

PBL - The Ternary Weight System

A simple class to weigh - on a balance with 2 cups - a given integer value using a ternary weight set:

1, 3, 9, 27, 81, 243, ...

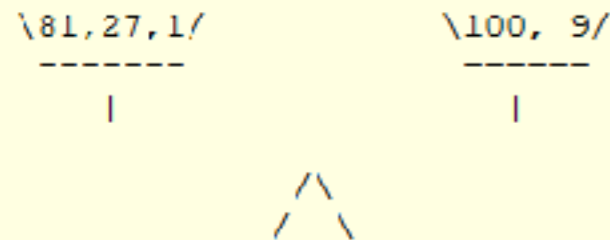
Input (on the command line) should be a valid integer value

If there is no valid integer value input on the command line then the default value of 100 will be used.

The output will be a text string on `System.out` of the form:

```
To weigh 100 in right cup of balance, one needs to place the ternary weights in the left (L) and right (R) cups as follows -  
L : 81  
L : 27  
R : 9  
L : 1
```

This is to represent the balance in the state:



TO DO: Develop this application (in whatever language you wish) and demonstrate your best Problem Solving Skills

Hint 1 -Polya - How To Solve It

Step 1: Understand the problem.

Requirements Can you validate a solution?

Step 2: Devise a plan (translate).

There are problem solving strategies (a tool box)

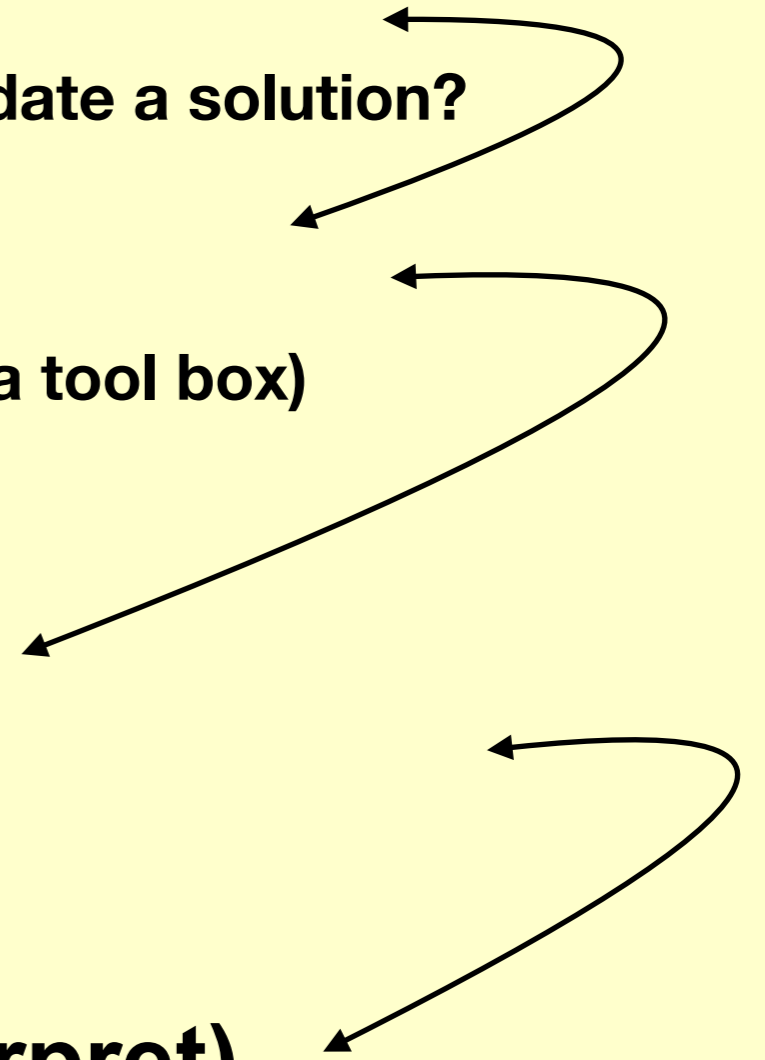
Design

Step 3: Carry out the plan (solve).

Implementation

Step 4: Look back (check and interpret).

Test



Hint 1 -Polya - How To Solve It

Step 2: Devise a plan (translate).




DRAW A PICTURE/ACT IT OUT

- ★ Draw a picture, have people play roles, or use manipulatives to act the problem out.
- ★ Manipulate your materials to find the solution to the problem.
- ★ Remember—different pictures might all lead to the correct solution.
- ★ Label the steps as you work out the problem.

