Common and natural bases In practice, the two bases most often used are base 10, called the *common* logarithm base, and base $e = 2.718\ldots$, called the *natural* logarithm base. When common logarithms are used, y and x are related as follows:

$$y = \log_{10} x, \text{ or } x = 10^y$$

When natural logarithms are used, the symbol ln is used to signify that the logarithm has a base of e; in other words, $\log_e x = \ln x$.

$$y = \ln x, \text{ or } x = e^y$$

For example, $\log_{10} 52 = 1.716$, so $\text{antilog}_{10}\, 1.716 = 10^{1.716} = 52$. Likewise, $\ln 52 = 3.951$, so $\text{antiln}\, 3.951 = e^{3.951} = 52$.

Note that you can convert between base 10 and base e with the equality

$$\ln x = (2.302\,585)\log_{10} x.$$

Some useful properties of logarithms are summarized in **Table 5.**

Table 5 Properties of Logarithms

Rule	Example
$\log(ab) = \log a + \log b$	$\log(2)(5) = \log 2 + \log 5$
$\log\left(\frac{a}{b}\right) = \log a - \log b$	$\log\frac{3}{4} = \log 3 - \log 4$
$\log(a^n) = n \log a$	$\log 7^3 = 3 \log 7$
$\ln e = 1$	
$\ln e^a = a$	$\ln e^5 = 5$
$\ln\left(\frac{1}{a}\right) = -\ln a$	$\ln\frac{1}{8} = -\ln 8$

Conversions Between Fractions, Decimals, and Percentages

The rules for converting numbers from fractions to decimals and percentages and from percentages to decimals are summarized in **Table 6.**

Table 6 Conversions

Conversion	Rule	Example
Fraction to decimal	divide numerator by denominator	$\frac{31}{45} = 0.69$
Fraction to percentage	convert to decimal, then multiply by 100%	$\frac{31}{45} = (0.69)(100\%) = 69\%$
Percentage to decimal	move decimal point two places to the left, and remove the percent sign	$69\% = 0.69$