

Exponential Growth

Terminology:

The *exponent* or *power* or *index* (plural: *indices*) or *order* or *logarithm* is the small number written as a superscript to show how many times the main number (the *base*) is to be multiplied by itself.

Eg: $3^2 = 3 \times 3 = 9$ and $1.2^5 = 1.2 \times 1.2 \times 1.2 \times 1.2 \times 1.2 = 2.48832$

One of the most common uses of the exponential function is in compound interest. To calculate the amount owed at an interest rate of 20%, use the formula:

$$Debt = Original \times 1.2^n$$

where n is the number of years

1. A credit card company charges 20% annual interest on loans. Complete the table to show how much you would owe over time if you borrowed £1000 initially:

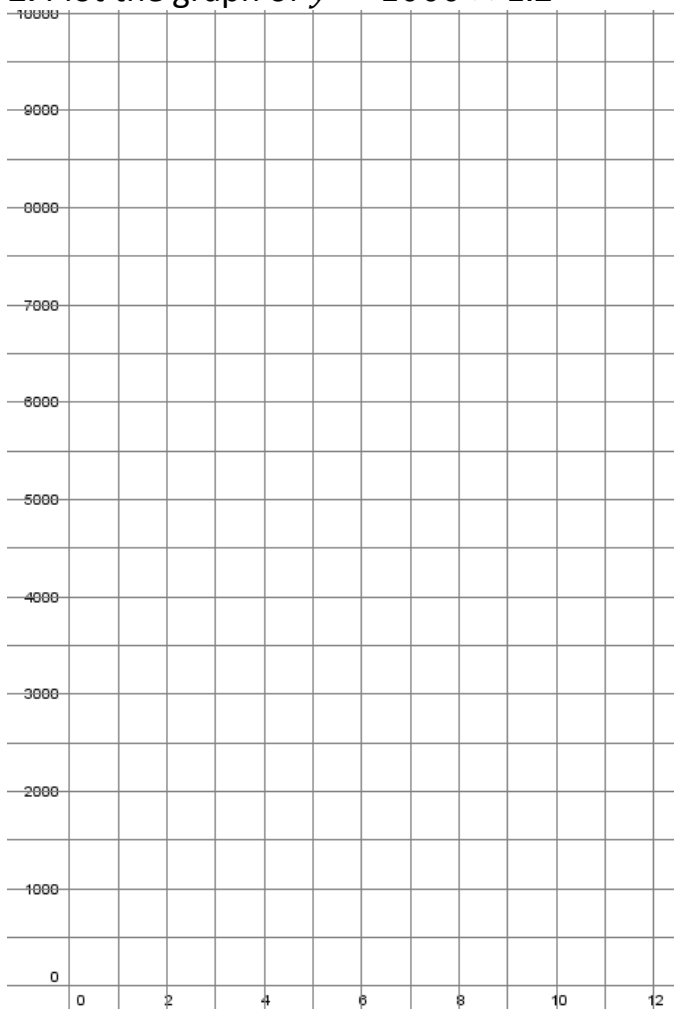
Years	0	1	2	3	4	5	6
Debt	£1000						

This function can be written as:

$$y = 1000 \times 1.2^x$$

where y is the amount of debt and x is the number of years

2. Plot the graph of $y = 1000 \times 1.2^x$



3. Use the formula to fill in the following:

a)

A normal credit card charges 20% interest.
20% Credit Card Loan of £1000:

6 years: £_____ 12 years: £_____

(Add this point to your graph)

b)

A £1000 bank loan charges just 5% interest.
5% Bank Loan of £1000:

6 years: £_____ 12 years: £_____

c)

£1000 invested in savings earns 2% interest.
2% Savings of £1000:

6 years: £_____ 12 years: £_____

Exponential Growth SOLUTIONS

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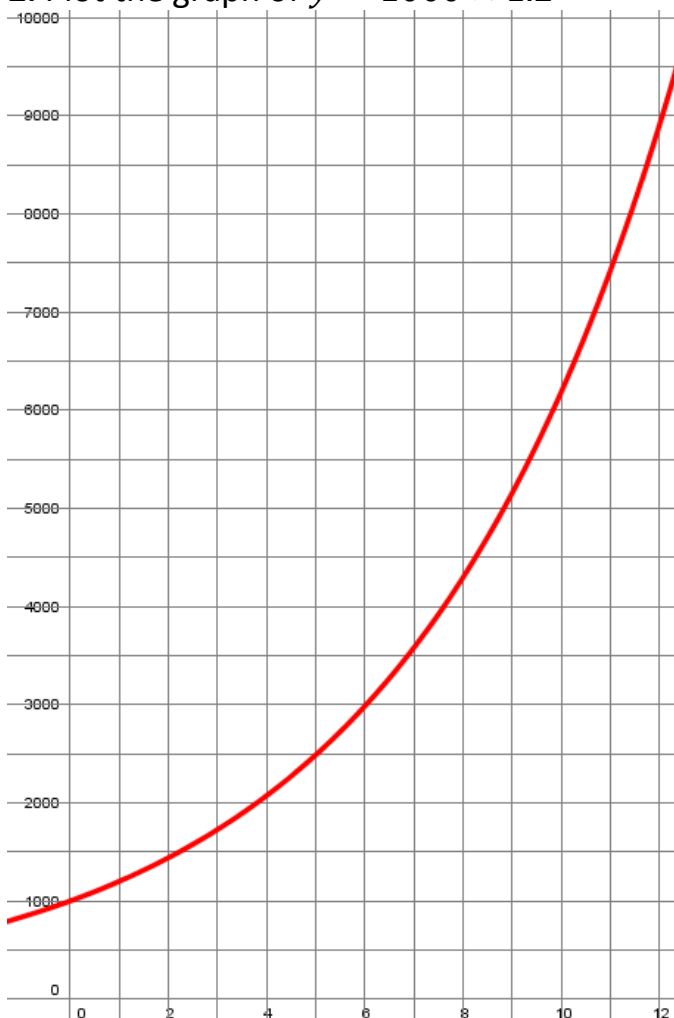
Years	0	1	2	3	4	5	6
Debt	£1000	£1200	£1440	£1728	£2073.60	£2488.32	£2985.98

This function can be written as:

$$y = 1000 \times 1.2^x$$

where y is the amount of debt and x is the number of years

2. Plot the graph of $y = 1000 \times 1.2^x$



3. Use the formula to fill in the following:

a)

A normal credit card charges 20% interest.
20% Credit Card Loan of £1000:

6 years: £2985.98 12 years: £8916.10
 (Add this point to your graph)

b)

A £1000 bank loan charges just 5% interest.
5% Bank Loan of £1000:

6 years: £1340.10 12 years: £1795.86

c)

£1000 invested in savings earns 2% interest.
2% Savings of £1000:

6 years: £1126.16 12 years: £1268.24