

What We Are Learning

Number Theory

Vocabulary

These are the math words we are learning:

base the number that is raised to an exponent

compatible numbers numbers that are close to the numbers in the problem, which may help with mental math

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

exponential form a number that is written with a base and an exponent

overestimate an estimate that is greater than the exact answer

underestimate an estimate that is less than the exact answer

Dear Family,

Your child is working on ordering, comparing, and estimating with whole numbers. Your child may use place value or a number line to order or compare whole numbers. The following is an example of the way place value is used to compare whole numbers.

The National Park Service reports that they maintain and service 242,755 acres of land at the national park in Badlands, South Dakota and 241,904 acres of land at the national park in Capitol Reef, Utah. Which of these national parks has more acreage?

2 4 **2**, 7 5 5

2 4 **1**, 9 0 4

2000 > 1000

242,755 > 241,904

Start at the left and compare digits in the same place value position. Look for the first place where the values are different.

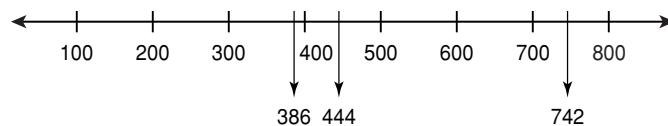
The national park in Badlands, South Dakota has more acreage than the national park in Capitol Reef, Utah.

When your child uses a number line to order numbers, make sure he or she first graphs the numbers correctly, then reads the graph from left to right. The numbers will be in order from least to greatest.

This is how your child will use a number line to order numbers.

Write the numbers in order from least to greatest.

444; 386; 742



The numbers in order from least to greatest are 386, 444, and 742.

Your child will be using estimation to find sums, differences, products and quotients. He or she may round to an indicated place value or use compatible numbers to estimate an answer to a problem. Here is how your child will use rounding to estimate a sum.

Estimate the sum by rounding to the place value indicated.

$10,826 + 16,115$; thousands

$$\begin{array}{r} 11,000 \\ +16,000 \\ \hline 27,000 \end{array}$$

Round up 10,826.

Round down 16,115.

The sum is about 27,000.

Here is an example using compatible numbers to estimate a product.

Mike earns \$5.85 an hour at the hardware store. He worked 29 hours last week. About how much money did Mike earn last week?

To find out how much money Mike earned, multiply his wage and the number of hours he worked.

$$\$5.85 \times 29 \rightarrow 6 \times 30$$

6 and 30 are compatible because they can be multiplied mentally.

$$6 \times 30 = 180$$

This is an overestimate.

Mike earned about \$180 last week.

Learning to find the value of numbers in exponential form is another concept that will be covered in this chapter. A number in exponential form is written with a base and an exponent. The exponent tells how many times to multiply the base by itself.

$$5^3 \text{ is written } 5 \times 5 \times 5$$

$$5^3 = 5 \times 5 \times 5 = 125$$

You have an important role in building your child's confidence and understanding in mathematics. Your continual support will make a noticeable difference in your child's learning.

Sincerely,

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Number Theory

Write the numbers in order from least to greatest.

1. 7,587; 6,742; 4,281; 408

2. 4,212; 3,698; 1,999; 999

3. 66,058; 66,842; 64,897; 6,442

4. 25,103; 22,503; 23,502; 25,306

Estimate each sum or difference by rounding to the place value indicated.

5. $63,765 - 32,874$; ten thousands

6. $2,347 + 5,981$; thousands

7. $54,879 + 89,201$; ten thousands

8. $7,803 - 2,963$; thousands

Write each expression in exponential form.

9. 6×6 _____

10. $2 \times 2 \times 2 \times 2 \times 2$ _____

Find each value.

11. 3^4 _____

12. 7^3 _____

13. 4^2 _____

14. 9^1 _____

15. 5^5 _____

16. 6^3 _____

17. Bobby started with one pet rabbit. Every 6 months the number of rabbits tripled. How many rabbits were there after 2 years? Explain your answer using exponents. (*Hint:* There are 2 six-month periods every year.)

Answers: 1. 408; 4,281; 6,742; 7,587 2. 999; 1,999; 3,698; 4,212 3. 6,442; 64,897; 66,058; 66,842 4. 22,503; 23,502; 25,103; 25,306 5. 30,000 6. 8,000 7. 140,000 8. 5,000 9. 6^2 10. 2^5 11. 81 12. 343 13. 16 14. 9 15. 3,125 16. 216 17. 3^4 or 81 rabbits in 2 years

