ANALOGIES

Thinking strategies to enhance skills of analysis, creativity, and problem solving.

DOMINO ANALOGIES

Lesson Description: Students work in small groups to determine the analogous relationships among sets of dominos, state the relationship(s) in words and numbers, and generate relationships to share with others. When students generate analogies, they possess a more sophisticated structure for generating creative ideas. Students make use of several Habits of Mind with analogies: persisting; thinking flexibly; striving for accuracy; questioning and problem posing; thinking and communicating with clarity and precision; creating, imagining and innovating; remaining open to continuous learning; and thinking interdependently.

Pre-assessment/Prior Knowledge:

- Students have indicated a basic understanding of the Questioning strategy through the introductory lesson (p. 21).

SOL/POS Objective:
Math PSA 4
Develop and apply operations and strategies to solve a wide variety of non-routine and multi-step routine problems.
Math PSA 6
Solve problems by working collaboratively with peers; entertain other's points of view. (PSA 5)
Share, explain (verbalize/record) and justify (defend) reasoning during and after solving a problem.
Math PSA 7
Verify and interpret results with respect to the original problem situation. Compare and analyze solution paths (process used to solve problems).
Math PSA 3
Identify information that is available but not needed to solve a problem or additional information needed to solve a problem.
Math 6.8
Solve problems by using a logical procedure (a plan).
Math PSA 5, PSA 6, PSA 7
Verify and interpret results with respect to the original problem situation. Compare and analyze solution paths (process used to solve problems).
Math 3.24, 4.21, PFA 1
Recognize, describe, predict, extend, and create patterns of objects, pictures, charts of numbers, and simple number patterns.

Instructional Strategy:
Identifying Similarities and Differences- Students explore mathematical concepts through analogies.

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Materials:

- set of double six dominos for demonstration
- Transparencies 1 & 2 (pp. 121, 122)
- Student Handouts 1, 2 (pp. 123, 125)
- *Try It!* (p. 127)

Enduring Understanding:

- Analogies help us understand new concepts.
- Analogies help us visualize our thinking.
- Analogies help us see the world in a new way and discover new ideas.
- Analogies provide opportunities for us to persist at our thinking and problem solving.

Introduction/Essential Questions:

- How do analogies assist in understanding new concepts?
- How do analogies help you to visualize your thinking?
- Why and how do analogies help you develop new ways to see and discover new ideas?
- How do analogies help you become a self-directed learner?

Teach and Explore Strategy:

- Ask the class: "Since analogies compare two items in order to discover a perceived resemblance or similarity, how can we find analogies with numbers or number concepts?" *Pause for think time.*
- "Let's compare two unlike things: area and parallel lines; squares of numbers and fractions; mean and exponents. Does anyone have other ideas?" (Allow for discussion.)
- As you complete Transparency 1 with the class, reveal each analogy one at a time, as students determine the analogous relationships. Write the ideas offered by the students on the board.
- Uncover the Solution for Transparency 1 (solution process is printed at the bottom of the Transparency) to see which of the ideas offered would complete the analogies.
- Complete Transparency 2 with the class in similar fashion as you did Transparency 1. Be careful not to expose the solution at the bottom of the page, until you have ideas generated from the class documented on the board.
- Pass out Analogies Handouts 1 & 2. Have students work in small groups to solve the Analogies and write the analogy in the box in the middle of page of each Handout. Go over the solutions with the class.
- Distribute the handout *Try It!* as groups finish Handouts 1 &2. Allow each student to create their own analogies and trade with their classmates.

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Assessment Evidence:

- Class discussions
- Teacher observations
- Completed products and sharing
- Student discussions

Metacognition:

- How do analogies facilitate you in becoming a self-directed learner?
- What Habits of Mind did you access to solve the analogies?
- What Habits of Mind did you access to create your own analogies?
- How do analogies help you in other aspects of your life?
- How and why do analogies assist you in math?

Extensions:

- Create other analogies in other units studied in math.
- Have students explain and write analogies for younger students.

