E A G L E A C A D E M Y

Algebra II Essential Skills for the Scholar

Quadratic Functions and Graphs

- Multiply polynomials
  - Ex.
- Factor quadratic equations
  - Ex.
- Solve quadratic equations using three different strategies
  - Factoring
  - Completing the square/vertex form
  - Quadratic formula
- Know that roots, x-intercepts, and solutions are all the same thing
- Determine the location of the vertex of a quadratic equation
- Graph a quadratic equation
- Determine a quadratic equation based on its graph
- Solve equations with square roots

Higher Order Polynomial Functions and Graphs

- Identify the lead term, lead coefficient, linear term, constant, degree, root, x-intercept, and solution of a polynomial
- Identify a polynomial's roots
- Factor by grouping
- Factor using difference of squares
  - Khan academy video: https://youtu.be/tvnOWIoeeaU
- Create a sign diagram and sketch graphs of polynomial equations
  - A good summary: http://tutorial.math.lamar.edu/Classes/Alg/GraphingPolynomials.aspx
- Divide polynomials
  - Divide
- Recognize how roots of polynomials are related to the factors of a polynomial

Rational Functions

- Identify removeable discontinuities and vertical asymptotes of rational functions
- Find roots of rational functions
- Create a sign diagram and graph a rational function
  - A great summary: http://tutorial.math.lamar.edu/Classes/Alg/GraphRationalFcns.aspx
- Solve rational equations
  - Ex.
- Solve systems of equations
  - Ex. Find x and y that satisfy and

Sequences, Series, and Exponential Equations

- Identify and write arithmetic and geometric sequences and series
- Determine a specific term of a sequence or value of a series
- Model a real life situation using sequences and series
  - Khan Academy video: https://youtu.be/BdsURIUQ04k
- Solve exponential and logarithmic equations
  - Ex. Solve for x in
- Model and solve real life problems using exponential equations including compound interest and exponential growth and decay
  - Ex. If a bank account with 2% annual interest compounded monthly starts with 100 dollars. How much does it have after 10 years?

Sequences

Arithmetic: $a_n = a_1 + (n-1)d$

$$S_n = \frac{n(a_1 + a_n)}{2}$$

Geometric: $a_n = a_1 \cdot r^{n-1}$

$$S_n = \frac{a_1(1-r^n)}{1-r}$$

Recursive: Example: $a_1 = 4; \quad a_n = 2a_{n-1}$

Probability

- Calculate probabilities of simple events
    - Ex. What is the probability of rolling an even number on a die?

- Calculate conditional and non-conditional probabilities of joint events
    - Ex. What is the probability of rolling an even number on a die and flipping heads on a coin?

- Calculate probabilities of repeated events
    - Ex. What is the probability of flipping heads on a coin 10 times in a row?

- Determine if events are independent or dependent

Statistics

- Determine mean, median, and mode of datasets
    - Ex. Mean is the average, mode is the most often occurring number, median is the "middle number"

- Understand that standard deviation is a measure of spread
    - i.e. A high standard deviation means a high spread.

- Know that about 65% of data will fall within 1 standard deviation of the mean

- Know that an outlier is a point outside 2 standard deviations of the mean
    - i.e. it is in the 5% of data that falls outside the middle 95%

- Use the bell curve, know all its parts
    - An excellent summary: https://mathbitsnotebook.com/Algebra2/Statistics/STnormalDistribution.html

- Analyze datasets to determine if they are biased or skewed
    - Graphs that are symmetric are not skewed.

Trigonometric Functions

- know how to use the unit circle

- solve trigonometric equations

- know the definitions of trig functions as they relate to a right triangle

- Graph each trig function
    - Sine, cosine, tangent, cotangent, cosine, and secant.

- identify the equation of a trig function from a graph

- understand the parts of a trig function
    - Amplitude, period, phase shift, vertical shift

- understand the parts of a trig equation and graph in the context of a real life situation
    - ex. a tire rotating or spring going up and down

- apply a transformation to a trig function and change the graph and equation accordingly
    - ex. is just like but slid up one unit.

Graph Equations
Exponential and Log functions
Statistics
Standard deviation
Rational Numbers
Trig
Logarithms
Fluency with Fractions - ex. as a denominator decreases, the value of the fraction goes up