Name _____ Date _____ Class _____

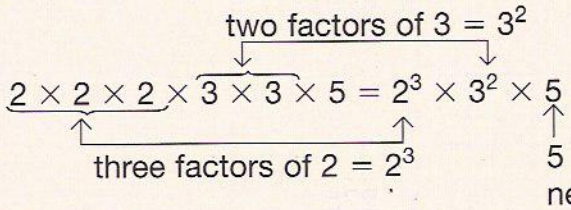
SKILL 5: Prime Factorization with Exponents

You can use exponents to express prime factorization in a compact form. For example, 125 is equal to $5 \times 5 \times 5$ or 5^3.

To write the prime factorization of 360 in exponential form, first write the factors in expanded form.

$$360 = 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

Use exponents to show the number of identical factors.



So, the exponential form of the prime factorization of 360 is $2^3 \times 3^2 \times 5$.

Example

Write the prime factorization $3^3 \times 5^2$ in standard form.

First write in expanded form. $3^3 \times 5^2 = \underbrace{3 \times 3 \times 3}_{27} \times \underbrace{5 \times 5}_{25} = 675$

Then multiply.

The standard form of the number $3^3 \times 5^2$ is 675.

Guided Practice

1. Write $2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5$ using exponents.

$2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 = 2^{\square} \times 3^{\square} \times 5^{\square}$

2. Write the prime factorization $2^3 \times 7^2$ in standard form.

a. Write 2^3 in expanded form. _____

b. Multiply the factors in part **a.** _____

c. Write 7^2 in expanded form. _____

d. Multiply the factors in part **c.** _____

e. Multiply the numbers you found in parts **b** and **d.** _____

f. So, $2^3 \times 7^2 = 2 \times$ _____ $\times$ _____ $\times 7 \times$ _____ $= 8 \times$ _____ $=$ _____.