

Adult Basic Education

Mathematics

Mathematics 3109B

Data Analysis

Measurement Technology

Curriculum Guide

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

Credit Value: 1

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 Instructor

I. Introduction to Mathematics 3109B

The intent of the first unit is to motivate students to examine the various ways to represent data. Students will look at how data are manipulated to represent a particular point of view.

The second unit will give students experience in determining measurements in metric (SI) and Imperial systems using different measuring devices. The instructor should provide a variety of measuring instruments (e.g. metre sticks, yard sticks, measuring tapes, calipers, micrometers). Students will also perform basic conversions within and between the Imperial and SI systems, using technology or conversion tables where appropriate.

II. Prerequisites

Students should be able to change from degree measure to percent of a circle and vice versa. They should also know how to use a protractor. Students should be able to add, subtract, multiply and divide fractions. Students should be familiar with the metric system and be able to make conversions using a unit ratio. The instructor should provide review worksheets if students do not have these prerequisites.

III. Textbook

Essentials of Mathematics 11 is designed to emphasize the skills needed in adult life as well as in the workplace. Students should appreciate that mathematics is practical and useful for accomplishing real-world activities. With this in mind, this resource has been developed with contents that are real and relevant to the lives of students.

Each chapter begins with an introduction which presents the key mathematical ideas that will be encountered. The following categories are in each chapter:

Chapter Goals: Located on the bottom of each introductory page, this section lists the major concepts to be learned.

Chapter Project and Project Activity: Each chapter contains a guided project. This type of group work is not well suited for the Adult Basic Education environment. Therefore, **these sections have been omitted from the course**. However, if there are several students working on the same chapter, instructors may use their discretion in assigning the **Chapter Project**, or some modification of it, for an assessment.

To the Instructor

Exploration: Most of the concepts are introduced, developed and explained in these lessons. In this section, **Examples** and **Solutions** for typical problems are provided. The instructor should ensure that students carefully study and understand each **Example** before proceeding.

Class Discussion, Small Group Discussion and Pairs Activities: As the titles imply, these activities are provided to give students an opportunity to work collaboratively. Some of these sections have been assigned in the Study Guide, especially if they can be completed by a student working alone.

Mental Math: The questions contained in these sections are often calculations that are similar to those required in the **Solutions** to the **Examples**. Although called **Mental Math**, students should not be required to complete these activities without pencil and paper. If students have difficulty with these problems, the instructor should provide practice worksheets. The solutions to **Mental Math** are found in the *Teacher Resource Book 11*.

Notebook Assignment: This section provides a series of problems similar to those in the **Exploration**. Students 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 only answers to **Notebook Assignment**, but the *Teacher Resource Book 11* has solutions with workings and some explanations.

Chapter Review: This section contains a series of questions that review the chapter outcomes. Answers are in the textbook as well as the *Teacher Resource Book 11*.

Case Study: This part requires students to express their understanding of the skills they have learned. Answers are in the textbook as well as the *Teacher Resource Book 11*.

IV. Technology

The use of technology in our society is increasing and technological skills are becoming mandatory in the workplace. It is assumed that all students have a scientific calculator and its manual for their individual use. Ensure that the calculator used has “scientific” on it as there are calculators designed for business and statistics which would not have the functions needed for this course. Although students will sometimes use a calculator, they should first complete most problems using pencil and paper.

To the Instructor

V. Curriculum Guides

Each new ABE Mathematics course has a Curriculum Guide for the instructor and a Study Guide for the student. The Curriculum Guide includes the specific curriculum outcomes for the course. Suggestions for teaching, learning, and assessment are provided to support student achievement of the outcomes. Each course is divided into units. Each unit comprises a **two-page layout of four columns** as illustrated in the figure below. In some cases the four-column spread continues to the next two-page layout.

Curriculum Guide Organization: The Two-Page, Four-Column Spread

Unit Number - Unit Title		Unit Number - Unit Title	
Outcomes Specific curriculum outcomes for the unit.	Notes for Teaching and Learning Suggested activities, elaboration of outcomes, and background information.	Suggestions for Assessment Suggestions for assessing students' achievement of outcomes.	Resources Authorized and recommended resources that address outcomes.

