

Problem Solving Strategies

Name(s) _____

Complete each of the following problems, using the suggested strategy. Show your reasoning process for each solution.

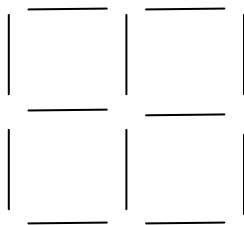
1. Draw a Picture

In a horse race, when a horse is ahead of another horse so that his tail is even with the head of another, he is said to be one length ahead. The length refers to the length of the horse. In a make-believe horse race, Citation finished one length ahead of Seattle Slew, Spectacular Bid finished ahead of Citation but behind Secretariat, and Man-of-War finished four lengths ahead of Seattle Slew and one length behind Spectacular Bid. What was the finish place of each horse?



2. Experiment, Act out, or Use Manipulatives

(a) Move 3 toothpicks to form 3 equal-sized squares with no toothpicks left over.



(b) How many pennies can you arrange so that every penny touches every other penny?



3. Find a pattern.

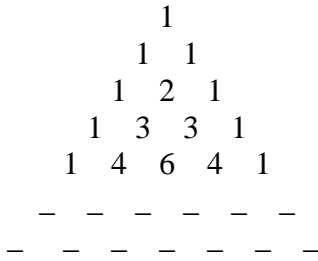
(a) Game of 50 — Find a partner. The game is played using the numbers 1, 2, 3, 4, 5, and 6. The two players (A and B) alternate in selecting numbers, and the first to reach 50 wins. As each new number is selected, it is added to the sum of the previously selected numbers. For example, if the first person picks 3 and the other person picks 6, the total is now 9. The first person may select any number and add it to the total. The first to reach 50, wins. There is a very cool strategy to this!

Show a game example:

A										
Total										
B										
Total										

P.S. Try to discover the optimal strategy and show an example where you are “in control” throughout the entire game.

- (b) Pascal's Triangle — Complete the next two rows in this famous and useful triangle of numbers. Describe the pattern.



4. Make a table

Three young couples walked across Landis Green on the way to a movie. One girl was dressed in red, one in green, and one in blue. The boys wore outfits of these same three colors. The boy in red spoke to the girl in green, whom he wasn't dating, and said, "Isn't it funny, Jennifer? Not one of us is going with the person dressed in the same color." Who is going to the movie with whom?

5. Guess, check, and revise (Trial and error)

Make a "magic square" by completing the table so that each row, column and main diagonal has the same sum. The sum needs to be 15 in each case. Show each step.

		2
	5	
	1	

6. Solve a simpler problem/look for a pattern

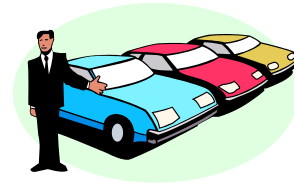
A man earns \$1 on the first day of a job. The second day, he is paid \$2, the third day \$4, the fourth day \$8, and so on. Each day, his salary is twice that of the preceding day. He plans to stay on the job for 15 days and wishes to know what his total earnings will be. Find an easier way to determine his total salary without adding up all fifteen days' earnings. [This could also be considered a "looking for a pattern" problem.]

7. Use logic

Twenty balls numbered 1 through 20 are mixed up in a barrel. How many balls must you draw from the barrel (without looking) to be sure that you have three odd-numbered balls?

8. Use an algebraic method (solving linear systems with substitution)

A sales person wants to rent a car for one day. Rental Agency A charges \$35 per day plus 20 cents per mile driven. Rental Agency B charges \$30 per day plus 25 cents per mile driven. Should she rent the car from Agency A or Agency B to get the best rate? [Hint: Consider a low mileage situation and a high mileage situation, and use algebra to find the critical mileage number that makes the costs the same.]



9. Work backward

(a) You enter a store and spend half your money and then \$10 more. Then you enter a second store and spend half your remaining money and then \$20 more. You enter a third store and spend half of your remaining money and then \$30 more. Now you have no money left. How much money did you have when you went into the first store?

(b) A water lily doubles itself in size each day. From the time its first leaf appeared to the time when the surface of the pond was completely covered took twenty days. How long did it take for the pond to be half covered?



10. Unit analysis

Jim Morris (in the movie *The Rookie*) could throw a baseball pitch 98 mph. If the distance from the pitcher's mound to home plate is 60 ft 6 in., find the time it takes for his major league pitch to go from his hand to the catcher's mitt. Round to the nearest hundredth of a second.

11. Use a formula

There is a building with a 12 ft high window. You want to use a ladder to go up to the window, and you decide to keep the ladder 5 ft away from the building to have a good slant. How long should the ladder be? Draw a picture, and show proper use of the Pythagorean Theorem.

Do your best! Rise to the challenge! Live and learn!