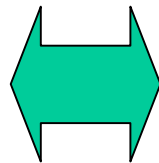


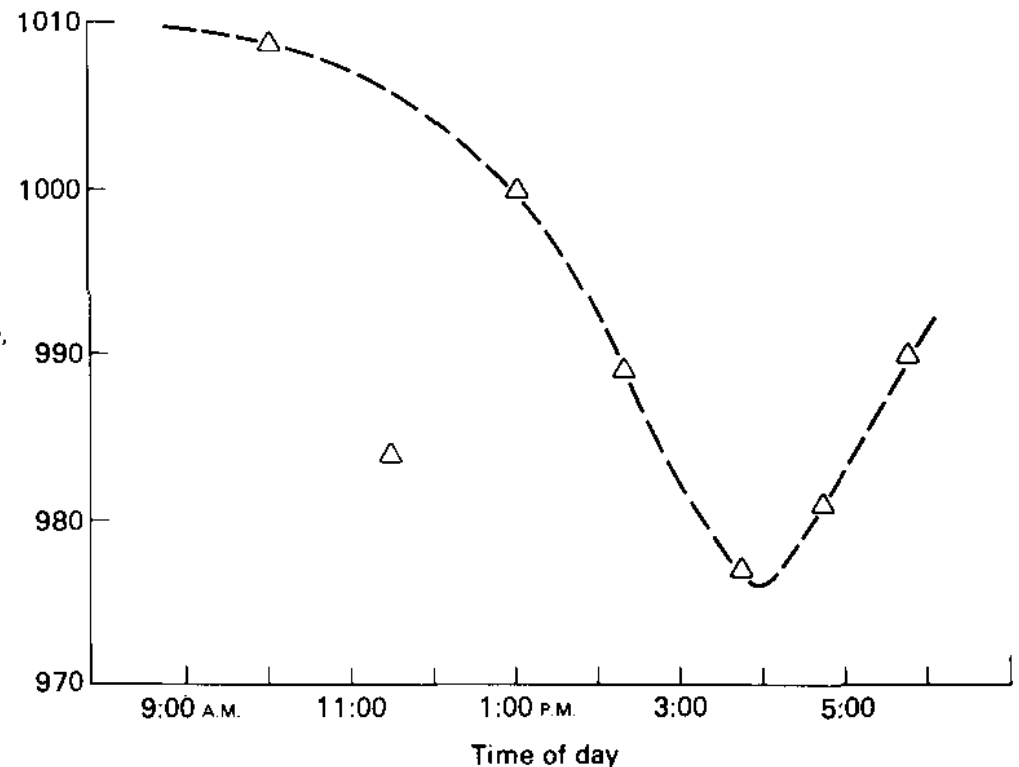
Graphing

- Graphs are one of the most effective ways to communicate experimental results...
- Graphs are simple to construct but they are often constructed very poorly and this completely negates their benefit...
- NOTE: these illustrations are from Beckwith, Marangoni & Lienhard

Time	Pressure
10:00	1009.0
11:30	984.2
1:00PM	999.8
2:15	989.0
3:40	977.1
4:40	981.2
5:40	990.0