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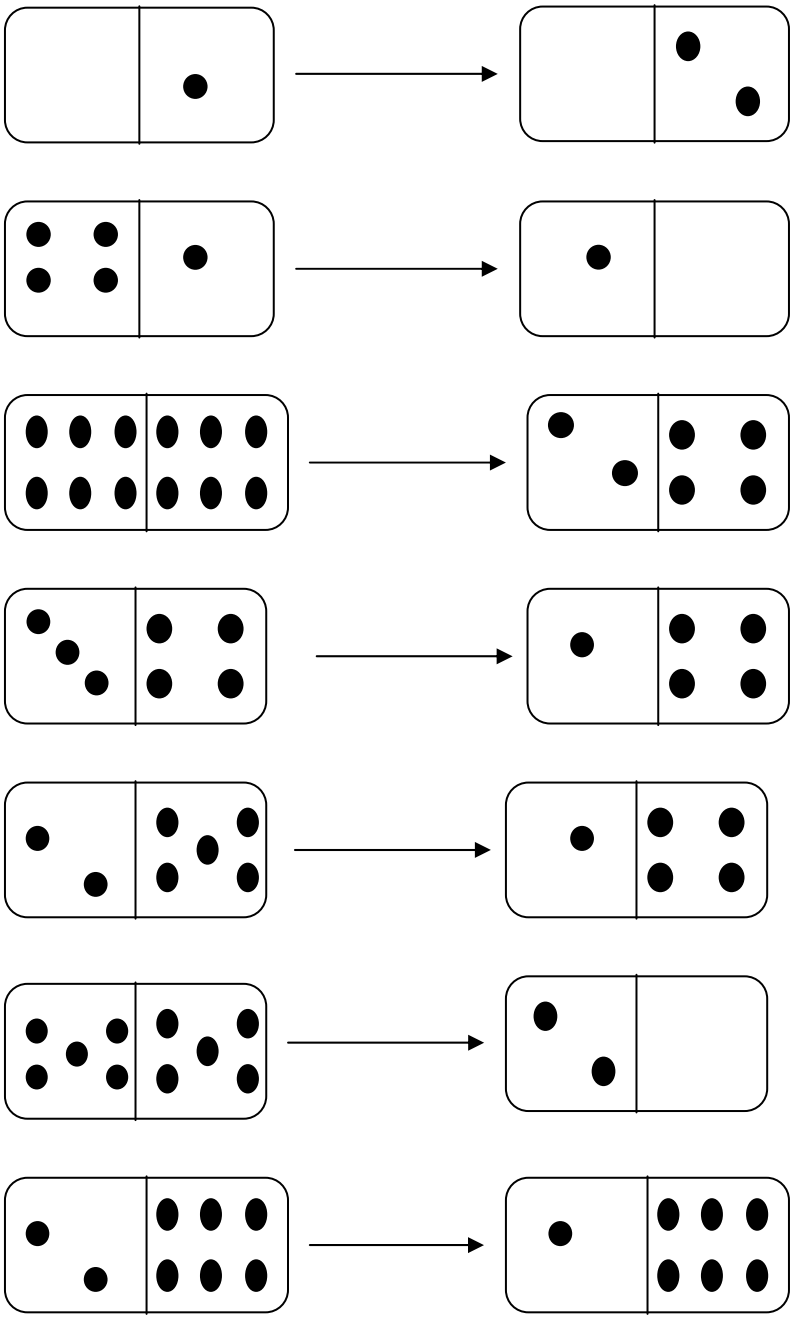
Determine the analogy from the following relationships.



Domino Analogy
Transparency 1

Solution: Add both sides of the first domino together and double the answer. The result on the second domino is in place value.

