

NUMBER THEORY

7

Name: Key Date: \_\_\_\_\_ Period: \_\_\_\_\_

SECTION 7.2 PRIME AND COMPOSITE NUMBERS

VOCABULARY

| DEFINITION   | EXAMPLE  |
|--|--|
| Prime number: An integer greater than 1 with only two positive factors: 1 and itself   | 2, 3, 19   |
| Composite: An integer greater than 1 with more than 2 positive factors                 | 8, 15  |
| Square number: An integer that can be written $n^2 = n \cdot n$ for some integer $n$ . | $25 = 5^2 = 5 \cdot 5$<br>$36 = 6^2 = 6 \cdot 6$ |

**Big Idea:** How do we determine if a number is prime or composite? What are the divisibility rules?

EXAMPLE 1

Is 117 prime or composite? Explain how you determine your answer.

Composite. 117 is divisible by 3.  
 $117 = 3 \cdot 39$

PROBLEM 1

Is 127 prime or composite? Explain how you determine your answer. Prime.



Answers will vary.  
127 is not divisible by any number 1-126

**PROBLEM 2**

Is 119 prime or composite? Explain how you determine your answer.

*Composite.*

$$119 = 7 \cdot 17$$

**EXPLORATION 1**

How do you know that a number is divisible 2? 3? 4?... 10? Think of rules that could be used to determine divisibility, and fill in the table below.

| A number is divisible by: | Rule  |
|---------------------------|---|
| 2                         | <i>Number is even. Last digit is 0, 2, 4, 6, or 8.</i>  |
| 3                         | <i>Sum of the digits is divisible by 3.</i>             |
| 4                         | <i>Last two digits (as a number) is divisible by 4.</i> |
| 5                         | <i>Last digit is 0 or 5.</i>                            |
| 6                         | <i>Number is divisible by 2 and 3.</i>                  |
| 8                         | <i>Last 3 digits as a number is divisible by 8.</i>     |
| 9                         | <i>Sum of the digits is divisible by 9.</i>             |
| 10                        | <i>Last digit is 0.</i>                                 |

EXPLORATION 2

In small groups or individually, determine whether the following numbers are prime or composite. Try to devise as many time-saving strategies as you can, so you don't have to check every integer between 1 and the target number.

a. 87

composite  
3 · 29

b. 131

prime

c. 323

composite  
17 · 19

PRACTICE EXERCISES

1. For each of the following numbers, find all of the factors of the numbers. Circle the prime factor in each. Indicate how you obtained your answers.

a. 45

b. 23

c. 16

d. 63

e. 37

a. 1, 3, 5, 9, 15, 45

$45 = 3 \cdot 15$     $15 = 3 \cdot 5$

b. 1, 23

23 is prime

c. 1, 2, 4, 8, 16

$16 = 2 \cdot 8$     $8 = 2 \cdot 4$     $4 = 2 \cdot 2$

d. 1, 3, 7, 9, 21, 63

$63 = 3 \cdot 21$     $21 = 3 \cdot 7$

e. 1, 37

37 is prime.

2. Are any of the values in exercise 1 prime? If so, how did you determine they were prime?

Yes. They had no factors besides 1 and themselves.  
(see exercise 1)

3. Determine whether each of the following numbers is prime or composite? List all the factors if the number is composite,

a. 181      b. 546      c. 785      d. 2361      e. 209

a. prime

b. composite      1, 2, 3, 6, 7, 13, 14, 21, 26, 42, 78, 91, 182, 273, 546

c. composite      1, 5, 157, 785

d. composite      1, 3, 787, 2361

e. composite      1, 11, 19, 209

**SUMMARY (What I learned today)**

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