Unit 1 – Algebra Boot Camp #1

(2 weeks, August/September)

Common Core State Standards Addressed:

F.IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

F.IF.7b: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

F.IF.7d: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
(+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

A.APR.7: (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Student Friendly Learning Targets (In order of teaching):

- I can graph piecewise functions.
- I can identify asymptotes and holes in a rational function (graphically and algebraically).
- I can graph rational functions and identify domain, intercepts, and end behavior.
- I can simplify rational expressions.

Vocabulary:

piecewise functions, asymptotes, holes, rational function, domain, x-intercept, y-intercept, end behavior

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com, graph paper, ruler

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapter 1

- **I can graph piecewise functions.**
- **I can identify asymptotes and holes in a rational function (graphically and algebraically).**
- **I can graph rational functions and identify domain, intercepts, and end behavior.**

(From Ohio's Model Curricula for all three) Flexibly move from examining a graph and describing its characteristics (e.g., intercepts, relative maximums, etc.) to using a set of given characteristics to sketch the graph of a function.

Examine a table of related quantities and identify features in the table, such as intervals on which the function increases, decreases, or exhibits periodic behavior.

Explore various families of functions and help students to make connections in terms of general features. For example, just as the function $y = (x + 3)^2 - 5$ represents a translation of the function $y = x$ by 3 units to the left and 5 units down, the same is true for the function $y = | x + 3 | - 5$ as a translation of the absolute value function $y = | x |$.

Discover that the factored form of a quadratic or polynomial equation can be used to determine the zeros, which in turn can be used to identify maxima, minima and end behaviors.

Use various representations of the same function to emphasize different characteristics of that function. For example, the *y*-intercept of the function $y = x^2 - 4x - 12$ is easy to recognize as (0, -12). However, rewriting the function as
$y = (x - 6)(x + 2)$ reveals zeros at (6, 0) and at (-2, 0). Furthermore, completing the square allows the equation to be written as $y = (x - 2)^2 - 16$, which shows that the vertex (and minimum point) of the parabola is at (2, -16).

Common Misconceptions from Ohio's Model Curricula:
Students may believe that each family of functions (e.g., quadratic, square root, etc.) is independent of the others, so they may not recognize commonalities among all functions and their graphs.

Students may also believe that skills such as factoring a trinomial or completing the square are isolated within a unit on polynomials, and that they will come to understand the usefulness of these skills in the context of examining characteristics of functions.

Additionally, student may believe that the process of rewriting equations into various forms is simply an algebra symbol manipulation exercise, rather than serving a purpose of allowing different features of the function to be exhibited.

- **I can simplify rational expressions.**

(From Ohio's Model Curricula) In order to rewrite simple rational expressions in different forms, students need to understand that the rules governing the arithmetic of rational expressions are the same rules that govern the arithmetic of rational numbers (i.e., fractions). To add fractions, we use a common denominator:

$$\frac{a}{b} + \frac{c}{d} = \frac{ad}{bd} + \frac{bc}{bd} = \frac{ad + bc}{bd}$$

as long as $b, d \neq 0$. Although in simple situations, a, b, c, and d would each be whole numbers, in fact they can be polynomials. So now suppose that $a = 2, b = (x-1), c = x,$ and $d = (x+1)$, then

$$\frac{2}{x-1} + \frac{x}{x+1} = \frac{2(x+1)}{(x-1)(x+1)} + \frac{(x-1)x}{(x-1)(x+1)} = \frac{2(x+1)+(x-1)x}{(x-1)(x+1)}$$

And then the numerator can be simplified further:

$$= \frac{2x+2+x^2-x}{(x-1)(x+1)} = \frac{x^2+x+2}{(x-1)(x+1)}$$

In order to meet A-APR.6, students will need some experiences with the arithmetic of simple rational expressions. For most students, the above example helps illustrating the similarity of the form of the arithmetic used with rational expressions and the form of the arithmetic used with rational numbers. As indicated by the (+) symbol, some (but not all) students will need to develop fluency with these skills.