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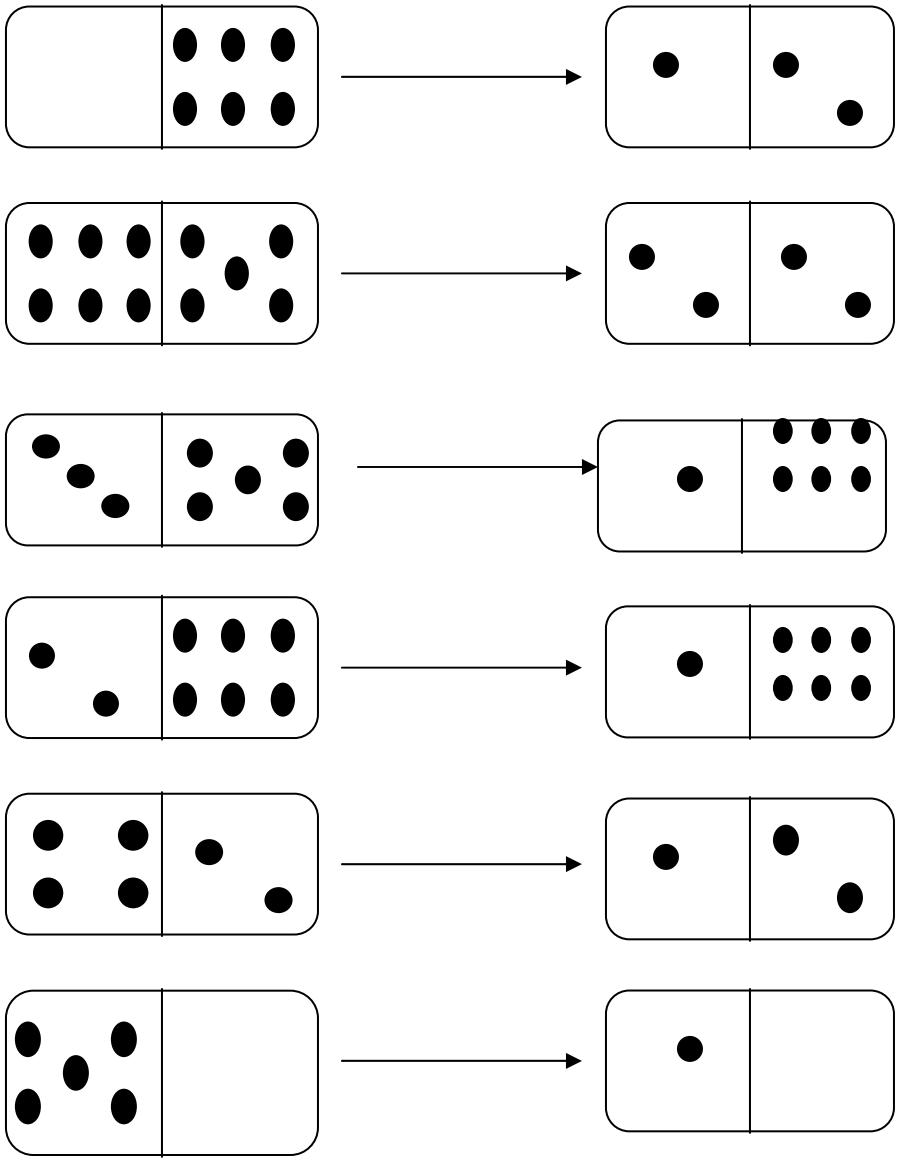
Solve the following relationships.



Solution: Add the sides together and double that sum. The solution domino is the sum in place value positioning.

