

Adult Basic Education
Mathematics

Mathematics 3109B

Data Analysis
Measurement Technology

Study Guide

Prerequisites: Mathematics 2105A, 2105B, 2105C,
Mathematics 3109A

Credit Value: 1

Text: *Essentials of Mathematics 11*, Baron, Celia; Pacific
Educational Press, 2002.

Mathematics Courses [General College Profile]

Mathematics 2105A

Mathematics 2105B

Mathematics 2105C

Mathematics 3107A

Mathematics 3107B

Mathematics 3107C

Mathematics 3109A

Mathematics 3109B

Mathematics 3109C

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To the Student

I. Introduction to Mathematics to 3109B

In the first unit, you will examine the various ways to analyze data. You will become aware of how data can be manipulated to represent a particular point of view.

The second unit will give you experience with linear measurement in both metric (SI) and Imperial systems. Although Canada has adopted the metric system, measurements in trades areas are often given using Imperial units. For example, in carpentry, you will find most measurements in feet and inches. Therefore, you should be comfortable with both systems. You will also convert from one system to the other, (e.g. metres to feet) but conversion charts and technology will help you with this. You should not memorize conversions. You will also learn how to use Vernier calipers and micrometers in this unit. Be sure to obtain these tools before you begin.

II. Resources

You will require the following:

- *Essentials of Mathematics 11*
- scientific calculator
- protractor
- caliper
- micrometer

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 (<i>entire course</i>)	<u>50%</u>
	100%

Unit 1 -Data Analysis

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

Reading for this unit: *Essentials of Mathematics 11*

Chapter 2:	Exploration 1:	pages 79, 82 - 89
	Exploration 2:	pages 90 - 95
	Exploration 3:	pages 96 - 102
	Exploration 4:	pages 105 - 112
	Exploration 5:	pages 114 - 122
	Chapter Review:	pages 123 - 128
	Case Study:	pages 130 - 132

References and Notes

Omit all references to **Chapter Project** and **Project Activity**.

Read page 79 and **Exploration 1**.

You will need grid paper for this chapter.

Study **Example 1**. Work through the solution and construct your own *line plot*.

Answer the following questions.



Work to Submit

- 1.1 Define the following terms:
- i) cluster
 - ii) gap
 - iii) outlier
 - iv) range

Unit 1 -Data Analysis

References and Notes

Read **Exploration 2**.

Study **Examples 1** and **2**. Work through the calculations given in the solutions.

The symbol, Σ , is the Greek letter, upper case sigma. Σx simply means to sum of all the x 's, or add up all the values given.

Answer the following questions.



Sometimes there is more than one mode. If two values occur the same number of times, then there are two modes. If all the values occur the same number of times, then there is no mode.

Work to Submit

1.2 **Small Group Activity**, page 85

Note: If possible, complete this activity with a partner.

Answer questions a) - f).

1.3 **Notebook Assignment**, pages 86 - 89

Answer questions 1 and 2.

1.4 Define the terms:

- i) measure of central tendency
- ii) mean
- iii) median
- iv) mode

1.5 **Class Discussion**, page 91

Note: This question can be done with a partner.

Read the solution to **Example 1** and answer the questions.

1.6 **Class Discussion**, page 92

Note: This question can be done with a partner.

Read the solution to **Example 2** and answer the questions.

Unit 1 -Data Analysis

References and Notes	Work to Submit
<p>Ask your instructor for a copy of Practice Exercise 1, Mean/Median/Mode</p> <p>Read Exploration 3.</p> <p>Study Examples 1 - 3. Work through the calculations given in the solutions.</p> <p>Answer the following questions. ▶▶</p> <p>Read Exploration 4.</p> <p>Study Examples 1 - 3 and the given solutions. Draw your own bar graph for Example 3.</p> <p>Read “Drawing a Bar Graph” on pages 108 and 109. Make sure that you know how to draw a biased and an unbiased bar graph.</p> <p>Answer the following questions. ▶▶</p> <p>Ask your instructor for a copy of Practice Exercise 2, Bar Graphs.</p>	<p>1.7 Small Group Activity, pages 92 and 93 Note: This question can be done with a partner. Answer questions a) - d).</p> <p>1.8 Mental Math, page 92</p> <p>1.9 Practice Exercise 1, Mean/Median/Mode</p> <p>1.10 Notebook Assignment, pages 93 - 95 Answer questions 1 - 8.</p> <p>1.11 Notebook Assignment, pages 100 - 102 Answer questions 1 - 5 and 7, Scenario A.</p> <p>1.12 Practice Exercise 2, Bar Graphs Answer questions 1 and 2.</p> <p>1.13 Notebook Assignment, pages 110 - 112 Answer questions 1 - 4.</p>

Unit 1 -Data Analysis

References and Notes

Read **Exploration 5**.

Note: Circle graphs are sometimes called pie charts.

Study **Example 1**. Work through the calculations and construct your own *circle graph* for this question.

If you have difficulty changing a percent to a decimal, see your instructor.

You should have a protractor and know how to use it. Make sure that you know how to change from degree measure to percent of a circle and vice versa.

Answer the following questions.



Work to Submit

1.14 Define the term *sector of a circle*. Draw a sketch.

1.15 **Classroom Activity**, pages 118 and 119
Answer questions 1 - 6.

1.16 **Notebook Assignment**, pages 120 - 122
Answer questions 1 - 3.

1.17 **Chapter Review**, pages 123 - 128
Answer questions 1 - 11.

1.18 **Case Study**, pages 130 - 132
Read the Supermarket Scenario and write a critique of Ralph Johnson's data analysis and interpretation.

