

**LAGUARDIA COMMUNITY COLLEGE  
CITY UNIVERSITY OF NEW YORK  
MATHEMATICS, ENGINEERING,  
AND COMPUTER SCIENCE DEPARTMENT**

**MAT 095 – INTRODUCTION TO ALGEBRA**

**4 Lecture Hours, 1 Educo Lab Hour, 1 Tutoring Lab Hour, 0 Credits**

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**Catalog Description:**

This course has a problem solving approach that emphasizes the importance of mathematical reasoning in addressing real-world problems drawn from diverse disciplines. Topics include arithmetic (signed numbers, fractions, decimals and percents), elementary algebra (solving first degree equations and inequalities, rules of exponents, equations of lines) and basics of geometry (area and perimeter of triangles, rectangles, squares, trapezoids and circles), as well as numeracy (estimation, unit analysis). The course is intended for students with little or no algebra background.



### **Instructional Objectives:**

During this course, the instructor expects to:

1. Provide students with the arithmetic skills necessary to solve real world problems involving whole numbers, fractions and decimals.
2. Familiarize students with proportional reasoning, enabling them to solve a wide variety of applied problems, and providing a natural introduction to solving one variable equations.
3. Develop the students' number sense, providing them with skills in estimation and unit analysis.
4. Thoroughly reinforce students' signed number skills, not only in performing arithmetic operations but also in the areas of exponents and scientific notation.
5. Familiarize students with the basics of plane geometry, in particular providing them with formulas for calculating the areas and perimeters of familiar geometric figures, and with the Pythagorean Theorem.
6. Introduce students to numerical/algebraic relationships between two variables, fostering their ability to visualize these relationships as graphs in the  $xy$ -coordinate plane.
7. Reinforce and expand students' equation-solving abilities: Linear equations with one and two unknowns, absolute value equations, and linear inequalities.
8. Introduce fundamental algebraic objects and properties: Polynomials, exponents, and distributive law, combining like terms.

### **Performance Objectives:**

At the conclusion of this course, students will be able to:

1. Solve real life problems requiring a full range of arithmetic skills.
2. Solve challenging real life problems involving ratios, proportion and percents.
3. Perform estimates, and judge whether more elaborate and precisely calculated solutions to problems are numerically reasonable.
4. Make calculations with signed numbers in a variety of different settings.
5. Compute areas and perimeters of basic two-dimensional geometric figures, and to use the Pythagorean Theorem to find the length of the third side of a right triangle given the lengths of two other sides.
6. Appreciate elementary numerical/algebraic relationships between two variables and to understand how such relationships can be visualized as planar graphs.
7. Solve elementary equations in both one and two variables as well as linear inequalities.
8. Understand/master algebra fundamentals as generalizations of arithmetic, establishing a base upon which to build the sequel course, MAT096.

**Textbooks:**

**Pre-Algebra** by Man M. Sharma, Roxann King, Asha Mittal, 6<sup>th</sup> edition, Educo International Inc., 2007;

**Pre-Algebra Supplement: Linear Equations and Inequalities in One Variable, Linear Equations and Inequalities in Two variables, Exponents and Polynomials** by Man M. Sharma, Educo International, Inc.

**Evaluation:**

The purpose of a grading system is to give students, and those that will read their transcripts, an accurate record of their performance in this course. The role of the Mathematics, Engineering & Computer Science Departments is to provide a fair, valid, and reliable structure for assessing student achievement.

**Categories:**

Online Homework.....	10%
Online Quizzes (at least 5).....	5%
Math Lab.....	5%
Instructor’s Assessments (Tests, Projects)...	15%
Departmental Exams (2).....	30%
Departmental Final Exam.....	35%

The minimum passing score for the course is 70. A student with a class average of 70 or above (Departmental Final Exam included) and a score of at least 60 on the Departmental Final Exam will pass the course.

If a student has a failing class average (less than 70) or has scored below 60 on the Departmental Final Exam, then the student receives either an **F** or an **R** grade, as appropriate.

**Academic Integrity**

This class will be conducted in compliance with LaGuardia Community College’s academic integrity policy.

**Attendance**

The maximum number of absences will be **9 hours**. Unexcused absences beyond this maximum will result in a grade of **WU** or **F**.