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Hint 1 -Polya - How To Solve It

Step 2: Devise a plan (translate).



GUESS AND CHECK

- ★ Think of an answer that might work, and then test your guess.
- ★ If your guess isn't right, think about how you can change it to get closer to the answer.
- ★ Write down your guesses so you can start seeing patterns, and use the information to make revised guesses.
- ★ Repeat until you reach the exact answer.

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Hint 1 -Polya - How To Solve It

Step 2: Devise a plan (translate).



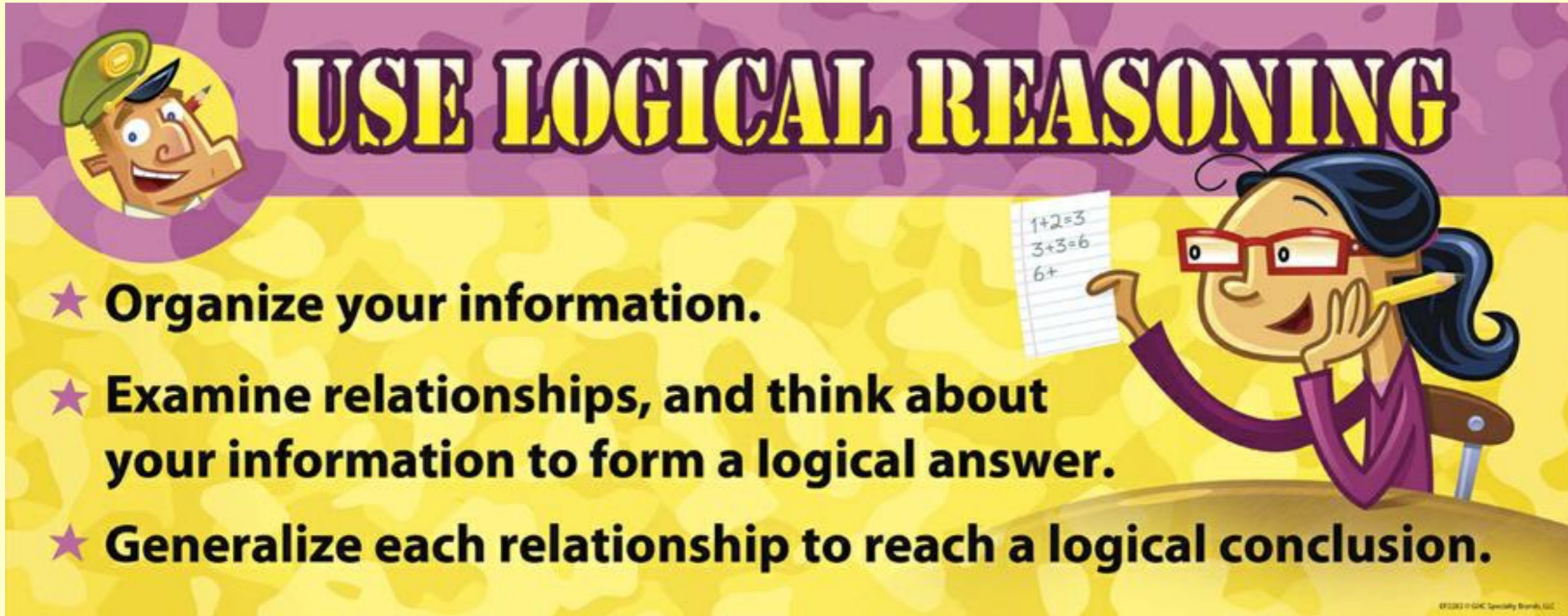
MAKE A TABLE, LIST OR CHART

- ★ **Decide what information needs to go on your chart.**
- ★ **List all the possibilities in a table or chart to make sure pieces of the problem don't get lost.**
- ★ **Organize and record the information so it makes sense.**

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Step 2: Devise a plan (translate).



