the order given in this Guide.

To be successful, you should read the **References and Notes** first and then, when indicated by the ▷▷ symbols, complete the **Work to Submit** problems. Many times you will be directed to see your instructor, and this is vital, especially in a Mathematics course. If you have only a hazy idea about what you just completed, nothing will be gained by continuing on to the next set of problems.

To the Student

The Study Guide has the following format:

Reading for this Unit: In this box, you will find the name of the text, and the chapters, sections and pages used to cover the material for this unit. As a preliminary step, skim the referenced section, looking at the name of the section, and noting each category. Once you have completed this overview, you are ready to begin.

References and Notes

This left hand column guides you through the material to read from the text.

It will also refer to specific **Examples** found in each Exploration. You are directed to carefully study these **Examples** with solutions and see your instructor if you have any questions. The **Examples** are important in that they not only explain and demonstrate a concept, but also provide techniques or strategies that can be used in the assigned questions.

You should read and understand the **Hints** and **New Terms** that are at the bottom of selected pages in the textbook.

The symbols ▶▶ direct you to the column on the right which contains the work to complete and submit to your instructor. You will be evaluated on this material.

This column will also contain general **Notes** which are intended to give extra information and are not usually specific to any one question.

Work to Submit

There are two basic categories included in this column that correspond to the same categories in the sections of the text. They are **Mental Math** and **Notebook Assignment**.

Mental Math: These problems should be completed using pencil and paper. If you have difficulty, you should see your instructor for extra practice problems. Usually the skills that are applied in **Mental Math** are those required to successfully complete **Notebook Assignment**.
Your instructor will provide the answers to **Mental Math** exercises.

Notebook Assignment: This section provides a series of problems similar to those in the **Exploration**. You should attempt these problems only after the **Exploration** problems have been understood and all assigned **Mental Math** and practice worksheets have been completed.
The textbook contains answers to **Notebook Assignment**. Your instructor will provide more detailed solutions with workings and some explanations.

This column will also contain **Notes** which give information about specific questions.

IV.   Recommended Evaluation

Written Notes	10%
Assignments	10%
Test(s)	30%
Final Exam *(entire course)*	<u>50%</u>
	100%

Unit 1 - Income and Debt

To meet the objectives of this unit, students should complete the following:

Reading for this unit:	*Essentials of Mathematics 11*	
	Chapter 1: Exploration 1:	pages 11, 13 - 20
	Exploration 2:	pages 22 - 27
	Exploration 3:	pages 28 - 33
	Exploration 4:	pages 34 - 39
	Exploration 5:	pages 40 - 46
	Exploration 6:	pages 50 - 56
	Exploration 7:	pages 57 - 63
	Exploration 8:	pages 64 - 70
	Chapter Review:	pages 71 - 73
	Case Study:	pages 75 - 78

References and Notes	**Work to Submit**
Omit **Chapter Project** and all **Project Activity**. Read **Exploration 1**. Study **Examples 1** - **3**. Use your calculator to work through the given solutions. Read **Hints** on page 17. To change .4% to a decimal, move the decimal two places to the left to get .004. Answer the following questions. ▶▶	1.1 Define each of the following terms: i) commission ii) performance - based income iii) quota

Unit 1 - Income and Debt

References and Notes	Work to Submit
	1.2 **Small Group Discussion**, page 16 Answer questions a) - d).
	1.3 **Mental Math**, page 17 Answer questions a) - d).
Ask your instructor for a copy of **Practice Exercise 1**, *Earning Commission*.	1.4 **Practice Exercise 1**, *Earning Commission* Answer questions 1 - 15.
	1.5 **Notebook Assignment**, pages 18 - 20 Answer questions 1 - 7 and 9 - 11.
Read **Exploration 2**. Study and work through the calculations for **Examples 1** - **3**. Answer the following questions. ▶▶	
Ask your instructor for a copy of **Practice Exercise 2,** *Weekly Wages for Piecework*.	1.6 **Practice Exercise 2,** *Weekly Wages for Piecework* Answer questions 1 - 20.
	1.7 **Notebook Assignment**, pages 25 - 27 Answer questions 1 - 12. (*See note below on question 11*.)
	Question 11: Assume that the bonus is paid on board feet over 5000 board feet a day.
Read **Exploration 3**. Study and work through the calculations for **Examples 1** - **5**. .	