VI. Study Guides

The Study Guide provides the student with the name of the text(s) required for the course and specifies the sections and pages that the student will need to refer to in order to complete the required work for the course. It guides the student through the course by assigning relevant reading and providing questions and/or assigning questions from the text or some other resource. Sometimes it also provides important points for students to note. (See the *To the Student* section of the Study Guide for a more detailed explanation of the use of the Study Guides.) The Study Guides are designed to give students some degree of independence in their work. Instructors should note, however, that there is much material in the Curriculum Guides in the *Notes for Teaching and Learning* and *Suggestions for Assessment* columns that is not included in the Study Guide and instructors will need to review this information and decide how to include it.

To the Instructor

VII. Resources

Essential Resources

Essentials of Mathematics 11, ISBN: 0-7726-4823-9

Essentials of Mathematics 11, Teacher Resource Book 11, ISBN: 0-7726-4878-6

Mathematics 3109B Study Guide

Resources

Math Link: <http://mathforum.org>
<http://edHelper.com>
<http://www.purplemath.com/index.htm>
<http://www.educationindex.com/math/>
<http://www.learner.org/exhibits/dailymath/resources.html>

VIII. Recommended Evaluation

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

Data Analysis

Measurement Technology

Unit 1 - Data Analysis

Outcomes

1.1 Construct line plots.

1.1.1 Use line plots to display data.

1.1.2 Analyze data in a line plot by:

- a) identifying any clusters
- b) identifying any outliers
- c) stating the range
- d) deciding whether the line plot is appropriate for graphing the given data.

Notes for Teaching and Learning

In this unit, students will explore various ways to represent data and gain an awareness of how data can be manipulated to emphasize a particular viewpoint.

The instructor should spend some time searching the Statistics Canada website: www.statscan.ca/english/edu/index.htm which provides data that may be used in this unit.

A line plot is a means of displaying data one-dimensionally on a horizontal line.

The instructor should ensure that students use graph paper when constructing line plots.

If possible, the instructor could have students work in pairs to complete the **Small Group Activity** on page 85. If that is not possible, the instructor should spend some time discussing the activity with students before the questions are completed.

Unit 1 - Data Analysis

Suggestions for Assessment

Study Guide questions 1.1 to 1.3 will meet the objectives of Outcome 1.1.

Resources

Essentials of Mathematics 11,
Line Plots, pages 79, 82 - 89

Teacher Resource Book 11,
pages 51 - 56

Blackline Master 3 (Grid
Paper)

Statistics Canada website:
[www.statscan.ca/english/edu/
index.htm](http://www.statscan.ca/english/edu/index.htm)

Unit 1 - Data Analysis

Outcomes

1.2 Given a set of data, calculate the three measures of central tendency: mean, median and mode.

1.2.1 Use each of the measures of central tendency appropriately.

Notes for Teaching and Learning

The instructor should provide an explanation of the symbol Σ , and some extra problems which use this symbol.

Students should be advised to work with a partner, if possible, when completing **Class Discussion** on page 91.

The measure of central tendency that is used depends on the data.

- **mean** for sets of data with no unusually high or low numbers
- **median** for sets of data with some points that are much lower or higher than most of the others
- **mode** for sets of data with many data points that are the same

Unit 1 - Data Analysis

Suggestions for Assessment

Study Guide questions 1.4 to 1.10 will meet the objectives of Outcome 1.2.

Students have been assigned Practice Exercise 1, *Mean/Median/Mode* in the Study Guide. The instructor may wish to use it for a homework assignment.

Resources

Essentials of Mathematics 11,
Determining Measures of
Central Tendency, pages
90 - 95

Teacher Resource Book,
pages 57 - 60

Appendix, Practice
Exercise 1,
Mean/Median/Mode

Unit 1 - Data Analysis

Outcomes

1.3 Solve problems involving mean, median and mode.

Notes for Teaching and Learning

The major focus of this **Exploration** is on how different individuals or groups use mean, median or mode to represent a particular point of view.