USE LOGICAL REASONING

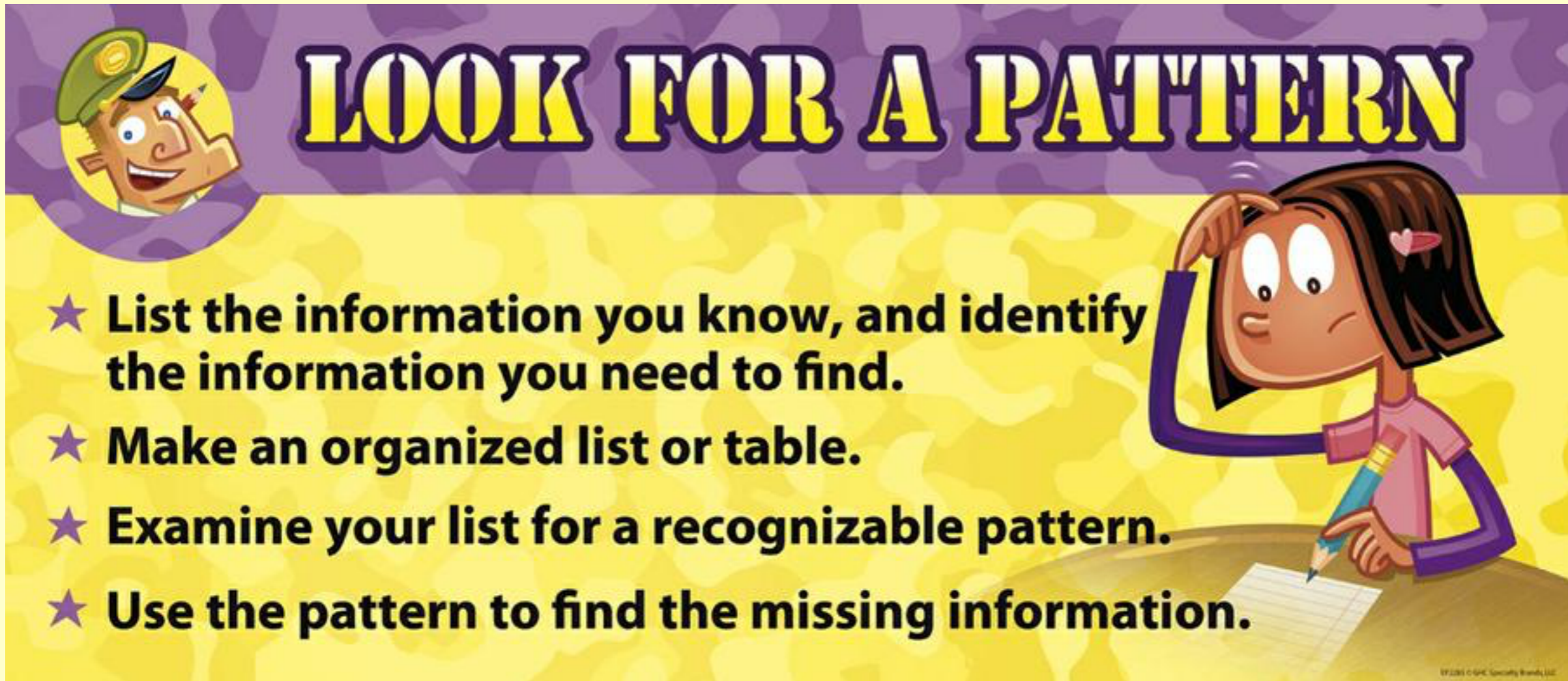
- ★ **Organize your information.**
- ★ **Examine relationships, and think about your information to form a logical answer.**
- ★ **Generalize each relationship to reach a logical conclusion.**

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Step 2: Devise a plan (translate).



