

## Guided Self-Placement for Math Courses, Fall 2023.

Version 5 April 2023

*Basic facts:*

1. Our ten math courses separate into four tiers:
  - a. *Adult Basic Ed*
  - b. *Developmental and Program Level*
  - c. *Basic College Level*
  - d. *College Algebra Level*
2. The following course descriptions will help you assess which courses best fit your needs. These include sample content, prerequisite knowledge, and a list of programs that require and/or accept each course.
3. If you wish, you may inquire at Student Service about placement exams, GPA, and other criteria that have been used in the past to place students into courses. This is no longer a requirement, however.

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*Note: This list is not arranged by course number, but in order of increasing difficulty (more or less). Changes in color, from clover to blueberry to grape to maraschino, indicate jumps between the four levels of courses.*

### **MATS 0075 Number Sense**

Adult Basic Ed: 1 cr.

**Required for programs:**

None.

**Accepted by Programs:**

None.

**Target Audience:**

Primarily intended for students who wish to brush up on basic math (fractions, etc.), such as those headed to HEAL 1150 dosage calculations or any other program course involving basic math.

**Builds on Knowledge from:**

“None.”

**Some Things You Will Learn:**

1. 62.5% is equivalent to what fraction?
2. Math operations with fractions, such as:
$$\frac{1}{3} + \frac{3}{4}, \quad \frac{4}{5} \div \frac{4}{7}$$
3. What is 30% of 25? What percent of 55 is 17?

**Special Notes:**

*This one-credit course is NOT eligible for federal financial aid.*

## **MATS 1000 Math for Welders**

Developmental and Program Level: 3 cr.

### **Required by Programs:**

Welding Technology.

### **Accepted by Programs:**

Same.

### **Target Audience:**

Students in the Welding Technology program.

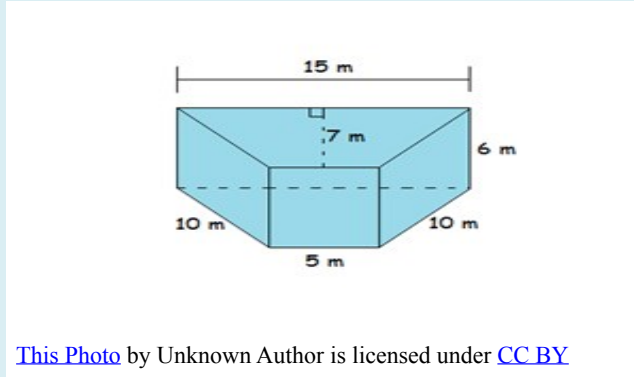
### **Builds on Knowledge From:**

Basic math at ABE level (see MATS 0075 Number Sense).

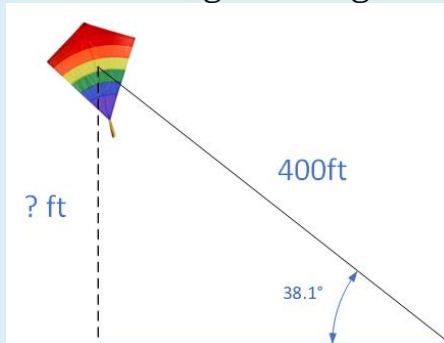
### **Some Things You Will Learn:**

Begins with a review of basic math, then goes into real world applications of geometry and trigonometry. Such as:

1. Find the surface area and volume of a dimensioned trapezoidal prism:



2. Find the missing side length using trig ratios:



3. Determine the number of full seamless 3" x 5" pieces that can be cut from an 8' x 10' sheet of steel.

### **Special Notes:**

*What if you've had calculus already? Do you still need this course?*

*Yes and no: Yes, because it contains enough different content to preclude a one-for-one substitution, but no, if you're motivated enough to self-study and attempt a test-out.*

*Please contact the instructor if you are interested in this option.*

## **MATS 1205 Math for Electricians**

Developmental and Program Level: 3 cr.

### **Required for Programs:**

Electrical Construction & Maintenance.

### **Accepted by Programs:**

Same.

### **Target Audience:**

Students in the Electrical Construction & Maintenance program.

