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# Game 9
# IT'S ALL RELATIVE!

**Materials**

- Index cards
- Internet random-number generator
    - Internet sites for the random-number generator:
        http://www.mathgoodies.com/calculators/random_no_custom
        http://www.randomlists.com/random-numbers
- Whiteboard or Smartboard (optional)

**Learning Standards for Mathematics Concepts**

- Number sense
- Prime and relatively prime numbers
- Multiples and factors

## – Overview –

Students use their knowledge of prime numbers, relatively prime numbers, factors, and multiples to match a randomly-generated number with a number they have chosen. A prime number has no factors other than itself and 1. Relatively prime numbers are two or more numbers that share no factors other than 1.

## – The Game –

Distribute 10 index cards to each student. A student randomly picks 10 numbers between 1 and 100 and writes each number on a different index card. Activate a random-number generator or generate your own numbers. As the random number appears on the board, have students look at the numbers on their index cards to see if they have a number that is relatively prime to it. They have one minute to test their numbers. Upon finding a number, the student raises the card with the relatively prime number. When the minute is up, each student with a raised card must justify to the class why she/he chose that number. If she/he is correct, that card is turned over. Another number is generated on the board. The process continues until 15 minutes is up. The winner is the student with the most cards turned over.

## – Variations –

a. Same as above, except students look among their index cards to see if they have a multiple of the number on the board.

b. Same as above, except students look among their index cards to see if they have a number that shares a factor, other than 1, with the number on the board. The number on the index card may not be the shared factor with the number on the board.

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## Questions for Further Discovery

1. Given any two numbers, how would you describe their relationship?

   Do they share any factors other than 1? If yes, is one a multiple of the other? If no, they are relatively prime.

2. Are there any other categories, other than the ones in the above activities that could describe the relationship between any two numbers?

   One number is a power/root of the other numbers.
   Examples: 9 and 81, $81 = 9^2$, 9 is the square root of 81 and 81 is the square of 9.
   3 and 27, 27 is the cube of 3 and 3 is the cube root of 27.

3. Is a prime number relatively prime to every number?

   No. It is not relatively prime to multiples of itself.

4. Can you think of 3 or more numbers that are relatively prime?

   25, 49, 64

5. What is the largest group of numbers you can come up with that are relatively prime?

   Answers will vary.

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