CHAPTER

Family Fun

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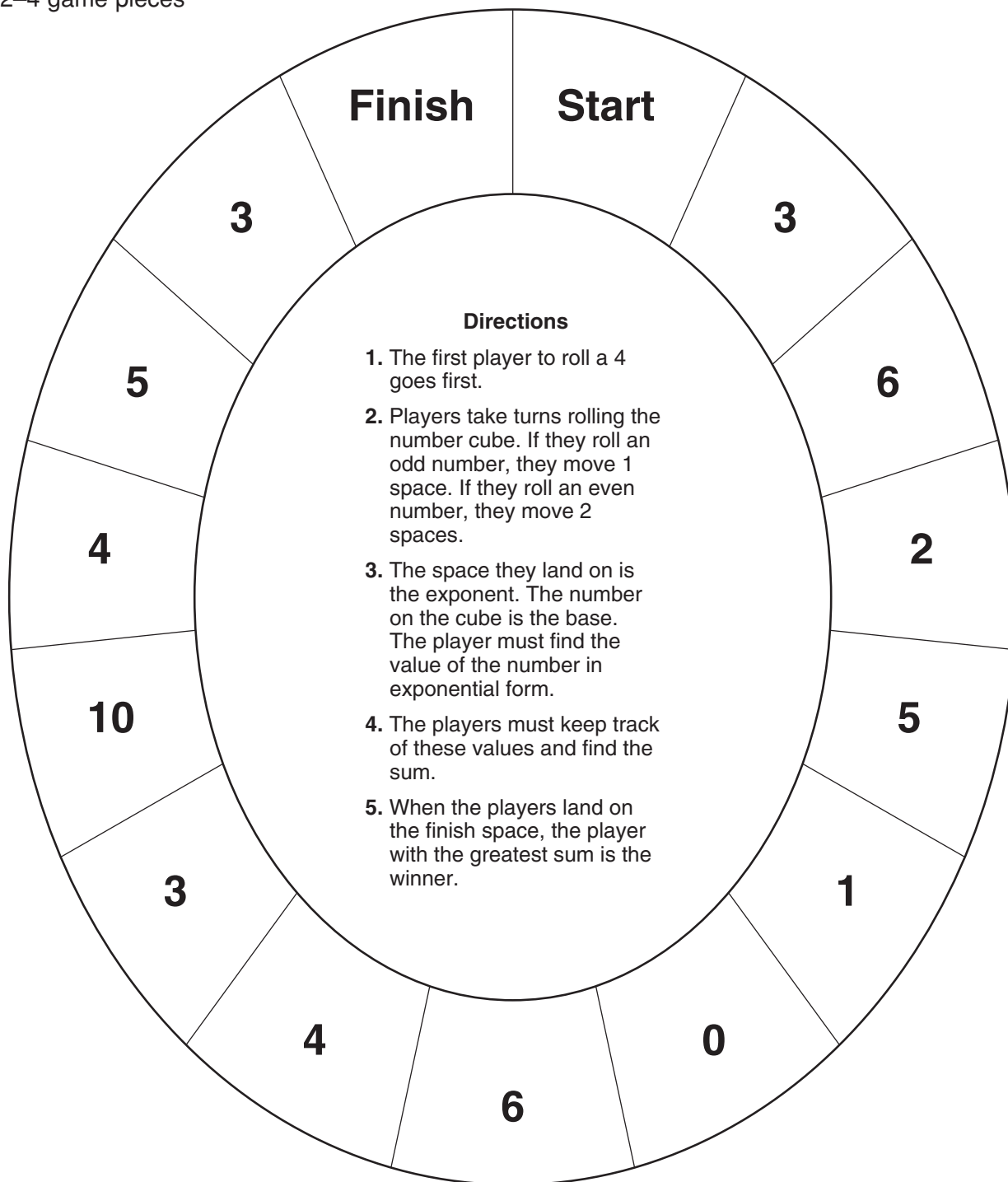
Exponential Excitement

Materials

Gameboard

1 number cube

2–4 game pieces



What We Are Learning

Number Theory

Vocabulary

These are the math words we are learning:

arithmetic sequence

a sequence in which the terms change by the same amount each time

Associative Property

Changing the groupings in addend factors does not change the sum or product.

Commutative Property

Changing the order of the addends or the factors does not change the sum or product.

Distributive Property

Numbers added or subtracted within a set of parenthesis can be multiplied by a number outside the parenthesis.

evaluate replace each variable in an expression with a number and then follow the order of operations

numerical expression

a mathematical phrase that includes only numbers and operation symbols

order of operations

1. Perform operations in parentheses.
2. Find the value of numbers with exponents.
3. Multiply or divide from left to right as ordered in the problem.

Dear Family,

Your child will need to practice following the order of operations to help her or him accurately solve many different types of problems. When there is more than one operation involved in a problem, your child will need to know which operation to do first. The steps your child needs to follow to solve multi-operational problems are listed below.

1. Perform operations in parentheses.
2. Find the value of numbers with exponents.
3. Multiply or divide from left to right as ordered in the problem.
4. Add or subtract from left to right as ordered in the problem.

Evaluate the expression $10 + 6(7 - 2)$.

$$10 + 6(7 - 2)$$

$$10 + 6 \times 5$$

Perform the operation inside the parentheses.

$$10 + 30$$

Multiply.

$$40$$

Add.

Your child will be learning three number properties he or she can use to solve problems mentally.

