

# Factors, Divisibility and Relatively Prime

## Summary

Identify factors of a number. Determine whether a number is prime or composite. Identify common factors given two numbers. Find pairs of numbers that are relatively prime.

## Main Core Tie

Mathematics Grade 4

[Strand: OPERATIONS AND ALGEBRAIC THINKING \(4.OA\) Standard 4.OA.4](#)

## Materials

Divisibility rules foldable on colored paper for each student

50 color tiles for each student pair

Calculators

Investigation worksheet- "[Relatively Prime With Color Tiles](#)"

Journal page- "[Defining Relatively Prime](#)"

## Background for Teachers

Enduring Understanding (Big Ideas): Every number can be written as the product of factors. Numbers that are relatively prime have only 1 as their common factor.

## Essential Questions:

How can divisibility rules be used to find factors for a number?

How can factors help us compare numbers?

How does the meaning of "relatively prime" differ from the meaning of "prime"?

Skill Focus: Find factors for numbers and determine whether two numbers are relatively prime.

Vocabulary Focus: Factor, divisible, prime number, composite number, relatively prime.

Ways to Gain/Maintain Attention (Primacy):

Small group discussion , manipulative, sketching, writing on foldable, technology, game.

## Instructional Procedures

### Starter:

Anne, Bea, Cecilia and Dori found a secret staircase leading to the cellar. Nobody used it for a long time, so it was covered with dust. The girls ran down on it as fast as they could: Anne stepped on every other step, Bea used every 3rd step, Cecilia used every 4th step, and Dori used only every 5th step. There are a total of 40 steps on this staircase, and everybody started from the step on top. How many steps have still no footprints on them after the girls ran down? Which steps are they?

Use the starter to review vocabulary such as factors, prime numbers.

Lesson Segment 1: How can divisibility rules be used to find factors for a number? When can knowing a divisibility rule be useful?

Have student fold the attached [divisibility foldable](#) on the dotted line and cut flaps on the solid lines just to the dotted line forming the four-flap foldable. Review divisibility and deepen meaning for students by associating the divisibility rules with place value as described below. Have students use calculators to check their hypotheses. Remind students that divisible means divisible with no remainder. Suggest the two if-then statements, having students use calculators to quickly check the examples. Then, ask students to write these if, then statements on the very back of the foldable and

generate an example for each. Select several students to share their examples with the class. These general statements can be written on the back of the foldable along with the other examples.

#### If-Then Statements and Divisibility Rules

Statement# 1 If a number is divisible by a given factor, then all the multiples of that number are divisible by that factor as well. (If  $n$  is a factor of  $a$ , then  $n$  is a factor of  $a \cdot b$ ). Ex. If 10 is divisible by 2, then  $10 \times 10$  (100), 1,000, etc are also divisible by 2.

Statement #2 If two numbers are each divisible by a factor, their sum is also divisible by that factor.

Ex. 3 is a factor of 30. 3 is a factor of 27. So, 3 is a factor of  $30 + 27$  or 57.

Divisibility by 2: Every ten is divisible by 2. And, since 100 is a multiple of 10 and 1,000 is a multiple of 10 (statement 1), there is only one place we need to look to decide whether the number is divisible by 2. The one's place must be divisible by 2. Which numbers from 0-9 are divisible by 2? Have students write the rule for divisibility by 2 under the flap of the foldable and write 3 numbers that are divisible by 2.

Divisibility by 3: Write each place in the number 1,111 using distributive property.  $1(999 + 1) + 1(99 + 1) + 1(9 + 1) + 1(1)$ . Our decimal system is based on multiples of 10.  $9 + 1$  is 10. All the 9's and multiples of 9 (statement 1) are divisible by 3. The sum of all the 1's must be a multiple of 3, so only the sum of all the 1's need be checked for divisibility by 3. Try 3,261:  $3(999 + 1) + 2(99 + 1) + 6(9 + 1) + 1(1)$ . How many 1's are there?  $3(1) + 2(1) + 6(1) + 1(1) = 12$ . 12 is divisible by 3, so 3,261 is divisible by 3.

Divisibility by 5: Every ten is divisible by 5. Since all other places are multiples of 10 (statement 1), only the ones place must be checked for divisibility by 5. What numbers from 0-9 are divisible by 5?

Divisibility by 10: All numbers from the tens place and greater are multiples of 10 and are thus divisible by 10 (statement 1). Only the one's place must be checked for divisibility. What numbers from 0-9 are divisible by 10

Lesson Segment 2: How does the meaning of "relatively prime" differ from the meaning of "prime"? The attached investigation worksheet, "[Relatively Prime With Color Tiles](#)" leads students to build meaning for factors, divisibility, prime numbers and relatively prime. It is a good basis for discussion with the class. Have students work with a partner to do one item on the worksheet. Pairs should compare and discuss their response with another pair (Pairs-Share). As you listen to the student's focused conversation, look for ways to clarify thinking and meaning. Following the discussion, have students complete the Frayer Model for [defining "relatively prime"](#) and the practice problems on that same paper.

#### Lesson segment 3: Practice

Play Team Challenge. Each team writes two numbers which are at least 2 digits. The team should find all of the factors listed in the foldable for which each number is divisible and determine whether the two numbers are relatively prime or not. A team is called on to challenge the class by writing their numbers on the overhead and asking the class to find the factors from the foldable and to decide if they are relatively prime. The other teams in the class are given a minute to discuss and record the problem. The challenging team then chooses one person to answer. If that person gives the correct answers, their team earns a point. If not, the challenging team tells the answers, and their team earns a point

Appropriate text practice may be assigned.

#### Assessment Plan

Performance task, observation.

#### Bibliography

This lesson plan was created by Linda Bolin.

Authors

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