EXPONENTIAL FUNCTIONS (R.2, R.6, 5.3, 5.6)

- Remember that multiplying by a positive number larger than 1 enlarges number smaller than 1 reduces

- Know that a P% increase is the same as multiplying by (1 + 0.01P)
a P% decrease is the same as multiplying by (1 - 0.01P)

- Given an amount, apply a percent increase/decrease. [basic math]
- Given an amount with a percent increase/decrease, find the original amount. [elem. algebra]
- Know the equivalent meanings of negative exponents and any rational-number exponent (in fraction or decimal form) [R.2, R.6]
- Use the three basic properties of exponents.
- Recognize (without a calculator) certain powers of small whole numbers:
  1, 2, 4, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096,...
  1, 8, 27, 64, 125, 216, 343, 512, 729, 1000,
  1, 16, 81, 256, 625, ..., 10000,
  1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144,...

- Calculate rational powers of rational numbers (without a calculator).
- Sketch a rough "cartoon" of an exponential function.
- Understand that an asymptote provides a long-term trend for a graph.
- Know that every exponential function can be written in the form \( f(x) = C a^x \).
- Explain, using examples, the difference between linear growth and exponential growth.
- Describe (in words) the difference between linear and exponential growth.
- Given two data points, find an exponential function that fits the data.

INVERSE FUNCTION CONCEPT (5.2)

- Know that a function returns one output value for each input value.
- Understand that an inverse function is the "undo" of a function.
- Know that the symbol for inverse of a function \( f \) is \( f^{-1} \). It does not mean reciprocal.
- Given a verbal description for a function \( f \), give a verbal description for \( f^{-1} \). [opposite operation]
- Given a formula for a function \( f \), give a formula for \( f^{-1} \). ["undo" the steps]
- Given a table for a function \( f \), give a table for \( f^{-1} \). [swap the input and output columns]
- Given a graph for a function \( f \), give a graph for \( f^{-1} \). [swap the x and y co-ordinates](reflection around the line \( y = x \))
- Understand that the inverse of a composition of functions is the composition of the inverse functions, but in reverse order: 
  \((f \circ g)^{-1} = g^{-1} \circ f^{-1}\)

LOGARITHMIC FUNCTIONS (5.4, 5.5, 5.6)

- Know that logarithms are exponents!
- Know that the inverse of an exponential function is a logarithmic function.
- Given a statement in logarithmic form, write an equivalent statement in exponential form.
- Given a statement in exponential form, write an equivalent statement in logarithmic form.
- Sketch a rough "cartoon" of a logarithmic function.
- Know and use the three basic properties of logarithms.
- Use properties of logarithms to solve exponential and logarithmic equations.
- Calculate logarithms of rational numbers (without a calculator).
APPLICATIONS (5.3, 5.4, 5.6)

- Remember that interest rates are assumed to be annual.
- Know what is meant by compounding (annually, quarterly, monthly, daily).
- Given the interest rate, frequency of compounding, length of time, and present value of an investment, calculate the future value.
- Given the interest rate, frequency of compounding, length of time, and future value of an investment, calculate the present value.
- Given the interest rate, frequency of compounding, present value, and future value of an investment, calculate the length of time required.
- Given the interest rate and frequency of compounding of an investment, calculate the doubling time, tripling time, quadrupling time, etc.
- Solve other application problems involving exponential growth or decay, particularly ones related to population growth, radioactive decay (half-life), earthquake intensity (Richter scale), and Newton’s law of cooling (or heating).