Domino Analogy
Transparency 2

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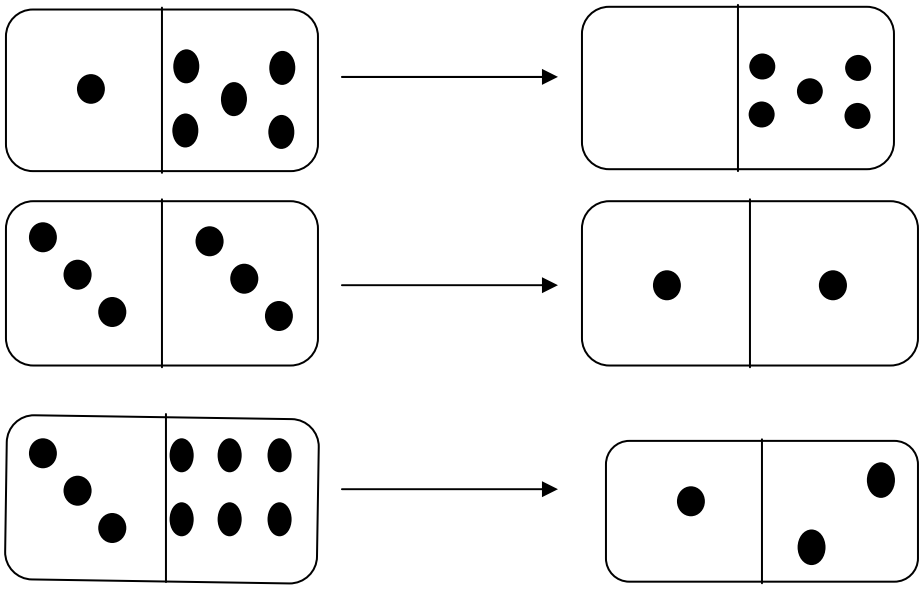
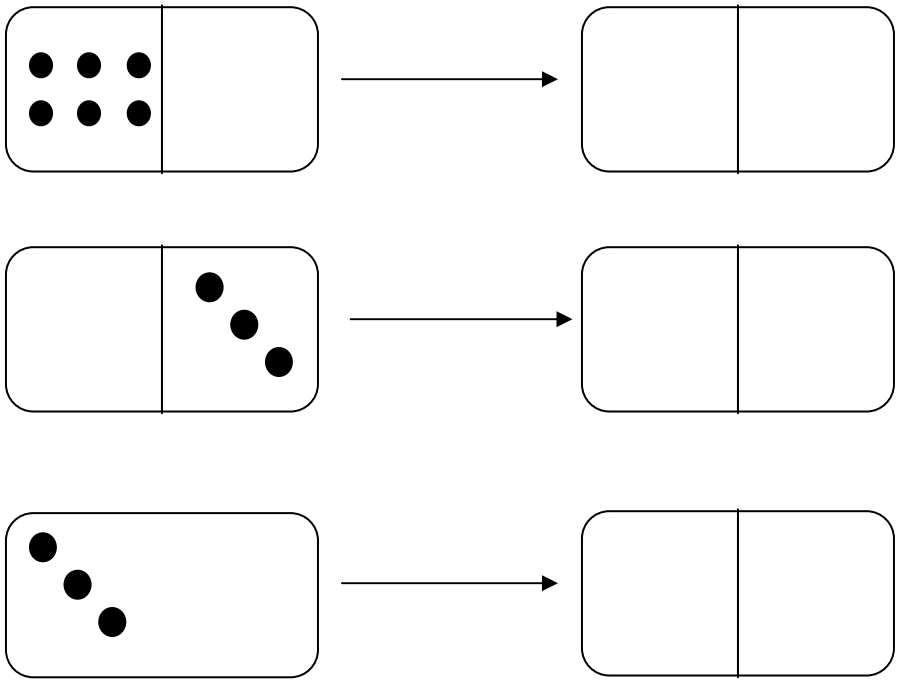


Explain the analogy in the space and complete the following domino analogy.



Domino Analogy Student Handout 1

ANALOGIES

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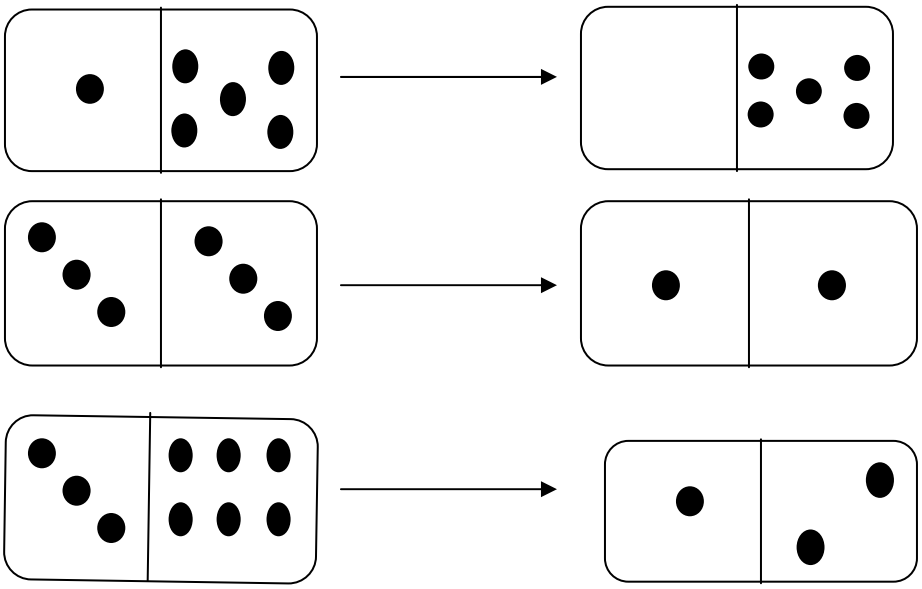
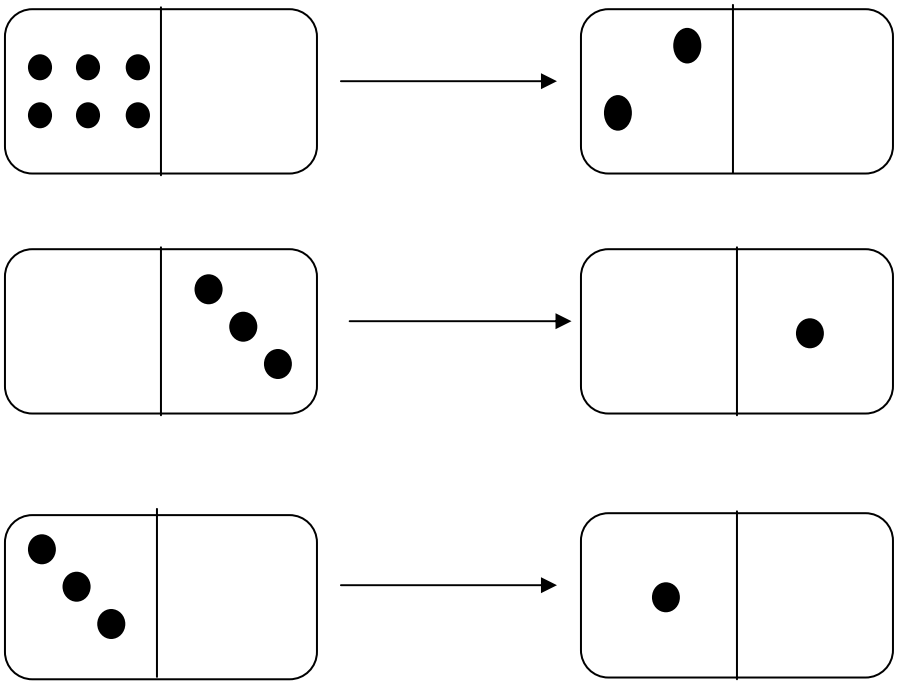