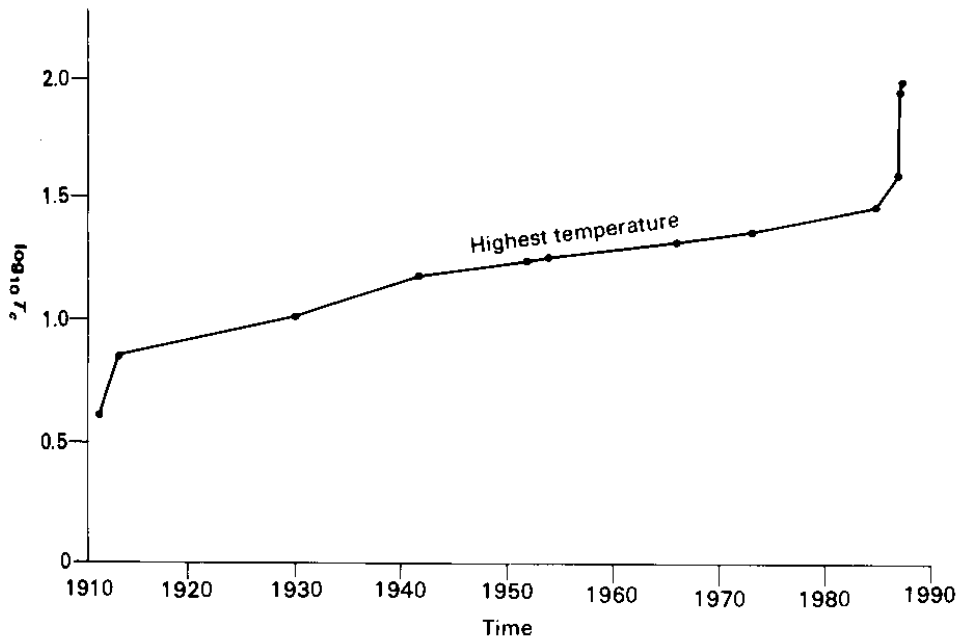


Pressure,
 p (mbar).



- Picture vs 1000 words
- Clarity & logic

Make it Clear to Reader...

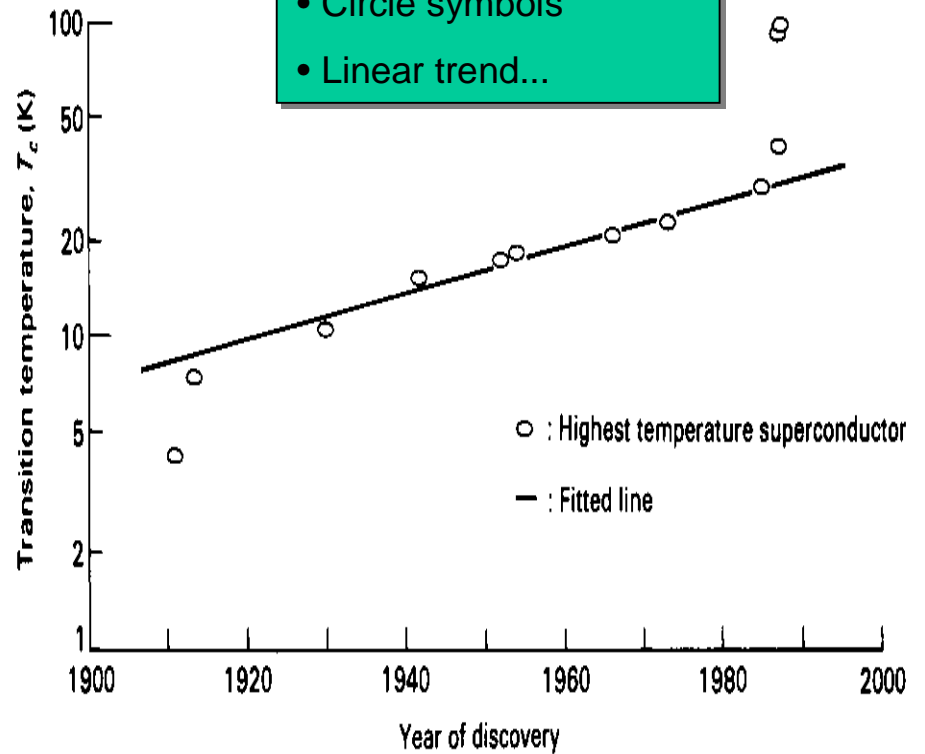


Poor:

