2.2 POWER FUNCTIONS WITH MODELING

Learning Targets:

1. Identify a power functions.
2. Model power functions using the regression capabilities of your calculator.
3. Understand the difference between "direct variation" and "inverse variation".
4. Use power functions to solve word problems.

In the last section we studied linear functions and quadratic functions. In this section we move to *power functions*.

A power function looks like _____,

where a = _____, and k = _____.

We say that $f(x)$ _____ as the a^{th} power of x, or that $f(x)$ is _____ the a^{th} power of x.

If a is _____ we say that $f(x)$ varies _____ with the a^{th} power of x.

If a is _____ we say that $f(x)$ varies _____ with the a^{th} power of x.

Example 1: Determine if the function is a power function. For those that are not, explain why not.

a) $f(x) = -3x^4$ b) $f(x) = \sqrt[3]{8x^5}$ c) $g(x) = 7 \cdot 2^x$ d) $h(x) = 2x^{-5}$

Example 2: The volume V of a sphere varies directly as the cube of the radius r. When the radius of a sphere is 6 cm, the volume is 904.779 cm^3. What is the radius of a sphere whose volume is 268.083 cm^3?

Example 3: The force of gravity F acting on an object is inversely proportional to the square of the distance d from the object to the center of the earth. Write an equation that models this situation.

Example 4: Velma and Reggie gathered the data in the table below using a 100-watt light bulb and a Calculator-Based Laboratory(CBL) with a light-intensity probe.

a) Use your calculator to find the power regression model of the data.

b) Describe the relationship between the intensity and distance modeled with the equation in part *a*.

c) Use the regression model from part *a* to predict the intensity of an object 2.75 meters away.

Light Intensity Data for a 100-W Light Bulb	
Distance(m)	Intensity(W/m²)
1.0	7.95
1.5	3.53
2.0	2.01
2.5	1.27
3.0	0.90