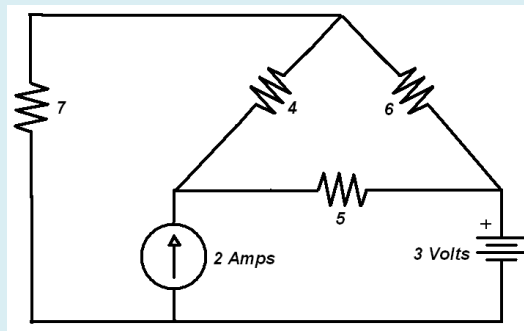
### **Builds on Knowledge from:**

Basic math at ABE level (see MATS 0075 Number Sense).

### **Some Things You Will Learn:**

Begins with a review of basic math, but introduces some algebra (solving systems of equations in application of Kirchoff's laws), trig (phasor analysis of AC circuits), and other topics relevant to electricians:

1. Given  $P = 34 \text{ kW}$  and  $E = 985 \text{ mV}$ , find  $R$  (use  $P = E^2/R$ ).
2. Given a series RLC circuit with  $R = 35 \text{ k}\Omega$ ,  $X_L = 20 \text{ k}\Omega$ , and  $X_C = 5 \text{ k}\Omega$ , find the circuit impedance, phase angle, apparent power, and true power. Show the phasor diagram for your analysis.
3. Solve for all currents and voltages in the circuit below:



### **Special Note:**

*What if you've had calculus already? Do you still need this course?*

*Yes and no: Yes, because it contains enough different content to preclude a one-for-one substitution, but no, if you're motivated enough to self-study and attempt a test-out.*

*Please contact the instructor if you are interested in this option.*

## **MATS 0700 Foundations of College Math**

Developmental and Program Level: 4 cr.

### **Required for Programs:**

None.

### **Accepted by Programs:**

None.

### **Target Audience:**

Students preparing for any of the following:

MATS 0795 Support for College Algebra,  
MATS 0800 Intermediate Algebra,  
MATS 1240 Quantitative Reasoning,  
MATS 1251 Statistics, or  
MATS 1340 Math for Engineering Technology.

### **Builds on Knowledge from:**

Basic math at ABE level (see MATS 0075 Number Sense).

### **Some Things You Will Learn:**

Proportional thinking (broadly defined): ratio and proportion, percent including percent change, unit conversions, geometrical formulas, linear equations and graphs, and an intro to polynomials:

1. You have \$20 in your pocket. If you wish to leave a 25% tip, how high can the bill go (before tip)? *Hint: the answer is NOT \$15!*
2. Biff's secret sauce calls for ingredients A, B, and C in proportion 3:4:7. How much of each ingredient will he need to prepare 20 gallons of this sauce?
3. An oil slick grows at a rate of 400 square meters per hour. Convert this to acres per day.

4. Solve:

$$\frac{3}{5} \left( \frac{1}{6} - 5x \right) = 4 - (x - 3)$$

5. Simplify to a polynomial in standard form:

$$2x(x - 1) - (x - 1)^2$$

### **Special Notes:**

None.

## **MATS 0800 Intermediate Algebra**

Developmental and Program Level: 4 cr.

### **Required for Programs:**

None.

### **Accepted by Programs:**

None.

### **Target Audience:**

Those wishing to build a more solid foundation for precalculus and calculus by following the traditional path to College Algebra (MATS 1300 College Algebra would be taken in the following term).

### **Builds on Knowledge from:**

Elementary algebra, such as high school algebra.  
(See also MATS 0700 Foundations of College Math.)

### **Some Things You Will Learn:**

Polynomials and rational expressions/equations, simplifying radicals/rationalizing denominators, coordinate geometry and graphing:

1. Solve:

$$\frac{x+2}{x^2-4} - \frac{x-1}{x^2-1} = 3$$

2. Express in simplified radical form:

$$\frac{1}{\sqrt[3]{4x^2}} - \sqrt[3]{16x^4}$$

3. Find the equation of the line, in slope-intercept form, that contains the points:

$$\left(-\frac{3}{4}, 2\frac{1}{3}\right) \text{ and } \left(-4, -1\frac{1}{6}\right)$$

*P.S. Be sure to use exact fraction forms, not crummy decimal approximations.*

### **Special Notes:**

- *Though considered “developmental” in terms of college credit, in terms of rigor and challenge this course is at the same level as our basic college level math courses (listed farther below, in grape color).*
- *Unfortunately, this course is only available for independent study (you won’t see it on the course schedule). Please ask a math instructor if interested.*

## **MATS 1240 Quantitative Reasoning**

Basic College Level: 4 cr, meets Goal-4.

