

Aim: How do we approximate the value of irrational exponents? (Section 7.1)

Do Now: Complete the table of values for each function. Then graph the function.

1. $y = 3^x$

x	3^x	y
-2	3^{-2}	0.11
-1	3^{-1}	
0		
1		
2		

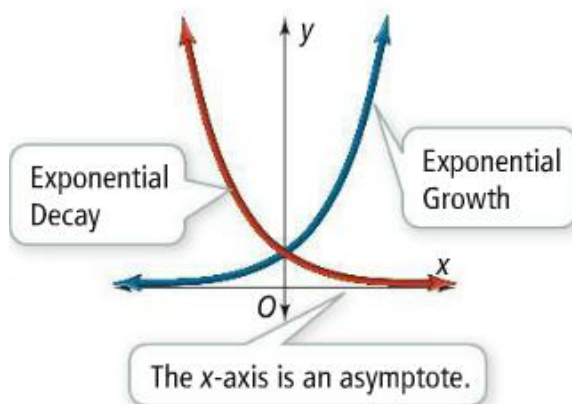
2. $y = 0.5(2)^x$

x	$0.5(2)^x$	y
-1	$0.5(2)^{-1}$	
0		
1		
2		
3		
4		

1-

An **exponential function** is a function with the general form $y = ab^x$, $a \neq 0$, with $b > 0$, and $b \neq 1$. In an exponential function, the base b is a constant. The exponent x is the independent variable with domain the set of real numbers.

1)



2)

What is the graph of each function?

a. $y = 4^x$

b. $y = \left(\frac{1}{3}\right)^x$

c. $y = 2(3)^x$

d. **Reasoning** What generalizations can you make about the domain, range, and y-intercepts of these functions?

3)

Take note

Concept Summary Exponential Functions

For the function $y = ab^x$,

- if $a > 0$ and $b > 1$, the function represents exponential growth.
- if $a > 0$ and $0 < b < 1$, the function represents exponential decay.

In either case, the y-intercept is $(0, a)$, the domain is all real numbers, the asymptote is $y = 0$, and the range is $y > 0$.

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4) Without graphing, determine whether the function represents exponential growth or exponential decay.

a. $y = 3(7)^x$

b. $y = 4(2.5)^x$

c. $y = 5(0.75)^x$

d. $y = 0.5(0.2)^x$

e. $y = 10(6)^x$

f. $y = 0.6^x$

II Modeling Exponential Growth –

1)

take note

Key Concept Exponential Growth and Decay

You can model exponential growth or decay with this function.

$A(t) = a(1+r)^t$

Amount after t time periods

Rate of growth ($r > 0$) or decay ($r < 0$)

Initial amount

Number of time periods

For growth or decay to be exponential, a quantity changes by a fixed percentage each time period.

2) For each annual rate of change, find the corresponding growth or decay factor.

a. 35%

b. - 20%

c. 62%

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- 3) A music store sold 200 guitars in 2007. The store sold 180 guitars in 2008. The number of guitars that the store sells is decreasing exponentially. If this trend continues, how many guitars will the store sell in 2012?

$$r = \frac{y_2 - y_1}{y_1}$$

$$A(t) = a(1 + r)^t$$

$$r = \frac{180 - 200}{200}$$

$$A(5) =$$

$$r =$$