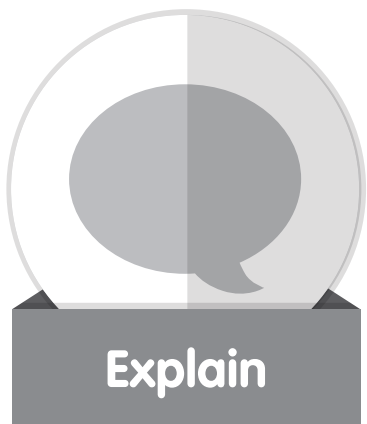
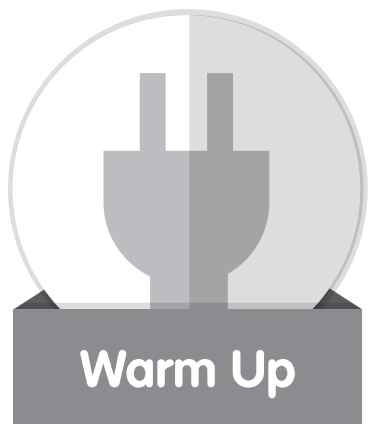


MATH GAMES

FOR THE COMMON CORE

Grade 4

Operations • Algebraic Thinking • Base Ten • Fractions



Gail Gerdemann with Kathleen Barta

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The Multiplication Master

GAME
4-1

Learning Objectives

Make number patterns that follow a given rule. Analyze the patterns.

Content Standard

Generate a number . . . pattern that follows a given rule . . .
(CCSSM: 4.OA.5)

Math Vocabulary

- *constant amount of change*
- *number sequence*
- *pattern*
- *sequence*
- *term (of a sequence)*

General Vocabulary

English	Spanish
<i>predict</i>	<i>prediga</i>

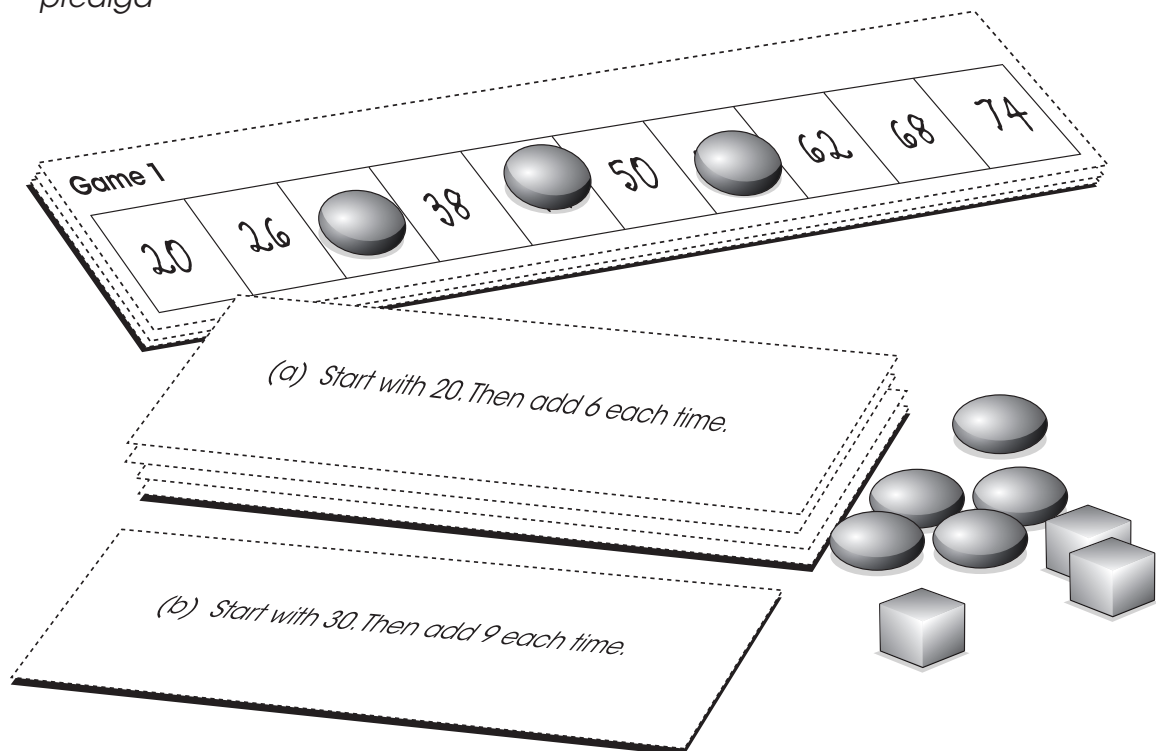
Materials

For each student:

