Trigonometry and Statistics

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Unit #1 Algebra Review

Stage 1 – Desired Results

Established Goals

2009 NJCCC Standard(s), Strand(s)/CPI #
(http://www.nj.gov/education/cccs/2009/final.htm)

Common Core Curriculum Standards for Math and English
(http://www.corestandards.org/)

Arithmetic and Polynomials & Rational Expressions A.ARP: #1,3,7

- Perform arithmetic operations on polynomials
- Understand the relationship between zeros and factors of polynomials

Reasoning with Equations & Inequalities A.REI: #1,2,3,4,10

- Understand solving equations as a process of reasoning and explain the reasoning
- Solve equations and inequalities in one variable
- Represent and solve equations and inequalities graphically

Creating Equations A.CED: #1,2,4,5,7

- Create equations that describe numbers or relationships

21st Century Themes
(www.21stcenturyskills.org)

___ Global Awareness
_x__Financial, Economic, Business and Entrepreneurial Literacy
___Civic Literacy
___Health Literacy
___Environmental Literacy

21st Century Skills

Learning and Innovation Skills:
___Creativity and Innovation
_x__Critical Thinking and Problem Solving
_x__Communication and Collaboration

Information, Media and Technology Skills:
___Information Literacy
___Media Literacy
_x__ICT (Information, Communications and Technology) Literacy

Life and Career Skills:
_x__Flexibility and Adaptability

Interpreting Functions F.IF: #1,2,4,5,7 • Understand the Concept of a Function and Function Notation • Interpret Functions that Arise in Applications in Terms of the Context **Interpreting Categorical and Quantitative Data S.ID: #7** • Interpret Linear Models **Building Functions: F.BF: #1** • Build a Function that Models a Relationship between Two Quantities **Building Functions: F.BF: #4** • Build New Functions from Existing Functions	_x__Initiative and Self-Direction ___Social and Cross-Cultural Skills _x__Productivity and Accountability _x__Leadership and Responsibility
<u>Enduring Understandings:</u> *Students will understand that . . .* *EU 1* A polynomial function's behavior can be interpreted by solving or graphing equations *EU 2* Through solving and graphing equations, students will increase their ability to analyze a function's behavior *EU 3* Mathematical modeling can lead to more effective decision making.	**<u>Essential Questions:</u>** *EU 1* • How do we graph the parent polynomial function? • How do we translate the parent polynomial graph? • What are the most appropriate methods for solving polynomial and exponential equations? *EU 2* • What is the relationship between a parent function and its translation? • How do you solve polynomial and exponential equations graphically and analytically? • How do you simplify and solve radical and rational expressions/equations? • What is the relationship between a parent function and its translation? *EU 3* How does modeling of functions lead to more effective decisions?

Knowledge: *Students will know . . .* *EU 1* • useful information about equations and inequalities (including solutions) can be found by analyzing graphs or tables. • functions can be represented in a variety of ways, such as graphs, tables, equations, or words. Each representation is particularly useful in given different situations. • the numbers and types of solutions vary directly, based upon the type of equation. *EU 2* • solving an equation is the process of rewriting the equation to make what it says about its variable(s) as simple as possible. • some important families of functions are developed through transformations of the simplest form of the function • new functions can be made from other functions by applying arithmetic operations • taking the nth root is the inverse of taking the nth power *EU 3* • many real-world mathematical problems can be represented algebraically. These representations can lead to algebraic solutions. • a function that models a real-world solution can be used to make estimates or predictions about future occurrences.	**Skills:** *Students will be able to . . .* *EU 1* • graph Linear and Quadratic Equations using a graphing tool with and without a graphing calculator • identify the zeros of a Linear and Quadratic Functions both analytically and graphically. *EU 2* • simplify exponential functions using the properties of exponents. • simplify radical and rational expressions. • solve radical and rational expressions. • identify the Maximum and Minimum Values of a Quadratic function. • develop a family of functions through the transformation of a parent function EU 3 • model real-world problems algebraically. • solve real-world problems algebraically.

Stage 2 – Assessment Evidence

Recommended Performance Tasks ***EU 1, 2, 3***

You are deciding to either purchase or lease a new car. Using a newspaper or the internet choose a vehicle and determine the sales price and the leasing rate for at least 3 dealers. Check with banks, credit unions and dealers for interest rates and leasing rates. Using the formula Buying Cost= Down Payment + Amount Financed + Finance Charges. Determine the true cost for buying a car. Using the formula Leasing Cost= Down Payment + Total Monthly Payments + Residual + Finance Charge and 30 cents per mile for overage determine the total leasing cost of a car. Assuming that you have signed a 5 year lease and you have taken out a loan for 5 years write a narrative discussing which option is your best decision. Keep in mind things like but not limited to the amount of miles that you drive in a year and your expected income. Please provide an explanation for your choice and show all mathematical evidence to support your decision.

