3.6 Appreciation and Depreciation

Ex. 1 A collectible action figure worth $100 increases in value by 20% each year.

a) Complete the table to show the value at the end of each year for 10 years.

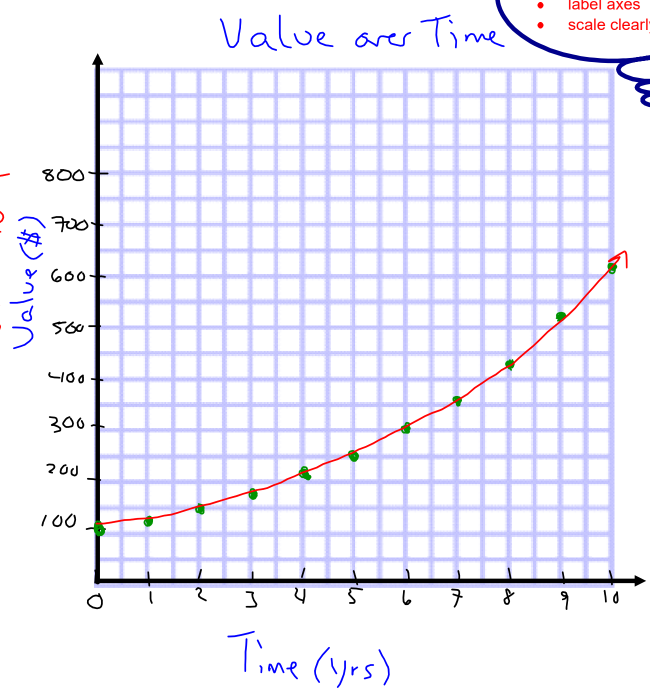
Time (yrs)	Value ($)
0	100
1	120
2	144
3	172.8
4	207.36
5	248.83
6	298.60
7	358.32
8	429.98
9	515.98
10	619.17

×1.2 ×1.2 ×1.2 ×1.2 ×1.2 ×1.2 ×1.2

SOLID Line since 1.5 years is Valid

b) Display the information from the table in a graph.

Communication
- title
- label axes
- scale clearly marked



c) The intial value of the toy was \$100. The value gets multiplied by 1.2 each year.

d) Write an equation to model the toy's value, V, after t years.

Value of the toy → $V = 100(1.2)^t$ ← # of years

Initial Value

$100\% + 20\% = 120\%$
$= 1.2$

e) Use your equation to find the value after 15 years.

$V = 100(1.2)^{15}$
$= 1540.70$

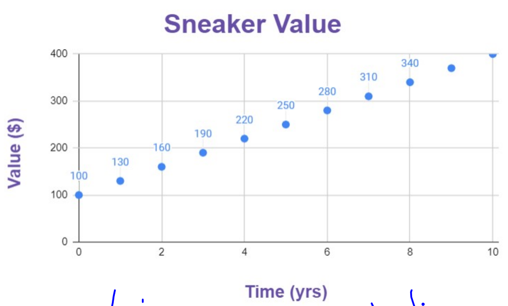
Calc? $\boxed{x^y}$ OR $\boxed{\wedge}$ OR $\boxed{x^{\square}}$

The toy model is an example of appreciation.

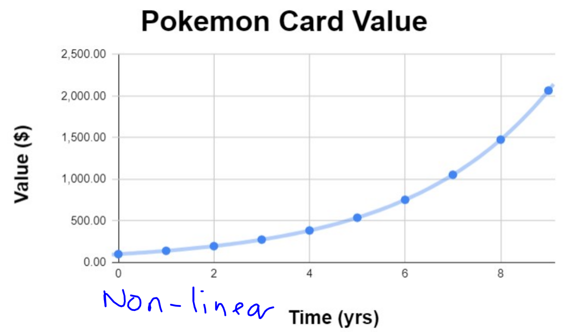
↑ Value goes UP!

Appreciation

- the value increases over time
- the graph rises from left to right



Linear appreciation



Non-linear appreciation

- the values in the table are getting bigger (added or multiplied by a # greater than 1)

Time (yr)	Value ($)
0	50
1	60
2	70
3	80
4	90
5	100

+10
+10
+10

Linear appreciation

Time (yr)	Value ($)
0	100
1	125
2	156.25
3	195.31
4	244.14
5	305.18

+25
+31.25

Non-linear!