### **Required for Programs:**

None.

### **Accepted by Programs:**

Software Development.  
Network Administration.  
Information Systems Management.  
Individualized Studies.  
Minnesota Transfer Curriculum.

### **Target Audience:**

Students wishing to fulfill Goal-4 of the Minnesota Transfer Curriculum by taking the most “every-day practical” math course we have on offer.

### **Builds on Knowledge From:**

Students should feel very comfortable working with fractions, decimals, percentages, and especially proportions (see MATS 0700 Foundations of College Math).

Experience creating and analyzing basic graphs and charts will also be useful (see, for example, [https://youtu.be/hGdKSP\\_a0qU](https://youtu.be/hGdKSP_a0qU) & related videos). Though Excel is used for this purpose in the course, no prior experience with Excel is necessary.

### **Some Things You Will Learn:**

Brings proportional reasoning to a college level. Students learn to build Excel spreadsheets while critically analyzing claims made in the media, personal finances, and the like. Open-ended questions are used to encourage a habit of independent research.

1. Using Excel, work out an amortization table for a \$50,000 loan at 7.5% APR, compounded monthly, with monthly payments of \$800. How long will it take to pay down this loan, and how much total interest will you pay?
2. Assume that caffeine has a half-life of 4 hours. If you drink a large Caribou in the morning and a medium Caribou at lunch, how much caffeine will you still have in your system at bedtime? Is this acceptable? If not, how might you adjust your Caribou drinking habits (assuming you love the stuff too much to give it up)?
3. Look up the U.S. national debt for the years 1980 and 2020. Use this data to predict the national debt in 2050, using (a) a linear model, and (b) an exponential model. Which do you believe is more accurate (if either), and why?

### **Special Notes:**

None.

## **MATS 1251 Statistics**

Basic College Level: 4 cr, meets Goal-4.

### **Required for Programs:**

Marketing (AND College Algebra).  
Business Admin (AND College Algebra).  
Exercise & Sports Science A.S.

### **Accepted by Programs:**

Software Development.  
Information Systems Management.  
Networking Administration.  
Individualized Studies.  
Minnesota Transfer Curriculum.

### **Target Audience:**

Students wishing to fulfill Goal-4 of the Minnesota Transfer Curriculum by learning to analyze data using accepted statistical methods.

### **Builds on Knowledge From:**

Students should feel very comfortable converting among fraction, decimal, and percent forms of a number, and be able to solve basic linear equations involving at least two steps. (See MATS 0700 Foundations of College Math).

Experience creating and analyzing basic graphs and charts will also be useful (see, for example, [https://youtu.be/hGdKSP\\_a0qU](https://youtu.be/hGdKSP_a0qU) & related videos). Though Excel is used for this purpose in the course, no prior experience with Excel is necessary.

### **Some Things You Will Learn:**

Basic principles of probability; probability distributions, including binomial, Poisson, and the normal distribution (bell curve); how to take good samples; confidence intervals; hypothesis testing. Examples:

1. A poll of 40 Iowans finds 18 of them “feeling the Bern.” According to this data, what is the percentage of Iowans who will vote for Bernie Sanders? What is the margin of error for this poll, at the 95% confidence level?
2. Biff rolls twenty, six-sided dice. Find the probabilities that he rolls
  - a. exactly three sixes, and
  - b. at least three sixes.
3. A new drug is tested on 214 people, and 193 of them get better. Test the claim at the 99% level that the drug is at least 90% effective.

### **Special Notes:**

None.

# MATS 1340 Math for Engineering Technology

Basic College Level: 4 cr, meets Goal-4.

## Required for Programs:

Civil Engineering Tech.  
Industrial Engineering Tech (recommended).

## Accepted by Programs:

Construction Management AS/AAS.  
Individualized Studies.  
Minnesota Transfer Curriculum.

## Target Audience:

Engineering Tech majors wishing to fulfill Goal-4 Minnesota Transfer Curriculum by learning the most relevant parts of College Algebra, trigonometry, and statistics in a single course.