Common Misconceptions from Ohio's Model Curricula:
Students with only procedural understanding of fractions are likely to cancel terms (rather than factors of) in the numerator and denominator of a fraction. Emphasize the structure of the rational expression: that the *whole numerator* is divided by the *whole denominator*. In fact, the word "cancel" likely promotes this misconception. It would be more accurate to talk about dividing the numerator and denominator by a common factor.

Strategies for Diverse Learners:
Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can graph piecewise functions.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can identify asymptotes and holes in a rational function (graphically and algebraically).**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can graph rational functions and identify domain, intercepts, and end behavior.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can simplify rational expressions.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:
Formative:

- exit slips

- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

http://www.illustrativemathematics.org/

IIS

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall

Unit 2 – Limits and Continuity

(2 weeks, August/September)

Student Friendly Learning Targets (In order of teaching):

- I can find the limit of an expression.
- I can find one-sided limits.
- I can identify asymptotes using limits.
- I can identify when a function is continuous or not continuous.

Vocabulary:

limit, one-sided limit, infinity, continuity, discontinuity

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com, graph paper, ruler

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapter 2

- **I can find the limit of an expression.**

- **I can find one-sided limits.**

http://infinitesums.com/commentary/2014/i-love-mean-girls

- **I can identify asymptotes using limits.**

- **I can identify when a function is continuous or not continuous.**

http://www.epsilon-delta.org/2013/09/continuity-and-ivt.html

Strategies for Diverse Learners:

Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can find the limit of an expression.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find one-sided limits.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can identify asymptotes using limits.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can identify when a function is continuous or not continuous.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:

Formative:

- exit slips
- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall

Unit 3 – Algebra Bootcamp #2

(2 weeks, August/September)

Common Core State Standards Addressed:

F-LE.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

A-APR.5: (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

F-TF.5: (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$, and $\pi/6$, and use the unit circle to express the values of sine, cosines, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.

Student Friendly Learning Targets (In order of teaching):

- I can write an equation of a line given point(s) and/or slope.
- I can rationalize the numerator of a function.
- I can expand (x + y)^n using the binomial theorem.
- Evaluate sin θ, cos θ, tan θ at special angle values without a calculator
- I can find average and instantaneous speed.
- I can find average and instantaneous rate of change of a function.

Vocabulary:

slope, rationalize the denominator, rationalize the numerator, binomial theorem, sine, cosine, tangent, average speed, instantaneous speed, rate of change, average rate of change, instantaneous rate of change

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com, graph paper, ruler

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapters 1 and 2

- **I can write an equation of a line given point(s) and/or slope.**

(From Ohio's Model Curricula) Use various representations of the same function to emphasize different characteristics of that function.

Common Misconceptions (from Ohio's Model Curricula):

Additionally, students may believe that the process of rewriting equations into various forms is simply an algebra symbol manipulation exercise, rather than serving a purpose of allowing different features of the function to be exhibited.

- **I can rationalize the numerator of a function.**

- **I can expand (x + y)^n using the binomial theorem.**

(From Ohio's Model Curricula) Ask students to use the vertical multiplication format (as describe in the first cluster) to write out term-by-term multiplication to generate $(x + y)^3$ from the expanded form of $(x + y)^2$. Then use that expanded result to expand $(x + y)^4$, use that result to expand $(x + y)^5$, and so on. Students should begin to see the arithmetic that generates the entries in Pascal's triangle.

http://mathcoachblog.com/2013/05/28/the-binomial-theorem-jigsaw/

- **Evaluate sin θ, cos θ, tan θ at special angle values without a calculator.**

(From Ohio's Model Curricula) Some students can use what they know about 30-60-90 triangles and right isosceles triangles to determine the values for sine, cosine, and tangent for π/3, π/4, and π/6. In turn, they can determine the relationships between, for example, the sine of π/6, 7π/6, and 11π/6, as all of these use the same reference angle and knowledge of a 30-60-90 triangle.

