UNIT 1

Chapter 1: Transformations:

Vertex-Form of Parabola: $y = a(b(x - p))^2 + q$.

- Parameters a, p, q
- Mapping vs. equation: $y = (x -$ *2)2 2R* $f(x) \rightarrow f(x+2)$
- $f(x)\ vs.\ f(-x)\ vs.\ -f(x)\ vs.\ f^{-1}(x)$
- Invariant points
- Horizontal stretch: FACTOR OUT B, TAKE RECIPROCAL
- Order of transformations matters! Always slide LAST
- One-to-one function passes a horizontal line test as well as a vertical line test.
- Inverse of one-to-one function is a function.
- Restrictions on range of $f(x)$ become domain restrictions on $f^{-1}(x)$.
- TRANSFORMATION RULES APPLY TO ALL FUNCTIONS!

Chapter 2: Radicals:

- Restricted domain on radical functions, connection to graph.
- Graph using a table (to adjust points) and do transformations in an appropriate order.
- How to graph $\sqrt{f(x)}$ given the graph of $f(x)$.
  - Square root of y.
  - $\sqrt{f(x)}$ above $f(x)$ for $0 < y < 1$ but below for $y > 1$.
  - Invariant at y=0 and y=1
- Solving radical equations:
  - State restrictions, check for extraneous roots
  - Isolate radical

Chapter 3: Polynomial Functions:

- Vocabulary: Degree of polynomial function, constant, leading coefficient, end behavior, quotient, dividend, divisor, remainder
- Maximum number of x-intercepts (zeros), minimum number of x-intercepts (zeros)
- Even vs. odd degree polynomial: end behavior
- Leading coefficient: end behavior
- Long division/synthetic division:
  - Terms in descending order, no missing terms.
  - Pay attention to coefficients!
  - Synthetic division, change sign from divisor in little box.
  - Know your division statements
- Remainder theorem P(a)=remainder given x-a
- Factor theorem, when P(a)=0, x-a is a factor.
- Change sign out of brackets, change sign into brackets.
- Integral zero theorem: ± factors of constant term provide all possible integral roots of polynomial.
- Know how to factor/solve polynomial degree > 2!

Unit 1 Cumulative Review: Pages 158-159

Unit 1 Test Pages 160-161

Unit 2

Chapter 4: Trigonometry & The Unit Circle:

- Radian/Degree conversions
- Coterminal angles, reference angles, principal angles
- Arc length
- The unit circle, $x^2 + y^2 = r^2$, exact values quadrantal angles
- Know your special triangles and exact values!
- Reciprocal trig ratios, $\frac{r}{y}$ etc. SIGN OF X & Y DEPENDS ON LOCATION!
- Evaluate reciprocal trig ratios in calc.
- See exact values think special triangles & radicals
- ASTC, solving simple equations, ignore sign of ratio to find reference angle.
- Quadrant restrictions: $0 \leq \theta \leq \frac{\pi}{2}$, $0 \leq \theta \leq \pi$, $0 \leq \theta \leq 2\pi$ are the most common.
- General solution, don't forget $n \in Z$

Chapter 5: Trig functions and Graphs:

- Graphing sine and cosine, know it!!!! $y = a\sin\big(b(x - c)\big) + d$
- Period, domain & range
- a is amplitude, always positive
- b gives period, $\frac{2\pi}{b}$
- c is phase shift, change the sign
- d is vertical displacement (sinusoidal axis placement)
- tangent function: know the graph, period, equation of asymptotes, range/domain.
- Solve equations on your graphing calc, WINDOW, zoomtrig.

Chapter 6: Trig Identities & Equations:

- Know your identities formula sheet! Where are they? What are they?
- Review strategies for completing proofs.
- Use a vertical line!
- Use sum/difference identities to find exact values
- When dealing with double angle for cosine, ask yourself if you need to cancel out a 1 or -1? Will factoring a difference of squares help?
- Sometimes we use our trig identities when solving equations to be able to simplify.

Unit 2 Cumulative Review: Pages 326-327

Unit 2 Test Pages 328-329

Unit 3

Chapter 7: Exponential Functions:

- Characteristics of exponential functions: asymptote, increasing/decreasing
- Growth, decay, half-life
- Transformations are tricky, don't take short cuts.
- Solving exponential equations:
    - Rewrite all terms with a common base.
    - Drop base when you have ONE TERM ONLY on each side of =
    - Use your exponent laws!
    - If you can't write with common bases, you must go logging☺ Take the log of both sides. Use brackets and be careful!
- Know how to use compound interest formula
- Know $F = Ir^{t/n}$ or some "version" of this.

Chapter 8: Logarithmic Functions:

- Know log graph, asymptote, transformations
- Evaluate logs, with and without calc. (including change of base)
- Know your 3 log "tricks"
- Know your log laws and how to use them.
- Don't worry about ln or e for final exam.
- Solving log equations: 3 types (Restrictions!)
    - Only one log: isolate log, switch to exponential and solve.
    - Exponential that can't be written with common base, take log of both sides and be careful. Use brackets!
    - More than one log, move logs to one side, write as single log and then switch to exponential etc.

Unit 3 Cumulative Review: Pages 422-423

Unit 3 Test Pages 424-425

Unit 4

Chapter 9: Rational Functions:

- Graph: asymptotes, characteristics, range/domain, end behavior and behavior near vertical asymptote, NPVs
- Vertical asymptote vs. point of discontinuity
- Open dots on graph
- Solving rational equations, restrictions, extraneous roots.
- When solving multiply ALL terms by LCD

Chapter 10: Function Operations:

- Sum & difference of functions from graph and equation
- Notation
- Product/Quotient from graph and equation.
- Quotient, don't forget restriction
- Composition of functions: do it the right way, inside out!
- **Domain must satisfy original functions and combined function created!**

Chapter 11: Combinatorics:

- Fundamental counting principal: don't forget about the little lines☺
- Factorial! (calc., simplifying, formulas)
- Permutations: ORDER MATTERS
    - ${}_nP_r$, !, groups and arrangements, identical objects
    - Solving ${}_nP_r$ equations.
    - $AB \neq BA$

- Combinations: ORDER DOESN'T MATTER
    - ${}_nC_r$, groupings, or vs. and,
    - Solving ${}_nC_r$ equations.
    - $AB = BA$
- Pascal's triangle, numeric and combination form, symmetry, pathways, binomial theorem, start row 0☺
- ${}_nC_r = {}_nC_{n-r}$
- Pathways
- Specific term of binomial expansion (k is 1 less than desired term)
- Binomial theorem to expand

Unit 4 Cumulative Review: Pages 550-551

Unit 4 Test Pages 552-553