

Chapter 8

Exponents

and

Exponential

Functions

Section 8.1 Multiplication Properties of Exponents

Assignment:

Multiplication Properties of Exponents

Let a and b be numbers and let m and n be positive integers.

*** Product of Powers Property

To multiply powers having the same base, add the exponents.

$$a^m a^n = a^{m+n}$$

*** Power of a Power Property

To find a power of a power, multiply the exponents.

$$(a^m)^n = a^{mn}$$

*** Power of a Product Property

To find a power of a product, find the power of each factor and multiply.

$$(ab)^m = a^m b^m$$

Examples

- $4^5 \cdot 4^3$
 $4^{5+3} = 4^8 = 65,536$
 - $y^4 y^5 y^6$
 $y^{4+5+6} = y^{15}$
 - $2^1 \cdot 2^6$
 $2^{1+6} = 2^7 = 128$
 - $(-5)(-5)^3$
 $(-5)^{1+3} = (-5)^4 = 625$
- $(5^2)^3$
 $5^2 \cdot 5^2 \cdot 5^2 = 5^6 = 15,625$
 - $(x^3)^2$
 $x^{3 \cdot 2} = x^6$
 - $[(-2)^2]^4$
 $(-2)^{2 \cdot 4} = (-2)^8 = 256$
 - $(y^3)^8$
 $y^{3 \cdot 8} = y^{24}$

3. a. $(3 \cdot 4)^2$
 $3^2 \cdot 4^2$
 $9 \cdot 16 = 144$

b. $(3xy)^4$
 $3^4 x^4 y^4$
 $81 x^4 y^4$

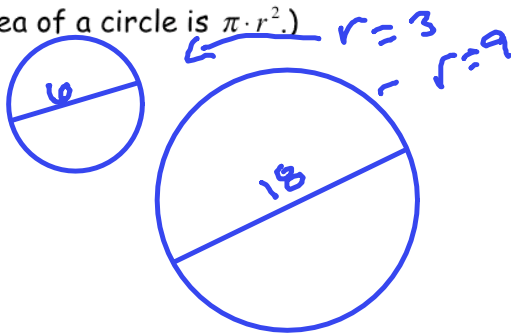
c. $(-3y)^2$
 $(-3)^2 y^2$
 $9y^2$

d. $-(3y)^2$
 $-3^2 y^2$
 $-9y^2$

4. a. $(3x^2y)^2 y^5$
 $3^2 (x^2)^2 y^2 y^5$
 $9x^4 y^7$

b. $(-c^2)^3 \left(\frac{1}{2}c^3\right)^2$
 $(-c^6) \left(\frac{1}{2}\right)^2 c^6$
 $(-c^6) \frac{1}{4} c^6$
 $-\frac{1}{4} c^{12}$

5. The diameter of a small pizza is 6 inches and the diameter of a large pizza is 18 inches. Find the ratio of the area of the large pizza to the area of the small pizza. (Area of a circle is $\pi \cdot r^2$.)



$\frac{1}{2} \frac{9^2 \pi}{3^2 \pi} = \frac{81}{9} = 9$
 $9:1$