Unit 1 - Income and Debt

References and Notes	Work to Submit

When using the formula for simple interest, $I = Prt$, you should solve the equation for the variable that you are looking for.
 	
For example, if you are looking for the interest rate, r, first write $I = Prt$, then divide both sides by Pt, to get $\dfrac{I}{Pt} = r$.
 	
After you have isolated the variable r, then you can substitute the given values for I, p and t.
 	
In **Example 3** on page 30, rearrange the formula to solve for P, since that is what you are looking for.
 	
$I = Prt \implies \dfrac{I}{rt} = P$
 	
Next, substitute $I = \$300$, $r = 0.06$ and $t = 4$ into the formula to find P.
 	
When using the formula $I = Prt$, make sure that r is expressed as a decimal and time is expressed in years.
 	
Answer the following questions. ▶▶
	1.8 Define the following terms:
	     i) interest
	     ii) per annum
	     iii) principal

Unit 1 - Income and Debt

References and Notes	Work to Submit
	Work to Submit
	1.9 **Mental Math**, page 29
	Note: Try to do these mentally, without pencil, paper or calculator.
	1.10 **Notebook Assignment**, pages 32 and 33 Answer questions 1 - 7.
Ask your instructor for a copy of **Practice Exercise 3**, *Calculating Simple Interest*	1.11 **Practice Exercise 3**, *Calculating Simple Interest* Answer questions 1 and 2.
Read **Exploration 4**. Carefully study **Examples 1** - **3**.	
Use the x^y or y^x button on your calculator to evaluate a power such as $(1.07)^4$. See **Technology** on the bottom of page 36.	
Find each Year-end Value of Investment in **Example 3** by using the formula given in **Example 2**, $A = P (1 + \frac{r}{n})^{nt}$.	
Read **Hints** on page 36.	
Use BEDMAS to help you remember the order of operations. Your instructor may have a review worksheet on order of operations.	

Unit 1 - Income and Debt

References and Notes	**Work to Submit**
Answer the following questions. ▶▶	

	1.12 Define the following terms:
	        i) compounded annually
	        ii) compounded daily
	        iii) compounded semi-annually

	1.13 **Mental Math**, page 39

	1.14 **Notebook Assignment**, pages 38 and 39
	        Answer questions 1 - 3.
	        (*See note below on question 3.*)
	
	        Answer questions 4 - 8.

	Question 3: Compounded quarterly means every 3 months or 4 times a year. Compounded monthly means once a month or 12 times a year. If interest is compounded semi-annually then $n = 2$ in the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. Similarly, if interest is compounded daily, then $n = 365$.
Read **Exploration 5**. Study **Examples 1** - **5**, working through each calculation using pencil, paper and a calculator.	
Answer the following questions. ▶▶	1.15 **Mental Math**, page 43
	1.16 **Notebook Assignment**, pages 44 - 46 Answer questions 1 - 7.
Read **Exploration 6**.	
Study **Examples 1** and **2**. Make sure that you understand the given solutions.	

Unit 1 - Income and Debt

References and Notes	**Work to Submit**

Answer the following questions. ▶▶	1.17 Define the following terms:
	     i) administration fees
	     ii) installment buying
	     iii) installment price
	     iv) deferred payments
	     v) carrying charges
	
	1.18 **Notebook Assignment**, page 56
	     Answer questions 1 - 4.
	
	Note: Use provincial sales tax chart on page 51.

Read **Exploration 7**.
 	
Study **Examples 1** and **2**. See your instructor if you need help in reading the chart *Personal Loan Payment Calculator* on page 59.
 	