- "Guess My Secret" Game Board (page 46)
- 10 cubes or other markers, 3/4 inch or smaller

For each pair of students:

- Game Cards (page 47)
- Alternate Game Cards (page 48)
- Game Rules, if needed after presentation (page 63)



Explaining the Game: Guess My Secret

Number of Players: 2

Object: Players guess their partner's secret number pattern and the rule with the least number of clues.

How to Play:

Each player:

- Writes a number pattern on the game board that follows a rule.
Note: Game cards are provided with ideas for patterns. Use is optional. However, patterns should be limited to growing or shrinking patterns. Begin with patterns that use only one operation (addition or subtraction).
- Covers each number of the pattern with a cube.

Then Player A:

- Uncovers two numbers on Player B's game board.
- Predicts what a third number will be and uncovers it.
- If the player's prediction is correct, continues to guess and uncover numbers.
- States the rule at any time. If the rule:
 - Is correct, Player A wins the round.
 - Is not correct, it is Player B's turn.
- Player B repeats steps 1-4 with the pattern on Player A's game board.

Example with Player B's pattern:

(3, 8, 13, 18, 23, 28, 33, 38, 43, 48)

Player A uncovers:



Player A points to a covered number (see arrow) and predicts, "I think this is 18."

That is correct, so Player A gets to keep guessing covered numbers.

At any time Player A can state the rule.



Differentiation

More Support

- Use Alternate Game Cards (page 48) for basic pattern ideas.



More Challenge

- Give students several numbers, parts of a pattern, that are multiples of a certain number, plus a decade number.

For example: 37, 44, . . . , 65 (multiples of 7, plus 30: $7 \times 1 + 30, 7 \times 2 + 30, \dots, 7 \times 5 + 30$) or 66, 74, . . . , 98 (multiples of 8, plus 50).

- ~ Ask students to figure out a start number and a rule that would generate the numbers you give them, as well as other numbers.
- ~ The start number must be different from the first number given.
- Have students choose a pattern with a constant amount of change.
 - ~ Predict the 20th term. Then check it.
 - ~ Predict the 100th term. Try to find a way to check it without making a list of terms.
- Have students create their own start number and rule.
 - ~ Use multiplication or division.
 - ~ Predict the 10th term. Then check it.

Deepening the Understanding

Ask the class:

If four consecutive terms in a sequence are:

... 18, 25, 32, 39 ...

- What is the next number?
- What number comes before 18?
- What is the constant amount of change? Use math terms to explain how you know.

Mathematical Practices (CCSSM)

- MP6 Attend to precision.
- MP7 Look for and make use of structure.
- MP8 Look for and express regularity in repeated reasoning.

For any sequence, if your rule or constant amount of change is "add 5," what qualities or properties will the numbers in your sequence have? Why? Use math terms to explain your ideas.

(Note: The digit in the ones place will alternate between two digits: one even and one odd. There will be two numbers in each "decade" — for example, 23 and 28 are in the same decade.)

What are some other interesting qualities you found in other sequences you made/guessed today?

- MP2 Reason abstractly and quantitatively.
- MP6 Attend to precision.

What is an example of a rule that will generate only even numbers in the pattern? Only odd numbers? Only numbers ending in 0? No numbers ending in 0? Only multiples of 3? No multiples of 3? etc.

- MP1 Make sense of problems and persevere in solving them.
- MP7 Look for and make use of structure.

After a student shares an idea, ask the class if they agree or disagree and why.

- MP3 Construct viable arguments and critique the reasoning of others.