Students will not use spreadsheets in this unit.

The instructor may need to provide some extra explanation for **Example 3** on page 99.

Notebook Assignment, questions 3 and 4, are similar to **Example 3**.

Students have been directed to complete only Scenario A in question 7.

Unit 1 - Data Analysis

Suggestions for Assessment

Study Guide question 1.11 will meet the objectives of Outcome 1.3.

Resources

Essentials of Mathematics 11,
Adjusting Measures of
Central Tendency, pages 96 -
102

Teacher Resource Book 11,
pages 61 - 63

Unit 1 - Data Analysis

Outcomes

1.4 Construct and analyze bar graphs.

1.4.1 Construct and analyze misleading bar graphs.

Notes for Teaching and Learning

Since graphs can be drawn and statements can be made to create a false impression, students should be able to decide when this is so. Students should be able to carefully study the data and the graph and decide whether the statistics are being used to represent an opinion or influence a decision.

Students will be expected to manipulate a bar or a line graph to represent a particular point of view.

Unit 1 - Data Analysis

Suggestions for Assessment

Study Guide questions 1.12 and 1.13 will meet the objectives of Outcome 1.4.

Practice Exercise 2, *Bar Graphs*, has been assigned in the Study Guide. The instructor may wish to use this worksheet as a homework assignment.

Resources

Essentials of Mathematics 11,
Using Bar Graphs to
Represent Data, pages
105 - 112

Teacher Resource Book 11,
pages 64 - 66

Appendix, Practice
Exercise 2, *Bar Graphs*

Unit 1 - Data Analysis

Outcomes

1.5 Construct and analyze circle graphs.

1.5.1 Change a fraction to a percent.

1.5.2 Change a percent of a circle to a degree measure and vice versa.

1.5.3 Use a protractor to draw a central angle with a given degree measure.

Notes for Teaching and Learning

The instructor must ensure that students know how to use a protractor before they begin this unit.

The instructor should provide guidance and practice worksheets on how to change a percent to a decimal, how to change from percent of a circle to degree measure and vice versa.

Unit 1 - Data Analysis

Suggestions for Assessment

Study Guide questions 1.14 to 1.16 will meet the objectives of Outcome 1.5.

In the Study Guide, students have been instructed to complete questions in the **Chapter Review** and **Case Study**.

However, the instructor could use these questions or similar ones for a unit test or assessment.

Resources

Essentials of Mathematics 11,
Using Circle Graphs to
Represent Data, pages 114 -
122

Chapter Review, pages 123 -
128

Case Study, pages 130 - 132

Teacher Resource Book 11,
pages 68 - 75

Unit 2 - Measurement Technology

Outcomes

2.1 Explore the history of measurement systems.

2.1.1 Identify the most suitable units in both SI (metric) and imperial systems for measuring different items.

Notes for Teaching and Learning

The instructor should take time to discuss the development of measurement systems. Students should realize that there are more systems than the SI (metric) and imperial systems. This unit, however, will focus on these two. The imperial system may be new to students.

If possible, students should work in pairs or small groups for much of this chapter.

Unit 2 - Measurement Technology

Suggestions for Assessment

Study Guide questions 2.1 and 2.2 will meet the objectives of Outcome 2.1.

In the Study Guide, students have been assigned Practice Exercise 3, *Suitable Units of Linear Measure*. The instructor may choose to use this worksheet as a homework assignment.

Resources

Essentials of Mathematics 11,
The History of Measurement,
pages 193, 195 - 200

Teacher Resource Book 11,
pages 118 and 119

Blackline Master 13, Ruler

Appendix,
Practice Exercise 3, *Suitable
Units of Linear Measure*

Unit 2 - Measurement Technology

Outcomes

2.2 Use appropriate metric and imperial rulers and tape measures to measure dimensions of given objects to solve problems.