## **Explanation of Grading Category**

### ***Online Homework:***

Online homework is a time sensitive assignment that will be given on a daily basis by the instructor using the Educo system. The exercises reinforce concepts learned in the class.

### ***Online Quizzes:***

Students will be required to take quizzes online. It is important to be aware of deadlines because when the allotted time has expired, the system will not allow any further work on the quiz.

### ***Instructor's Assessments:***

An instructor's assessment is an exam or a project designed by the instructor and assigned for the section. It will be given online or in traditional paper format.

### ***Math Lab Work:***

There are 10 lab sheets corresponding to 10 scheduled lab sessions. Each lab sheet should be completed by students during a lab hour and handed in to the instructor. The instructor will grade these labs on a weekly basis and return them to students. Students are advised to keep lab work for review purposes.

### ***Departmental Exams:***

There are two one-hour departmental exams and one two-hour Departmental Final Exam that are given on-line. The Final Exam will be a cumulative exam. Calculators are **NOT** allowed in **ANY** of these exams.

## **PQL Projects**

Project I: **Household Electricity Consumption** (simple average, decimals, operations on whole numbers) by Marina Dedlovskaya and Patricia Sololski

Project II: **The Diaper Debate** (percentages, ratios, proportions) by Shenglan Yuan

Project III: **Dust Cloud: Height and Thickness** (Pythagorean theorem, exponents and radicals, linear equations determination, slope, graphical interpretation) by Yasser Hassebo

Project IV: **Carbon Emission** (reading graphs, weighted average, unit conversion, decimals) by Prabha Betne

Project V: **CO<sub>2</sub> Emissions by Cars** (measurements, plotting graphs, and ratios) by Sreedevi Ande

Project VI: **Trends in CO<sub>2</sub> and Global Temperature** (graphs, linear equations and slope, solving two step equations) by Prabha Betne

Project VII: **Asthma and Air Pollution** (fractions, percentages, decimals, conversion from one form to another, rounding) by Zahidur Rahman

All projects are available at <http://ctl.laguardia.edu/pql/sampler/activities.htm>

## COURSE OUTLINE

	Lesson	Topic	Chapter	Class Work		Online Home Work	
				Examples	Suggested Exercises	Tutorial	HW
Week 1	1	Whole Numbers. Place value	0.1	Pg.1-4: 1-3	Pg.5: 3, 8, 16, 20, 58, 60	0.1.1 Place Value of a Digit 0.1.2 Write a Whole Number in Words	HW#1
	2	Rounding whole numbers.	0.2	Pg.6-10: 1-3	Pg.11-12 :9, 10, 92, 98, 107, 110	0.2.3 Round a Whole Number to a Given Place	HW#1
	3	Fundamental operations on Whole Numbers	0.3	Pg.14-20:1-6	Pg.22-23: 34, 76, 104, 109, 138-150(even)	0.3.1 Add and Subtract Whole Numbers 0.3.2 Multiply and Divide Whole Numbers	HW#2
	4	Integers, Opposites, Absolute Values	1.1	Pg.31-35: 1-8	Pg.40-41: 11, 12, 17, 23, 37, 39, 40, 43, 45-49, 62, 64, 67, 88, 89, 91, 94, 104, 106	1.1.1 Graphing Integers; Finding the Opposite of an Integer; and Comparing Two Integers. 1.1.2 Finding the Absolute Value of an Integer	HW#3
	5	<b>eLab</b>		Introduction to EDUCO Learning System			
Week 2	6	Addition and Subtraction with Integers	1.2	Pg.41-54:1, 2, 4, 5, 7, 8, 9	Pg.54-56: 16, 19, 22, 24, 41, 82, 92, 108, 112, 141, 145, 148, 151, 154, 156	1.2.1 Add Integers and Properties of Addition. Examples 1 and 2 1.2.2 Subtract Integers	HW#4
	7	Addition and Subtraction with Integers (continued)	1.2				
	8	Multiplication and Division with Integers	1.3	Pg.57-65: 1, 2, 7, 8, 11	Pg.66-67: 6, 7, 11, 32, 72, 76, 77, 81, 82, 124	1.3.1 Multiply integers, and Estimate Product Examples 1-3, 7 1.3.2 Divide Integers and Estimating Quotients	HW#5
	9	Exponents, Order of Operations	1.4	Pg.68-77: 1, 3, 7-9, 11, 12	Pg.78-79: 47, 54, 92, 99, 126, 156	1.4.1 Exponential Form of the Product of Integers 1.4.2 Multiply or Divide an Integers by Power of 10 1.4.3 Evaluate Numerical Expressions involving Integers	HW#6
	10	<b>eLab</b>		<b>Instructor's Assessment #1</b>			
		<b>Math Lab</b>		Lab Sheet #1		Lab #1	
Week	11	Translating, Simplifying and Evaluating	2.1	Pg.85-99: 1-4, 6-12, 15,	Pg.100-102: 3, 4, 7, 12, 17, 19, 76, 104,	2.1.1 Translate Phrases or Statements into	HW#7

