

# MATH-0930: ESSENTIAL SKILLS FOR ALGEBRAIC & QUANTITATIVE REASONING

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## Cuyahoga Community College

**Viewing: MATH-0930 : Essential Skills for Algebraic & Quantitative Reasoning**

**Board of Trustees:**

January 2022

**Academic Term:**

Summer 2021

**Subject Code**

MATH - Mathematics

**Course Number:**

0930

**Title:**

Essential Skills for Algebraic & Quantitative Reasoning

**Catalog Description:**

Course supports the learning outcomes of MATH-1190 Algebraic and Quantitative Reasoning as a co-requisite course. Students develop foundational knowledge and conceptual and procedural tools in numeracy, proportional reasoning, and algebraic reasoning, to support the use and communication of key mathematical concepts in a variety of ways. Course must be taken concurrently with MATH-1190.

**Credit Hour(s):**

3

**Lecture Hour(s):**

3

**Lab Hour(s):**

0

**Other Hour(s):**

0

## Requisites

**Prerequisite and Corequisite**

MATH-0910 Basic Arithmetic and Pre-Algebra, or appropriate score on Math Placement Test; and concurrent enrollment in MATH-1190 Algebraic & Quantitative Reasoning.

## Outcomes

**Course Outcome(s):**

Apply quantitative reasoning abilities to critical reading, verbal and written communication, and visual, graphical, and technological literacy.

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Demonstrate an appreciation for quantitative literacy by reading about and discussing the importance of quantitative literacy in the world, both globally and in individuals' lives.

2. Use technology appropriately as a tool including: a. Knowing when and how to use calculators appropriately. b. Using computers and the Internet to gather, research and analyze quantitative information. c. Questioning and evaluating the output from a computer application. d. Using spreadsheets to create and/or investigate mathematical models whenever possible.
3. Apply spatial reasoning to solve geometric problems involving area, perimeter, and volume of basic shapes including using and translating between different units of measurement.
4. Check the reasonableness of quantities that have been presented, calculated, or estimated.
5. Use correct units when using numbers based on the context.
6. Read and interpret quantitative information from a variety of real-world sources, including visual displays of quantitative information.
7. Recognize and evaluate quantitative assumptions and quantitative results both in writing and orally using appropriate language, symbolism, data, and graphs.
8. Analyze and use quantitative information to support an argument.

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**Course Outcome(s):**

Apply the concepts of numeracy to investigate and describe quantitative relationships and solve problems in a variety of contexts.

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Demonstrate operation sense and communicate verbally and symbolically the effects of common operations on numbers.
2. Demonstrate competency in using, and an understanding of, magnitude in the context of place values, fractions, and numbers written in scientific notation.
3. Use estimation skills, knowing how and when to estimate results, to solve problems, detect errors, and check accuracy.
4. Apply quantitative reasoning to solve problems involving quantities in ratios or rates.
5. Explain and interpret data using measures of central tendency.
6. Read and make decisions based upon data from line graphs, bar graphs, and charts.
7. Use and interpret percentages in a variety of contexts: Parts to whole comparisons, decimal representations of percentages, quantifying risks and other probabilities, rates, relative change, and margins of error.

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**Course Outcome(s):**

Reason using the language and structure of mathematics to investigate, represent, and solve problems.

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Compare various uses of variables to represent quantities or attributes.
2. Describe the effect that a change in the value of one variable has on the value(s) of other variables in the algebraic relationship.
3. Construct and use equations and inequalities to represent relationships. Identify when there is insufficient information given to solve a problem.
4. Create and use tables, graphs, equations, and words to model authentic contextual situations.
5. Identify when a linear model or trend is appropriate for data, when a linear model does not appear to be appropriate, and know how to explore the applicability of other models.
6. Identify when an exponential model or trend is appropriate for data, when an exponential model does not appear to be appropriate, and know how to explore the applicability of other models.
7. Recognize that abstract mathematical models used to characterize real-world scenarios or physical relationships are not always exact and may be subject to error from many sources, including variability.

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**Methods of Evaluation:**

1. Quizzes
2. Homework

3. In-class collaborative work
4. Online coursework
5. Class participation
6. Projects
7. Self-evaluations
8. Essays

**Course Content Outline:**

1. Numeracy and Applications
  - a. Estimation strategies
  - b. Place values
  - c. Large numbers
  - d. Ratios, decimals, and percentages
  - e. Simple interest
  - f. Doubling time
  - g. Absolute and relative change
  - h. Ratios and proportions
    - i. Rates: population density, consumer price index and inflation
    - j. Perimeter and area
  - k. Applied percentages, conditional probabilities from two-way tables
2. Modeling
  - a. Coordinate plane and plotting points
  - b. Representations of linear models: verbal descriptions, patterns, tables, graphs, and equations
  - c. Slope and rate of change
  - d. Solving linear equations
  - e. Creating linear models for real-world contexts and articulating limitations
  - f. Finding trendlines: estimating by hand and using spreadsheets or other math technology
  - g. Exponents and roots
  - h. Representations of exponential models: verbal descriptions, patterns, tables, graphs, and equations
    - i. Multi-variable formulas
3. Statistics
  - a. Spreadsheets
  - b. Bar, line, and pie charts
  - c. Measures of central tendency

**Resources**

Carnegie Math Pathways at WestEd. *Quantway College with Corequisite*. Version 2.8. 2021.

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Richard Aufmann. *Discovering Math with Corequisite Support*. 1st edition. Cengage, 2020.

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Eric Zaslow. *Quantitative Reasoning: Thinking in Numbers*. 2020.

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Eric Gaze. *Thinking Quantitatively: Communicating with Numbers*. 2nd edition. Pearson, 2020.

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Dana Center Math Pathways. *Quantitative Reasoning*. Version 1.0. 2016.

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Abbott, April; Coston, Elwanda; Dicks, Gary; Gregus, Jan; McLendon, Sheila; and Urquhart, Amanda. *Quantitative Reasoning Workbook*. 2020. <https://oer.galileo.usg.edu/mathematics-ancillary/21>

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Rick Gillman. *Current Practices in Quantitative Literacy*. Mathematical Association of America, 2006.

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