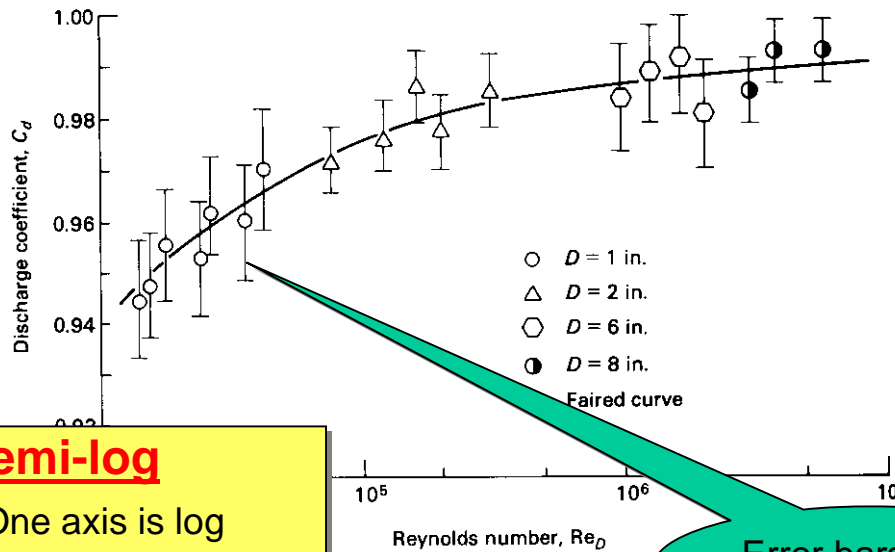
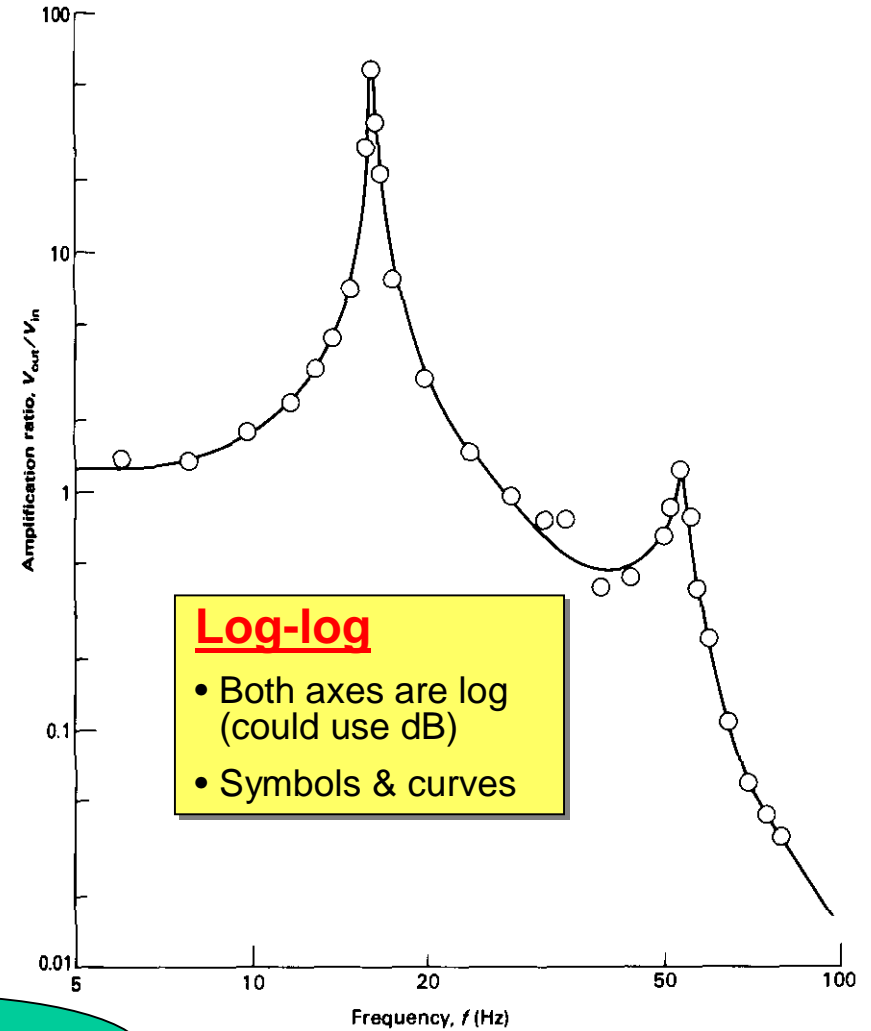
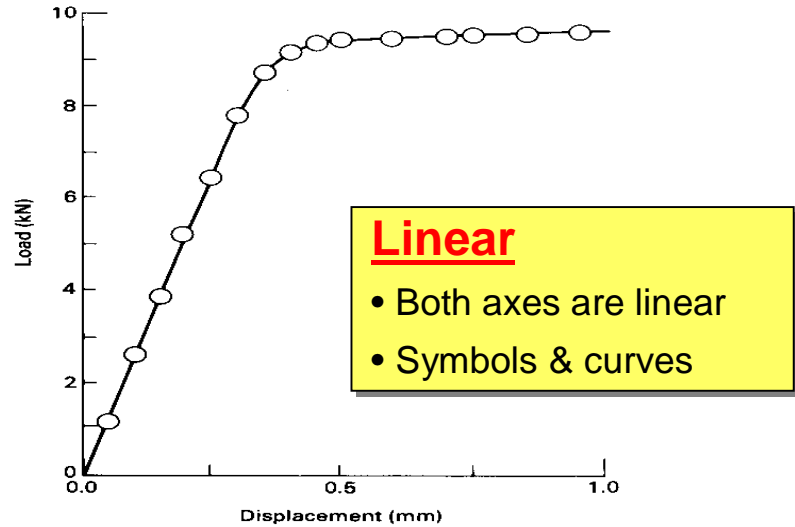
- $y = \log()$
- $x = \text{too many values}$
- No data symbols
- What does line mean?

