In this lesson, the workshop model is used to provide students with the opportunity to problem-solve through reasoning. Various approaches can be used to solve the problem, which can lead to a prime opportunity to engage in math discourse.

Standards:

* 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
* 7EE B4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
* (With extensions) 8FB4 Construct a function to model a linear relationship between two quantities.
* (With extensions) HSFBFA1 Write a function that describes a relationship between two quantities.\*

* [CCSS.MATH.PRACTICE.MP1](http://www.corestandards.org/Math/Practice/MP1/) Make sense of problems and persevere in solving them.

#### [CCSS.MATH.PRACTICE.MP2](http://www.corestandards.org/Math/Practice/MP2/) Reason abstractly and quantitatively.

#### [CCSS.MATH.PRACTICE.MP3](http://www.corestandards.org/Math/Practice/MP3/) Construct viable arguments and critique the reasoning of others.

#### [CCSS.MATH.PRACTICE.MP4](http://www.corestandards.org/Math/Practice/MP4/) Model with mathematics.

#### Thinking Strategy Foci:

#### Creating a Mental Model

#### Making Inferences

Elephants walking along the trails

Are holding hands by holding tails.

Trunks and tails are handy things,

When elephants walk in circus rings.

Elephants work and elephants play.

And elephants walk along the way.

And when they walk it never fails

They're holding hands by holding tails.

**Lesson Hook: (3 minutes) – Read aloud!**

Elephants and Squares!

**DEBRIEF: (10 minutes)**

Ask selected pairs of students to share out their thinking; make sure to select pairs who used differing approaches to the task.

On index cards, ask students to answer the following question: “How did CREATING A MENTAL MODEL help you to think about the task? How did MAKING INFERENCES help you to think about the task?”

**Work Time: (37 minutes)**

Materials needed: Poster paper, colored markers, colored tiles, index cards

Hand out the student worksheet. Ask students to CREATE MENTAL MODELS and MAKE INFERENCES to describe the pattern that they see.

* Begin by having students (working in pairs) select a pattern, and write what they notice about their pattern.
* Then ask students to illustrate the growth of the pattern using colored tiles, using colors to show how they see the pattern increasing during each iteration.
* After they’ve used tiles, ask students to use MENTAL MODELS and MAKE INFERENCES to communicate what they’re thinking with others. Their thinking should be clear on their posters.
* As students work, walk around the room noting approaches students are taking.
* As students finished, ask them to hang their posters grouped according to selected pattern.
* After students hang their posters, ask them to visit at least 2 other posters, and either 1) make a comment on the poster about something they appreciate/agree with, or 2) ask a question about something that may be unclear on the poster.

**Mini-Lesson: (10 minutes)**

Put the following prompt on the board: “I wonder…..when elephants are walking in a line, how many trunks & tails are being HELD, and how many are NOT being held? Doesn’t it depend on the number of elephants? Could I predict the number HELD, based upon how many elephants are in a row?

Do a think-aloud, focusing on CREATING MENTAL MODELS and MAKING INFERENCES. Suggestion: Start by drawing pictures and counting, then move to a table with specific values, then try to generalize about what I see.

Construct Simple Equations to Solve Problems by Reasoning