

# Foundations of MDC

## **Five Strategies of Assessment for Learning**

1. Clarifying and sharing learning intentions and criteria for success.
2. Engineering effective discussions, questions, and learning tasks that elicit evidence of learning.
3. Providing feedback that moves learners forward.
4. Activating students as the owners of their own learning.
5. Activating students as instructional resources for one another.

## **Big Idea of Assessment for Learning**

Students and teachers

Using evidence of learning

To adapt teaching and learning

To meet immediate learning needs

Minute-to-minute and day-by-day

## **Productive Struggle**

“The five key ingredients are designed to ensure that students are engaged in a productive struggle with mathematics rather than on the receiving end of a lecture.” -Dr. Ann Shannon, 2012

## **Common Core State Standards for Mathematical Practice**

- 1) Make sense of problems and persevere in solving them.
- 2) Reason abstractly and quantitatively.
- 3) Construct viable arguments and critique the reasoning of others.
- 4) Model with mathematics.
- 5) Use appropriate tools strategically.
- 6) Attend to precision.
- 7) Look for and make use of structure.
- 8) Look for and express regularity in repeated reasoning.

# CCRS in Action – Puzzling Problems

## **Overview**

Puzzling Problems involves students in cooperative groups working on basic problem solving or a rich task that involves multiple components. This strategy provides students the opportunity to work through mathematical problems collaboratively. The idea was adapted from a lesson shared by Bob Trammel, math consultant, Indiana.

## **Teacher Directions**

1. Enlarge a word problem or task to fit on one sheet of cardstock. Cut the problem into puzzle pieces. The number of pieces can correspond to the number of students per group, or you can give each student multiple pieces of the same puzzle.
2. Give each student a puzzle piece or pieces.
3. Two or more students must match their puzzle pieces to form a problem to solve.
4. As a learning group, students select a strategy to solve the problem.



## **Student Directions**

1. Match your puzzle pieces with other similar pieces to form a problem to solve.
2. (Think/Write) Individually record all of the possible strategies that could be utilized to solve the problem.
3. (Pair) As a learning group, select an appropriate strategy and solve.
4. (Share) Your team must be able to construct a viable argument with respect to your strategy and solution.

