WARM-UP

1) How many ways can 12 students stand in a line? $12!$ or ${}_{12}P_{12} = 479{,}001{,}600$

2) A bin contains 23 toys, but 6 of those toys are broken. If you grab 4 toys, what is the probability that all 4 are broken? $\frac{{}_6C_4}{{}_{23}C_4}$

3/1771

3) Jackson is picking out a schedule; he has 4 math, 5 english, 3 science and 7 electives to choose from. If he is picking one of each, how many schedules are possible? F.C.P

$4 \cdot 5 \cdot 3 \cdot 7 = 420$

Unit 8: Finance & Exponential Functions

Reminders: Properties of Exponents

Zero Exponent - $4^0 = 1$ $\quad x^0 = 1$

Anything to the zero power $= 1$

Negative Exponents - $3^{-2} = \frac{1}{3^2}$

$\left(\frac{a}{b}\right)^{-4} = \left(\frac{b}{a}\right)^4$

Product of Powers - $x^3 \cdot x^5 = x^8$

Add Exponents

Power to Power - $(x^3)^5 = x^{15}$

Multiply Exponents

Division of Powers - $\frac{x^5}{x^3} = x^2$

Subtract Exponents

Radical Form - $x^{\frac{2}{3}} \longleftrightarrow \sqrt[3]{x^2}$

Exponential

Time

$$y = ab^x \qquad\qquad y = ab^x + k$$

Base

Initial Amount

End Amount

Vertical Shift

Parent $\rightarrow y = 2^x$

Exponential Growth

$$y = ab^x$$

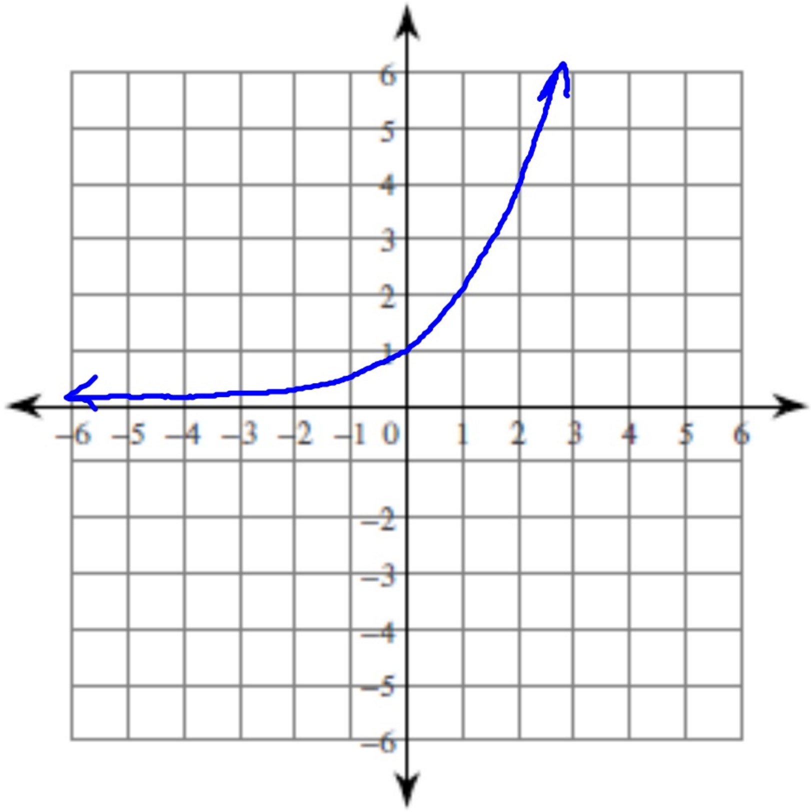
$b > 1$

Key Words:

