

Exponential function:-

- ⇒ An exponential function is a mathematical function in the form $f(x) = a^x$,
- ⇒ where "x" is a variable and "a" is a constant which is called base
- ⇒ It should be greater than 0.
- ⇒ The most commonly used exponential function base is the transcendental number e,
- ⇒ which is approximately equal to 2.71828

Exponential function formula:-

- ⇒ It is defined by the formula $f(x) = a^x$
- ⇒ where the input variable x occurs as an exponent.
- ⇒ The exponential curve depends on the exponential function & it depends on the value of the x.

$$f(x) = a^x$$

where $a > 0$ and a is not equal to 1.

- ⇒ x is any real number
- ⇒ If the variable is negative, the function is undefined for $-1 < x < 1$

Here,

x is a variable
a is a constant

⇒ An exponential curve grows, or decay depends on the exponential function.

Exponential Growth

⇒ the quantity increases very slowly at first and then rapidly.

⇒ The rate of change increases over time.

⇒ The rate of growth becomes faster as time passes.

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

where r is the growth percentage.

Exponential Decay:-

⇒ the quantity decreases very rapidly at first and then slowly.

⇒ The rate of change decreases over time.

⇒ The rate of change becomes slower as time passes.

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

Exponential function:- Properties

⇒ The exponential graph of a function represents the exponential function properties.

Let us consider the exponential function

$$y = 2^x$$

$$y = f(x) = 2^x$$

$$x = -4 \text{ then } y = 2^{-4}$$

$$y = 1/2^4$$

$$y = 1/16 = 0.0625$$

$$x = -3 \text{ then } y = 2^{-3}$$

$$= 1/2^3$$

$$= 1/8 = 0.125$$

$$x = -2 \text{ then } y = 2^{-2}$$

$$= 1/2^2$$

$$= 1/4 = 0.25$$

$$x = -1 \text{ then } y = 2^{-1}$$

$$= 1/2^1$$

$$= 1/2 = 0.5$$

$$x = 0 \text{ then } y = 2^0$$

$$y = 1$$

$$x = 1 \text{ then } y = 2^1 = 2$$

$$x = 2 \text{ then } y = 2^2 = 4$$

$$x = 3 \text{ then } y = 2^3 = 8$$