Good:

- $y = \text{values on log scale}$
- $x = \text{every 20 years}$
- Circle symbols
- Linear trend...

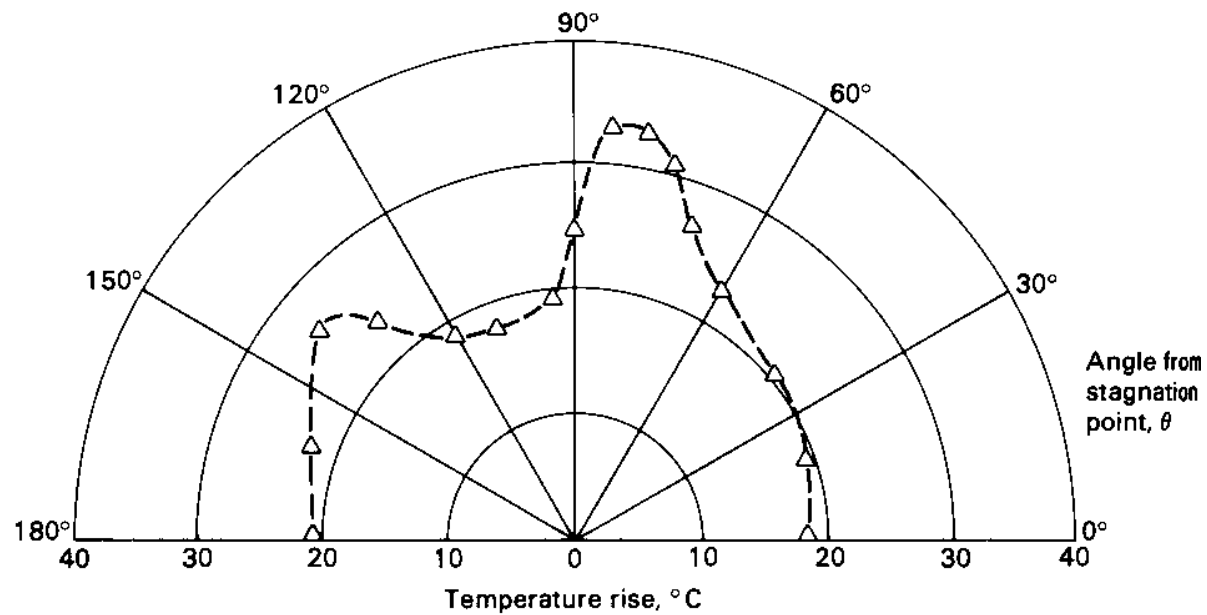


