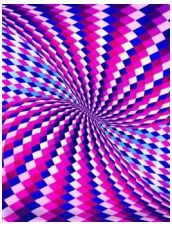


Problem Solving Strategies

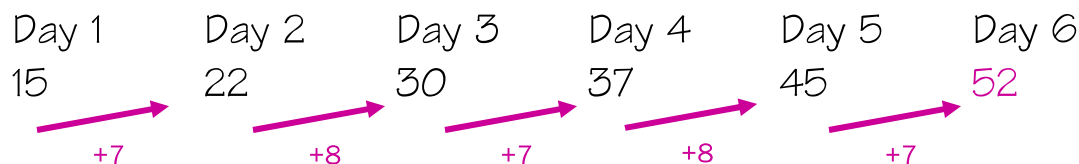


Look For A Pattern

A pattern is a regular repetition. A pattern can use number or visual shapes. By identifying the pattern, you can predict 'what will come next' or what will happen again in the same way. This strategy can be used with many different kinds of problems and with other strategies.

For example:

Abby and Owen noticed they were getting more snails in their garden this summer. On the first day they found 15 snails, then on the second day they found 22 snails. On the third day they found 30, 37 on the fourth, and 45 on the fifth day. How many snails will they find on the sixth day?



SOLUTION: On Day 6, Abby and Owen found 52 snails (using +7, +8 pattern).



Guess & Check

Some problems can be solved by using the Guess & Check strategy. It is a way to use your guesses to make better and more accurate guesses as you solve a problem. If the first guess is correct, the problem is solved. If not, change your guess and recheck until the solution is found.

For example:

Jane and Simon collect baseball cards. Jane has 4 more cards than Simon. Together they have 14. How many does each one have?

	First Guess	Second Guess	Third Guess
Simon = ?	6	3	5
Jane = ? + 4	(6+4) 10	(3+4) 7	(5+4) 9
Total = 14	16 too high	10 too low	14 GOT IT!

SOLUTION: Simon has 5 baseball cards, Jane has 9 baseball cards. Together they have 14 baseball cards.

Problem Solving Strategies



Draw A Picture

This strategy does not require pictures or diagrams to be well drawn. It is helpful to visualize (see) parts of a problem in order to help you understand and move the information around as needed.

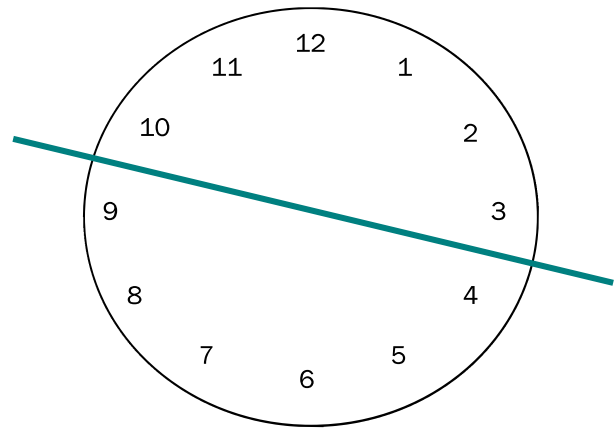
For example:

Using a clock face labeled with the numbers 1 through 12, draw a straight line to divide the clock into two sections. It must be divided so that the sum of the numbers on one side of the line will equal the sum of the numbers on the other side of the line.

SOLUTION:

$$10 + 11 + 12 + 1 + 2 + 3 = 39$$

$$9 + 8 + 7 + 6 + 5 + 4 = 39$$



Organized List, Table or Chart

Making an organized list helps you organize your thinking about a problem. Writing your work in an organized makes it easy to review what has been done, and plan for what still needs to be completed. Using a table or chart to record a list helps you keep track of information, identify missing information, and find the information needed to complete the problem.

For example:

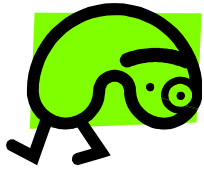
Amy and Lynette are sisters. They have always played well together despite their age difference, Amy is 4 years old and Lynette is 13 years old. When will Lynette be twice as old as Amy?

SOLUTION:

In 5 years, Lynette will be 18 and Amy will be 9 years old.

	Today	1 year	2 years	3 years	4 years	5 years
Amy	4	5	6	7	8	9
Lynette	13	14	15	16	17	18

Problem Solving Strategies



Working Backwards

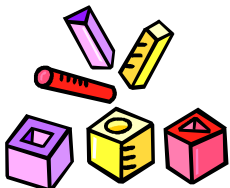
To solve some problems, you begin working with the information presented at the **END** of the problem and finish solving it with the information presented at the **BEGINNING** of the problem. Carefully reading the problem, identify what math operations are being used, then use the **IN-VERSE** (opposite) operation to work backward to the problem's beginning.

For example:

Duncan returned from shopping with \$3.00 left in his pocket. He had spent \$9.25 for lunch and \$12.75 for a new book. How much money did he have before he went shopping?

