Key

n = original input size

T(n) = time required to process input of size n

m = new input size

T(m) = time required to process input of size m

O(log n) Algorithms

- It doesn't matter which base you use for the logs, as long as you use the same base throughout the problem.
- If the numbers in the problem are powers of 10, use base 10.
- If the numbers in the problem are powers of 2, use base 2.
- Even if you don't use the base suggested above, you'll still get the same answer, but the arithmetic will be more complicated.

T(n) = c log(n)

T(m) = c log(m)

$$\frac{T(n)}{\log(n)} = \frac{T(m)}{\log(m)}$$

O(n) Algorithms

T(n) = c n

T(m) = c m

$$\frac{T(n)}{n} = \frac{T(m)}{m}$$

O(n log n) Algorithms

T(n) = c n log(n)

T(m) = c m log(m)

$$\frac{T(n)}{n\log(n)} = \frac{T(m)}{m\log(m)}$$

O(n^2) Algorithms

T(n) = c n^2

T(m) = c m^2

$$\frac{T(n)}{n^2} = \frac{T(m)}{m^2}$$

O(n^3) Algorithms

T(n) = c n^3

T(m) = c m^3

$$\frac{T(n)}{n^3} = \frac{T(m)}{m^3}$$

O(2^n) Algorithms

T(n) = c 2^n

T(m) = c 2^m

$$\frac{T(n)}{2^n} = \frac{T(m)}{2^m}$$