Basic Types of Cartesian Plots



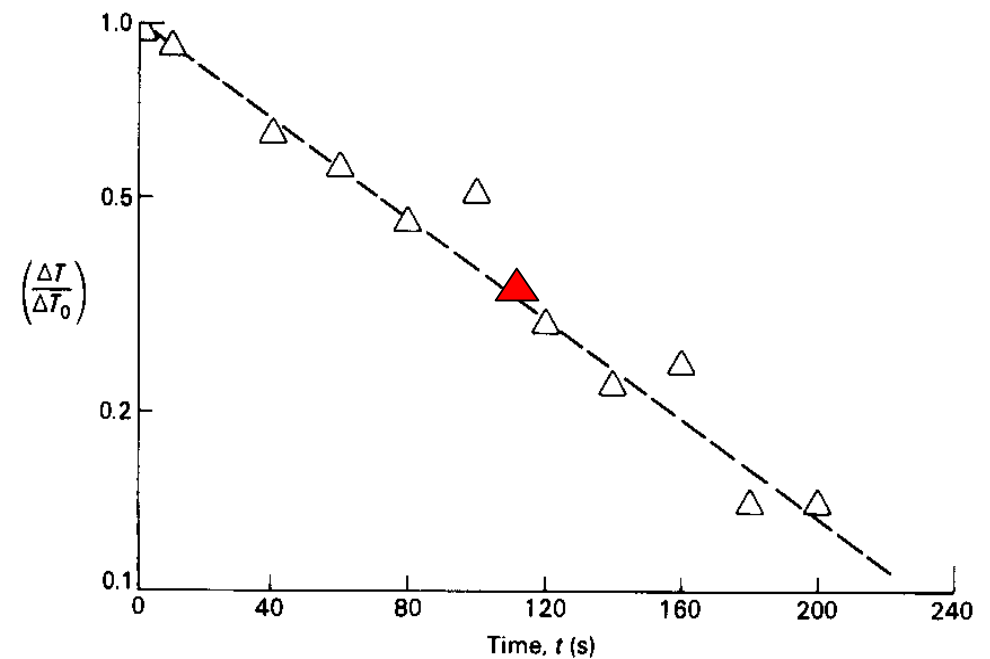
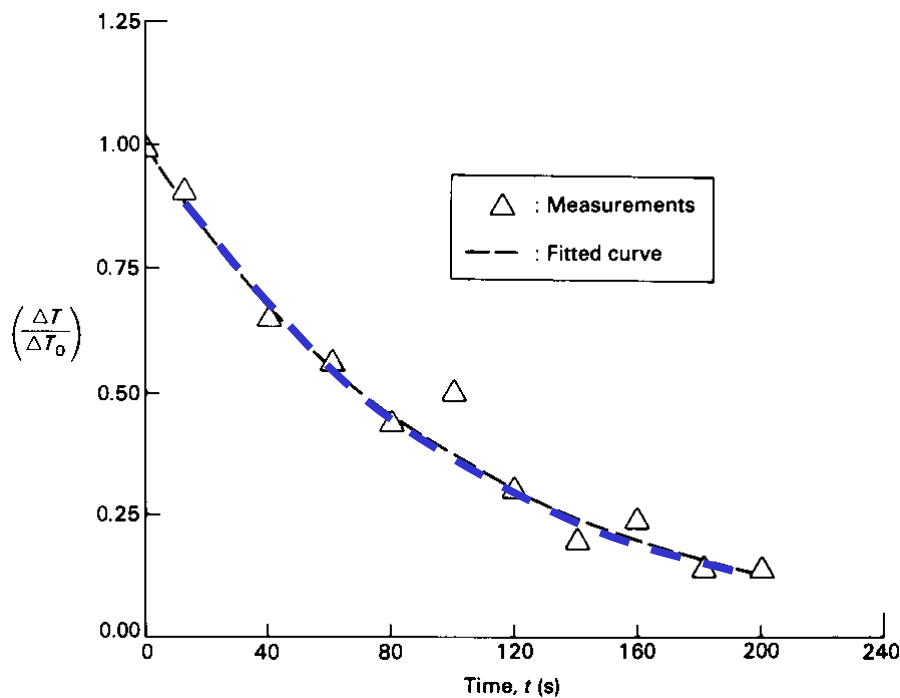
Polar Chart

