

# **Math Department Student Learning Objectives – Updated April, 2014**

## **Institutional Level Outcomes:**

*Victor Valley College has adopted the following institutional outcomes to define the learning that all students are intended to achieve as a result of their experience with the college's instructional, student support, and campus support programs.*

**Communication:** Read and write analytically including evaluation, synthesis, and research; deliver focused and coherent presentations.

**Computation:** Apply complex problem-solving skills using technology, computer proficiency, decision analysis (synthesis and evaluation), applications of mathematical concepts and reasoning, and the analysis and use of numerical data.

**Creative, Critical and Analytical Thinking:** Apply procedures for sound reasoning in the exercise of judgment and decision making; demonstrate intellectual curiosity and a respect for learning; solve problems through analysis, synthesis, evaluation and creativity; identify, evaluate and appropriate use of multiple sources of information.

**Social and Personal Responsibility:** Evaluate the relationship between natural, social and economic systems and the significance of sustainability; demonstrate responsible attitudes toward cultural diversity, citizenship, personal contribution to local and international communities, and the effect of human actions on the environment.

## **Math GE SLOs:**

Students who complete the Category V: Mathematics GE requirement for the Associate degree will have achieved each of the following outcomes.

1. Communicate mathematical concepts formally, using appropriate notation and terminology, and informally by using everyday language.
2. Effectively organize, present, interpret and summarize quantitative information using symbolic, numerical and graphical methods.
3. Solve problems by evaluating the available information and type of problem, choosing an appropriate technique, applying the technique, and verifying whether or not the solution is reasonable.
4. Use mathematical concepts and methods to understand, analyze, and express applications in quantitative terms.

## **Math Dept. Goals:**

**Students will demonstrate:**

1. Mathematical correctness and proficiency.
2. Proficiency in mathematical language and notation
3. The ability to interpret real world situations and apply mathematical concepts.

## **Math Dept. PLOs:**

### **Students will be able to:**

1. **calculate** arithmetic, algebraic, geometric, spatial, and statistical quantities using appropriate technology.
2. **estimate** arithmetic, algebraic, geometric, spatial, and statistical solutions.
3. **solve** arithmetic, algebraic, geometric, spatial, and statistical expressions, equations, functions, and problems using appropriate technology.
4. **represent** mathematical information numerically, symbolically, graphically, verbally, and visually using appropriate technology.
5. **interpret** mathematical and statistical models such as formulas, functions, graphs, tables, and schematics, drawing conclusions and making inferences based on those models.
6. **develop** mathematical and statistical models such as formulas, functions, graphs, tables, and schematics using appropriate technology.
7. **communicate** mathematical theories and ideas clearly and concisely to others in the oral and written form.

## **Math 6**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Apply arithmetic operations to whole numbers.
2. Apply arithmetic operations to fractions.
3. Apply arithmetic operations to decimals.
4. Apply order of operations to expressions involving whole numbers, fractions, and decimals.
5. Solve applications involving whole numbers, fractions, and/or decimals.

## **Math 10**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Add, subtract, multiply and divide whole numbers, fractions and decimals.
2. Solve percentage problems.
3. Find the perimeter and area of basic polygons.

## **Math 12**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Solve linear equations and applications.
2. Perform order of operations using signed numbers.
3. Perform polynomial operations.
4. Factor polynomials.

## **Math 50 (to become Math 42 in Fall 2014)**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Graph linear equations and inequalities.
2. Factor polynomials.
3. Solve a system of linear equations.
4. Simplify rational expressions.
5. Solve first and/or second-degree polynomial equations.
6. Translate words into algebraic expressions and equations.

## **Math 90**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. find the domain of polynomial, radical, rational, exponential and logarithmic functions.
2. express sets and inequalities using set notation and interval notation.
3. choose an appropriate method (graphing, substitution, elimination, row reduction of matrices, or Cramer's Rule) to solve a system of equations or an application involving a system of equations and determine whether the solution is reasonable.
4. Translate application problems into algebraic equations.

