

Algebra CC
Assignment #7
Exponents as Repeated Multiplication

1. Rewrite each of the following terms as an extended product. Consider carefully your order of operations and remember that exponents come before multiplication. You do not need to simplify the products.

(a) 4^3

(b) $3^2 \cdot 3^3$

(c) $(2^3)^4$

(d) x^3y^4

(e) $8x^2y^5$

(f) $(9x^2)^2$

2. Write out each of the following products and then express them in simplest exponential form.

(a) x^4x^7

(b) y^3y^6

(c) $x^3y^2x^5y^2$

3. Rewrite each of the following as equivalent expressions in simplest exponential form. There is one that cannot be simplified. Identify it.

(a) $4x^3 \cdot 7x^6$

(b) $x^5y^3x^2$

(c) $(-x^2)(3x^{10})$

(d) $x^2y^3z^3$

(e) $(4x)^3$

(f) $(-3x^2)^2$

4. One of the most common uses of exponents is when dealing with **scientific notation**. Recall that 3.2×10^4 is written in scientific notation where 10 is being raised to the 4th power. If 3.2×10^4 is the length of a park in meters and 2.5×10^6 is the width in meters, what is the area of the park if it is in the shape of a rectangle? It may help to write the terms out as an extended product and then regroup them.

$$\text{Area} = \text{Length} \times \text{Width} = (3.2 \times 10^4)(2.5 \times 10^6) =$$

5. So far we have come up with an exponent rule for the multiplying two monomials with like bases. We saw this to be $x^a \cdot x^b = x^{a+b}$. We can also find a rule for simplifying the expression $(x^a)^b$. Try the following questions and see if you can find the pattern that helps simplify this type of expression.

(a) Rewrite the following terms as extended products and then express them in the form 2^n or x^n .

(i) $(2^2)^4$

(ii) $(x^3)^4$

(b) Looking back at part (a) see if you can see a connection between your answer and the question. Make a general rule for all terms in the form of $(x^a)^b$

$$(x^a)^b =$$

KNOW THIS RULE!!!

R1. Simplify $(2 + 3)^2$

R2. Simplify: $(x - 3)^2$

R3. State which property (associative, commutative, or distributive) was used to get from one equivalent expression to the next.

$$\begin{aligned}
 & -2(3x+5)+4(2x-1) \\
 & = -6x-10+4(2x-1) \text{ _____} \\
 & = -6x-10+8x-4 \text{ _____} \\
 & = -6x+8x-10-4 \text{ _____} \\
 & = (-6x+8x)+(-10-4) \text{ _____} \\
 & = (-6+8)x-1(10+4) \text{ _____} \\
 & = 2x-14 \text{ _____}
 \end{aligned}$$

R4. A total of 1680 ounces of dog food have to be packed in 5-pound bags. How many 5-pound bags of pet food can be packed?

1. (a) $4 \cdot 4 \cdot 4$
 (b) $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
 (c) $2^3 \cdot 2^3 \cdot 2^3 \cdot 2^3$
 or $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
 (d) $x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y$
 (e) $8 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y$
 (f) $9x^2 \cdot 9x^2$
 or $9 \cdot 9 \cdot x \cdot x \cdot x \cdot x$

R1. 25

R2. $x^2 - 6x + 9$

R3.

$$\begin{aligned}
 & -2(3x+5)+4(2x-1) \\
 & = -6x-10+4(2x-1) \text{ _Distributive} \\
 & = -6x-10+8x-4 \text{ _Distributive} \\
 & = -6x+8x-10-4 \text{ _Commutative} \\
 & = (-6x+8x)+(-10-4) \text{ _Associative} \\
 & = (-6+8)x-1(10+4) \text{ _Reverse Distributive} \\
 & = 2x-14 \text{ _Combine Like Terms}
 \end{aligned}$$

2. (a) x^{11}
 (b) y^9
 (c) x^8y^4
3. (a) $28x^9$
 (b) x^7y^3
 (c) $-3x^{12}$
 (d) cannot simplify
 (e) $64x^3$
 (f) $9x^4$

R4. 21 bags

4. 80,000,000,000
5. (a) (i) 2^8 (ii) x^{12}
 (b) $x^{a \cdot b}$