

48.2: Introduction

Graphs allow us to visualize the relationship between two sets of numbers. Scientists often graph sets of numbers looking for a correlation, or a mathematical relationship. When constructing a graph of physical quantities, the independent variable is placed on the horizontal (x-axis), and the dependent variable is placed on the vertical (y-axis). A best fit line is utilized to represent the data; it is a smooth line or curve which is the average of the data points. The graph can be used to develop an equation relating the two sets of data, and shows how the two sets of data are related.

Independent & Dependent Variables

Independent variables do not depend on the measurement of another quantity. They are fundamental quantities. A change in location or direction will not affect a fundamental quantity. (*Example: time*)

Dependent variables depend on the measurement of another quantity. A change in location or direction will affect/change this type of quantity. (*Example: acceleration*)

Guidelines for Constructing a Good Graph

- Draw the axes of the graph such that the graph will fill the space provided, leaving just enough room for labeling.
- Determine the independent and the dependent variables, and label your axes accordingly. Include the units in your axes labels.
- Determine the minimum and maximum values for each axis. Then choose a scale with equal increments (like 10, 20, 30, etc.) which will accommodate all of the data; the scale may be different for each axis.
- Plot the data and draw a smooth line or curve that best fits the data points.

Linear or Direct Relationship

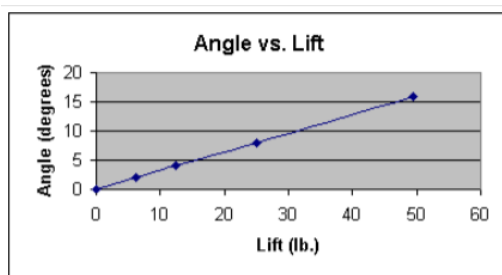


Image Credit: NASA

Figure 48.2.1: Graph shows relationship is $y = x$

Quadratic Relationship

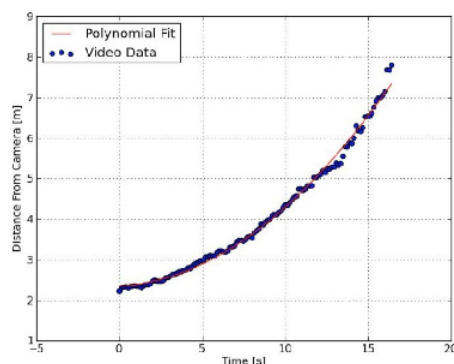


Image Credit: ESA

Figure 48.2.2: Graph shows relationship is $y = x^2$

Inverse Square Relationship

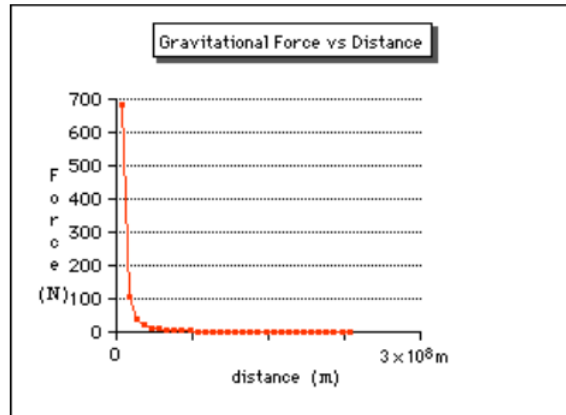


Image Credit: NASA

Figure 48.2.3: Graph shows relationship is $y = \frac{1}{x^2}$

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