Explain the analogy in the space and complete the following domino analogy.
Left domino is place value. Right domino is divided by 3, in place value.



Domino Analogy Student Handout 1 Key

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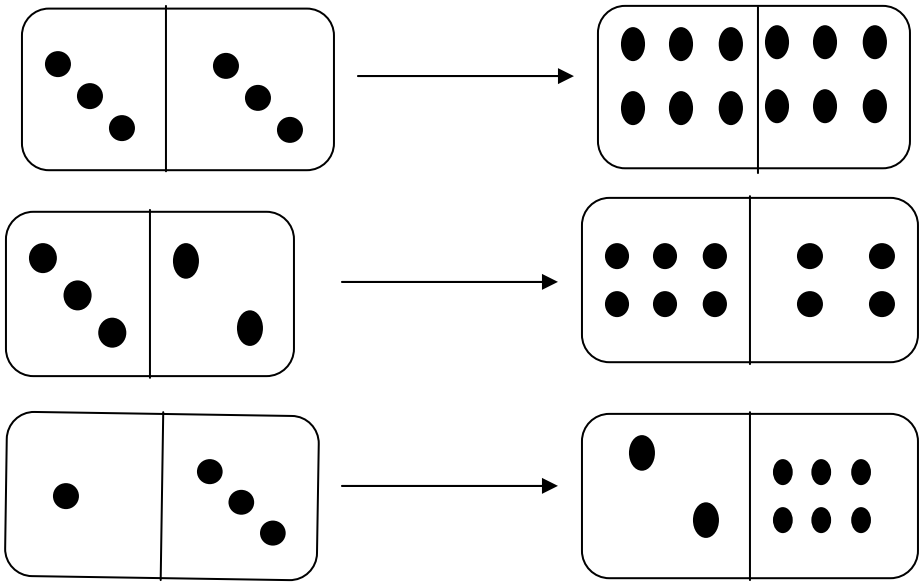
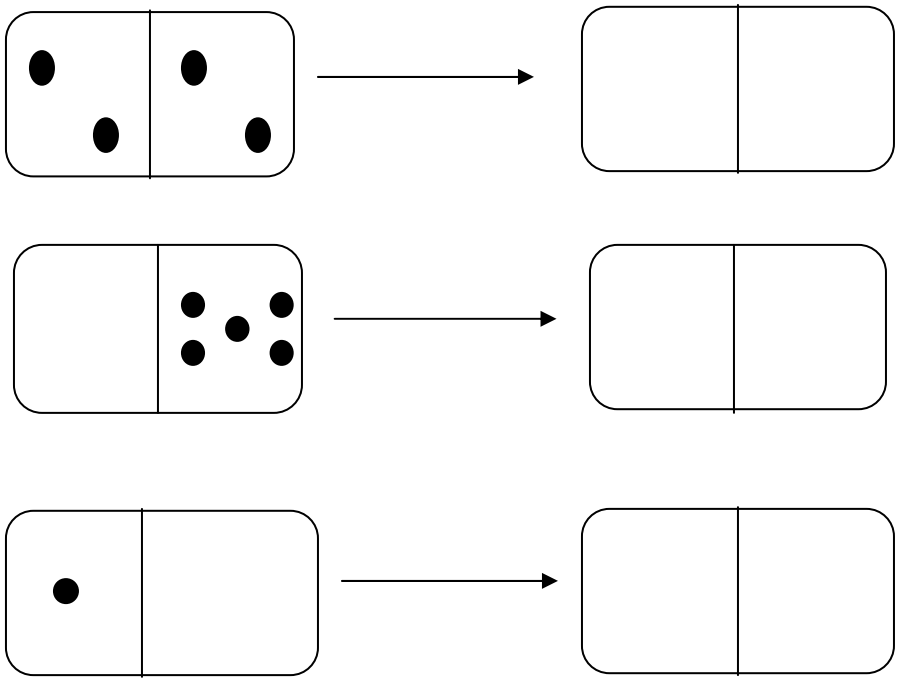


