8.5

5 Write and Graph Exponential Growth Functions



Before

You wrote and graphed linear models.

Now

You will write and graph exponential growth models.

Why?

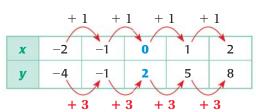
So you can find the value of a collector car, as in Example 4.

Key Vocabulary

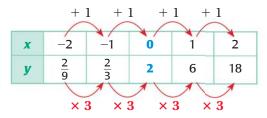
- exponential function
- exponential growth
- compound interest

An **exponential function** is a function of the form $y = ab^x$ where $a \neq 0$, b > 0, and $b \neq 1$. Exponential functions are *nonlinear* functions. Observe how an exponential function compares with a linear function.

Linear function: y = 3x + 2



Exponential function: $y = 2 \cdot 3^x$



EXAMPLE 1

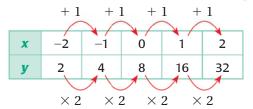
Write a function rule

Write a rule for the function.

X	-2	-1	0	1	2
y	2	4	8	16	32

Solution

STEP 1 Tell whether the function is exponential.



Here, the *y*-values are multiplied by 2 for each increase of 1 in x, so the table represents an exponential function of the form $y = ab^x$ where b = 2.

STEP 2 Find the value of a by finding the value of y when x = 0. When x = 0, $y = ab^0 = a \cdot 1 = a$. The value of y when x = 0 is 8, so a = 8.

STEP 3 Write the function rule. A rule for the function is $y = 8 \cdot 2^x$.

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GUIDED PRACTICE

for Example 1

1. Write a rule for the function.

X	-2	-1	0	1	2
y	3	9	27	81	243