<p style="color: purple; font-size: 2em;">?</p> <p>minus \$9.25</p> <p>minus \$12.75</p> <p>Start with the END of the problem</p>	<p>= \$3.00 left</p>		<p>\$3.00</p> <p>ADD \$12.75</p> <p>ADD \$9.25</p> <p>= \$25.00</p>	<p>Work backwards using the opposite math operation</p>
--	----------------------	--	---	---

SOLUTION: Duncan had \$25.00 before he went shopping.



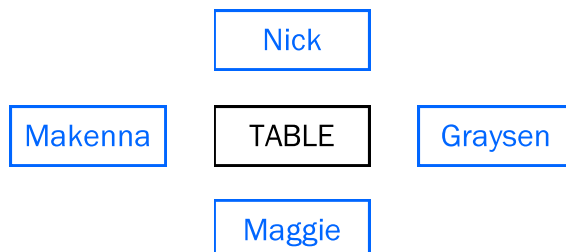
Act It Out or Use Manipulatives

To help you see a problem clearly, some problems may require you to act it out or manipulate objects to develop a visual. This allows you to see the information in the problem and how move objects so that you can see the solution in action. Manipulatives can be pieces of paper, counters, beans or any object that helps you visualize the relationships in the problem.

For example:

In playing a game, Nick sits across from Maggie, Graysen is at Maggie's right, and Makenna complains that Nick's right elbow bumps her left arm. How are the friends arranged at the table?

SOLUTION:



Problem Solving Strategies



Deductive Reasoning

When several facts are included together to find a solution, use reasoning skills to help you solve the problem. Logical thinking is really used for all problem solving.

For example:

Mary and Jack each have a job. One is a bricklayer. One is a carpenter. The man is not a bricklayer.

SOLUTION: If Jack is the man and not a bricklayer, Jack is the carpenter and Mary is the bricklayer.

The information given is often organized in a chart or matrix grid. This type of problem requires you to make sense of statements/clues given in a problem as you work through it to identify relationships in the statements or eliminate choices.

For example:

Sydney, Alex, Timmy and Katie were in line at the cafeteria. Each one chose a different lunch. The lunches they chose were a slice of pizza, a taco, a hamburger, and a hot dog. Eat through the statements to discover what each student chose for lunch.

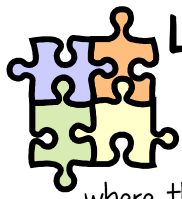
- Alex is in the same class as the girl who chose a hamburger and the girl who picked a hot dog.
- Timmy told the others he was allergic to pizza.
- Sydney hates hot dogs.

	Pizza	Taco	Hamburger	Hot Dog
Sydney	X	X	O	X
Alex	O	X	X	X
Timmy	X	O	X	X
Katie	X	X	X	O

SOLUTION:

- * Eliminate both Alex and Timmy (boys) from the hamburger or hot dog choices. CLUE 1
- * Being allergic, Timmy would not have chosen pizza. After eliminating that choice, he is left with having a taco. CLUE 2
- * With taco taken by Timmy, Alex is left with pizza as his only choice. CLUE 2
- * Sydney would not choose the hot dog, so she chose hamburger, leaving Katie to have the hot dog. CLUE 3

Problem Solving Strategies



Logical Thinking

Logical thinking is really used in many ways for all problem solving. Although Sudoku puzzles are made up of numbers, there are no calculations involved. You must use logic to work out where the numbers go. Variations of the puzzle can include using symbols or letters in place of numbers. Every puzzle is different but the logic is the same: no two of the same number, symbol or letter can be in any row, column or mini-grid puzzle.

For example, a beginner's puzzle:

3	1	4	2
4	2	3	1
1	3	2	4
2	4	1	3

SOLUTION: There is only one way to finish each puzzle, begin by looking for columns or rows with the most numbers included to help you fill in. Looking at the third column, a 2 and 1 are present, you are missing the 3 and 4. You cannot place a 3 in the top square because there is already a 3 in that row. The top square of the third column must be a 4 and the square underneath must be where the 3 belongs.

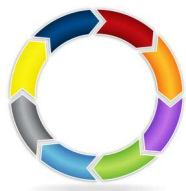
The top row now contains a 3, 1, and 4—missing the 2. The second column contains a 1 and 2, missing the 3 and 4. The 3 cannot be placed in the last block of the column because there is a 3 already in the bottom row. The bottom row is now only missing a 2. To complete the puzzle you can now simply look at the individual 2x2 mini-grids inside to fill in the missing number of each to complete the puzzle.

