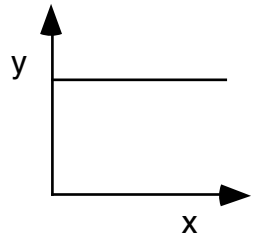
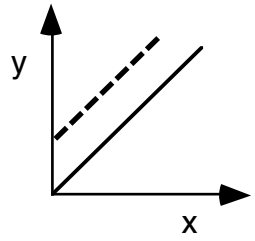
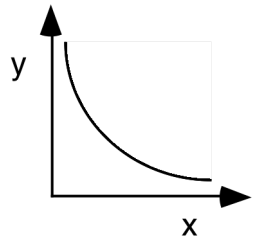
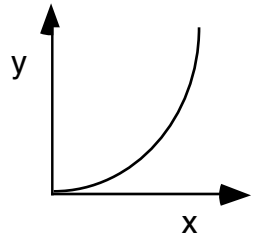
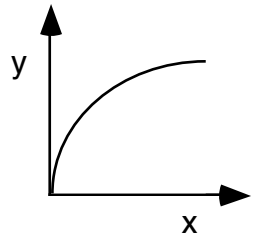
# Graphical Methods Summary (mathematical models from graphs)

A graph is one of the most effective representations of the relationship between two variables. The independent variable (one controlled by the experimenter) is usually placed on the x-axis. The dependent variable (one that responds to changes in the independent variable) is usually placed on the y-axis. It is important for you to be able interpret a graphical relationship and express it in a written statement and by means of an algebraic expression.

| Graph shape | Written relationship | Modification required to linearize graph | Algebraic representation |
|---|---|---|---|
|  | **No relation**<br>As x increases, y remains the same. There is no relationship between the variables. | None | $y = b$, or<br>y is constant |
|  | **Direct relation** ——<br>As x increases, y increases proportionally.<br>Y is directly proportional to x.<br><br>**Linear relation** – – – –<br>As x increases, y increases.<br>Y varies directly and linearly with x | None | $y = mx + b$ |
|  | **Inverse proportion**<br>As x increases, y decreases.<br>Y is inversely proportional to x. | Graph y vs $\frac{1}{x}$, or<br>y vs $x^{-1}$ | $y = m\left(\frac{1}{x}\right) + b$ |
|  | **Exponential relation (or parabolic)**<br>Y is proportional to the square of x. | Graph y vs $x^2$ | $y = mx^2 + b$ |
|  | **Power function (or parabolic)**<br>The square of y is proportional to x. | Graph $y^2$ vs x | $y^2 = mx + b$ |

When you state the relationship, tell how *y* depends on *x* ( e.g., as *x* increases, *y* …).