2.2.1 Add, subtract and multiply fractions.

2.2.2 Use the $[A \frac{b}{c}]$ key on a scientific calculator.

2.2.3 Given a figure, find its perimeter and area.

Notes for Teaching and Learning

Students may need some review on the basic units of measurement in both SI (metric) and imperial systems. (The chart on page 209 of *Essentials of Mathematics 11* could be used as a guide.)

The instructor should provide a review worksheet, if necessary, on adding, subtracting, multiplying and dividing fractions. Although the text uses the $[A \frac{b}{c}]$ key on a scientific calculator, students must develop the skills necessary to do these calculations with pencil and paper.

The opportunity is here for the instructor to review or introduce perimeter, area and volume of geometric shapes.

Unit 2 - Measurement Technology

Suggestions for Assessment

Study Guide questions 2.3 to 2.5 will meet the objectives of Outcome 2.2.

In the Study Guide, students have been assigned Practice Exercise 4, *Imperial and SI Measure* and Practice Exercise 5, *Word Problems*. These worksheets may be used as an assessment.

Resources

Essentials of Mathematics 11,
Measurement in the Metric
and Imperial Systems, pages
201 - 208

Teacher Resource Book 11,
pages 120 - 123

Appendix,
Practice Exercise 4, *Imperial
and SI Measure*

Appendix,
Practice Exercise 5, *Word
Problems*.

Unit 2 - Measurement Technology

Outcomes

2.3 Make basic conversions within the imperial and SI (metric) systems.

2.3.1 Identify the unit conversion ratio required to solve a problem.

Notes for Teaching and Learning

The instructor should ensure that students know how to convert from one unit to another by using a unit conversion ratio. Students will need extra guidance in this area.

The instructor should advise students to check the website www.onlineconversion.com/.

Unit 2 - Measurement Technology

Suggestions for Assessment

Study Guide questions 2.6 and 2.7 will meet the objectives of Outcome 2.3.

In the study Guide, students have been assigned Practice Exercise 6, *Metric Prefixes*.

The instructor could assign the following questions for extra practice.

1. Convert each of the following units of linear measure as indicated.

- a) 3 m = _____ cm b) 53 cm = _____ mm
c) 25 mm = _____ cm d) 450 cm = _____ m
e) 0.65 m = _____ mm f) 7.4 mm = _____ cm
g) 3.5 km = _____ m h) 560 m = _____ km

Solutions

- a) 300 cm b) 530 mm c) 2.5 cm d) 4.50 m
e) 650 mm f) 0.74 cm g) 3500 m h) 0.560 km

2. Convert each of the following units of linear measure as indicated.

- a) 5 ft. = _____ in. b) 3 yd. = _____ ft.
c) $2\frac{1}{2}$ ft. = _____ in. d) 36 in. = _____ ft.
e) 18 in. = _____ ft. f) 27 in. = ___ ft. + ___ in.
g) 4 ft. 4 in. = _____ in. h) 2 yd. 8 in = _____ in.

Solutions

- a) 60 in. b) 9 ft. c) 30 in. d) 3 ft.
e) 1.5 ft. f) 2 ft. + 3 in. g) 52 in. h) 80 in.

Resources

Essentials of Mathematics 11,
Conversions Within Systems,
pages 209 - 214

Teacher Resource Book 11,
pages 124 and 125

www.onlineconversion.com

www.think-metric.com

Appendix,
Practice Exercise 6, *Metric
Prefixes*

Unit 2 - Measurement Technology

Outcomes

2.4 Make basic conversions between the imperial and SI (metric) systems.

Notes for Teaching and Learning

Conversion between the SI and imperial systems are extremely important for students interested in a trades career.

Use of the conversion table on page 216 is a must. The instructor should provide students with the conversion table on Blackline Master 14.

Students do not have to memorize the conversions, but given a chart of conversions, they should know how to use it.

For introducing the need to understand conversion between the systems in trades careers, the instructor should provide the sheet, *Changing Units Between Metric and Customary Systems*.

The instructor should spend some time discussing this chart and giving help in conversions.

Unit 2 - Measurement Technology

Suggestions for Assessment

Study Guide question 2.8 will meet the objectives of Outcome 2.4.

