

## What We Are Learning

## Exponents

## Vocabulary

These are the math words we are learning:

**associative property**

property that states that when you add or multiply, you can group numbers in any combination

**base** when a number is written in exponential form, the number that is used as a factor is the base

**commutative property**

property that states that when you add or multiply, you can do so in any order

**distributive property**

property that states that number times a sum equals the sum of the products of that number and each addend

**exponent** a number that tells how many times to multiply the base by itself

**identity property** property that states that the product of 1 and a number and the sum of 0 and a number is that number

**numerical expression**

an expression made up of numbers and operations

**order of operations**

the rules that must be followed when simplifying expressions

*Dear Family,*

Your child will be learning to look for patterns in repeated multiplication. Multiplying a number by itself repeatedly will yield a series of repeated numbers. For instance, when multiplying 3 by itself repeatedly, the ones place of each product will produce the pattern 3, 9, 7, 1.

Your child is also learning to represent numbers by using exponents. Just as multiplication is valuable when you are representing repeated addition, exponents are valuable when you are representing repeated multiplication. An exponent is a part of a power. It is a number that represents how many times the base is to be multiplied by itself.

Using exponents will allow your child to write repeated multiplication in a more efficient way. This is how your child will find the value of a number with an exponent.

**Find the value of  $3^4$ .**

$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$       Multiply the base 3 by itself 4 times.

Your child will use powers of ten when expressing large numbers with scientific notation. When multiplying by ten with positive exponents, your child will move the decimal point to the right the same number of places as the value of the exponent. This is how your child will multiply by a power of ten.

**Multiply  $258 \cdot 10^4$ .**

$258 \cdot 10^4 = 2,580,000$       Move the decimal point 4 places to the right. Add 4 zeros as placeholders.

Large numbers are often written in a shorthand form called scientific notation. Your child will learn to express large numbers using these guidelines for this shorthand method.

**Write 45,258,000 in scientific notation.**

- 4.5258000      Move the decimal point left to form a number that is greater than one but less than 10.
- $10^7$       Since the decimal point was moved 7 places to the left, the power of ten is 7.
- $4.5258000 \times 10^7$       Write the number in scientific notation.

Note that  $4.5258000 > 1$  and  $4.5258000 < 10$ .

As your child works with larger and more complex numbers, he or she will continue to explore the use of scientific notation, as well as applications of exponents.

**power** a number written as a base and an exponent

**scientific notation** a type of shorthand for writing large numbers

Another means to help your child navigate through complex expressions is the process called the order of operations, developed to create a standard set of problem-solving steps.

<b>Order of Operations</b>
1. Perform operations within grouping symbols.
2. Evaluate exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

Here is how your child will evaluate an expression using the order of operations.

### Evaluate $3^2 \cdot 6 + 4$ .

$3^2 \cdot 6 + 4$	There are no parentheses.
$9 \cdot 6 + 4$	Evaluate the power.
$54 + 4$	Multiply.
58	Add.

These simple steps will help your child evaluate many types of mathematical expressions. When working with multi-operational problems, have your child explain which step to do first, second, etc., in order to correctly evaluate the expression.

Your child will also learn about several number properties.

### Property Words Algebra

Commutative Property	Add or multiply. You can group the numbers in any order.	$a + b = b + a$ $k \cdot m = m \cdot k$
Associative Property	When you add or multiply, you can group the numbers together in any combination.	$(p + s) + t = p + (s + t)$ $(x \cdot y) \cdot z = x \cdot (y \cdot z)$
Identity Property	The sum of 0 and any number is the number. The product of 1 and any number is the number.	$x + 0 = x$ $x \cdot 1 = x$
Distributive Property	A multiplier outside the parentheses of another operation can be applied to each number inside the parentheses before the operation is performed.	$d(e + f) = d(e) + d(f)$

These properties apply to all numbers. Provide him or her with sample problems and ask how to produce problems by using these properties.

**Sincerely,**

**CHAPTER**  
**1** **Family Letter**  
**Exponents**

Find each value.

1.  $3^5$

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2.  $9^4$

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3.  $2^6$

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4.  $11^3$

\_\_\_\_\_

5.  $8^3$

\_\_\_\_\_

6.  $5^4$

\_\_\_\_\_

7.  $10^2$

\_\_\_\_\_

8.  $1^9$

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Write each number using an exponent and the given base.

9. 16, base 2

\_\_\_\_\_

10. 81, base 9

\_\_\_\_\_

11. 27, base 3

\_\_\_\_\_

12. 25, base 5

\_\_\_\_\_

Multiply.

13.  $12 \cdot 10^5$

\_\_\_\_\_

14.  $4 \cdot 10^3$

\_\_\_\_\_

15.  $27 \cdot 10^0$

\_\_\_\_\_

16.  $35 \cdot 10^4$

\_\_\_\_\_

Find each product.