Explain the analogy in the space and complete the following domino analogy.



Domino Analogy Student Handout 2

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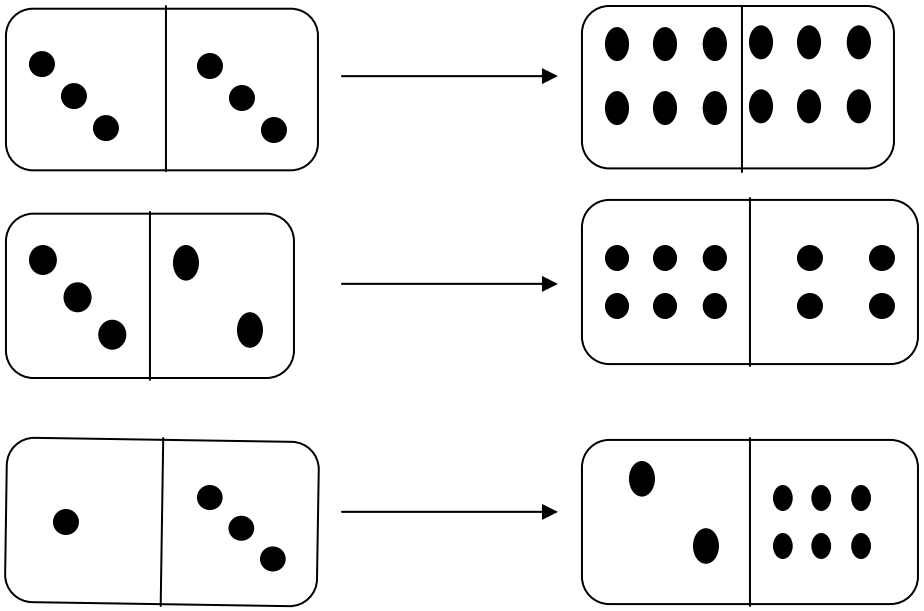
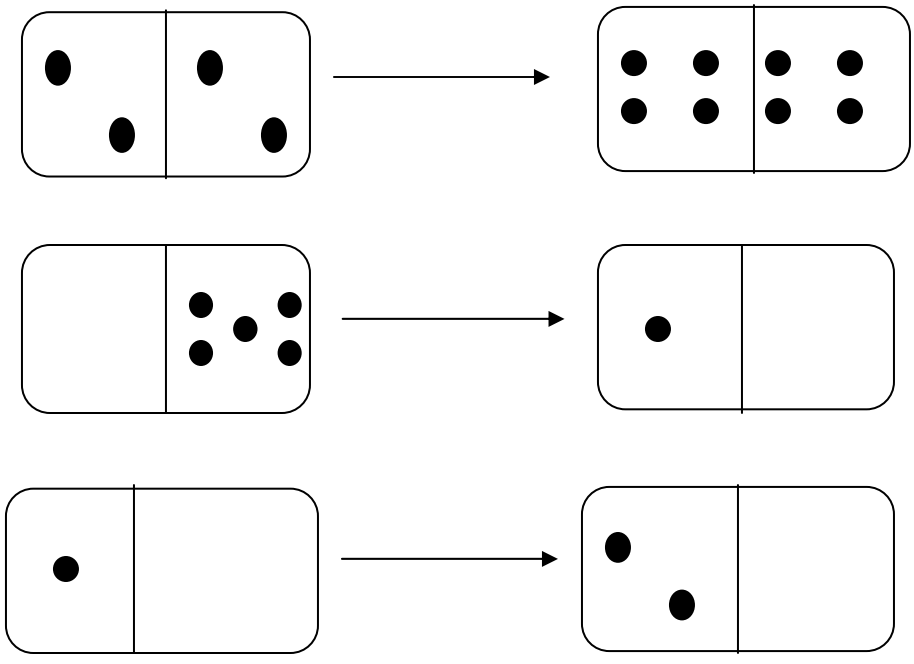


