

# Exemplars Problem Solving Process

## Leading Questions for Teachers

Use in Connection with [Stop Light Sheet](#)

See [Polya's four-step approach](#) to problem solving.

### Understand the Problem

#### **1. Read the Problem - 1st Read**

- a. Students read problem to yourself
- b. The teacher reads it outloud
- c. Summarize - Retelling
  - i. Ask a student to retell the story in their own words. "What is this problem about? What seems to be going on?"
  - ii. Have student focus on the larger, overarching question

#### **2. Read the Problem again - 2nd Read**

- a. **What's the Question? What problem are we trying to solve?**
  - i. Think - Pair - Share
  - ii. 30 seconds silent think time - **What are we trying to solve?**
  - iii. Tell your buddy - The buddy tries to restate what their partner said.
  - iv. Help who is lost.

#### **b. What's the Question?**

- i. Have someone state what they believe the problem is they need to solve for the whole class.
- ii. Have someone else restate what that student just said
- iii. **Ask students to provide a Problem Statement**

##### **1. "I need to ... (find...)" "I have to..."**

- a. Put this on the board for class.
- b. Ask for other ideas.
- c. Kids write problem statement on their sheet as the 1st sentence of communication.

#### **3. Read the Problem again - 3rd Read**

#### **a. What information do we have?**

- i. Work with students to define what information we have been given.
- ii. What information do we need that we do not have?

## Think of Your Plan

### 4. Connections

- a. Have we worked on a similar problem before?
- b. How was it similar? How was it different?
- c. What approach was helpful?
- d. What have we learned that will be useful in solving this problem?
  - i. Formulas
  - ii. Algorithms
  - iii. Strategies
- e. Was that method effective?
- f. Was that method efficient?

### 5. Organize the Data

- a. Can we draw, organize or represent what is going on in this problem?

### 6. Create a plan

- a. 30-45 seconds silent think time - "What strategy can you use?"
  - i. Then turn to buddy and say
    1. **"My plan is to ..."** or **"I will..."**
  - ii. Next, ask students to explain their partner's plan. Requires students to really listen to each other.
    1. "What's your partner's plan? Who can explain their partners strategy?"
  - iii. Put strategies up on the board. Leave these up during class -
    1. Put student's name on the board who offered strategy so others in the class will remember who to talk to as they work if they need help with a strategy.
    2. Student has to state the because. (Why do they think this is a viable strategy)
    3. Teacher can do quick mini lesson to explain a strategy students may not have thought of yet. (Optional)
- b. Ask students to write their strategy on their page
  - i. **"My plan is to ..."** or **"I will..."**
  - ii. May need to write more than one sentence if the problem requires multiple steps to find a solution.

## **Solve the Problem**

### **7. Carry out the Plan - Make an Attempt to Solve the Problem**

- a. Students work independently or with partners or teams to solve the problem.
- b. Various strategies may be attempted.
- c. Teacher's role is to ask [probing questions](#),
  - i. Review the question students are working to solve
  - ii. Review the information provided in the task
  - iii. What was their original strategy?
  - iv. Does their work make sense?
  - v. What are the challenges with their work so far?
  - vi. Does their current strategy make sense?

## **Present your Solution**

### **8. Put your solution into writing**

- a. Students organize their work to clearly show their solution strategy.
- b. Students explain the steps of their solution pathway.
- c. Students provide a representation to help show and clarify their mathematical thinking for the reader.
- d. Answer is clearly shown and labeled.
- e. Mathematical language is utilized by the student to clarify their thinking.

After some work time...

### **9. Share Student work - Math Discourse**

- a. Have students share their strategies and explain their math work so far. Students do not need to have a final answer.
  - i. Choose strategically which work to show in what order.
  - ii. Select common strategy to show first
  - iii. Select more sophisticated next
    1. Draw connections between strategies
      - a. How are they similar?
      - b. How are they different?
- b. Allow other students to ask clarifying questions
- c. Discuss progress of students showing work and possible next steps.

## **Make A Connection**

### **10. Discuss math connections**

- a. Make connections explicit with the kids at first.

- b. What mathematical concepts connect with this problem?
- c. What underlying math concepts are needed to solve this problem?
- d. Can they solve it another way?
- a. How are the different solution strategies connected or related?
- e. Can they create a formula, rule or algebraic equation to define their solution?

### **11. Discuss Representations**

- a. Ask for suggestions on what type of representation may help students work towards an answer.
- b. Place potential representation strategies on the board.
- c. Provide a representation binder with different representations highlighting different strategies.

### **Look Back**

#### **12. Completing Final Project**

- a. Review Student rubric to self assess.
- b. Have they achieved Practitioner for each of the levels?
- c. Is their work complete?
- d. Did they show all of their thinking?
- e. Did the student clearly show their answer?
- f. Is the writing clear, concise, easy to follow and understandable from start to finish?
- g. Does the work need any clarification?
- h. Have they labeled their representation?