Provide an oral/written/visual presentation of your finished product, including the calculations used in your project to your class.

All other specifications and requirements are to be determined by the classroom teacher.

Sample Rubric:

Evaluation	Excellent	Good	Average	Below Average	Try Again
Participation: Constructive use of classroom time	4	3	2	1	0
Knowledge: Shows understanding of the material.	4	3	2	1	0
Coverage: Assigned material is completed	4	3	2	1	0
Buying Cost: Calculations should support data.	4	3	2	1	0
Leasing Cost: Calculations should support data.	4	3	2	1	0
Content: Topic covered thoroughly. Enough information given to understand topic	4	3	2	1	0

	Conclusion: Well Written and in essay format. Content of conclusion should include pros and cons from reading material, and discussion with teacher.	4	3	2	1	0

- Tests and quizzes to include: Finding the roots of linear and quadratic equations; finding the maximum or minimum of a quadratic function; simplifying radicals and radical expressions; solving linear, quadratic and radical equations

Other Recommended Evidence: *Tests, Quizzes, Prompts, Self-assessment, Observations, Dialogues, etc.*

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: *Consider the WHERETO elements. Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.*

TI-Nspire Activity# 1: Families of Functions (M,T)

- Students will investigate the effects parameters a, h, and k have on a given function.
- Students will generalize the effects that parameters a, h, and k have on any function.
- Students will make sense of the problems and persevere in solving them
- Students will look for and make use of structure
- http://education.ti.com/calculators/timath/US/Activities/Detail?sa=1010&id=16010

TI-Nspire Activity # 2: Translating Functions (M,T)

- Students will vertically translate a function by adding a constant and write the appropriate symbolic representation for the translated function
- Students will horizontally translate a function by adding a constant and write the appropriate symbolic representation for the translated function.
- Student will identify the effect of a and b in y=af(x) + b on the graph of a general function y=f(x)
- Students will look for and make use of structure
- Students will use appropriate tools strategically
- http://education.ti.com/calculators/timathnspired/US/Activities/Detail?sa=1010&t=1163&id=16009

Learning Activity # 3: (A, M, T): The polynomial $2x^3 + 9x^2 + 4x - 15$ represents the volume in cubic feet of a rectangular holding tank at a fish hatchery. Assume the length is the greatest dimension and that the length is 13 feet. The depth of the tank is (x-1) feet

Using synthetic division factor the volume of the polynomial find the height and depth of the holding tank.

- How many linear factors should you look for?
- Which linear factor represents the 13 ft. length?
- What are the dimensions of the tank?
- What is the volume?
- What is the value of x?
- Do you get the same volume if you substitute the value of x into $2x^3 + 9x^2 + 4x - 15$.

Learning Activity # 4: (M,T): Before discussing radicals and exponents. Pair students up and have each pair determine at least one real life example of when a radical or exponent would be used.

Key Vocabulary Includes: standard form, slope intercept form, transformations, absolute value, linear, polynomial, zeros of a function, maximum, minimum,

The following is the suggested sequence of learning activities and number of days for the Trigonometry and Statistics class.. Adjustments should be made accordingly to level.

Approximate time line 30 Days

- Graph a Linear Equations written in slope intercept form and general form (A,M)
- Graphing Quadratic Equations written in general form and y= form (A,M)
- Solving Equations Graphically- finding roots of linear equations by their x-intercepts (if any) (A,M)
- Solving Equations Graphically- finding roots of quadratic equations by their x-intercepts (if any) (A,M)
- Solving Simultaneous Equations Graphically- finding intersection of equations on a Cartesian coordinate plane using slope, intercepts and intersection points (M,T)
- Simplifying and solving equations involving rational exponents (A,M)
- Finding the roots of degree second and third degree equations (A,M)
- Factorization and simplifying Radical Expressions (M,T)
- Activity # 4
- Removing the common term during factorization (A,M)
- Factoring Trinomial into 2 Binomials and the difference of Squares Factoring (A,M)
- Defining and implementing the characteristics of Polynomial Functions (A,M)
- Activity #4
- Exploring the end behavior of Polynomial Functions as they go towards positive and negative infinity (A,M)
- Ti-Nspire Activity # 1
- Exploring the Behavior of Exponential Functions (M,T)
- Ti-Nspire Activity# 2
- Defining and implementing the characteristics of Logarithmic Functions (M,T)

• Identifying and Simplifying Rational Expressions (M,T) • Using exponential properties for solving Rational Expressions (M,T)