

Inverse Square Law

The intensity of light or other energy radiating from a point source is inversely proportional to the square of the distance from the source. An object of the same size twice as far away, receives only $\frac{1}{4}$ the energy in the same time period. Other examples of inverse square laws include sound and radio waves, X-rays, nuclear radiation, gravity and many other effects. In math, this is sometimes called a “Power” curve.

$$I = \frac{k}{d^2}$$



Point of Light
© Kts | Dreamstime.com

Task: In this activity you will construct a function to control the Function Plane’s servo so that the laser will follow a cart as it moves in front of a light source. The function’s only input will be data from a light probe mounted to the cart.

Additional Materials: You will need a Measuring stick or tape, light probe, light source, non-motorized cart or any moving object such as a toy truck to mount the light sensor on. You will also need your graphing calculator or Excel® to do a curve fit.

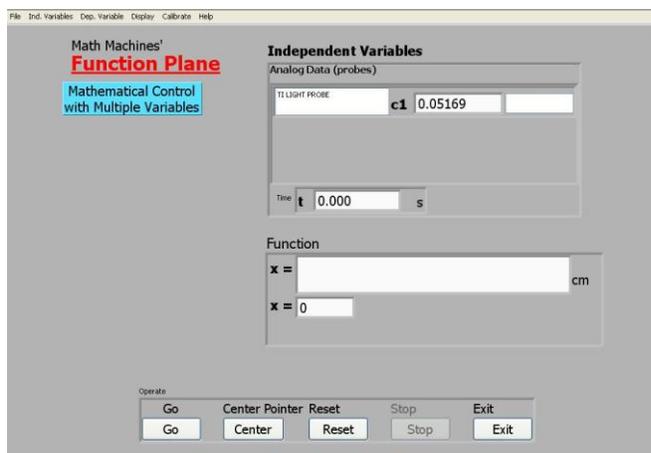
Math Machines Program:

Function Plane

Activity File: Light001

Light Probe should be plugged into Ch. 1.

Load Activity File: Light001



6. The general Inverse Square Law says:

“Any point source which spreads its influence equally in all directions without a limit to its range will obey the inverse square law. --This comes from strictly geometrical considerations. The energy twice as far from the source is spread over 4 times the area (Surface area of Sphere = $4\pi r^2$), hence, $\frac{1}{4}$ the intensity.

Gravity, sound, light, electric fields, radiation all obey this law.

$$I = \frac{k}{d^2}$$

How does your function compare to the “Inverse Square Law”?

Can you account for any differences?

7. To make the laser on the function plane follow the cart you will need will need to find ‘x’ as a function of ‘c1’. Do this algebraically and show your work below.

x = _____

8. Type the function you created above into the window for ‘x’ and run the Light001 program. Does the laser follow the cart as you move it from one position to the other? Troubleshoot any problems and report on your findings below.