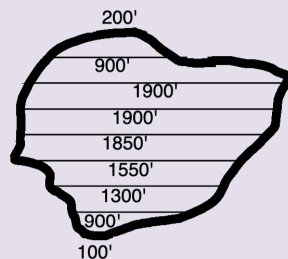
## Builds on Knowledge From:

Students should feel very comfortable converting among fraction, decimal, and percent forms of a number, and be able to solve basic linear equations involving at least two steps. (See MATS 0700 Foundations of College Math).

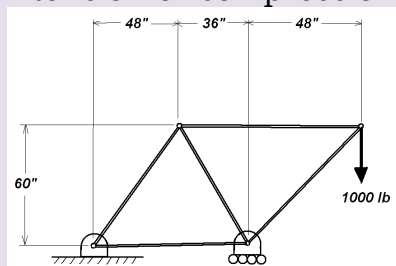
## Some Things You Will Learn:

Areas and volumes of composite shapes, including irregular shapes and prismsoids using Simpson's Rule; unit conversions, including units of force, energy, and power; vector analysis of forces for structures in static equilibrium; uncertainty analysis of repeated measurements. Typical problems:

1. Using  $P = \frac{1}{2} \rho V^2$ , find the wind speed required for a windmill to generate 40 kW of electricity. Write your assumptions for the density of air and the diameter of the blade circle, and show your unit analysis.
2. Demonstrate the use of Simpson's Rule to estimate the area of this island paradise, in acres. The horizontal measurements shown below are spaced 200' apart.



3. Solve for the forces in each truss member below. Be sure to state whether each is in tension or compression!



## Special Notes:

None.



## MATS 1300-01 College Algebra (Day section, with support)

College Algebra Level: 4 cr, meets Goal-4.

### Required for Programs:

Marketing (AND Statistics).  
Business Admin (AND Statistics).  
Sport Management.  
Biomedical Equipment Tech.

### Accepted by Programs:

Construction Management AS/AAS.  
Software Development.  
Networking Administration.  
Information Systems Management.  
Individualized Studies.  
Minnesota Transfer Curriculum.

### Target Audience:

Those with high competence in basic algebra who wish to earn the most widely transferable of our college math credits.

### Builds on Knowledge from:

High school Algebra 2 (see MATS 0800 Intermediate Algebra).

### Some Things You Will Learn:

College Algebra basically amounts to precalculus without trig. Students move beyond reasoning proportionally and manipulating algebraic expressions, towards a habit of careful analysis of functions, especially including graphical transformations, composition and inverses, and exponential and logarithmic growth and decay. Sample problems:

1. Sketch a graph of the following function, being sure to solve for the intercepts (including their multiplicity), locate any asymptotes (vertical, horizontal, or oblique), and account for any holes:

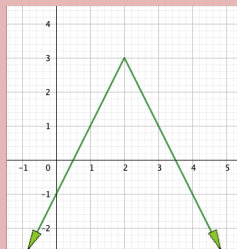
$$f(x) = \frac{2x^2(x+4)}{(x-2)^2(x+3)}$$

2. Recall the formula for the Learning Curve, given below. If  $A = 100$  and  $L(5) = 20$ , find  $L(10)$ . Then, make up a real-life scenario this could be describing!

$$L(t) = A \left( 1 - e^{-kt} \right)$$

3. Write the formula for the function graphed below.

*Hint: use your knowledge of the parent function and transformations.*



### Special Note:

*One hour of lecture each on Tuesdays and Wednesdays, plus two hours of lab on Thursdays. The lab component is paper-based not computer-based, and uses two instructors to offer students as much one-on-one help as possible.*

## **MATS 1300-59 College Algebra (Online section, "without support")**

College Algebra Level: 4 cr, meets Goal-4.

**This course is identical to the day section of College Algebra (see previous page), with the following exceptions:**

- 1. All content is delivered using an asynchronous-online format (videos, textbook, optional discussion forum).*
- 2. Assignments are submitted by scanning and uploading to a dropbox.*
- 3. Two proctored exams must be taken by appointment at DCTC. Morning, afternoon, and evening slots will be offered. (If you are out of state, please contact the instructor ahead of time to discuss possible arrangements.)*
- 4. While online tutoring services are available, there is no special lab component as in the day section. Students signing up for the online section should be confident in their abilities to work independently in our most rigorous math course.*