For example, a medium level puzzle:

SOLUTION: A good way to begin is to look for number that already appears frequently in the puzzle. The number 3 appears in every column but the second and third columns. The second box in the top row is the only place open that does not have a 3 in the column underneath. The third column only has one box open where a 3 does not appear in the rows. Looking at the top row, there is only one box open to place a 2. The second column also only has one box open for a 2. The second column is missing a 1 and 5. The 1 cannot be placed in the second box of the column, this box is part of the mini-grid where a 1 is already in the mini-grid so the 5 must go there. To complete the top left mini-grid, a 4 and 6 are missing. The 4 must go in the top left box of the grid because there is a 4 already at the bottom of the third column. The top row is missing a 6. The second row is missing a 1 and 4, carefully placing the 1 under the 5 since there is a 1 in the fifth column down. The third column is missing a 2 and 5, there is a 2 in the fifth row so the 2 needs to be placed under the 3 in the third column. From here, looking at various rows and columns to find the missing numbers to make sure no two numbers reside in the same row or column or mini-grid.

4	3	1	5	2	6
2	5	6	1	4	3
5	6	3	2	1	4
1	4	2	6	3	5
3	1	5	4	6	2
6	2	4	3	5	1

Critical Thinking Strategies



Common Connections

To Some of the most common types of riddles have clues to the solution within them, but have to be thought about very carefully to be fully understood. For these lists, you must find the common trait, feature or thread between all of the items. In many cases there may be more than one shared characteristic.

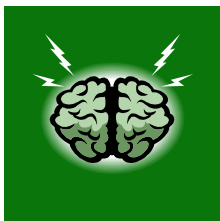
For example:

House

War

Finger

SOLUTION: Paints (house paint, war paint, finger paint)



Brain Teasers

A riddle, sometimes called a "brain teaser," is usually a question that requires clever or unexpected thinking for its answer. The structure of a riddle typically uses one of several techniques to create a twist, which makes it difficult to guess. One common technique involves double meanings. If the double meaning is in the words of the question, then the language creates intentional confusion. The riddle intends one meaning and hopes that the solver will understand the words differently and guess incorrectly.

For example:

Samantha fell over 30 feet. She wasn't hurt and barely had a scratch on her. How is that possible?

SOLUTION: Samantha tripped over 15 of her classmates who were sitting on the floor. It was their feet, not the distance in feet.

Another method for deception in riddles involves a deliberate attempt to make a listener come to a false conclusion.

For example:

I am found in Paris, but not in France. What am I?

SOLUTION: By using city and country, you mislead into thinking the object may be part of a location. It is the letter l, which is a part of the word Paris but not in the word France.

Critical Thinking Strategies



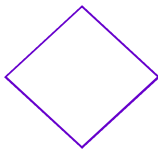
Amazing Analogies

An analogy is a comparison between two things. It points out the similarities between things that might be different in other situations. This comparison highlights the common characteristics of two things, and think about the possible relationship. Once a relationship is identified, you can use that connection to determine the relationship between two new things you are comparing.

For example: (visual)



SOLUTION:



For example: (verbal)

Pencil *is like* write *as* brush *is like* _____.

SOLUTION: paint (comparing an object with its job)



Improvisation & Creative Writing

Use knowledge of vocabulary, grammar and punctuation to create sentences for a narrative. Using inferencing, main idea, plot, character and setting to write a creative narrative with a title that reflects the main idea in the story.

By using the words and punctuation supplied you are challenged to create complete sentences that make sense, use only one word per blank, and may not add any other punctuation or blanks.

Review the blank story. Pay attention to the words provided and the punctuation included. Brainstorm what you would like the story to be about. Begin filling in the blanks of the narrative. It must make sense! Finally, give your story a title that summarizes the main idea!

Critical Thinking Strategies



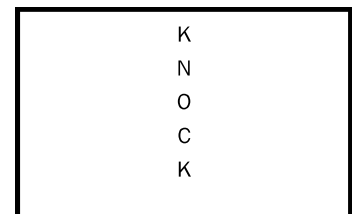
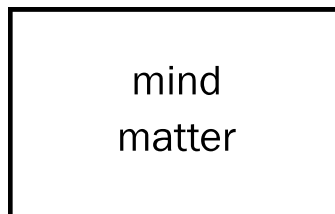
Position Puzzles

To key to solving a visual word puzzle is to look at the way the words are written in the box. After some practice, you will see a pattern that will enable you to solve and decode position puzzles easily.

A few clues to help you get started:

- Words that are written near the upper part of a box usually mean 'top' or 'high'
- Words that are written near the bottom part of a box usually mean 'bottom' or 'low'
- Words that are written vertically from top to bottom, or bottom to top, will have the words 'down' or 'up' as part of the word or phrase
- Words that are written on the far right or left side of the box will have the terms 'right,' 'left,' or 'side'
- Words written larger or in bold may have the word 'big,' while words written very small may use 'little,' 'small,' or 'tiny'
- Many times the number of the words or letters in the word will give you a hint, as number words may be part of the solution
- Words written above or below other words usually use the words 'above,' 'under,' 'over,' or 'below' in the phrase
- Words that are written in front of or after another word may indicate needing the word 'before' or after as part of the phrase
- Watch for position puzzles that use one or more of these techniques to disguise the solution!

For example:



SOLUTION:

“once in a blue moon”

“mind over matter”

“knock down”