# CCRS in Action – Puzzling Problems

## Reflection

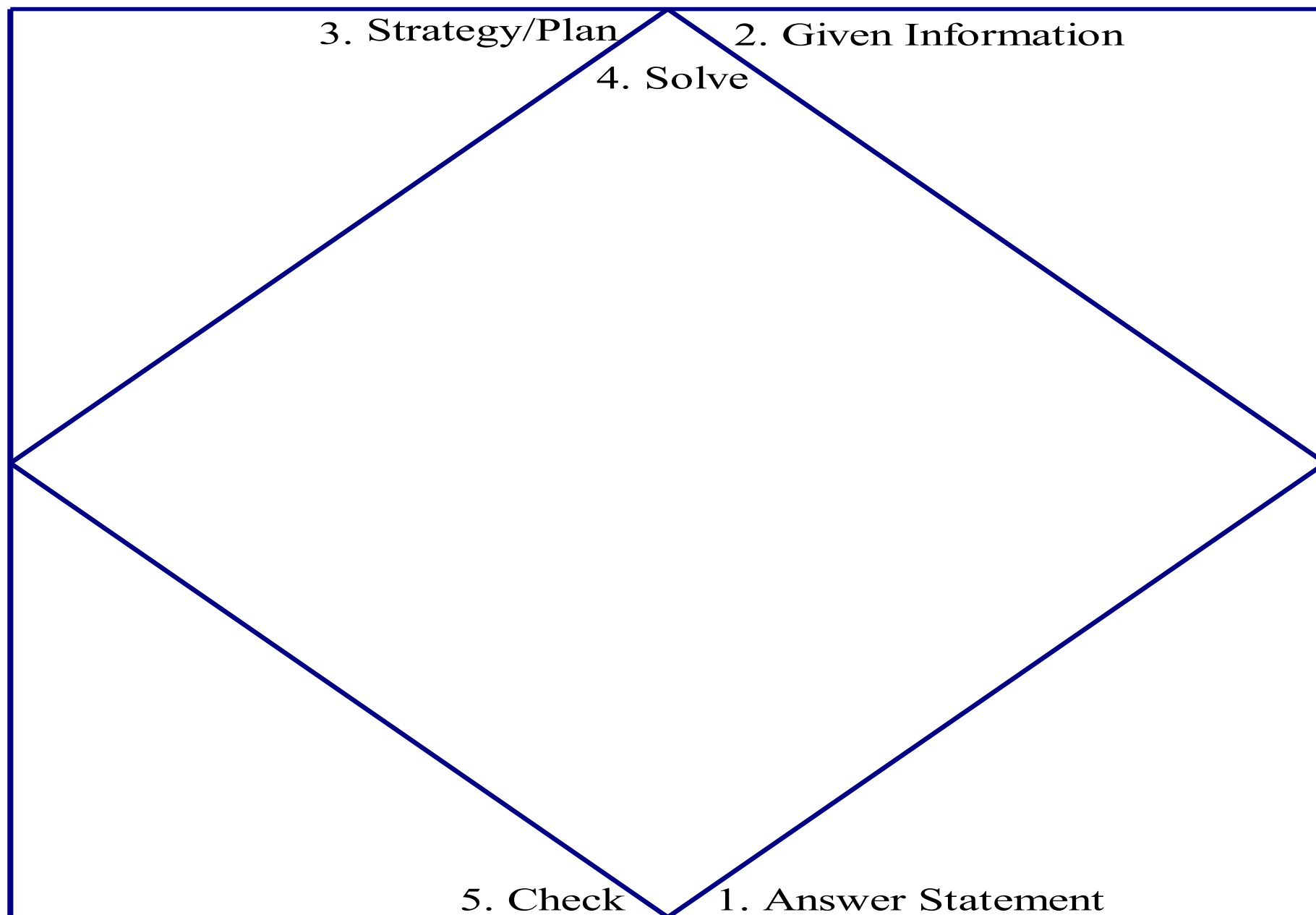
What **content knowledge** must students have to solve the Puzzling Problems?

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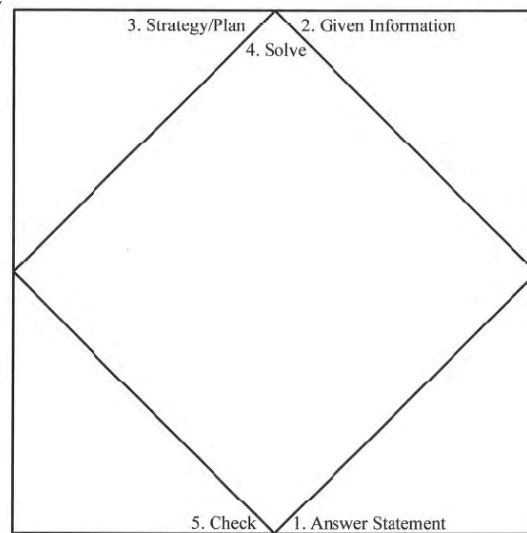
What **mathematical practices** must students use to solve the Puzzling Problems?

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# Problem Solving Process



# Problem Solving Process



## 1. Answer Statement

- Hint: The question usually appears as the last sentence of the problem. Students can cover the other information and focus on the last line to determine what the problem is asking. (Note: If the question is not here, go to the preceding line until it is found.)
- Write the question as an answer statement and leave a blank for the solution.

## 2. Given Information

- Hint: Use the same process of covering everything and view each sentence separately.
- Determine and record relevant information from the problem.

## 3. Strategy/Plan

- Students will use this space to state additional ideas they have for the problem. This may include other information they know about the problem, possible strategies for getting started, estimations for the solution, constraints, predictions, etc.
- NOTE: This is the section that allows students to formulate their own ideas about the problem and provides a place for them to create their own meaning about what is being asked.

## 4. Solve

- Students select a strategy (translate verbal statements into mathematical statements, draw a picture, make a table, etc.) and solve.
- NOTE: Students can compare this to the estimation to determine the reasonableness of their answer.

## 5. Check

- Students check their answers by substitution or by using another method to justify.
- NOTE: Once the answer has been checked, write the answer in the blank from step #1.