	Expressions. Simple Average		17, 19, 20	113, 112, 126, 135	Expressions 2.1.2 Identify Coefficients of the Terms of an Expression 2.1.4 Evaluate Algebraic Expressions 2.1.5 Average of a Group of Integers		
12	Solving Equations with Integers	2.2	Pg.103-108: 1-4	Pg.111-112: 2, 4, 8, 19, 21, 24, 43, 47, 56, 58, 59, 63, 74, 78, 82, 86	2.2.1 Determine if a Number is a Solution of an Equation 2.2.2 Solve Equations using the Addition and Division Properties 2.2.3 Solve General Linear Equations with Integers	HW#8	
13	Applications using integers	2.3	Pg.112-116: 2, 3, 5	Pg.116-118: 6, 14, 21, 25, 38, 43, 44	2.3.1 Application of Linear Equations Applications 2-5	HW#9	
14	Basic Geometry. Perimeter and Area of triangle, rectangle, square and trapezoid	2.4	Pg.127-129: 11-14	Pg.132: 43-46	2.4.4 Perimeter and Area of triangle, rectangle, square and trapezoid	HW#10	
15	<b>eLab</b>		EDUCO assignment				
	<b>Math Lab</b>		Lab Sheet #2		Lab #2		
Week 4	16	Multiples, and Factors. Prime Factors	3.1, 3.2	Pg.150: 5, 6 Pg.152-159: 2, 5, 6	Pg.151: 58, 60, 68(a, b, f) Pg.159-160: 21, 25, 30	3.1.1 Divisibility Tests 3.1.2 Identify Multiples and Factors 3.2.1 Prime and Composite Numbers 3.2.2 Prime Factorizations	HW#11
	17	Least Common Multiples	3.3	Pg.161-166: 1-3, 6	Pg.166-167: 2, 5, 23, 52	3.3.1 Finding the LCM	HW#12
	18	Equivalent Fractions, Comparing Fractions	3.5, 3.6	Pg.178-181: 1, 2 Pg.182-189: 1, 2, 5	Pg.181-182: 15, 20, 21, 57 Pg.189-190: 51, 53, 59	3.4.1 Identify Rational Numbers 3.5.1 Building Equivalent Fractions 3.5.2 Reduce Fractions to Lowest Terms 3.6.2 Comparing and Listing Fractions	HW#13
	19	<b>Review for Departmental Exam #1</b>					
	20	<b>eLab</b>		<b>Departmental Exam #1</b>			
		<b>Math Lab</b>		Lab Sheet #3		Lab #3	
Week 5	21	Introduction to Mixed Numbers	3.7	Pg.191-195: 1-3	Pg.196-197: 1, 5, 14, 38, 56, 62	3.7.1 Change Mixed Numbers to Improper Fractions	HW#14
	22	Translating Ratios,	3.8	Pg.197-202:	Pg.202-205: 2, 4, 26,	3.8.1 Translating to	HW#15