LOOK FOR A PATTERN

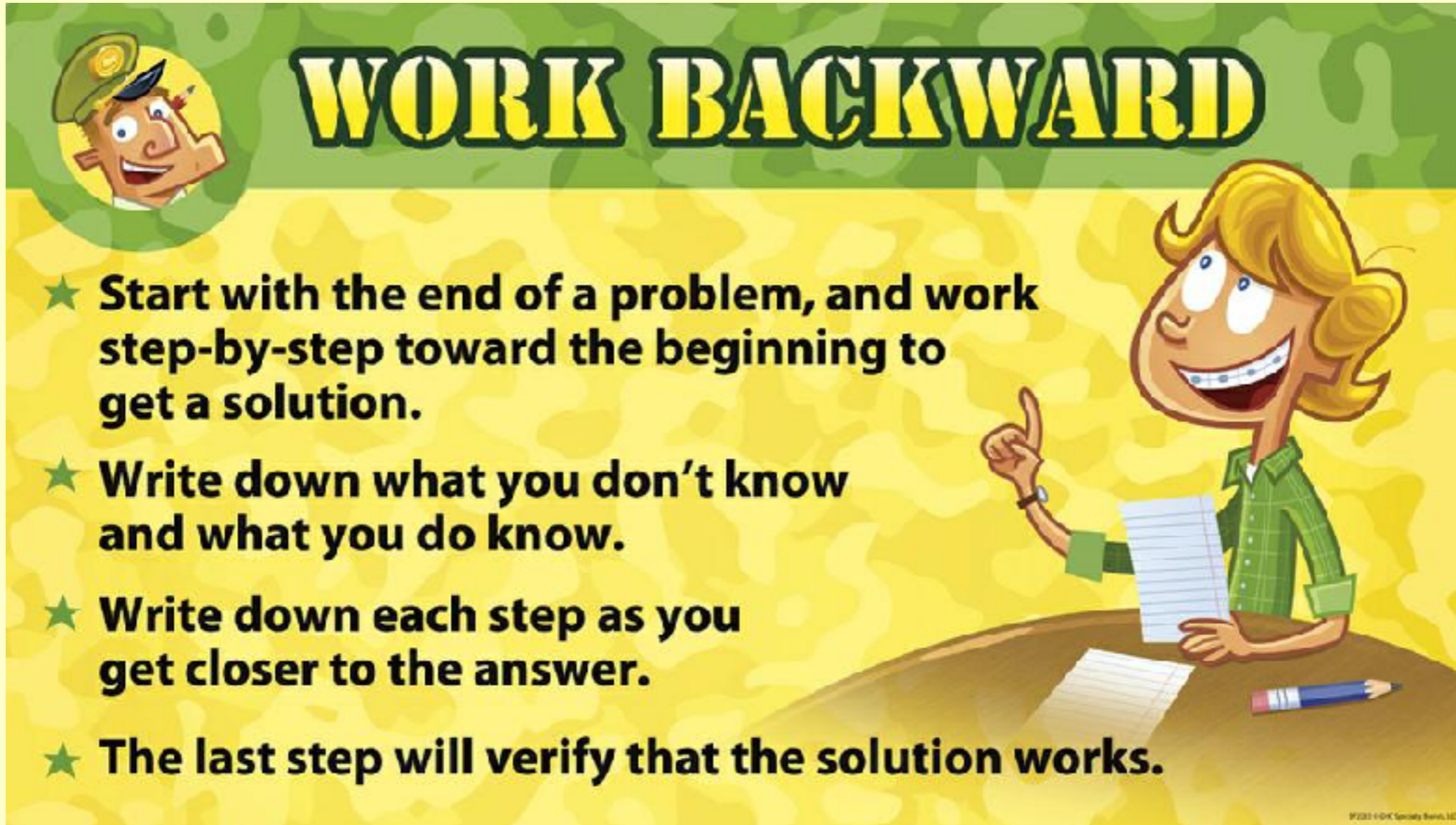
- ★ List the information you know, and identify the information you need to find.
- ★ Make an organized list or table.
- ★ Examine your list for a recognizable pattern.
- ★ Use the pattern to find the missing information.

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Hint 1 -Polya - How To Solve It

Step 2: Devise a plan (translate).



WORK BACKWARD

- ★ Start with the end of a problem, and work step-by-step toward the beginning to get a solution.
- ★ Write down what you don't know and what you do know.
- ★ Write down each step as you get closer to the answer.
- ★ The last step will verify that the solution works.

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Hint 1 -Polya - How To Solve It

Step 2: Devise a plan (translate).

Solve an easier version

IF YOU CANNOT SOLVE THE PROPOSED
PROBLEM, TRY TO SOLVE FIRST A SIMPLER
RELATED PROBLEM.

- GEORGE PÓLYA -

LIBQUOTES.COM

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Hint 2 -Polya - How To Solve It

Step 3: Carry out the plan (solve) - code patterns.

$f(x) = g(h(x))$

re-use sequence

$f(x) = g(h(x), i(x))$

split and compose

$f(x) = h(g(x), f(x-1))$

recursion

$f(x) = \text{if } p(x) \text{ then } g(x) \text{ else } h(x)$

partial solution(s)

$f(x) = \text{repeat } x \text{ times } g()$

iteration

$f(x) = g(x, y)$

generalise/specialise

$f(1), f(2), f(3), \dots f(x)$

TDD