Appreciation

Increase

Double/Triple



Exponential Decay

$$y = a\underline{b}^x$$

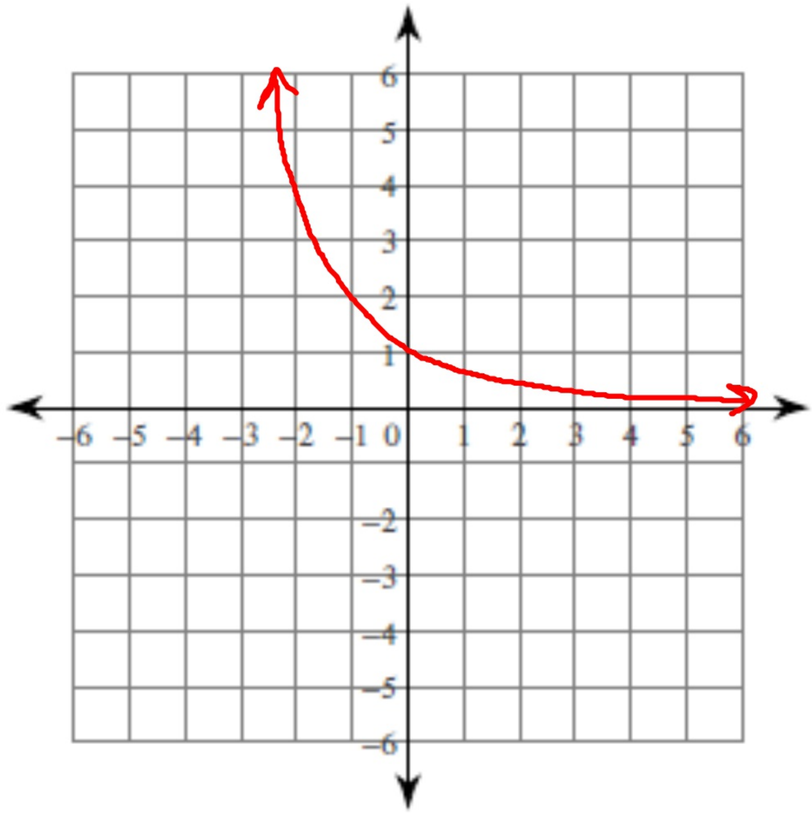
$0 < b < 1$

Key Words:

Depreciation

Decrease

Half-life



Exponential Growth

$$y = A(1 + r)^x$$

Final

Initial

Rate (decimal)

Time

$$y = A(1 + r)^t$$

Exponential Decay

$$y = A(1 - r)^x$$

Final

Initial

Rate (decimal)

Time

$$y = A(1 - r)^t$$

Compound interest equation: $A = P(1 + \frac{r}{n})^{nt}$

A = Amount of investment (Account balance)
P = Principle (Initial amount invested)
r = Annual interest rate (Decimal)
n = Compounding times per year
t = Number of years invested

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

What is simple interest? A = prt

Compound Interest Problems

Example: Assume \$1000 is deposited in an account that pays 8% annual interest compounded quarterly. What is the balance after one year?

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

$$A = 1000\ (1 + .08/4)^{(4 \cdot 1)}$$

A = [redacted]

A = \$1082.43

A = Amount of investment (Account balance)

Try This: If $5000 is deposited in an account that pays 6% annual interest. Find the balance after 25 years if the interest is:

a. Compounded Quarterly (n 4

$$A = 5000\left(1 + \frac{0.06}{4}\right)^{4 \cdot 25}$$

A = $22,160.23

b. Compounded Monthly (n = 12)

$$A = 5000\left(1 + \frac{0.06}{12}\right)^{12 \cdot 25}$$

A = $22,324.85

Try This: **You have inherited a house that was purchased for $20,000 in 1950. It is now 1995, and the value of the house increased by approximately 5% each year. What is the value of the hou**

$$y = A(1+r)^t$$

$1995 - 1950$

$$y = 20000(1 + 0.05)^{45}$$

A = $179,700.16

Try This: Suppose you have $250 to invest. The bank near your home pays 8.2% compounded semiannually, and the bank near school pays 8% compounded quarterly. In which account should you invest your money? Explain why?

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

Home

$$A = 250\left(1+\frac{0.082}{2}\right)^2$$

$$\boxed{\$270.92}$$

School

$$A = 250\left(1+\frac{0.08}{4}\right)^4$$

$270.61

A small town of 12,000 people has an annual rate of growth of 4%. What will the population be in 12 years?

$y = A(1+r)^t$

$y = 12000(1+0.04)^{12}$

$\boxed{19212 \text{ people}}$

Tom wants $1000 in his account in 4 years. If he has a 7% rate of growth, how much should he deposit?

$y = A(1+r)^t$

$1000 = A\underbrace{(1+0.07)^4}$

$\boxed{\$762.90}$

Interest Worksheet