Appreciation

- the initial value in an equation is added to or multiplied by a # greater than 1.

$$V = 92 + 5t$$

t	
0	92+0
1	92+5
2	92+10
3	92+15

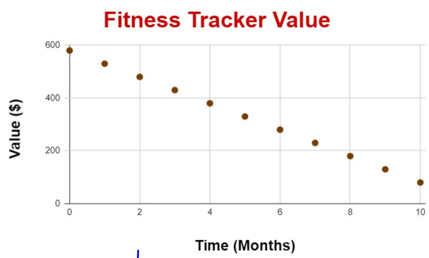
Linear

$$V = 3000(1.05)^t$$

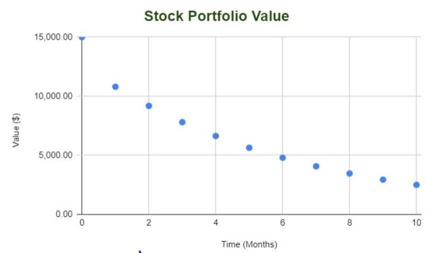
Non-linear
(Multiplying by 1.05 each time)

Depreciation

- the value decreases over time
- the graph falls from left to right



- Linear
- Depreciation



- Non-linear
- Depreciation

- the values in the table are getting smaller (subtracted or multiplied by a # smaller than 1)

Time (yr)	Value ($)
0	300
1	250
2	200
3	150
4	100
5	50

-50
-50
-50

Linear

Time (yr)	Value ($)
0	4,000
1	3,280
2	2,689.6
3	2,205.47
4	1,808.49
5	1,482.96

-720
-590.4
⋮

Non-linear

Depreciation

- the initial value in an equation is subtracted from or multiplied by a # less than 1.

$V = 800 - 75t$ $\qquad$ $V = 1800(0.95)^t$

Linear

Depreciation

Less than 1

$0.95 \rightarrow 95\%$

$100\% - 95\%$
$= 5\%$

Down by 5% each year

Ex. 2 A new set of winter tires worth $800 decreases in value by $50 for every month that they are used.

a) Complete the table to show the value at the end of each month for 10 months.

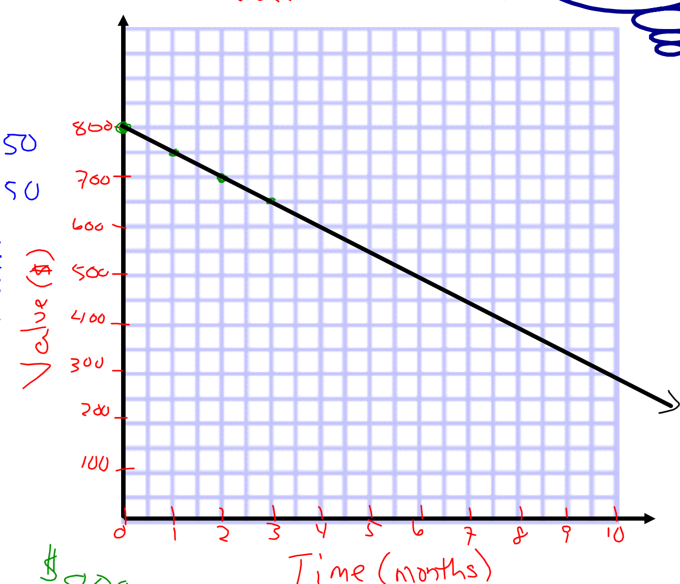
b) Display the information from the table in a graph.

Communication
- title
- label axes
- scale clearly marked

Time (months)	Value ($)
0	800
1	750
2	700
3	650
4	600
5	550
6	500
7	450
8	400
9	350
10	300

-50
-50

Value over Time



c) The intial value of the tires was $800. The value gets subtracted by 50 each month.

d) Write an equation to model the tires' value, V, after t months.

$$V = 800 - 50t$$

Initial Value

Subtract 50 each month

e) Use your equation to find the when the tires no longer have any value.

$V = 800 - 50t$

Sub $V = 0$

$0 = 800 - 50t$

$\frac{-800}{-50} = \frac{-50t}{-50}$

$16 = t$

.

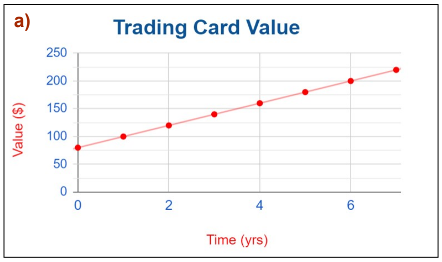
$\therefore$ The value will be zero after 16 months.

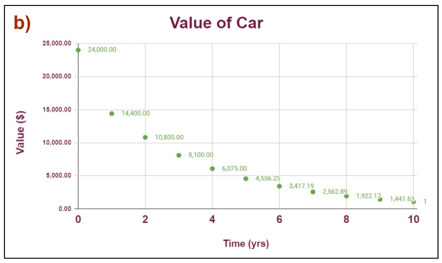
The tire model is an example of <u>depreciation.</u>

↓ Value goes DOWN!

Ex. 3 Describe the growth pattern represented by each model.

(appreciation or depreciation, linear or non-linear, how much does it increase/decrease for each time period)





c)

Time (yr)	Value ($)
0	300
1	280
2	260
3	240
4	220
5	200

d)

Time (yr)	Value ($)
0	300
1	330
2	363
3	399.3
4	439.23
5	483.15

e) $V=2000(0.85)^t$

f) $V= 150 + 25t$