Resources

Essentials of Mathematics 11,
Conversions Between
Systems, pages 215 - 219

Teacher Resource Book 11,
pages 126 and 127

Blackline Master 14,
Conversion Table

Appendix, *Changing Units
Between Metric and
Customary Systems*

Unit 2 - Measurement Technology

Outcomes

2.5 Use Vernier calipers to find inside and outside measurements of given objects.

Notes for Teaching and Learning

It takes practice to become efficient in using Vernier calipers.

The instructor should ensure that students have Vernier calipers for this entire **Exploration**.

The Vernier caliper applet (see Resources column) is an excellent resource for learning how to read the various scales on the caliper.

Although the **Class Activity** on page 225, is best suited for working in pairs, students can complete it individually.

The instructor should provide students with a list which suggests objects that could be measured.

Unit 2 - Measurement Technology

Suggestions for Assessment

Study Guide questions 2.9 and 2.10 will meet the objectives of Outcome 2.5.

Resources

Essentials of Mathematics 11,
Measuring with Vernier
Calipers, pages 222 - 229

Teacher Resource Book 11,
pages 131 and 132

Blackline Master 17, Vernier
caliper

[www.ronblond.com/M10/
Vern.APPLET/index.html](http://www.ronblond.com/M10/Vern.APPLET/index.html)

Unit 2 - Measurement Technology

Outcomes

2.6 Use a micrometer to find the outside measurements of given objects.

Notes for Teaching and Learning

Micrometers are more precise than Vernier calipers because they measure to a smaller unit (one hundredth of a mm). The instructor should ensure that students have access to a micrometer for the whole of this **Exploration**.

The instructor should have students use the suggested website which shows an applet of the measurement scale of a micrometer. (See Resources column.)

Unit 2 - Measurement Technology

Suggestions for Assessment

Study Guide question 2.11 will meet the objectives of Outcome 2.6.

Students have been assigned **Chapter Review**, questions 1 -10 and **Case Study**. The instructor may choose to use these questions as an assignment.

Resources

Essentials of Mathematics 11,
Measuring with Micrometers,
pages 230 - 237

Chapter Review, pages 238 -
240

Case Study, pages 242 and
243

Teacher Resource Book 11,
pages 133 - 136

Blackline Master 18,
Micrometer

www.ronblond.com/M10/Micrometer.APPLET/index.html

Appendix

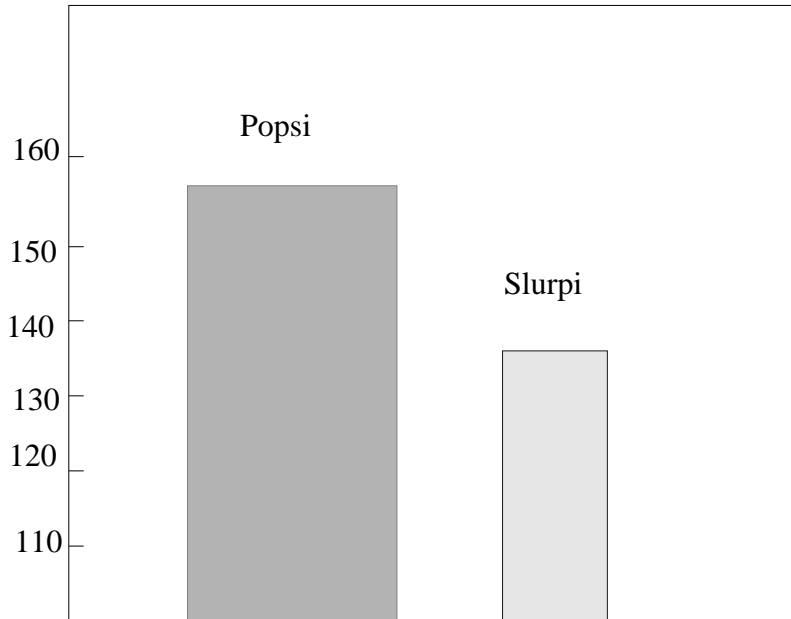
Practice Exercise 1: Mean/Median/Mode

The following table contains test results for the students in Mrs. Jones' mathematics class. The test has a maximum of 30 marks and a passing grade is 50%. Calculate the mean, median and mode for the class.