## **Math 104**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Identify six trigonometric functions and express them as the ratio of the sides of a right triangle.
2. Solve right triangle problems.
3. Use trigonometric identities to evaluate a non-standard angle without the use of a calculator.
4. Evaluate the six trig functions at standard angles without the aid of a calculator.

## **Math 105**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Recognize, graph and compute zeros for polynomial, rational, radical, logarithmic and exponential equations.
2. Apply matrix algebra to determine the solution of a system of linear equations.
3. Apply concepts of analytic geometry to the conic sections.
4. Demonstrate knowledge of geometric and arithmetic sequences.

## **Math H105**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Recognize, graph and compute zeros for polynomial, rational, radical, logarithmic and exponential equations.
2. Apply matrix algebra to determine the solution of a system of linear equations.
3. Apply concepts of analytic geometry to the conic sections.

4. Demonstrate knowledge of geometric and arithmetic sequences.
5. Apply skills learned to real-life problems and present solutions in written and verbal form.

### **Math 116**

#### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Evaluate all six trigonometric functions in both radians and degrees.
2. Apply transformation techniques to quadratic and trigonometric functions.
3. evaluate limits in both graphical and algebraic forms.

### **Math 119**

#### **Student Learning Outcomes**

Upon completion of the course the student can:

1. solve a system of linear equations using matrices.
2. maximize an application problem subject to constraints using linear programming and the simplex method.
3. solve conditional probability problems using tree diagrams and conditional probability.
4. validate the logic of an argument using truth tables.

### **Math 120 and H120**

#### **Student Learning Outcomes**

Upon completion of the course the student can:

1. find the sample mean and sample standard deviation of a given data set.
2. find the area under the normal curve between two x-values.
3. find and interpret a 95% confidence interval for a mean.
4. perform a hypothesis test for the mean of a population.

### **Math 132**

#### **Student Learning Outcomes**

Upon completion of the course the student can:

1. use Venn diagrams to solve applications.
2. use combinations and permutations to solve probability applications.
3. find the expected value of a probability distribution.

### **Math 216 and 226**

#### **Student Learning Outcomes**

Upon completion of the course the student can:

1. calculate basic limits.
2. calculate basic derivatives.
3. calculate basic integrals.
4. apply the derivative and integral to elementary applications.

## **Math H226**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. calculate basic limits.
2. calculate basic derivatives.
3. calculate basic integrals.
4. apply the derivative and integral to elementary applications.
5. Read, analyze and construct basic proofs.

## **Math 227**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Find derivatives and integrals which include exponential, logarithmic inverse trigonometric, polar and parametric functions.
2. Solve integrals using integration by parts, partial fraction and trigonometric substitution.
3. Determine whether a given improper integral is convergent or divergent, and evaluate the integral if it converges.
4. Find the convergence of an elementary infinite series.

## **Math H227**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Find derivatives and integrals which include exponential, logarithmic inverse trigonometric, polar and parametric functions.
2. Solve integrals using integration by parts, partial fraction and trigonometric substitution.
3. Determine whether a given improper integral is convergent or divergent, and evaluate the integral if it converges.
4. Find the convergence of an elementary infinite series.
5. Analyze proofs of early calculus theorems and write proofs using more than one technique.

## **Math 228 and H228**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Calculate the derivative and integral for vector-valued functions.
2. Compute double, triple, and line integrals.
3. Compute the gradient, curl and divergence of a vector-valued function.

## **Math 231**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. Use techniques of Linear Algebra to solve systems of linear equations.
2. Apply eigenvalues and eigenvectors to problems of dynamical systems.

## **Math 270**

### **Student Learning Outcomes**

Upon completion of the course the student can:

1. solve first and second order linear differential equations with initial conditions.
2. solve a nonhomogeneous differential equation by the method of undetermined coefficients.
3. solve first and second order non-linear differential equations with initial conditions, including the power series method and Laplace transformations.