Name_____ Date_____

5.1 Enrichment and Extension

Solving Equations with Exponents

Recall the Properties of Exponents: Let a and b be nonzero real numbers. Let m and n be integers.

Product of Powers	$(a)^m(a)^n = a^{m+n}$
Quotient of Powers	$\frac{a^m}{a^n} = a^{m-n}$
Power of a Power	$(a^m)^n = a^{mn}$
Power of a Product	$(ab)^n = a^n b^n$
Power of a Quotient	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

Example: Find the value(s) of n for which the statement is true.

$$\begin{aligned} 3^{2n-1} &= 27 \\ 3^{2n-1} &= 3^3 \\ 2n - 1 &= 3 \\ n &= 2 \end{aligned}$$

In Exercises 1–14, find the value(s) of *n* for which the statement is true.

1. $2^n = 4^3$

2. $3^n = 9$

3. $9^{n-1} = 9^4$

4. $(5^n)(5^4) = 125$

5. $(2^n)^n = 4^8$

6. $3^{2n} = 9^8$

7. $(7^n)(7^4) = 49^{n+3}$

8. $2^n = -4$

9. $3^{2n} = 729$

10. $4^{n+1} = \frac{1}{64}$

11. $9^{n+4} = 3^{n-8}$

12. $8^{n-2} = \sqrt{8}$

13. $4^{2n^2+2n} = 8$

14. $3^{n^2-3n} = 81$

Challenge: Find a, b, and c such that $(x^{-2}y^3z^2)(x^cy^az^b) = x^{-3}y^4$ for all nonzero values of x, y, and z.