Answer the following questions. ▶▶
	1.19 Define the following terms:
	     i) amortization period
	     ii) cost of borrowing
	     iii) fixed rate
	     iv) prime lending rate
	     v) term
	     vi) variable rate

Unit 1 - Income and Debt

References and Notes

Read **Exploration 8**.

The table on page 65 shows the bank selling rate which is used when the bank sells foreign currency to its customers. The bank buying rate is used when customers want to change foreign currency to Canadian funds.

Each number in the table represents how much it costs in Canadian dollars for 1 unit of the foreign currency.
For example: If you want to change $600 Canadian to Australian dollars, it may be helpful to set up a ratio first.

$.8766 Canadian = $1 Australian

$$\frac{\$1 \ Australian}{\$.8766 \ Canadian} = 1$$

So,

$$\$600 \ Can \times \frac{\$1 \, Australian}{\$.8766 \, Can}$$

= $684.46 Australian

Work to Submit

1.20   **Notebook Assignment**, pages 62 and 63
         Answer questions 1 and 2.
         (*See note below on question 2.*)

         Answer questions 3 - 5.

Question 2: Assume that the shipping charges are taxed.

Unit 1 - Income and Debt

References and Notes	Work to Submit
Similarly, if you wish to change 400 British pounds to Canadian dollars, set up the following ratio: $2.258 Can = 1 British pound $$\frac{\$2.258\ Canadian}{1\ British\ pound} = 1$$ $$400\ British\ pounds \times \frac{\$2.258\ Canadian}{1\ British\ Pound}$$ = $903.20 Canadian Therefore, instead of trying to memorize when to multiply or divide the bank selling rate, you should set up a ratio as just described. Study **Examples 1** - **4**. Answer the following questions. ▶▶ Ask your instructor for a copy of **Practice Exercise 4**, *Income and Debt*.	

1.21 **Notebook Assignment**, pages 69 and 70
Answer questions 1 - 7.

1.22 **Practice Exercise 4**, *Income and Debt*
Answer questions 1 - 9.

1.23 **Chapter Review**, pages 71 - 73
Answer questions 1 - 18.

1.24 **Case Study**, pages 75 - 78
Answer questions 1 - 7.

Unit 2 - Owning and Operating a Vehicle

To meet the objectives of this unit, students should complete the following:

Reading for this unit:	*Essentials of Mathematics 11*	
	Chapter 3: Exploration 1:	pages 133, 136 - 140
	Exploration 2:	pages 141 - 148
	Exploration 3:	pages 149 - 153
	Exploration 4:	pages 154 - 159
	Exploration 5:	pages 160 - 165
	Exploration 6:	pages 166 - 169
	Exploration 7:	pages 172 - 177
	Exploration 8:	pages 178 - 183
	Exploration 9:	pages 184 - 188
	Chapter Review:	pages 189 and 190
	Case Study:	page 192

References and Notes	**Work to Submit**
Read **Exploration 1**. Study **Examples 1** - **3**. Work through the calculations given in each section. When the textbook and Study Guide were printed, the GST rate was 7%. Your instructor will give you the current GST rate. If you use the current GST rate, some answers will differ from the given answer keys. Answer the following questions. ▶▶	 2.1 **Mental Math**, page 137 Answer questions a) and b).

Unit 2 - Owning and Operating a Vehicle

References and Notes	Work to Submit
	Work to Submit
	2.2 **Notebook Assignment**, pages 139 and 140 Answer questions 3 - 7 and 9.
	Note: Refer to the map on page 51 to find the tax rates for the provinces and territories.
Read **Exploration 2**.	
Study the formula on page 141 for *fuel economy*. Rearrange the formula, and solve for *litres of fuel used*. See your instructor if you have difficulty doing this.	
Study **Examples 1 - 5** and work through each solution.	
Answer the following questions. ▶▶	2.3 **Mental Math**, page 142
	2.4 **Notebook Assignment**, pages 146 - 148 Answer questions 3 - 11.
Read **Exploration 3** and study **Example 1**.	
Answer the following questions. ▶▶	2.5 Define the following terms: i) warranty ii) labour cost iii) shop rate