		Rates, Percents to Fractions		1-3, 5, 6, 9,11	27, 62, 63	Expressions involving Fractions 3.8.2 Express Ratios, Rates, and Percents as Fractions	
	23	Addition and Subtraction with Fractions	4.1	Pg.217-227: 1, 2, 4, 6, 8	Pg.227-229: 15, 18, 25, 68, 69, 129, 132	4.1.1 Adding Fractions 4.1.3 Subtracting Fractions Examples 1-3	HW#16
	24	Addition and Subtraction with Fractions (continued)	4.1				
	25	<b>eLab</b>		EDUCO assignment			
		<b>Math Lab</b>		Lab Sheet #4		Lab #4	
Week 6	26	Multiplication and Division with Fractions. Order of Operations with Fractions	4.2-4.3	Pg.238:1-3, 8 Pg.241-244: 1-5	Pg.238-240: 3, 11, 9, 14, 40, 90, 97, 106 Pg.244-246: 24, 29, 35, 41	4.2.1 Multiplying Fractions Examples 1, 2 4.2.3 Dividing Fractions Examples 1, 2 4.3.1 Simplifying Expressions involving Fractions	HW#17
	27	Multiplication and Division with Fractions. Order of Operations with Fractions (continued)	4.2-4.3				
	28	Equations with Fractions and Proportions	5.1	Pg.253-259: 1-6	Pg.260: 2, 7, 28, 30, 69, 70	5.1.1 Solve Simple Equations Involving Fractions 5.1.2 Solve Proportions Using Cross Products	HW#18

	29	Problems with Ratios and Proportions	S1.6	Pg.38-43: 4-6, 8 Worksheet #1	Pg.44-45: 56, 60, 63, 66, 74, 79	2.6.2 Solve Proportions 2.6.3 Solve applied problems involving Ratios Applications 1-3, 5	HW#19
	30	<b>eLab</b>		EDUCO Assignment			
		<b>Math Lab</b>		Lab Sheet #5		Lab #5	
Week 7	31	Problems with Ratios and Proportions (continued)	S1.6				
	32	Problems with Fractions	5.2	Pg.261-267: 1, 2, 4, 6-8 11-13	Pg.272-277: 10, 15, 40, 47, 56	5.2.1 Use of Equations to solve Application Problems 5.2.3 Applications to	HW#20



						demonstrate the use for "of" to "Multiply"		
	33	Problems with Fractions	5.2	Pg.267-272: 11-13	Pg.272-277: 72, 80, 87, 93.	5.2.4 Applications related to Rates, Unit Rates, and Proportions	HW#21	
	34	Reading, Writing, and Rounding Decimals	6.1	Pg.297-308: 1-7, 9-11	Pg.308-310: 11, 13, 14, 41, 51, 60, 67, 86	6.1.1 Word Names of Decimals 6.1.2 Rounding Decimals 6.1.3 Find Absolute Values, and Compare Decimals (only) Examples 3-5	HW#22	
	35	<b>eLab</b>		EDUCO assignment				
		<b>Math Lab</b>		Lab Sheet #6		Lab #6		
Week 8	36	Addition and Subtraction with Decimals	6.2	Pg.310-316: 1, 2, 4, 7, 8, 12	Pg.316-317: 21, 29, 52, 55, 75	6.2.1 Perform Addition and Subtraction with Decimal Numbers Examples 1-6	HW#23	
	37	Multiplication and Division with Decimals	6.3	Pg.318-330: 1, 3-6, 8, 9	Pg.330-331: 13, 22, 32, 38, 51, 111, 114	6.3.1 Multiplying Decimals 6.3.2 Perform Division with Decimal Numbers	HW#24	
	38	Decimals and Fractions	6.4	Pg.332-341: 1-6, 8, 9	Pg.341-343: 11, 12, 16, 48, 109, 115, 152	6.4.1 Changing numbers in Fraction to Decimal and Vice versa 6.4.2 Simplify Expressions containing Decimals or Fractions	HW#25	
	39	<b>Review for Departmental Exam #2</b>						
	40	<b>eLab</b>		<b>Departmental Exam #2</b>				
			<b>Math Lab</b>		Lab Sheet #7		Lab #7	
Week 9	41	Problems with Decimals	7.1	Pg.353-359: 1-3,10, 11	Pg.359-360: 2, 4, 10, 18, 19, 21, 25, 62, 70	7.1.1 Solve Equations involving decimals : Variable on one side 7.1.3 Solving Equations Containing Several Unknowns	HW#26	
	42	Problems with Decimals	7.2	Pg.361-366: 1, 3, 6, 7, 10,	Pg.366-369: 16, 20, 33, 35, 48, 62, 81	7.2.1 Application using Formulas 7.2.3 Applications involving Ratios, Rates, Unit Rates, or Unit Prices	HW#27	