17.  $428 \cdot 10^2$

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18.  $576 \cdot 10^5$

\_\_\_\_\_

19.  $8,791 \cdot 10^4$

\_\_\_\_\_

20.  $68,874 \cdot 10^1$

\_\_\_\_\_

21.  $1,783 \cdot 10^6$

\_\_\_\_\_

22.  $27,845 \cdot 10^3$

\_\_\_\_\_

Write each number in scientific notation.

23. 728,000

\_\_\_\_\_

24. 245,000

\_\_\_\_\_

25. 8,000,000

\_\_\_\_\_

26. 981.2

\_\_\_\_\_

Evaluate.

27.  $3 \cdot 7 + 7 + (6 - 4)^2$

\_\_\_\_\_

28.  $7711 \div 11 - 25 \cdot 4$

\_\_\_\_\_

29.  $45 \div (3)^2$

\_\_\_\_\_

30.  $(84 \div 4) \cdot 3$

\_\_\_\_\_

31.  $(20 \cdot 2) - (12 \div 3)$

\_\_\_\_\_

32.  $6^3 \div 3 + 15$

\_\_\_\_\_

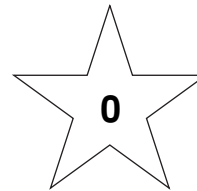
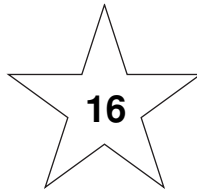
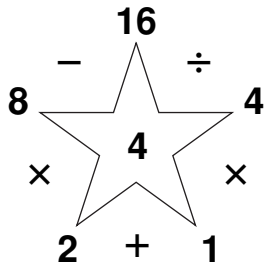
**Answers:** 1. 243 2. 6,561 3. 64 4. 1,331 5. 512 6. 625 7. 100 8. 1 9.  $2^4$  10.  $9^2$  11.  $3^3$  12.  $5^2$   
13. 1,200,000 14. 4,000 15. 27 16. 350,000 17. 42,800 18. 57,600,000 19. 87,910,000 20. 688,740  
21. 1,783,000,000 22. 27,845,000 23.  $7.28 \times 10^5$  24.  $2.45 \times 10^5$  25.  $8 \times 10^6$  26.  $9.812 \times 10^2$  27. 32  
28. 601 29. 5 30. 63 31. 36 32. 87

**CHAPTER 1** **Family Fun**  
**SHINING STARS**

**Directions**

Use any whole number, each of the four basic operations, and the order of operations to arrive at the total in the middle of the stars. Plot your answers on the points of the stars and move clockwise around the star, starting and ending at the apex of the star. Write the operation symbol being used in between each point.

The 4-star is done for you.



**Use the numbers in the stars to come up with your own game using the order of operations. Give your creation to a friend and see if they can figure it out.**

Possible answers:  $10: 100 \div 10 \times 1 + 5 \times 20 - 100; 9: 3 \times 3 + 100 \div 20 - 15 \div 3;$   
 $16: 2 \times 8 + 8 + 8 - 32 \div 2; 2: 2 \times 1 + 6 \div 3 - 4 \div 2; 0: 100 - 100 \div 1 + 4 \times 0 \times 100$

## What We Are Learning

## Beginning Algebra

**Vocabulary**

These are the math words we are learning:

**addition property of equality** you can add the same value to both sides of an equation and the statement will still be true

**algebraic expression** an expression that consists of constants, variables, and operations

**coefficient** the numerical factor in a term containing a variable

**constant** a number in an expression that does not change

**division property of equality** you can divide both sides by the same number and the statement will still be true

**equation** a mathematical statement that says two expressions are equal in value

**evaluate** substitute a number for a variable in an algebraic expression

**inverse operations** operations that undo each other

*Dear Family,*

In this section, your child will be learning the basic building blocks of algebra, beginning with recognizing the relationship between a constant and a variable. Your child will learn to evaluate an algebraic expression by substituting a given value for a variable and following the order of operations. Your child will follow the method shown below no matter how many variables are given in the expression.

**Evaluate  $5b + 7$  for  $b = 6$ .**

$$5b + 7$$

$$5(6) + 7 \quad \text{Substitute 6 for } b.$$

$$30 + 7 \quad \text{Multiply before adding.}$$

$$37 \quad \text{Add.}$$

Once your child has mastered how to evaluate algebraic expressions, he or she will learn to translate math words into the appropriate symbols. Being able to recognize math terminology is an important skill when solving word problems.

Listed below are examples of the four basic operations and some key phrases that may help your child write these algebraic expressions.