Provide students with real-world examples of periodic functions. One good example is the average high (or low) temperature in a city in Ohio for each of the 12 months. These values are easily located at weather.com and can be graphed to show a periodic change that provides a context for exploration of these functions.

Allow plenty of time for students to draw – by hand and with technology – graphs of the three trigonometric functions to examine the curves and gain a graphical understanding of why, for example, cos (π/2) = 0 and whether the function is even (e.g., cos(-*x*) = cos(*x*)) or odd (e.g., sin(-*x*) = -sin(*x*)). Similarly, students can generalize how function values repeat one another, as illustrated by the behavior of the curves.

Common Misconceptions from Ohio's Model Curricula:
Students may believe that there is no need for radians if one already knows how to use degrees. Students need to be shown a rationale for how radians are unique in terms of finding function values in trigonometry since the radius of the unit circle is 1.

Students may also believe that all angles having the same reference values have identical sine, cosine and tangent values. They will need to explore in which quadrants these values are positive and negative.

- **I can find average and instantaneous speed.**

- **I can find average and instantaneous rate of change of a function.**

Strategies for Diverse Learners:

Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can write an equation of a line given point(s) and/or slope.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can rationalize the numerator of a function.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can expand (x + y)^n using the binomial theorem.**

Reading in the textbook to help with understanding of the key terms and topics.

- **Evaluate sin θ, cos θ, tan θ at special angle values without a calculator**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find average and instantaneous speed.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find average and instantaneous rate of change of a function.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:

Formative:

- exit slips
- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

http://www.illustrativemathematics.org/

IIS

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Unit 4 – Derivatives

(2 weeks, August/September)

Student Friendly Learning Targets (In order of teaching):

- I can write the equation of the tangent line to a curve at a point.
- I can find the derivative of a function using the limit definition.
- I can determine if a function is differentiable.
- I can find basic derivatives including those of constants, powers, constant multiples and sums & differences.
- I can apply the Product Rule and Quotient Rule for derivatives.
- I can find higher order derivatives.
- I can find rates of change including velocity, speed, acceleration and marginals using derivatives.
- I can find derivatives of trigonometric functions.
- I can apply the Chain Rule for derivatives.
- I can do implicit differentiation.
- I can find derivatives of exponential functions.
- I can find derivatives of logarithmic functions.

Vocabulary:

tangent line, derivative, differentiable, velocity, speed, acceleration, marginal, Chain Rule, implicit differentiation

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com, graph paper, ruler

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapters 1 and 2

- **I can write the equation of the tangent line to a curve at a point.**
- **I can find the derivative of a function using the limit definition.**
- **I can determine if a function is differentiable.**
- **I can find basic derivatives including those of constants, powers, constant multiples and sums & differences.**
- **I can apply the Product Rule and Quotient Rule for derivatives.**

http://untilnextstop.blogspot.com/2013/11/product-rule-via-geometry.html

- **I can find higher order derivatives.**

- **I can find rates of change including velocity, speed, acceleration and marginals using derivatives.**

- **I can find derivatives of trigonometric functions.**

- **I can apply the Chain Rule for derivatives.**

http://samjshah.com/2013/10/24/do-they-get-it-the-instantaneous-rate-of-change-exactly/

- **I can do implicit differentiation.**

- **I can find derivatives of exponential functions.**

- **I can find derivatives of logarithmic functions.**

Strategies for Diverse Learners:

Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can write the equation of the tangent line to a curve at a point.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find the derivative of a function using the limit definition.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can determine if a function is differentiable.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find basic derivatives including those of constants, powers, constant multiples and sums & differences.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can apply the Product Rule and Quotient Rule for derivatives.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find higher order derivatives.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find rates of change including velocity, speed, acceleration and marginals using derivatives.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find derivatives of trigonometric functions.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can apply the Chain Rule for derivatives.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can do implicit differentiation.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find derivatives of exponential functions.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find derivatives of logarithmic functions.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:

Formative:

- exit slips
- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall

Unit 5 – Applications of Derivatives

(2 weeks, August/September)

Student Friendly Learning Targets (In order of teaching):

- I can find extreme values of a function.
- I can identify when a function is increasing or decreasing.
- I can apply the First Derivative Test for Local Extrema.
- I can identify points of inflection and concavity.
- I can apply the Second Derivative Test for Local Extrema.
- I can solve optimization problems.
- I can use linearization to find the approximate value of a function.
- I can use Newton's Method to approximate a zero of a function.
- I can find the differential and use it to solve problems.
- I can solve related rate problems.