	43	Square Roots and the Pythagorean Theorem	7.3	Pg.370-376: 1, 5-8	Pg.377-378: 22, 25, 31, 32, 72, 73, 92	7.3.1 Evaluate Expressions involving Square Roots Example 1 7.3.2 Applications involving the use of Pythagorean Theorem	HW#28
	44	Applications to Geometry. Area of a Circle, Circumference	7.4	Pg.386-390: 16-18, 20-22	Pg.392-396: 25, 26, 37, 41, 46	7.4.2 Circumference and Area of a Circle	HW#29
	45	<b>eLab</b>		<b>Instructor's Assessment #2</b>			
		<b>Math Lab</b>		Lab Sheet #8		Lab #8	
Week 10	46	Percents, Changing Percent to Decimal or Fraction, Changing Fraction or Decimal to Percent	8.1	Pg.407-413: 1, 2, 4-7	Pg.413-415: 16, 18, 90-104(even)	8.1.1 Change Percents to Numbers in Fraction or Decimals 8.1.2 Converting Fractions to Percents	HW#30
	47	Solving Percent Problems.	8.2	Pg.416-423: 1, 2, 4-10	Pg.423-425: 53, 57, 62, 66, 75 Compass Type Problems	8.2.1 Solve Problems using Percent Formula 8.2.2 Solve Business Applications	HW#31
	48	Solving Percent Problems.	8.2	Pg.416-423: 1, 2, 4-10	Pg.423-425: 53, 57, 62, 66, 75 Compass Type Problems	8.2.1 Solve Problems using Percent Formula 8.2.2 Solve Business Applications	HW#32
	49	Solving Percent Problems. (continued)	8.2				
	50	<b>eLab</b>		EDUCO assignment			
			<b>Math Lab</b>		Lab Sheet #9		Lab #9
Week 11	51	Solution of Linear Inequalities	S1.8	Pg.53-62: 1, 3(c, d), 5	Pg.62-63: 1, 3, 5, 6, 25, 37, 45, 52	2.8.1 Intervals and Their Graphs 2.8.2 Addition Property of Inequality Example 1 2.8.3 Multiplication Property of Inequality	HW#33
	52	Plotting points, Linear Equation in Two Variables and its Graph (Sketching the Graph of Linear Equation by constructing Table and Plotting Points in xy-plane)	9.4	Pg.479-492: 1, 2, 4-10	Pg.492-494: 14, 18, 23, 25, 34, 36, 39	9.4.1 Plot a Set of Ordered Pairs 9.4.2 Identify solutions of Linear Equation in two variables 9.4.3 Graph Linear Equations in two variables	HW#34
	53	Exponents	S3.1	Pg.91-94: 1-4	Pg.94-95: 4, 6, 8, 10, 15, 32, 37, 44, 52, 58, 70	5.1.1 Identify and use Exponents 5.1.2 Product Rule 5.1.3 Power Rules for Exponents Examples 1-3	HW#35

	54	Integer Exponents	S3.2	Pg.96-100: 1, 2(a,c), 4, 5(a-c)	Pg.100-101: 4, 6, 14, 16	5.5.1 Negative Exponents 5.5.2 Quotient Rule for Integer Exponents Examples 1-5	HW#36
	55	<b>eLab</b>		EDUCO assignment			
		<b>Math Lab</b>		Lab Sheet #10		Lab #10	
<b>Week 12</b>	56	Scientific Notation	S3.3	Pg.102-104: 1-3	Pg.104: 3, 13, 18, 31, 37, 49	5.7.1 Express Numbers in Scientific 5.7.2 Converting from Scientific Notation 5.7.3 Application : Using Scientific Notations	HW#37
	57	Scientific Notation (continued) (Multiplication and Division of Numbers written in Scientific Notations)	S3.3				
	58	<b>Review for Final Exam</b>					
	59-60	<b>eLab</b>		<b>Departmental Final Exam</b>			