

Sec. 7.6 - Exponential Problems

Learning Goal:

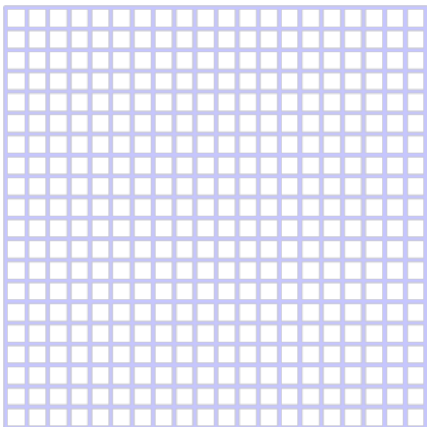
By the end of today, I will be able to recognize an exponential equation and use it to solve for a desired unknown

A petri dish contains 8 micro-organism that are able to double their numbers every 5 minutes.

Create a table of values for the number of micro-organisms for the first 40 minutes of an experiment.

Time		Number of MO
0	Equation Format	8

n



Interest calculations:

A 5% rate of return on an investment means you receive/pay 5% of the original capital/investment.

A \$1,000 investment at 5% will generate \$50.00 in interest money.

$$\$1,000 \times 0.05 =$$

$$I = P r t$$

P - principal amount invested

r - annual rate of return

t - time in years (usually)

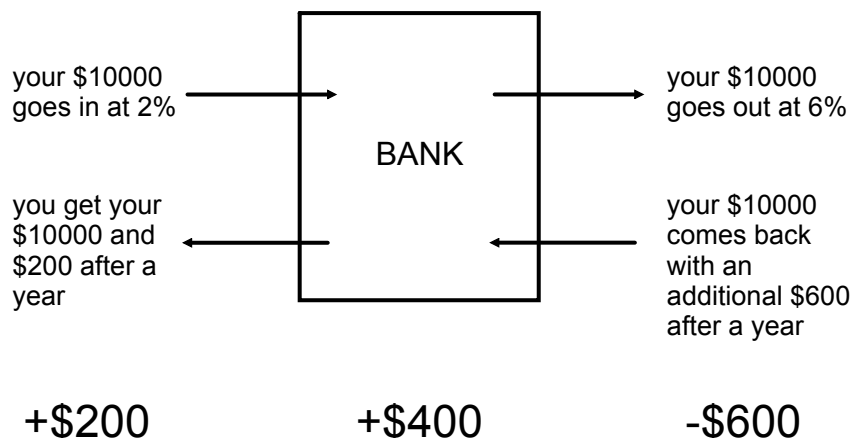
Interest on an investment or a loan is essentially a fee for using that money.

If you are investing YOUR money in a GIC, stock, bank account, etc., you collect interest, or charge the bank a fee to use your money.

If you take out a loan or mortgage, you are using the BANK's MONEY you pay a fee to use it.

Example:

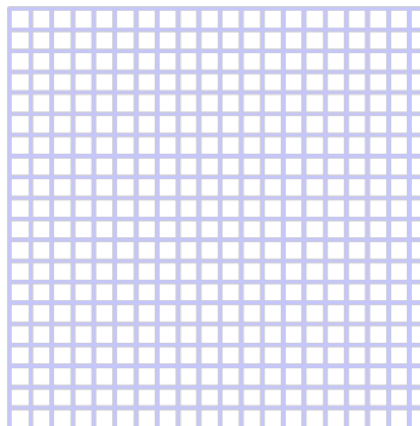
A bank will typically pay you around 1-2% for money that is left in your bank account. The bank then takes that money and loans it out at 4-8% to other people.



A investment you purchased for \$10,000 earns interest at the rate of 8% per year compounded annually. (compounded means you leave the interest in the bank to earn more interest)

Create a table of values for the number of micro-organisms for the first 8 years of the investment.

Time		\$
0	Equation Format	10,000
n		



Working with percent calculations - an algebraic simplification

1 - Calculating Tax on an item (increasing)

Original cost = \$100.00

HST = 13%

original cost tax calculation

$$\text{\$100.00} + (\text{\$100.00} \times 0.13)$$

Factor the \$100

2 - Calculating Depreciation on an item (decreasing)

Original cost = \$100.00

Sale Discount = 25%

original cost tax calculation

$$\text{\$100.00} - (\text{\$100.00} \times 0.25)$$

Factor the \$100

$$\text{Percentage Growth} \quad A = P(1 + i)$$

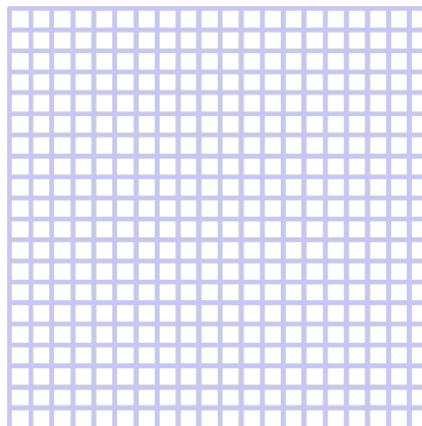
$$\text{Percentage Decrease} \quad A = P(1 - i)$$

where "i" is a percent in decimal form

A new car **depreciates (decreases)** by 7% for the first 5 years. If the new car originally cost \$40,000, what would be the value of the car at the end of each of the first five years.

Create a table of values for the car value over the first five years.

Time		\$
0	Equation Format	40,000
n		



Different Forms of Exponential Functions

$$A_f = A_o (1 + i)^n$$

Diagram showing the components of the exponential function $A_f = A_o (1 + i)^n$:

- A_f : Final Amount
- A_o : Initial (or starting) amount
- $(1 + i)$: Multiplier (growth or decay)
- i : Rate of Return

$$A_2 = 5000(1.34)^n$$

$$A_2 = 5000(1 + 0.34)^n$$

$$P_f = 250(2)^n$$

$$P_f = 250(1 + 1.0)^n$$

$$A_2 = 400(0.85)^n$$

$$A_2 = 400(1 - 0.15)^n$$

Homework

Page 429 - 430

#2, 3, 4, 6, 8