$5^x = 125$

$5^x = 5^3$

$x = 3$

$27^x = 3$

$27^x = \sqrt[3]{27}$

$27^x = 27^{\frac{1}{3}}$

$x = \frac{1}{3}$

$27^x = 3$

$(3^3)^x = 3^1$

$3^{3x} = 3^1$

$3x = 1$

$x = \frac{1}{3}$

$16^{3x-2} = \frac{1}{32}$

$16^{3x-2} = 32^{-1}$ ← 16 and 32 are powers of 2

$(2^4)^{3x-2} = (2^5)^{(-1)}$ ← $(b^m)^n = b^{m \cdot n}$

$2^{12x-8} = 2^{-5}$

$12x - 8 = -5$

$+8 \quad +8$

$\frac{12x}{12} = \frac{3}{12}$

$x = \frac{1}{4}$

definition - interest $I = Prt$

= cost of borrowing money
= profit for saving money

I = Interest
P = Principal
r = rate
t = time

$A = P + I$ A = Final Value

$A = P + Prt$

$A = P(1 + rt)$

Suppose $5000 is invested for 3 years @ 8%

- What is simple interest?

$I = Prt$ (r must be decimal)

$I = 5000(0.08)(3)$

$I = \$1200$

- Find the interest if interest is calculated once per year. $t = 1$

Year 1

$I = Prt$

$I = Pr$

$I = 5000(.08) = 400$

$A = P + I$

$= 5000 + 400$

$= 5400$

Year 2 *A becomes P

$I = Prt$

$I = 5400(.08)$

$= \$432$

$A = P + I$

$= 5400 + 432$

$= 5832$

Year 3

$I = Prt$

$I = 5832(.08)$

$= \$466.56$

$A = P + I$

$= 5832 + 466.56$

$= \$6298.56$

Total Interest $Y_1 + Y_2 + Y_3 =$

$\$400 + \$432 + \$466.56 = \$1298.56$

Final Value for Principal

$5000 + 1298.56 = \$6298.56$

Upon further review:

$A_0 = 5000 \cdot (1.08)^0$

$A_1 = 5000 + 400 = 5400$

$= 5000 + 5600(1.08)$

$: 5000(1+.08)$

$= 5000(1.08)^1$

$A_2 = 5400 + 432 = 5832$

$= 5400 + 5400(.08)$

$= 5400(1+.08)$

$= 5400(1.08)$

$= 5000(1.08)(1.08)$

$= 5000(1.08)^2$

$A_3 = 5832 + 466.56 = 6298.56$

$= 5000(1.08)^3$

→ The final value for any # of years for this model is $A_n = 5000(1.08)^n$

→ $A = P(1+r)^t$ compounds once per year

← same as exponential growth

Compound Interest is counted more then once per year

annual : $n = 1$

semiannual $n = 2$

quarterly $n = 4$

monthly $n = 12$

daily $n = 365$

weekly : $n = 52$

biweekly $n = 26$

bimonthly - $n = 6$

semimonthly - $n = 24$

Compound Interest

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A = final

P = initial

r = rate (decimal)

n = # times compounded

t = t (years)

*does not find interest

$$A = P + I$$

$$I = A - P$$

to find actual interest