

2.2 POWER FUNCTIONS WITH MODELING

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 .

A *monomial function* is simply a _____ power function that is ALSO a _____.

Example: Determine if the function is a power function and/or monomial function, given that π represents a constant.

For those that are, state the power/degree and constant of variation/leading coefficient.

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: Write each statement as a power function equation.

a) The surface area S of a sphere varies directly as the square of the radius r .

b) 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.

Example: Write a power function for the following situation, and then use the equation to solve for the missing information. The intensity I of light varies inversely as the square of the distance D from the source. If the intensity of illumination on a screen 5 feet from a light is 2 foot-candles, find the intensity on a screen 15 feet from the light.

Example: 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.

Light Intensity Data for a 100-W Light Bulb	
Distance(m)	Intensity(W/m ²)
1.0	7.95
1.5	3.53
2.0	2.01
2.5	1.27
3.0	0.90

- Use your calculator to find the power regression model of the data.
- Use the regression model from part *a* to predict the intensity of an object 2.75 meters away.

Exploration ...

Read example 2 on page 182, and complete the Exploration on page 183.