NAME _____ DATE _____

11-7 Exponential Functions (Pages 489–493)

Exponential Function	An **exponential function** is a function that can be described by an equation of the form $y = a^x$, where $a > 0$ and $a \neq 1$.

You can use ordered pairs to graph exponential functions. When you have graphed enough ordered pairs, connect the points to form a smooth curve. The graph of an exponential function changes little for small x-values, but as the values of x increase, the y-values increase quickly. The y-intercept of an exponential function is the y-coordinate of the point at which the graph crosses the y-axis. Exponential functions of the form $y = a^x$ have a y-intercept of 1. If a constant c is added to the function, it shifts the graph up or down c units.

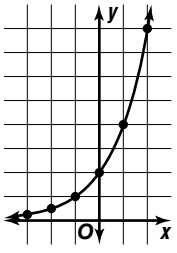
EXAMPLES

Graph each exponential function. Then state the y-intercept.

A $y = 2^{x+1}$

Make a table of values and then graph the function.

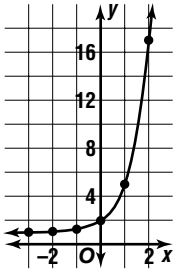
x	2^{x+1}	y
-3	2^{-3+1}	0.25
-2	2^{-2+1}	0.5
-1	2^{-1+1}	1
0	2^{0+1}	2
1	2^{1+1}	4
2	2^{2+1}	8



To find the y-intercept, let $x = 0$ and solve for y.
$y = 2^1$ or 2
In this case, the y-intercept is 2.

B $y = 4^x + 1$

x	$4^x + 1$	y
-3	$4^{-3} + 1$	≈ 1.02
-2	$4^{-2} + 1$	≈ 1.06
-1	$4^{-1} + 1$	1.25
0	$4^0 + 1$	2
1	$4^1 + 1$	5
2	$4^2 + 1$	17



The y-intercept is 2.

PRACTICE

Graph each exponential function. Then state the y-intercept.

1. $y = 2^x + 3$ **2.** $y = 2^{x-3}$ **3.** $y = 2^x - 3$

4. $y = 3^x + 1$ **5.** $y = 4^x - 2$ **6.** $y = 0.5^x$

7. Finance Paola opened a savings account with a deposit of \$1000. The account pays an annual interest rate of 4%. How much money will be in Paola's account in 5 years?

8. **Standardized Test Practice** A bank account with an initial deposit of \$500 has a 5% annual interest rate. What is the balance in the account after 3 years?

A \$578.81 **B** \$575.00 **C** \$579.64 **D** \$545.00

Answers: **1–6.** See Answer Key for graphs. **1.** 4 **2.** $\frac{1}{8}$ **3.** -2 **4.** 2 **5.** -1 **6.** 1 **7.** \$1216.65 **8.** A