Note: If possible, complete this case study with a partner. If not, discuss the case study with your instructor before writing your critique.

Unit 2 - Measurement Technology

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

Reading for this unit: *Essentials of Mathematics 11*

Chapter 4: Exploration 1:	pages 193, 195 - 200
Exploration 2:	pages 201 - 208
Exploration 3:	pages 209 - 214
Exploration 4:	pages 215 - 219
Exploration 5:	pages 222 - 229
Exploration 6:	pages 230 - 237
Chapter Review:	pages 238 - 240
Case Study:	pages 242 - 244

References and Notes

Omit all references to **Chapter Project** and **Project Activity**.

Read page 193 and **Exploration 1**.

Answer the following questions.



Ask your instructor for a copy of **Practice Exercise 3**, *Suitable Units of Linear Measure*.

Read **Exploration 2**.

Note: **Example 2** does the calculations with fractions using a scientific calculator which has a $[A \frac{b}{c}]$ key. You should be able to do the same calculations using pencil and paper.

Work to Submit

2.1 **Notebook Assignment**, pages 198 - 200
Answer questions 1 - 7.

2.2 **Practice Exercise 3**, *Suitable Units of Linear Measure*
Answer questions 1 - 3.

Unit 2 - Measurement Technology

References and Notes	Work to Submit
<p>Ask your instructor for review questions on adding, subtracting and multiplying fractions.</p>	
<p>Study and work through the calculations given in Examples 1 - 3.</p>	
<p>If necessary, ask your instructor for review questions on finding the perimeter and area of figures similar to Example 3.</p>	
<p>Answer the following questions. ▶▶</p>	<p>2.3 Notebook Assignment, pages 205 - 208 Answer questions 1 - 8.</p>
<p>Ask your instructor for a copy of Practice Exercise 4, Imperial and SI Measure and Practice Exercise 5, Word Problems.</p>	<p>2.4 Practice Exercise 4, Imperial and SI Measure Answer questions 1 and 2.</p>
<p>Read Exploration 3.</p>	<p>2.5 Practice Exercise 5, Word Problems Answer questions 1 - 4.</p>
<p>Study Examples 1 - 4. Work through the given solutions.</p>	
<p>The easiest way to convert from one unit or another is by using a unit conversion method which is explained on page 210. You can use the sentence below to help you remember the metric system. King Henry Drank My Delicious Chocolate Milk. kilo hecto deca metre deci centi milli</p>	

Unit 2 - Measurement Technology

References and Notes

Each word in the sentence represents one decimal place.

For example, 45.6 kilometres = 4, 560,000 centimetres because centi is 5 spaces to the right, therefore you move the decimal 5 places to the right.

Note: Decametre is dam and decimetre is dm.

Answer the following questions.



Ask your instructor for a copy of **Practice Exercise 6, Metric Prefixes**.

Read **Exploration 4**.

Ask your instructor for a copy of the conversion table, *Changing Units Between Metric and Customary Systems*. It is similar to the one on page 216. You will need this table for frequent referral.

For this **Exploration**, you should make conversions using information in the table. Do not memorize the conversions.

Work to Submit

2.6 **Practice Exercise 6, Metric Prefixes**

2.7 **Notebook Assignment**, pages 213 and 214
Answer questions 1 - 9.
(See note below on question 9.)

Question 9: Use the conversion 1 mile = 1.6093 km.

Unit 2 - Measurement Technology

References and Notes	Work to Submit
<p>The website www.onlineconversion.com should be useful. Conversions between SI (metric) and imperial units are extremely important for students interested in a career in trades.</p> <p>Study Examples 1 and 2 on page 217.</p> <p>Answer the following questions. ▶▶</p> <p>Study Exploration 5.</p> <p>If possible, work in pairs throughout this Exploration.</p> <p>See your instructor to obtain a Vernier caliper. It takes a little practice to properly use Vernier calipers.</p> <p>Compare the diagram on page 223 with actual calipers.</p> <p>The Vernier caliper applet found at the following website will help you learn to read a Vernier caliper. www.ronblond.com/M10/Vern.APPLET/index.html</p> <p>Study Examples 1 and 2.</p> <p>Note: The reading for Example 2 on page 225 is 4.61 cm NOT 4.68 cm as given in the textbook.</p>	<p>2.8 Notebook Assignment, pages 218 and 219 Answer questions 1 - 6.</p>

Unit 2 - Measurement Technology

References and Notes	Work to Submit
<p>Try to reproduce the measurements in these examples on your Vernier caliper</p>	
<p>Answer the following questions. ▶▶</p>	<p>2.9 Class Activity, page 225 Note: Check with your instructor to make sure that you are reading the calipers properly.</p>
<p>Read Exploration 6.</p>	<p>2.10 Notebook Assignment, pages 227 - 229 Answer questions 1 - 4.</p>
<p>If possible, work in pairs or small groups. Obtain a micrometer from your instructor. Micrometers are more precise than Vernier calipers. Compare the diagram on page 231 with the actual micrometer.</p>	
<p>The following applet will help you learn to read a micrometer. www.ronblond.com/M10/Micrometer.APPLET/index.html</p>	
<p>Study Examples 1 - 4. Try to reproduce the measurements in these examples on an actual micrometer.</p>	
<p>Answer the following questions. ▶▶</p>	<p>2.11 Notebook Assignment, pages 235 - 237 Answer questions 1 - 5.</p> <p>2.12 Chapter Review, pages 238 - 240 Answer questions 1 - 10.</p> <p>2.13 Case Study, pages 242 and 243</p>