

7.2 – Relating the Characteristics of an Exponential Function to Its Equation

Exponential = Repeated Multiplication

x	y
1	5
2	10
3	20
4	40
5	80

Testing for an Exponential Relationship: Is each step being multiplied by the same number?

* To test: divide a term by the previous term: it should be the same for all such divisions.

Number of x-intercepts:

Remember from 7.1 an Exponential Function will never touch the x-axis therefore will never have an x-intercept.

something crosses the x-axis when $y=0$ but for exponential functions $y = a(b)^x$ y can never be zero. $b^0 = 1$ $b^{positive} = positive$ $b^{negative} = fraction$

No x-intercepts \Rightarrow x-axis is an asymptote (a line that is never crossed)

Finding the y-intercept (Remember $x = 0$ when a graph crosses the y-axis)

$$y = 1(2^x)$$

$$y = 2^0$$

$$y = 1$$

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

$$y = 3(2^0)$$

$$y = 3(1)$$

$$y = 3$$

$$y = 10(2^x)$$

$$y = 10(2^0)$$

$$y = 10(1)$$

$$y = 10$$

* The leading coefficient is the y-intercept!
 $y = a(b)^x$
 (a is y-int)

Is the function Increasing or Decreasing?

$$y = 3^x$$

x	y
-1	1/3
0	1
1	3
2	9

$$y = \left(\frac{1}{2}\right)^x$$

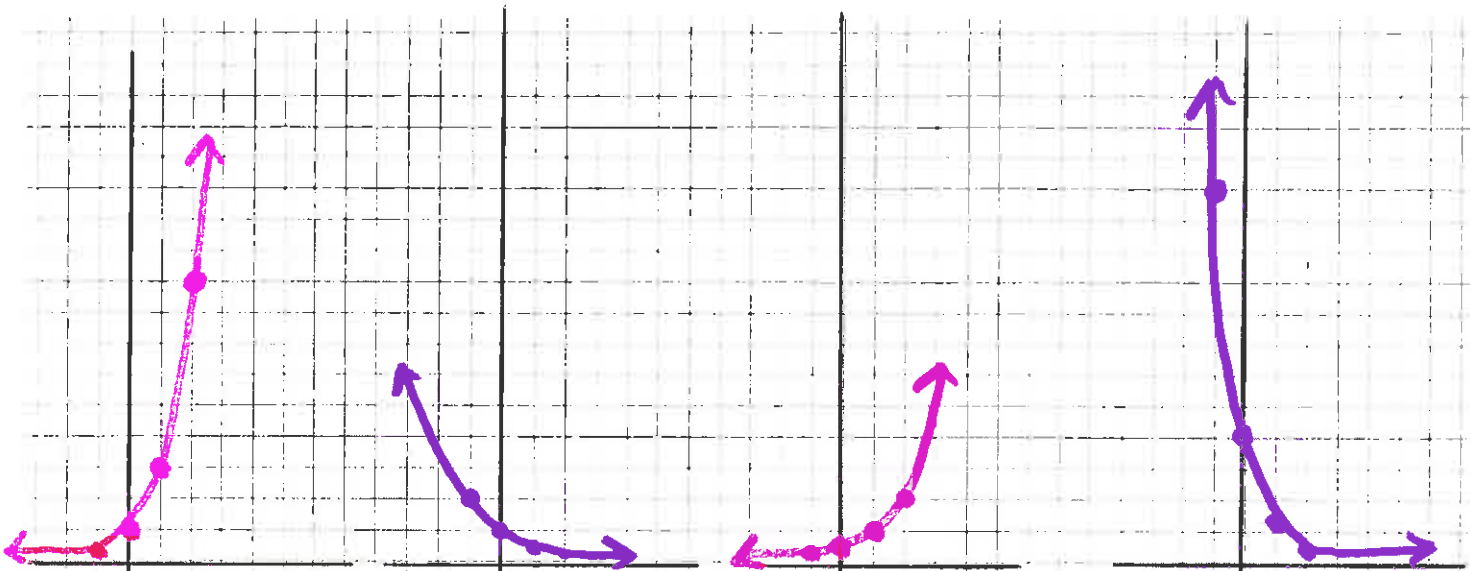
x	y
-1	2
0	1
1	1/2
2	1/4

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

x	y
-1	1/4
0	0.5
1	1
2	2

$$y = 4\left(\frac{1}{3}\right)^x$$

x	y
-1	12
0	4
1	4/3
2	4/9



Increasing

Decreasing

Increasing

Decreasing

Increasing if $b > 1$ (bigger than 1)
 Decreasing if $0 < b < 1$ (fraction/decimal)

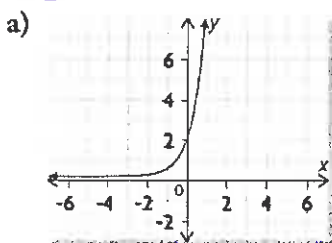
Example 1: Which exponential function matches each graph below?

$y = 3(0.2)^x$
 $y\text{-int} = 3$ ↓ decreasing

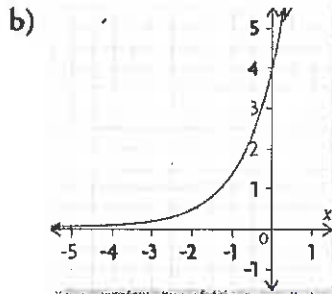
$y = 4(3)^x$
 $y\text{-int} = 4$ ↑ increasing

$y = 4(0.5)^x$
 $y\text{-int} = 4$ ↓ decreasing

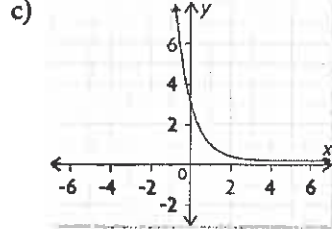
$y = 2(4)^x$
 $y\text{-int} = 2$ ↑ increasing.



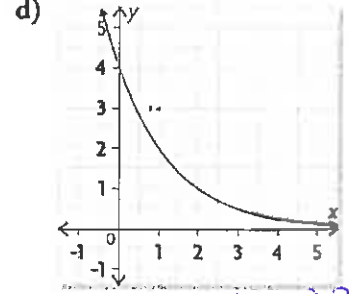
$y = 2(4)^x$



$y = 4(3)^x$



$y = 3(0.2)^x$



$y = 4(0.5)^x$