Student	Mark	Student	Mark	Student	Mark
Susan Adams	19	Sara Wall	21	Adam Smith	28
Elliot White	15	Peter Williams	23	Sally Swanson	22
John Buchanan	19	Sarah Gaudet	15	Barbara Wilson	25
Dave Moore	25	Joe MacMillan	18	David Vincent	18
Jeff Black	26	Jason Profit	19	Basil Vessel	17
Dana Gallant	24	Melanie Taylor	20	Randall Tozer	23
Gloria Gillis	18	Lynden Stewart	27	Steven Simmons	18
Ross Hill	16	Bryon Sorrie	30	Jack Randall	19
Kim Walsh	12	Stan Peardon	2	Harvey Arseneault	16

Practice Exercise 2: Bar Graphs

1. This graph displays the result of a taste test between Popsi and Slurpie soft drinks given to 300 customers.



- a) Looking only at the heights of the bars, how many times more popular does Popsi seem to be over Slurpie?
 - b) Which company appeared to have created the graph?
 - c) What three techniques were used to create a false impression?
 - d) Create a new graph that would more fairly compare consumer differences.
2. In a college, 200 out of 400 Applied Arts students and 100 out of 150 Business students attended a musical. Draw a graph to give the impression that:
 - a) Applied Arts students are better supporters of the musical.
 - b) Business students are better supporters of the musical.

Practice Exercise 3: Suitable Units of Linear Measure

1. Identify suitable units of linear measure in the SI and Imperial systems.		
Item	Metric - SI	Imperial
a) distance from St. John's to Clarenville		
b) length of a pen		
c) thickness of a coin		
d) diameter of a car tire		
e) dimensions of a duotang		

2. Complete the following table with an appropriate estimate.		
Item	Metric - SI	Imperial
a) distance from Gander to Corner Brook		
b) length of ice surface in an arena		
c) width of a floor tile		
d) dimensions of a loonie		
e) diameter of a human hair		

3. Estimate, in both SI and imperial units, the length and width of each of the following objects. Use a metre stick, ruler, tape measure, or any other suitable device, to determine the actual measure of each object (rounded to the nearest mm or 1/16th of an inch).				
Item	Metric - SI Estimate	Imperial Estimate	Actual SI	Actual Imperial
a) a desktop				
b) textbook				
c) classroom				
d) window				
e) door				











Practice Exercise 3: Solutions

Solutions: Example 1		
Item	Metric - SI	Imperial
a) distance from St. John's to Clarenville	km	miles
b) length of a pen	cm	inches
c) thickness of a coin	mm	fraction of an inch
d) diameter of a car tire	cm	inches
e) dimensions of a duotang	cm	inches













Solutions: Example 2		
Item	Metric - SI	Imperial
a) distance from Gander to Corner Brook	360 km	220 miles
b) length of ice surface in an arena	60 m	200 feet
c) width of a floor tile	30 cm	1 foot
d) dimensions of a loonie	2.5 cm	1 inch
e) diameter of a human hair	1 mm	1/16th of an inch

Practice Exercise 4: Imperial and SI Measure

1. Measure each of the following items to the nearest $\frac{1}{16}$ of an inch.

a) diameter of nut 	f) length of small nail 
b) length of gyproc 	g) length of large nail 
c) length of wood screw 	h) diameter of steel drill bit 
d) size of wood bit 	i) length of bolt (exclude head) 
e) diameter of dowel 	j) length of wrench 

2. Measure each of the following items to the nearest millimetre.

a) length of AAA battery 	g) length of small bolt 
b) diameter of loonie 	h) diameter of penny 
c) diameter of bolt head 	i) inside and outside diameter of washer 
d) length of paper clip 	j) length of large bolt 
e) length of small wrench 	k) length of nail 
f) length of large wrench 	l) length of pen 

Practice Exercise 5: Word Problems

Solve the following problems. Draw and label a sketch for each.

