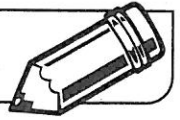


**LESSON**  
**1·2****Rows and Columns**

A rectangular array is an arrangement of objects in rows and columns. Each row has the same number of objects, and each column has the same number of objects.

Work with a partner to build arrays. For each array, take turns rolling dice. The first die is the number of rows. Write this number in the table under Rows. The second die is the number of cubes in each row. Write this number under Columns. Then use centimeter cubes to build the array on the dot grid. How many cubes are in the array? Write this number under Array Total on the dot grid table.

•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			

•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			
•	•	•	•	•	•			

**LESSON**  
**1•3****Factoring Numbers with Cube Arrays**

Use centimeter cubes to build arrays for the following numbers. With each array write the **factor pair**. Remember that the number of rows in the array is one **factor** and that the number of columns in the array is the other **factor**.



Continue to build every possible array until you have all of the factors for the number.

**1.** 14

Factors: \_\_\_\_\_

**2.** 8

Factors: \_\_\_\_\_

**3.** 10

Factors: \_\_\_\_\_

**4.** 20

Factors: \_\_\_\_\_

**5.** 33

Factors: \_\_\_\_\_

**6.** Can you tell when you have all of the factors for a number before you have built every possible array?

\_\_\_\_\_ Explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Try This**

**7.** Write three true statements about factors.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**LESSON**  
**1·2**

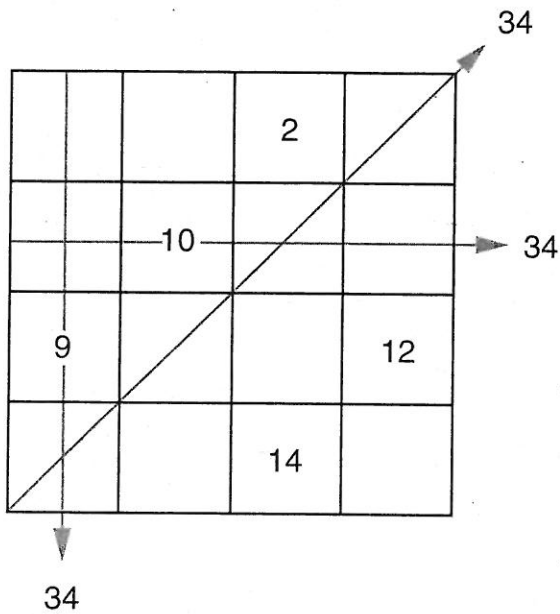
**Magic Square and Heterosquare Arrays**



A rectangular array is an arrangement of objects in rows and columns. The objects in an array can be numbers or numerical expressions. The Multiplication/Division Facts Table on the inside front cover of your journal is an example of numbers arranged in an array. The objects can also be words or symbols that represent elements of a given situation. For example, a plan for after-school snacks could be arranged in a 1-by-5 array, using *A* for apple, *B* for banana, and so on.

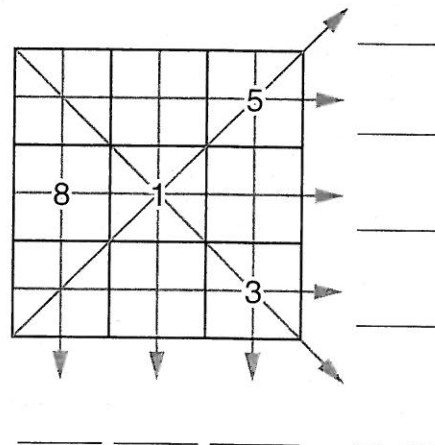
A magic square is an array of positive whole numbers. The sum of the numbers in each row, column, and diagonal will be the same.

1. Complete this magic square.

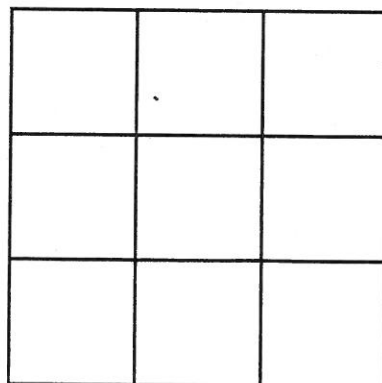


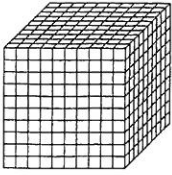
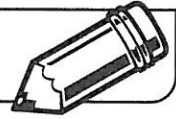
A heterosquare is like a magic square, except that the sum of the numbers in each row, column, and diagonal are different. A 3-by-3 array for a heterosquare will have an arrangement of the numbers 1–9.