Vocabulary:

local extrema, absolute extrema, local minimum, local maximum, absolute minimum, absolute maximum, increasing, decreasing, First Derivative Test for Local Extrema, points of inflection, concavity, concave up, concave down, Second Derivative Test for Local Extrema, optimization, linearization, Newton's Method, differential, related rates

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com, graph paper, ruler

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapters 1 and 2

- **I can find extreme values of a function.**

http://mathteachermambo.blogspot.com/2014/01/calculus-graphical-organizer.html

- **I can identify when a function is increasing or decreasing.**

http://mathteachermambo.blogspot.com/2014/01/calculus-graphical-organizer.html

- **I can apply the First Derivative Test for Local Extrema.**

http://mathteachermambo.blogspot.com/2014/01/calculus-graphical-organizer.html

- **I can identify points of inflection and concavity.**

http://mathteachermambo.blogspot.com/2014/01/calculus-graphical-organizer.html

- **I can apply the Second Derivative Test for Local Extrema.**

http://mathteachermambo.blogspot.com/2014/01/calculus-graphical-organizer.html

- **I can solve optimization problems.**
- **I can use linearization to find the approximate value of a function.**
- **I can use Newton's Method to approximate a zero of a function.**
- **I can find the differential and use it to solve problems.**
- **I can solve related rate problems.**

http://mathteachermambo.blogspot.com/2013/11/related-rates-and-crowd-sourcing.html
http://mathteachermambo.blogspot.com/2014/01/related-rates-update.html
http://bowmandickson.com/category/teaching/calculus/related-rates/
http://untilnextstop.blogspot.com/2013/11/organizing-information-for-related-rates.html

Strategies for Diverse Learners:
Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can find extreme values of a function.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can identify when a function is increasing or decreasing.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can apply the First Derivative Test for Local Extrema.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can identify points of inflection and concavity.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can apply the Second Derivative Test for Local Extrema.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can solve optimization problems.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can use linearization to find the approximate value of a function.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can use Newton's Method to approximate a zero of a function.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find the differential and use it to solve problems.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can solve related rate problems.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:

Formative:

- exit slips
- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall

Unit 6 – The Definite Integral

(2 weeks, August/September)

Student Friendly Learning Targets (In order of teaching):

- I can estimate area under a curve using finite sums.
- I can express the area under a curve as a Riemann Sum and as a definite integral.
- I can apply the Mean Value Theorem with respect to antidifferentiation.
- I can apply properties of definite integrals.
- I can apply the Fundamental Theorem of Calculus.
- I can find area under the curve using Trapezoidal Rule.
- I can find area under the curve using Simpson's Rule.

Vocabulary:

finite sums, Riemann Sum, definite integral, Fundamental Theorem of Calculus, Trapezoidal Rule, Simpson's Rule

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com, graph paper, ruler

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapters 1 and 2

- **I can estimate area under a curve using finite sums.**

- **I can express the area under a curve as a Riemann Sum and as a definite integral.**

http://infinitesums.com/commentary/2014/riemann-sums-and-hand-turkeys

- **I can apply the Mean Value Theorem with respect to antidifferentiation.**

- **I can apply properties of definite integrals.**

- **I can apply the Fundamental Theorem of Calculus.**

- **I can find area under the curve using Trapezoidal Rule.**

- **I can find area under the curve using Simpson's Rule.**

Strategies for Diverse Learners:

Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can estimate area under a curve using finite sums.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can express the area under a curve as a Riemann Sum and as a definite integral.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can apply the Mean Value Theorem with respect to antidifferentiation.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can apply properties of definite integrals.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can apply the Fundamental Theorem of Calculus.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find area under the curve using Trapezoidal Rule.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find area under the curve using Simpson's Rule.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:

Formative:

- exit slips
- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall

Unit 7 – Differential Equations and Mathematical Modeling

(2 weeks, August/September)

Student Friendly Learning Targets (In order of teaching):

- I can evaluate indefinite integrals.
- I can evaluate integrals using substitution.
- I can perform integration by parts.
- I can integrate separable differential equations.
- I can perform integration by partial fractions.

Vocabulary:

Integration by Parts, Separable Differential Equations, Partial Fractions

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapters 1 and 2

- **I can evaluate indefinite integrals.**

- **I can evaluate integrals using substitution.**

http://mathteachermambo.blogspot.com/2014/02/thank-you-pinterest.html
http://mrscookkhs.blogspot.com/2014/03/zombie-attack-integration-using-u.html

- **I can perform integration by parts.**

- **I can integrate separable differential equations.**

- **I can perform integration by partial fractions.**

Strategies for Diverse Learners:

Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can evaluate indefinite integrals.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can evaluate integrals using substitution.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can perform integration by parts.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can integrate separable differential equations.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can perform integration by partial fractions.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:

Formative:

- exit slips
- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall

Unit 8 – Applications of Definite Integrals

(2 weeks, August/September)

Student Friendly Learning Targets (In order of teaching):

- I can apply an integral as net change.
- I can find the area between curves whether open and enclosed, both with respect to x and to y.
- I can calculate volume of a solid of revolution using the Slice/Disc/Washer method.
- I can calculate volume of a solid of revolution using the Shell method.
- I can find the length of a smooth curve.

Vocabulary:

net change, displacement, Disc Method, Washer Method, Shell Method

Materials and/or Technology Needed:

calculator, graphing calculator, Desmos.com, graph paper, ruler

Instructional Strategies and Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall parts of Chapters 1 and 2

- **I can apply an integral as net change.**

http://mathteachermambo.blogspot.com/2014/03/straight-line-motion-calculus.html
http://mathteachermambo.blogspot.com/2014/03/straight-line-motion-and-ap-style.html

- **I can find the area between curves whether open and enclosed, both with respect to x and to y.**

- **I can calculate volume of a solid of revolution using the Slice/Disc/Washer method.**

http://www.epsilon-delta.org/2013/07/made4math-volumes-in-calculus.html
http://squarerootofnegativeoneteachmath.blogspot.com/2012/04/visualizing-volumes.html
http://oldmoodle.baylorschool.org/mod/resource/view.php?id=13219

- **I can calculate volume of a solid of revolution using the Shell method.**

http://www.epsilon-delta.org/2013/07/made4math-volumes-in-calculus.html
http://squarerootofnegativeoneteachmath.blogspot.com/2012/04/visualizing-volumes.html
http://squarerootofnegativeoneteachmath.blogspot.com/2011/04/cake-day-in-calculus.html

- **I can find the length of a smooth curve.**

Strategies for Diverse Learners:

Problems of varying difficulty are incorporated into the problem sets.

Literacy Standards Considerations:

- **I can apply an integral as net change.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find the area between curves whether open and enclosed, both with respect to x and to y.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can calculate volume of a solid of revolution using the Slice/Disc/Washer method.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can calculate volume of a solid of revolution using the Shell method.**

Reading in the textbook to help with understanding of the key terms and topics.

- **I can find the length of a smooth curve.**

Reading in the textbook to help with understanding of the key terms and topics.

Assessment:

Formative:

- exit slips
- observation of students working on problems in class
- observation of student work from outside of class practice problems

Summative:

- unit test questions

Assessment Resources:

Finney, Demana, Waits, and Kennedy. Calculus: Graphical, Numerical, Algebraic Third Edition Media Update © 2010 Pearson Prentice Hall