Operations	Key Word Phrases	Expression
Addition +	a number plus 7 add 7 to a number the sum of 7 and a number 7 more than a number	$7 + m$
Subtraction -	a number minus 10 10 less than a number a number decreased by 10 the difference of a number and 10	$m - 10$
Multiplication ×	9 times a number the product of a number and 9	$9m$
Division ÷	a number divided by 12 12 divided into a number the quotient of a number and 12	$m \div 12$ or $\frac{m}{12}$

**multiplication property of equality** you can multiply both sides of an equation by the same number and the new equation will have the same solution

**solution** the value of the variable that makes the statement true

**subtraction property of equality** you can subtract the same number from both sides of the equation and the new equation will have the same solution

**term** a number, variable, or a product of numbers and variables

**variable** a number that is represented by a letter because its value can change or vary

As a lead-in to solving equations, your child will learn to combine like terms. Like terms are terms with the same variable raised to the same power. This skill is similar to grouping objects that are alike. Once proficient at recognizing like terms, your child will learn to add and subtract like terms in order to solve basic equations.

Your child will use his or her equation solving skills to determine if a solution makes an equation true, as well as how to isolate the variable to solve one-step equations. Your child will use inverse operations to isolate the variable and equality properties of addition, subtraction, multiplication, and division to find solutions. This is how your child will solve one-step equations.

#### Solve an equation by addition

Solve the equation.

$$x - 24 = 65$$

Think: 24 is subtracted from  $x$ , so add 24 to both sides to isolate  $x$ .

$$\begin{array}{r} x - 24 = 65 \\ + 24 \quad +24 \\ \hline x = 89 \end{array}$$

#### Solve an equation by subtraction

Solve the equation.

$$y + 18 = 61$$

Think: 18 is added to  $y$ , so subtract 18 from both sides to isolate  $y$ .

$$\begin{array}{r} y + 18 = 61 \\ - 18 \quad -18 \\ \hline y = 43 \end{array}$$

#### Solve an equation by multiplication

Solve the equation.

$$\frac{k}{5} = 60.$$

Think:  $k$  is divided by 5, so multiply 5 by both sides to isolate  $k$ .

$$\begin{array}{l} (5)\frac{k}{5} = 60 (5) \\ k = 300 \end{array}$$

#### Solve an equation by division

Solve the equation.

$$180 = 6s.$$

Think:  $s$  is multiplied by 6, so divide both sides by 6 to isolate  $s$ .

$$\begin{array}{l} \frac{180}{6} = \frac{6s}{6} \\ s = 30 \end{array}$$

Encourage your child to explain how to solve these different equations in order to solidify the process and build confidence in his or her newly learned skills.

**Sincerely,**

**CHAPTER 1** **Family Letter**  
**Beginning Algebra**

Evaluate  $n + 6$  for each value of  $n$ .

1.  $n = 5$

2.  $n = 15$

3.  $n = 12$

4.  $n = 27$

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Evaluate each algebraic expression for the given variable values.

5.  $8y + 3$  for  $y = 4$

6.  $11w - 28$  for  $w = 7$

7.  $3t^2 + 6$  for  $t = 4$

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Write as an algebraic expression.

8. the difference of a number and 11

9. the product of 5 and a number

\_\_\_\_\_

\_\_\_\_\_

10. 13 less than 3 times a number

11. 8 more than 5 times a number

\_\_\_\_\_

\_\_\_\_\_

Identify like terms.

12.  $13a, 3a^3, 3a, x^3, 2x, 5a$

13.  $r^2, 2r, 5s^2, 5, 2r^2, rs$

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\_\_\_\_\_

Combine like terms.

14.  $7x + 5x$

15.  $2s + 5s + 2s$

16.  $14 + 4f + 3f^3 + 8f + 7$

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\_\_\_\_\_

\_\_\_\_\_

Determine if the given numbers are solutions of the given equation.

17.  $x = 2$  for  $5x + 3 = 13$

18.  $t = 4$  for  $5t - 8 + 2t = 30$

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\_\_\_\_\_

Solve the equation. Check your answer.

19.  $c + 61 = 105$

20.  $4v = 328$

21.  $\frac{w}{6} = 87$

22.  $t - 97 = 54$

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\_\_\_\_\_

\_\_\_\_\_

**Answers:** 1. 11 2. 21 3. 18 4. 33 5. 35 6. 49 7. 54 8.  $n - 11$  9.  $5n$  10.  $3n - 13$  11.  $5n + 8$   
12.  $13a, 3a, 5a$  13.  $r^2, 2r^2$  14.  $12x$  15.  $9s$  16.  $3t^3 + 12t + 21$  17. yes 18. no 19.  $c = 44$  20.  $v = 82$   
21.  $w = 522$  22.  $t = 151$

**CHAPTER** **Family Fun**

**1** *Be a Super Solver*

**Directions: Try to fill in the missing numbers.**

- The missing numbers are integers between 0 and 100.
- The numbers in each row add up to the totals in the far right column.
- The numbers in each column add up to the totals along the bottom row.
- The diagonal lines add up to the totals in the right corners.

						210
84	72	86	65		38	361
20	82			77		343
43		56	27	56	48	242
14		6	31	75	36	195
	55	54	2		64	241
7			86	80	46	313
215	337	222	280	323	318	318

Answers are read from left to right starting at the top. 16, 9, 69, 86, 12, 33, 47, 19, 83, 11