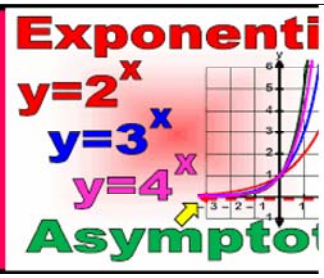
Unit 2

Exponents and Logarithms



4.5 Financial Applications

Compound Interest

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

P = Principle (initial)

i = interest rate (decimal ÷100)

n = # compounding periods

Write just the *equations* for the below situations. Don't calculate, you don't have *n*.

a. $1000 earns 5% interest per year

P i = 0.05

$A = 1000(1.05)^n$

b. A $20,000 car depreciates 18% per year.

1 + .18

remain? 82%

$A = 20000(0.82)^n$

c. $500 earns 7.75%/a

per annum

$A = 500(1.0775)^n$

d. A $1500 computer depreciates 35%/a.

$A = 1500(0.65)^n$

annually $n = 1$

monthly $n = 12$

quarterly $n = 4$

Semi-monthly / bi-weekly $n = 24$

daily $n = 365$

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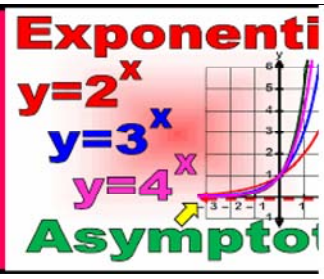

Ex.) Bryan invested $5000 in an account that pays 3.35% compounded annually in 2001. Using a graph, in what year will Bryan's investment be over $7500?

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

$$A = 5000\left(1 + \frac{0.0335}{1}\right)^{x}$$

$$\frac{7500}{5000} = \frac{5000(1.0335)^{x}}{5000}$$

$$1.5 = 1.0335^{x}$$

y_1 y_2

X-value at intersection: $X = 12.3$

round up

$X = 13$ years

Year: 2014

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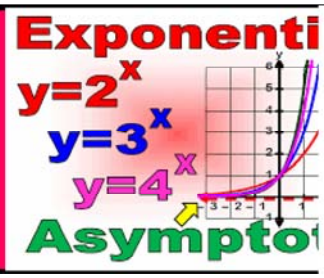

Ex.) A $22 000 car depreciates at 13% per year. When will the car be worth $10 000?

P $i = 87\%$ A

$i = 0.87$

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

$\frac{10000}{22000} = \frac{22000(0.87)^x}{22000}$

$0.45 = (0.87)^x$

$\frac{5}{11}$

y_1 y_2

$x = 5.7$ years

In about 6 years it will be worth less than $10 000.

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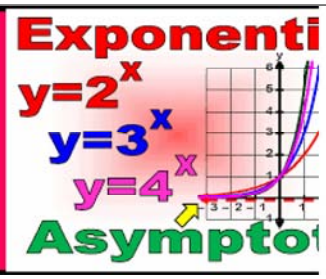

Ex.) An amount of money is put into a savings bond that pays 6.5% compounded monthly until the amount doubles. How many years from now will that occur?

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

$$A = P\left(1 + \frac{0.065}{12}\right)^{X}$$

$$2 = 1(1.0054)^{X}$$

$$2 = \underbrace{1\left(\frac{2413}{2400}\right)^{X}}_{y_2}$$

y_1

$$X \approx 128 \text{ years}$$

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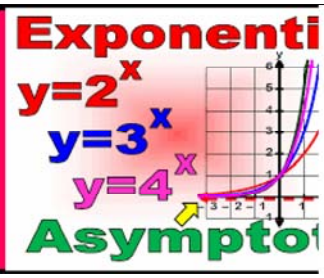

Ex.) Linda put all her Christmas money ($450) into a savings account at her credit union. Every month the credit union sends her an email stating the balance at the end of the month. Her first few months' balances are shown below. She wants to know what the interest rate on her account is.

L_1	**Month**	Jan 1	Feb 2	Mar 3	Apr 4	May 5	Jun 6
L_2	**Balance**	$451.18	$452.37	$453.55	$454.74	$455.94	$457.13

Enter the data into L1 and L2 of your calculator (the first entry should be L1=0, L2=450). Do an exponential regression of the data and insert your equation into Y1. Write your equation, to two decimal places below. Explicitly state the interest rate her account earns.

$A = P\left(1 + \frac{i}{n}\right)^n$ $\frac{12}{12}\cdot\frac{i}{12} = 0.0026 \cdot 12$

$i = 0.0312 \times 100 = \boxed{3.12\%}$

Using the graphing capabilities of your calculator, determine when Linda will have $500 in her account.

$y_2 = 500$ Intersection $x = 40.2$

$x = 41$ months later

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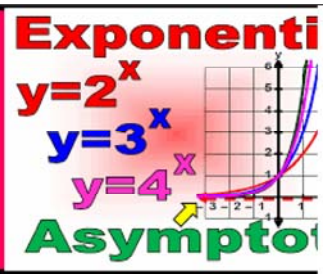

Ex.) Josh bought a new truck for $59 000. He researches how valuable his truck will be over the next four years and finds the following table from a vehicle insurance firm for his make of truck:

L_1

Age	New 0	One year 1	Two years 2	Three years 3	Four years 4
Value	$59 000	$51 920	$45, 690	$40 207	$35 382

Determine the rate of depreciation the insurance firm is using.

$y = 59\,000(0.88)^x$

88% remains

100% - 88% = 12%

What will the value of the truck be in 10 years?

2nd Trace 1:Value $X=10$ $x=10$ $y = \$16\,431.63$

When will the truck be depreciated to $25 000?

y_2

Intersection:

$x = 6.7$ = 7 years

Pg. 395 # 1, 6-8.