2. Complete this heterosquare, and write the sum for each row, column, and the two diagonals.

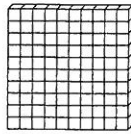


3. Create a magic square or heterosquare for your partner to solve.

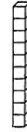


**LESSON**  
**1•5**
**Divisibility by 4**


1,000 cubes



100 cubes



10 cubes



1 cube

1. What number is shown by the base-10 blocks? \_\_\_\_\_
2. Which of the base-10 blocks could be divided evenly into 4 groups of cubes?

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3. Is the number shown by the base-10 blocks divisible by 4? \_\_\_\_\_

4. Circle the numbers that you think are divisible by 4.

324      5,821      7,430      35,782,916

Use a calculator to check your answers.

5. Use what you know about base-10 blocks to explain why you only need to look at the last two digits of a number to decide whether it is divisible by 4.

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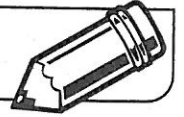


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Name \_\_\_\_\_

Date \_\_\_\_\_

Time \_\_\_\_\_

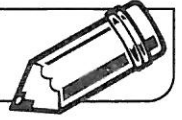
**LESSON**  
**1•6****Goldbach's Conjecture** *continued*

Write each number below as the sum of two prime numbers.

4 <u>2 + 2</u>	6 _____	8 _____	10 _____	12 _____
14 _____	16 _____	18 _____	20 _____	22 _____
24 _____	26 _____	28 _____	30 _____	32 _____
34 _____	36 _____	38 _____	40 _____	42 _____
44 _____	46 _____	48 _____	50 _____	52 _____
54 _____	56 _____	58 _____	60 _____	62 _____
64 _____	66 _____	68 _____	70 _____	72 _____
74 _____	76 _____	78 _____	80 _____	82 _____
84 _____	86 _____	88 _____	90 _____	92 _____
94 _____	96 _____	98 _____	100 _____	102 _____

**LESSON**  
**1•7**

# Completing Patterns



Build these patterns with counters. Draw the dot pattern that comes next and record the number of dots in the pattern.

**Example:**



**1.**



**2.**



**3.**

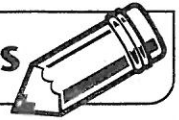


**4.** Write a description of the pattern in Problem 3.

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**LESSON**  
**1•8****Comparing Numbers with Their Squares**

1. a. Unsquare the number 1.  $\frac{\quad}{\quad^2} = 1$   
b. Unsquare the number 0.  $\frac{\quad}{\quad^2} = 0$
2. a. Is 5 greater than or less than 1? \_\_\_\_\_  
b.  $5^2 =$  \_\_\_\_\_  
c. Is  $5^2$  greater than or less than 5? \_\_\_\_\_
3. a. Is 0.50 greater than or less than 1? \_\_\_\_\_  
b. Use your calculator.  $0.50^2 =$  \_\_\_\_\_  
c. Is  $0.50^2$  greater than or less than 0.50? \_\_\_\_\_
4. a. When you square a number, is the result always greater than the number you started with? \_\_\_\_\_  
b. Can it be less? \_\_\_\_\_  
c. Can it be the same? \_\_\_\_\_
5. Write 3 true statements about squaring and unsquaring numbers.

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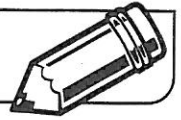
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**LESSON**  
**1•9**

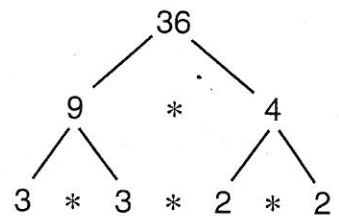
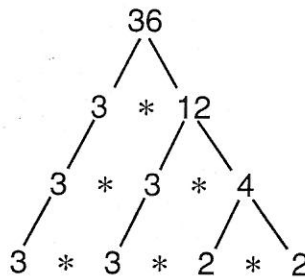
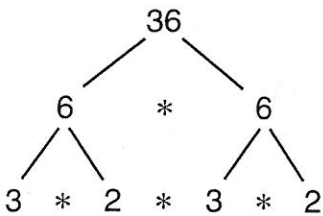
# Using Factor Trees



## Factor Trees

One way to find all the prime factors of a number is to make a **factor tree**. First write the number. Then, underneath, write any two factors whose product is that number. Then write factors of each of these factors. Continue until all the factors are prime numbers.

Below are three factor trees for 36.



It does not matter which two factors you begin with. You always end with the same prime factors—for 36, they are 2, 2, 3, and 3. The **prime factorization** of 36 is  $2 * 2 * 3 * 3$ .

Make a factor tree for each number. Then write the prime factorization for each number.

24

50

24 = \_\_\_\_\_

50 = \_\_\_\_\_

48

100

48 = \_\_\_\_\_

100 = \_\_\_\_\_