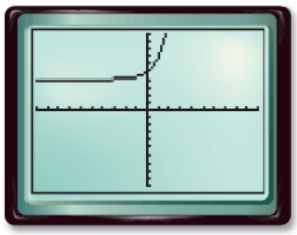
Lesson 13-8

Example 1

Graph $y = 3^x + 4$

Solution

You can use a graphing calculator to graph $y = 3^x + 4$. The y-intercept is 5.



[−10, 10] scl: 1 by [−10, 10] scl: 1

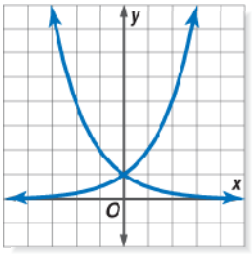
Example 2

Compare the graphs of $y = 2^x$ and $y = \left(\frac{1}{2}\right)^x$.

Solution

Make a table for $y = 2^x$. Graph the function.

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8



Make a table for $y = \left(\frac{1}{2}\right)^x$. Graph the function.

x	-3	-2	-1	0	1	2	3
y	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$

The graph are the reflections of each other across the y-axis. Both graphs have a y-intercept of 1. The graph of $y = 2^x$ increases from left to right. The graph of $y = \left(\frac{1}{2}\right)^x$ decreases from left to right.

Example 3

PHYSICS A ball is dropped from a height of 20 meters on to pavement. On each bounce, the ball bounces to a height that is 40% less than its height on the previous bounce. The height of the ball can be modeled by the equation $y = 20(0.6)^t$, where y is the height of the ball in meters, and t is the number of times the ball bounces. Find the height of the ball after its fourth bounce.

Solution

Since the height of the ball is decreasing by a fixed amount after each bounce, this is an example of exponential decay.

$y = 20(0.6)^t$
$y = 20(0.6)^4$ Substitute in the equation.
$y = 2.592$

The height of the ball after the fourth bounce is about 2.6 meters.