- Useful for showing angular effects



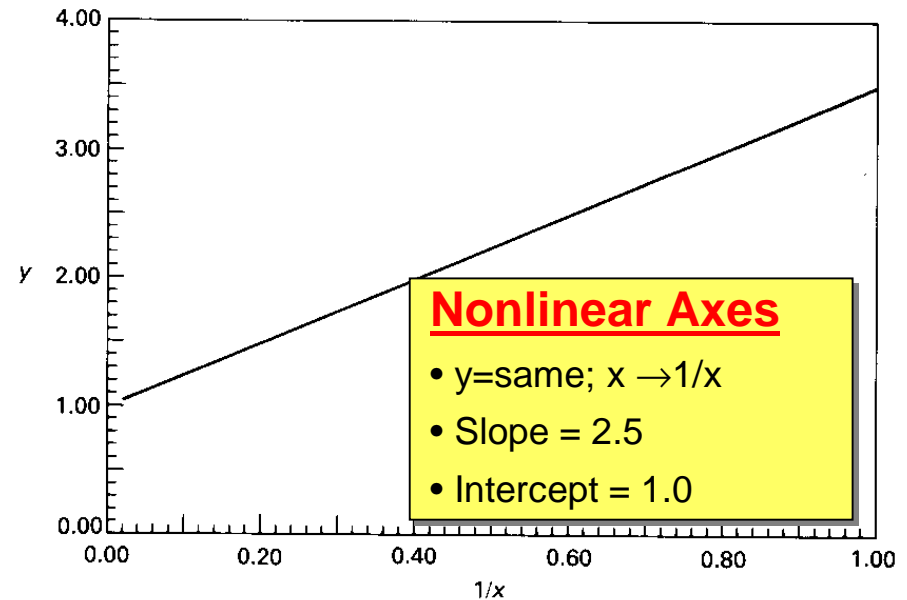
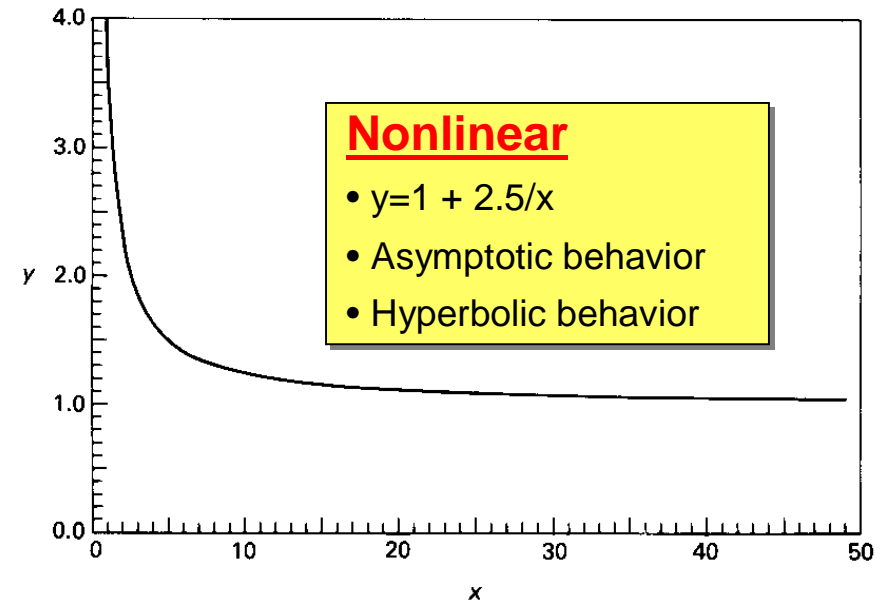
Semi-log Shows a Trend

- Cool-down data from liquid sample shows exponential trend when plotted using linear scales (left) and linear when plotted using log y scale.
- **Experimental** data shown with symbols.
- **Theoretical results** shown with smooth curves.
- Use Legend to define each curve or symbol used.



Changing Scales Can Show Structure

- Replotting nonlinear data using nonlinear axes can often reveal underlying analytical forms
- In this example, both asymptote and hyperbolic coefficient are revealed in intercept & slope of linear plot.
- Usually, replotting is designed to create a linear curve whose slope & intercept can be related to underlying parameters.



Transformations to Linear Forms

- Some simple transformations

$F(x)$	Y	X	A	B
$y = a + b/x$	y	$1/x$	a	b
$y = 1/(a + bx)$	$1/y$	x	a	b
$y = x/(a + bx)$	x/y	x	a	b
$y = ab^x$	$\log y$	x	$\log a$	$\log b$
$y = ac^{bx}$	$\log y$	x	$\log a$	$b \log c$
$y = ax^b$	$\log y$	$\log x$	$\log a$	b
$y = a + bx^N$ ($N = \text{known}$)	y	x^N	a	b

