

11-4

NAME _____ DATE _____

Exponential Functions (Pages 635–642)

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 $a \neq 1$.
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You can use ordered pairs to graph exponential functions. When you've graphed enough ordered pairs, connect the points to form a smooth curve. The y -intercept of an exponential function is the y -coordinate of the point at which the graph crosses the y -axis. You can use algebra to solve equations involving exponential expressions by using the following rule.

Property of Equality for Exponential Functions	Suppose that a is a positive number other than 1. Then $a^{x_1} = a^{x_2}$ if and only if $x_1 = x_2$.
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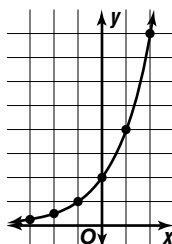
EXAMPLES

A Graph the equation $y = 2^{x+1}$ and state the y -intercept.

Make a table of values and then graph the function.

x	-3	-2	-1	0	1	2
y	0.25	0.5	1	2	4	8

The y -intercept is 2.



B Solve $6^{4x-1} = 36^x$.

Rewrite the equation so that the quantities have the same base, 6.

$$\begin{aligned}
 6^{4x-1} &= 36^x \\
 6^{4x-1} &= (6^2)^x & 36 &= 6 \cdot 6 \\
 6^{4x-1} &= 6^{2x} & \text{Product of powers} \\
 4x - 1 &= 2x & \text{Equate exponents.} \\
 2x - 1 &= 0 & \text{Solve for } x. \\
 2x &= 1 \\
 x &= \frac{1}{2}
 \end{aligned}$$

PRACTICE

Use a calculator to determine the approximate value of each expression to the nearest hundredth.

- $3^{4.5}$
- $\left(\frac{1}{4}\right)^{2.2}$
- $\left(\frac{3}{4}\right)^{-0.5}$
- $80(3^{-2})$
- $10(2^{-3.2})$

Graph each function. State the y -intercept.

- $y = 2^x$
- $y = 2^{x-3}$
- $y = 2^x - 3$
- $y = \left(\frac{1}{2}\right)^x$
- $y = \left(\frac{1}{2}\right)^{x+1}$
- $y = \left(\frac{1}{2}\right)^x + 1$

Solve each equation.

- $8^x = 8^{12}$
- $1000 = 10^{6x}$
- $10^{2x+9} = 10^{-1}$



15. Standardized Test Practice Solve $16^x = 2^{20}$.

- A** 2 **B** 4 **C** 5 **D** 8

Answers: 1. 140.30 2. 0.05 3. 1.15 4. 8.89 5. 1.09 6–11. For graphs, see Answer Key. 6. 1 7. $\frac{8}{1}$ 8. -2 9. 1 10. $\frac{2}{1}$