Unit 2 - Owning and Operating a Vehicle

References and Notes	Work to Submit
	Work to Submit
	2.6 **Notebook Assignment**, pages 152 and 153 Answer questions 2 - 6. (*See note below on question 6*.)
	Question 6: Calculate the total price for Newfoundland and Labrador instead of British Columbia.
Study **Exploration 4**. Make sure that you are familiar with the **New Terms** on pages 155 and 156. Read **Example 1** and the solution provided. You will <u>not</u> be asked to complete Insurance Estimate Forms. You will <u>not</u> complete the questions in **Notebook Assignment.** Your instructor may ask you to call or email different insurance companies and determine the cost of insurance for different vehicles and drivers.	

References and Notes	**Work to Submit**
Answer the following questions. ▶▶	2.7 Define the following terms: i) at-fault claim ii) basic coverage iii) collision insurance iv) comprehensive insurance v) third-party liability vi) deductible
Read **Exploration 5**. Study and become very familiar with **New Terms** on page 160. Study **Examples 1** and **2**. Answer the following questions. ▶▶	2.8 **Notebook Assignment**, pages 163 and 164 Answer questions 2 and 4 - 7. (*See note below on questions 4 - 7.*) **Questions 4 - 7**: After you have calculated the required costs, redo the problems, using the tax rate for Newfoundland and Labrador. Compare the costs.
Read **Exploration 6**. Study **Examples 1** - **3** and work through the given solutions. Answer the following questions. ▶▶	2.9 Define the following terms: i) depreciation ii) depreciation rate iii) resale value

Unit 2 - Owning and Operating a Vehicle

References and Notes	Work to Submit
	2.10 **Mental Math**, page 167
See your instructor for a copy of **Practice Exercise 5,** *Vehicle Expenses*.	2.11 **Practice Exercise 5,** *Vehicle Expenses* Answer questions 1 - 12.
	2.12 **Notebook Assignment**, pages 168 and 169 Answer questions 1 - 4.
Read **Exploration 7**.	
Study **Examples 1** and **2**. Work through the given calculations.	
	2.13 Define the term *lien search*.
Answer the following questions. ▶▶	2.14 **Class Discussion**, page 173
	Note: Make two lists, *advantages* and *disadvantages* of buying a used vehicle rather than a new one. Work with a partner if possible.
	2.15 **Notebook Assignment**, pages 175 and 176 Answer questions 1 - 10.
	Note: For these questions, PST is based on book value.
Read **Exploration 8**.	
Study and work through the calculations given for **Examples 1** and **2.**	
Read **Hints** on the bottom of pages 181 and 182.	

Unit 2 - Owning and Operating a Vehicle

References and Notes	Work to Submit
Answer the following questions. ▶▶	2.16 **Mental Math**, page 182
Ask your instructor for a copy of **Practice Exercise 6**, *Buying Cars*.	2.17 **Practice Exercise 6**, *Buying Cars* Answer questions 1 - 8.
	2.18 **Notebook Assignment**, pages 182 and 183 Answer questions 3 - 8. (*See note below on questions 6 - 8.*)
	Answer question 9.
	Questions 6 - 8: Use the table on page 59 to help find the monthly payment.
Read **Exploration 9**.	
Study **New Terms** on pages 184 and 185. Study **Examples 1** - **3** and work through the given solutions.	
Answer the following questions. ▶▶ Use the **Examples** and the **Hints** on page 186 to help you.	2.19 **Notebook Assignment**, pages 187 and 188 Answer questions 1 - 8.
Ask your instructor for a copy of **Practice Exercise 7**, *Owning and Operating a Vehicle.*	2.20 **Practice Exercise 7**, *Owning and Operating a Vehicle* Answer questions 1 - 4.
	2.21 **Chapter Review**, pages 189 and 190 Answer questions 1 - 4 and 6 - 10.
	2.22 **Case Study**, page 192 Answer questions 1 - 4, 6 and 8.