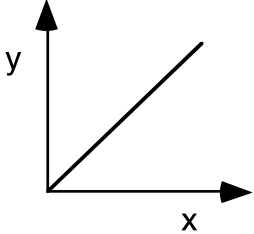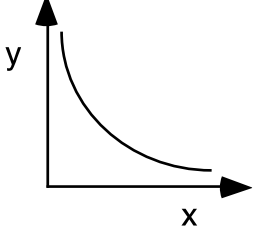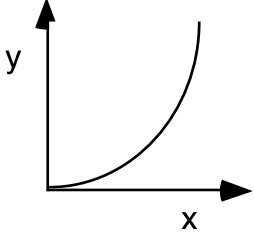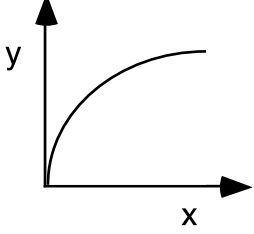# AP Physics 1- Graphical Methods Summary

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
	As x increases, y remains the same. There is no relationship between the variables. (linear function)	None	$y = b$ or y is constant
	As x increases, y increases proportionally. Y is directly proportional to x. (linear function) Ex. F=ma, V=IR	None	$y = mx + b$
	As x increases, y decreases. Y is inversely proportional to x. (rational function) $F = \frac{Gm_1m_2}{r^2}$ $F = \frac{kq_1q_2}{r^2}$ Ex. $\underline{a} = F/\underline{m}$	Graph, y vs. $\frac{1}{x}$ Or y vs. x^{-1} Or y vs. $1/x^2$	$y = m\left(\frac{1}{x}\right) + b$ Or $y = m\left(\frac{1}{x^2}\right) + b$
	Y is proportional to the square of x. (polynomial function) Ex. x= ½ at², x = v₀t + ½ at², **KE**=1/2 m**v²**	Graph y vs x^2	$y = mx^2 + b$
	The square of y is proportional to x. (radical function) Ex. $T_p = \sqrt{\ell}$, $v = \sqrt{F_t}$	Graph y^2 vs x Or y vs √x	$y^2 = mx + b$

- When you state the relationship, tell how y depends on x (e.g., as x increases, y …).
- Don't forget to replace X and Y with the variables from your experiment. (e.g. if you have a linear v(t) graph then as time increases, velocity increases proportionally so $v \propto t$.)
- [CLICK HERE](#) for a wonderful online resource.