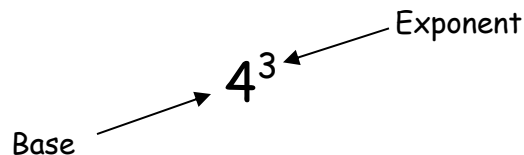


CHAPTER 2 EXPONENTS¹ AND TERMS WITH EXPONENTS²

LESSON 6: COMBINING LIKE TERMS

The first algebra skill you must master is working with exponents. You already know that 3^2 means 3×3 or 9. Now you will learn how to add, subtract, multiply, and divide numbers and variables with exponents too. I have good news though - it's really simple to learn all these skills in just a day or two.

We will use 4^3 as our first example. In this term, the number 4 is called the base and the number 3 is the exponent.



The exponent tells us how many times to use the base number as a factor in a multiplication problem. The term 4^3 means use the number four, three times in a multiplication problem. $4^3 = 4 \cdot 4 \cdot 4$ or 64. The term x^3 means $x \cdot x \cdot x$.

There are a few different ways to read, or say, exponential numbers. Look at the example below.

$$7^5$$

This term is read as, "Seven to the fifth power." Some people shorten it by saying, "Seven to the fifth." And others will say, "Seven to the power of five." Any of these phrases are correct.

Now we will attempt to *add* some terms with exponents. Look at this next problem.

$$4^3 + 4^3 =$$

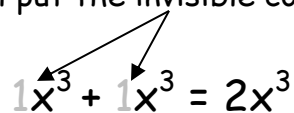
We already said that $4^3 = 64$, so that problem is saying $64 + 64$. That's easy to solve, so I'll make it a little more difficult. Look at this next problem.

$$x^3 + x^3$$

Since we don't know the value of x , we can't just add them together like we did with $4^3 + 4^3$. So let me ask you this question. Is $64 + 64$ the same thing as 64×2 ? Yes it is...so it should be easy for you to believe that $x^3 + x^3$ is the same thing as $x^3 \cdot 2$. In algebra this is written as $2x^3$ because we like to see the coefficient in front of the variables.

$$x^3 + x^3 = 2x^3$$

To make this even clearer, I will put the invisible coefficients in front of x^3 .


$$1x^3 + 1x^3 = 2x^3$$

Do you see how this problem is basically $1 + 1 = 2$? As long as the terms you are adding up are like terms, you can just add them together and put the new coefficient in front.

Can you solve this next problem?

$$x^3 + x^3 + x^3 =$$

How many x^3 do you see? I see 3, so the answer is $3x^3$.

We will look at another one.

$$3a^4 + 2a^4 =$$

Can you guess how to add these two terms together? Look at the two different coefficients of a^4 . They are 3 and 2. Think of a^4 as...umm...a type of apple! Now the problem is read as, "3 apples plus 2 apples," which of course equals 5 apples.

$$3a^4 + 2a^4 = 5a^4$$

However, we cannot add apples and oranges. Look at this next addition problem.

$$x^3 + a^4 =$$

We cannot add these two terms together. If "x³" stands for oranges and "a⁴" stands for apples, how can you add these together? Oranpples? No, that's not right. You can't add these two together because they are not like terms.

The rule to be learned here is that you can only add *like terms*. And they must be exactly alike too. The coefficients don't need to be the same, just the exponents and variables. You cannot add these two terms either.

$$\begin{array}{c} \swarrow \searrow \\ 5a^2 + 5a^3 = \end{array}$$

These cannot be added together because they are not like terms. An a² apple is completely different than an a³ apple; everyone knows that, so you cannot add these terms together.

Subtraction of exponents works the same way. You can only subtract like terms. Can you solve this one?

$$4xy^2 - 2xy^2 =$$

Since these two terms are alike, we can just subtract 4 - 2 = 2, so the answer is 2xy².

Can you subtract these terms?

$$7m^3 - 4m^2 =$$

No, you cannot. These are not like terms. You cannot simplify this problem any further. To *simplify* a problem means to do as much math as you can to make it smaller, simpler. Try some problems on your own by completing the next worksheet.

Name _____ Date _____

Worksheet 6

Add or subtract like terms.

1. $m^2 + m^2 =$
2. $2a^3 + 3a^3 =$
3. $4a^2b + 5a^2b =$
4. $6y^4 + 3y =$
5. $a^3 + a^3 + a^3 =$
6. $3a^5 + 2a^5 + a^5 =$
7. $7in^2 + 3in^2 =$
8. $9ab^2 + 7a^2 =$
9. $a^4 + 3a^4 =$
10. $mn + 3mn^2 + 2mn^2 =$

11. $5ab^3 - ab^3 =$
12. $9x^3 - 3x^3 =$
13. $4y^2 - 2y^3 =$
14. $15xy^4 - 12xy^4 =$
15. $11a^5 - 9a^6 =$
16. $12mn^2 - mn^2 =$
17. $10in^3 - 5in^3 =$
18. $3\pi r^2 - 2\pi r^2 =$
19. $3xy^2 - 3x^2y =$
20. $15y^2 - 5y^2 - 2y^4 =$