1. A gable roof composed of two rectangles is to be covered with asphalt shingles. Each rectangle is 44 ft. by 22 ft. A bundle of shingles contains 27 shingles and will cover $33\frac{1}{3}$ sq. ft.
 - a) Find the area of the roof.
 - b) How many complete bundles of shingles are needed to cover the roof?

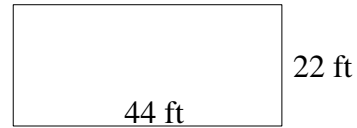
2. The inside dimensions of an aquarium are: 60 cm long, 30 cm wide and 40 cm deep.
 - a) Find the volume of the aquarium in cubic centimetres.
 - b) If 1 cubic centimetre equals 1 millilitre, find the volume of the tank in millilitres and litres.
 - c) If 1 litre of water has a mass of 1 kilogram, what is the mass of the water in the filled aquarium?

3. A contractor intends to pour a concrete pad for a shed that measures 24 feet by 48 feet. If the floor is to be 6 inches thick, find the number of cubic yards of concrete that are required.

4. A room measures 12' 6" and has a ceiling height of 96".
 - a) Ignoring any openings such as doors or windows, find the total square footage of wall area to be painted.
 - b) If the ceiling area is to be tiled, how many tiles measuring 12 " by 12" will it take to tile the ceiling?

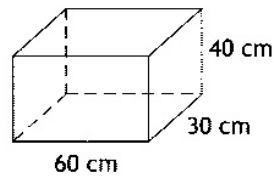
Practice Exercise 5: Solutions

1a) total square footage of roof
= 2 (44 ft.)(22 ft.)
= 1936 square feet



1b) one bundle covers $33\frac{1}{3}$ square feet
total # of bundles needed
= $1936 \div 33\frac{1}{3}$
= 58.08
→ 59 bundles are needed

2a) volume = (60 cm)(30 cm)(40 cm)
= 72 000 cm³



2b) volume in mL = 72 000 mL
volume in L = $72\,000 \div 1000 = 72$ L

2c) mass of water = 72 kg

3.

volume = $l \times w \times h$

24 ft. = 8 yds.

48 ft. = 16 yds.

6 in. = 0.5 ft. = $\frac{1}{6}$ yd.

so volume = $(8)(16)\left(\frac{1}{6}\right)$

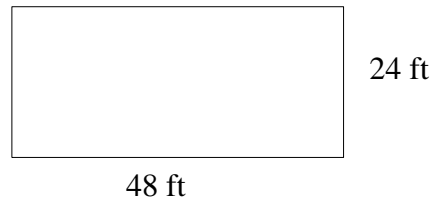
= $21\frac{1}{3}$ cubic yards

OR

volume = $24 \times 48 \times 0.5$
= 576 ft³

1 yd³ = 27 ft³

∴ $\frac{576}{27} = 21\frac{1}{3}$ yd³



4a) total square footage of wall = ?

$$12' 6'' = 12.5'$$

$$96'' = 8'$$

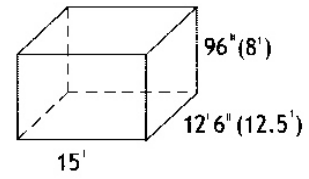
$$\text{two narrower walls} = 2(12.5 \text{ ft.})(8) = 200 \text{ square feet}$$

