PROBLEM SOLVING STRATEGIES FROM GEORGE POLYA

George Polya identified four principles that form the basis for any serious attempt at problem solving:

1. Understand the problem
   · What are you asked to find out or show?
   · Can you draw a picture or diagram to help you understand the problem?
   · Can you restate the problem in your own words?
   · Can you work out some numerical examples that would help make the problem more clear?

2. Devise a plan
   A partial list of Problem Solving Strategies include:
   - Guess and check
   - Solve a simpler problem
   - Experiment
   - Draw a picture or diagram
   - Model the Situation
   - Look for a pattern
   - Work backwards
   - Use deduction
   - Make a table
   - Use a variable
   - Change your point of view

3. Carry out the plan
   · Carrying out the plan is usually easier than devising the plan
   · Be patient – most problems are not solved quickly nor on the first attempt
   · If a plan does not work immediately, be persistent
   · Do not let yourself get discouraged
   · If one strategy isn’t working, try a different one

4. Look back (reflect)
   · Does your answer make sense? Did you answer all of the questions?
   · What did you learn by doing this?
   · Could you have done this problem another way – maybe even an easier way?
Let’s Practice!
Guess and Check

Here is an example of a *Guess and Check* problem:

Ruby visited her Uncle Jerry’s farm. There are cows and chickens on the farm. Ruby noticed that there were a total of 59 heads and 198 feet among them. How many cows and how many chickens did her Uncle Jerry have?

<table>
<thead>
<tr>
<th>Guess No.</th>
<th>Number of Cows</th>
<th>Number of Chickens</th>
<th>Total number of heads</th>
<th>Total number of feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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Let’s Practice!
Look for a Pattern

Here is an example of a Look for a Pattern problem:

Edith arranged buttons in a triangular shape as shown.
How many buttons will there be in a triangle that has 12 rows?

<table>
<thead>
<tr>
<th>Row</th>
<th>Number of Buttons</th>
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</thead>
<tbody>
<tr>
<td>1 layer</td>
<td>1</td>
</tr>
<tr>
<td>2 layers</td>
<td>3</td>
</tr>
<tr>
<td>3 layers</td>
<td>6</td>
</tr>
</tbody>
</table>
Here is an example of a *Make a List or Table* problem:

Beryl’s car can travel at a top speed of 55 miles per hour on the highway. Her sister Sue’s car can only travel 45 miles per hour on the highway. If the Sue leaves two hours early, how many hours will it take for Beryl to catch up to Sue?

<table>
<thead>
<tr>
<th>CAR</th>
<th>1 hr</th>
<th>2 hrs</th>
<th>3 hrs</th>
<th>4 hrs</th>
<th>5 hrs</th>
<th>6 hrs</th>
<th>7 hrs</th>
<th>8 hrs</th>
<th>9 hrs</th>
<th>10 hrs</th>
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</thead>
<tbody>
<tr>
<td>SLOW</td>
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<td>FAST</td>
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</table>
Let’s Practice!
Make a Drawing

Here is an example of a Make a Drawing problem:

A snail is climbing up the school’s flagpole. Each day the snail climbs 11 feet. Unfortunately, it rains every night. When it rains, the snail slips back down 4 feet. How many days will it take the snail to reach the top of the flagpole, which is 55 feet high?
Let’s Practice!
Modeling the Situation

Here is an example of a *Modeling the Situation* problem:

Irene was given 48 stones. She wanted to arrange them into a rectangle in her garden. How many different rectangular arrangements are possible using 48 stones?
Let’s Practice!
Solve a Simpler Problem

Here is an example of Solve a Simpler Problem:

Bill is building a shed. He needs nails to put up the siding. Bill shops at Hill’s Hardware where he can purchase nails by the scoop from a larger container. It costs $2.99 for ½ pound of nails. The salesperson gave him a scoop of nails that measured .62 pound. What should it cost to purchase the scoop of nails for the shed?