The **Commutative Property** is an ordering property. This allows you to add or multiply numbers in any order.

addition

$$5 + 7 = 7 + 5$$

multiplication

$$4 \times 8 = 8 \times 4$$

The **Associative Property** is a grouping property. You may group the numbers in any order as long as you are only adding or only multiplying. The numbers stay in place and only the grouping symbols move. This is an example of the associative property.

addition

$$(3 + 5) + 2 = 3 + (5 + 2)$$

multiplication

$$(5 \times 9) \times 4 = 5 \times (9 \times 4)$$

The **Distributive Property** allows you to multiply a sum by a number two different ways.

$$3 \times (4 + 6) = 3 \times (10) = 30$$

or

$$3 \times (4 + 6) = (3 \times 4) + (3 \times 6) = 12 + 18 = 30$$

4. Add or subtract from left to right as ordered in the problem.

sequence an ordered set of numbers

term a number in a sequence

As your child begins to solve problems, one of the most important steps is knowing how to choose the best method of computation. Sometimes your child might use compatible numbers or one of the number properties to solve a problem using mental math. Other times, your child might use paper and pencil or a calculator.

There are many times when a calculator is a much better choice than mental math or paper and pencil. Your child will learn how to decide which method is the most appropriate choice. Be sure to ask your child **WHY** he or she chose a particular method to compute.

A strategy called *Find a Pattern* will also be introduced. Your child will learn to recognize, describe, and extend a pattern in a given sequence. One sequence that is easily recognizable is the sequence of **perfect squares**. Your child will learn that a perfect square is a whole number raised to the second power. Examine the following sequence:

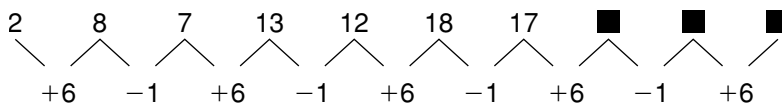
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, ...

The sequence is the first 12 whole numbers raised to the second power. Ask your child to name the next term in this sequence. Your child should tell you that the next term is 13^2 or 13 raised to the second power, which equals 169.

Your child will use the four basic mathematical operations to determine the pattern of a sequence.

Identify the pattern in the sequence and name the next 3 terms.

2, 8, 7, 13, 12, 18, 17, ■, ■, ■



The pattern is to add 6 to the term for the next term and then subtract 1 to get the term after that. The next three terms are 23, 22, and 28.

Playing mental math games with your child will help your child exercise his or her problem solving skills. Your enthusiasm and support in your child's math activities will help to build confidence and understanding.

Sincerely,

CHAPTER

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Family Letter

Number Theory

Evaluate each expression.

1. $5 \times 6 \div 3 + (5 + 9)$

2. $8 + (9 \div 3)^2 - 10$

3. $4^2 - (16 \times 2 \div 8)^2$

Use mental math to find each sum or product.

4. $5 + 12 + 15 + 8$

5. $10 \times 2 \times 3 \times 5$

6. $49 + 64 + 11 + 26$

Use the Distributive Property to find each product.

7. 7×35

8. 9×41

9. 3×73

Which computation method would you use, mental math or a calculator, to solve the following problems?

10. For her fruit salad recipe, Suzie needs 45 apples, 21 pears, 18 plums, 19 oranges and 43 grapes. How many pieces of fruit does she need?

11. Out of 798 students, 302 made the honor roll. How many students did not make the honor roll?

Identify a pattern in each sequence and name the next three terms.

12. 4, 20, 100, 500, ■, ■, ■, ...

13. 5, 16, 27, 38, ■, ■, ■, ...

Identify a pattern in each sequence and name the missing terms.

14. 3, 9, ■, ■, 43,046,721, ... _____

15. 1, 8, 2, ■, 4, 32, ■, 64, ... _____

Answers: 1. 24 2. 7 3. 0 4. 40 5. 300 6. 150 7. 7 8. $(9 \times 40) + (9 \times 1) = 360 + 9 = 369$ 9. $(3 \times 70) + (3 \times 3) = 210 + 9 = 219$ 10. calculator 11. mental math 12. multiply each term by 5 to get the next term: 2,500, 12,500, 62,500 13. add 11 to each term to get the next term: 49, 60, and 71 14. square each term; 81 and 6,561 15. multiply one term by eight and divide the next term by four; 16 and 8

CHAPTER

1

Family Fun

Operation Riddle

Solve each expression. Match the answer with the letter code below to find the answer to the following question.

Question: What is a cool place in which people compete?

Answer: _____

E	S	M	W	L	Y	N	T	R	P	C	I	O
2	4	68	25	0	28	9	96	27	16	1	5	300

Solve each expression.	Answer	Letter
$(2 + 4) \times 5 - 14 + 9$		
$8 \times 3 \div 2 - (21 \div 3)$		
$6 + 2 + 3 \times 3 - 8$		
$(7 - 1) + 6 \times (2 + 13)$		
$3 \times 4 - 8 + 5 - 7$		
$(20 + 7) \div 9 \times (13 - 4)$		
$5^2 \times (47 + 13) \div 5$		
$4 \times 4 \times 4 - (12 \div 3)^3$		
$30 - 8 \div 4$		
$(10^2 - 2^5)$		
$19 + 21 - 14 - 5 \times 2$		
$10 - (2 + 3)$		
$(8 + 17) \div (2 + 3)^2$		
$48 \div (4^2 - 4)$		