Explain the analogy in the space and complete the following domino analogy.
Left domino is place value. Right domino is double, in place value.



Domino Analogy Student Handout 2 Key

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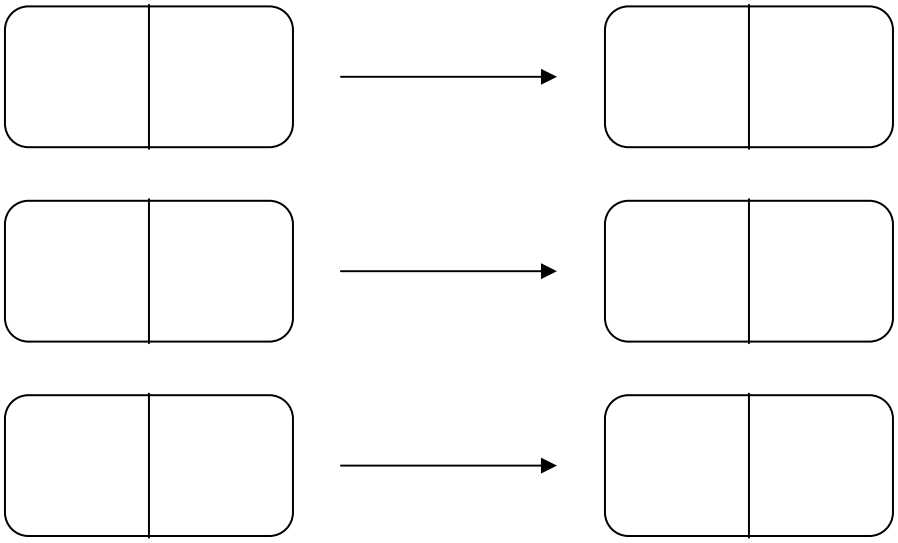
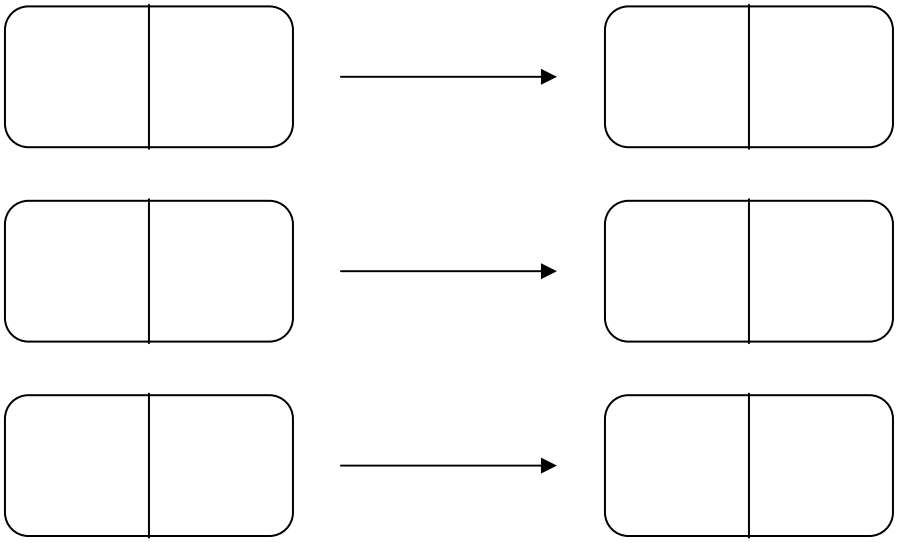
TRY IT!

Think of an analogy and give three examples of it.



Ask a classmate to solve your analogy. Be careful. There may be several solutions.



Domino Analogy: *Try It!*