$$\text{two longer walls} = 2(15 \text{ ft.})(8) = 240 \text{ square feet}$$

$$\text{total} = 200 + 240 = 440 \text{ square feet}$$

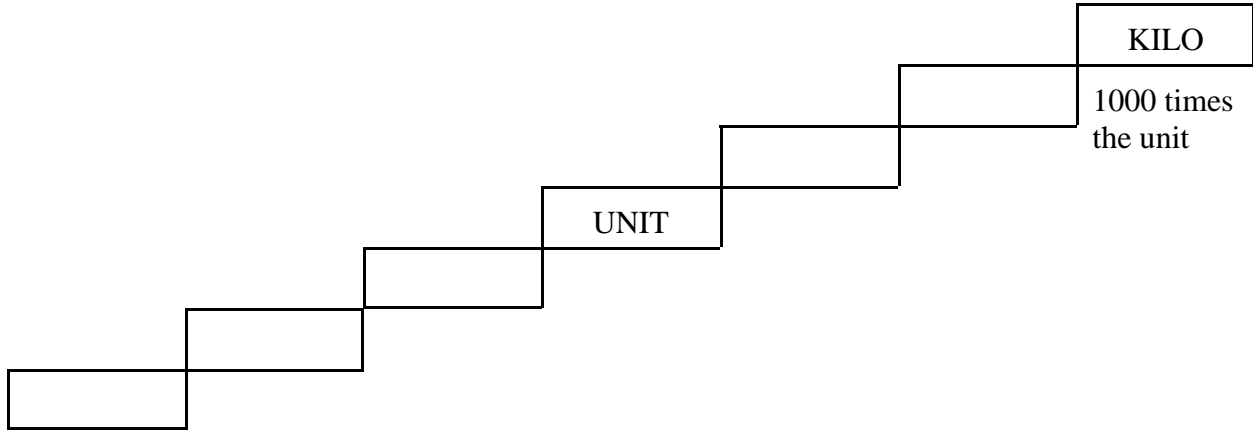
4b) area of ceiling = $15' \times 12.5' = 187.5 \text{ ft}^2$

$$\text{minimum number of tiles} = 188$$



Practice Exercise 6: Metric Prefixes

Record the *Metric Prefixes* in the spaces provided. Below each, describe what the prefix means. One prefix is done for you.



Now use the *Metric Steps* to make these conversions: (Remember to count the steps.)

500 cm	<input type="text"/> m
2 km	<input type="text"/> m
<input type="text"/> mL	5.5 liters
220 mm	<input type="text"/> cm
<input type="text"/> kg	20 000 g

Changing units between the Metric and Customary Systems

From Metric to Customary				From Customary to Metric			
Quantity	to change from	to	multiply by	Quantity	to change from	to	multiply by
Length	m	mil	0.039 37	Length	mil	m	25.4
	mm	in.	0.039 37		in.	mm	25.4
	cm	in.	0.393 7		in.	cm	2.54
	m	ft	3.280 8		ft	m	0.304 8
	km	mile	0.621 37		mile	km	1.609 3
Area	cm ²	sq in.	0.155	Area	sq in.	cm ²	6.451 6
	m ²	sq ft	10.736 9		sq ft	m ²	0.092 9
Volume	cm ³	cu in.	0.061	Volume	cu in.	cm ³	16.387
	m ³	cu yd	1.308		cu yd	m ³	0.764 6
	mL	fl oz	0.033 8		fl oz	mL	29.574 6
	L	fl oz	33.814		fl oz	L	0.029 6
	L	pt	2.113		pt	L	0.473 2
	L	qt	1.056 7		qt	L	0.946 4
	L	gal	0.264 2		gal	L	3.758 4
Mass or weight	g	oz	0.035 3	Mass or weight	oz	g	28.349 5
	kg	lb	2.205		lb	kg	0.453 6
	t	lb	2205		ton	kg	907.2
Bending moment, torque, moment of force	N-m	lbf-in.	8.850 7	Bending moment, torque, moment of force	lbf-in.	N-m	0.113
	N-m	lbf-ft	.737 6		lbf-ft	N-m	1.355 8
Pressure/ Vacuum	kPa	psi	0.145	Pressure/ Vacuum	psi	kPa	6.894 8
Velocity	km/h	mph	0.621 4	Velocity	mph	km/h	1.609 3
Force, thrust, drag	N	lbf	0.224 8	Force, thrust, drag	lbf	N	4.448 2
Power	W	W	1	Power	W	W	1
Temperature	C	F	$(1.8 \times C) + 32$	Temperature	F	C	$(F - 32) \div 1.8$