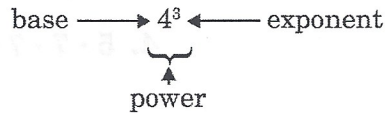


9-1 Study Guide**Powers and Exponents**

Use Exponents A number that is expressed using an exponent is called a **power**. The **base** is the number that is multiplied. The **exponent** tells how many times the base is used as a factor. So, 4^3 has a base of 4 and an exponent of 3, and $4^3 = 4 \cdot 4 \cdot 4 = 64$.



Any number, except 0, raised to the zero power is defined to be 1.

$$1^0 = 1 \quad 2^0 = 1 \quad 3^0 = 1 \quad 4^0 = 1 \quad 5^0 = 1 \quad x^0 = 1, x \neq 0$$

Example Write each expression using exponents.

a. $10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$

The base is 10. It is a factor 5 times, so the exponent is 5.

$$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 10^5$$

b. $(-9) \cdot (-9) \cdot (-9) \cdot (-9) \cdot (-9) \cdot (-9)$

The base is 9. It is a factor 6 times, so the exponent is 6.

$$(-9) \cdot (-9) \cdot (-9) \cdot (-9) \cdot (-9) \cdot (-9) = (-9)^6$$

c. $(p + 2)(p + 2)(p + 2)$

The base is $p + 2$. It is a factor 3 times, so the exponent is 3.

$$(p + 2)(p + 2)(p + 2) = (p + 2)^3$$

Exercises

Write each expression using exponents.

1. $5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

2. $(-7)(-7)(-7)$

3. $4 \cdot 4$

4. $8 \cdot 8 \cdot 8$

5. $(-2) \cdot (-2) \cdot (-2) \cdot (-2)$

6. $\left(\frac{1}{3}\right) \cdot \left(\frac{1}{3}\right) \cdot \left(\frac{1}{3}\right) \cdot \left(\frac{1}{3}\right) \cdot \left(\frac{1}{3}\right)$

7. $(0.4) \cdot (0.4) \cdot (0.4)$

8. $d \cdot d \cdot d \cdot d$

9. $m \cdot m \cdot m \cdot m \cdot m \cdot m \cdot m$

10. $x \cdot x \cdot y \cdot y$

11. $(z - 4)(z - 4)$

12. $3(-t)(-t)(-t)$