1

PENNY PROBLEMS

Problem Solving

Skill: Problem solving

Players: Alone or in small group

Directions:

1. Penny Moves

Six pennies start out in the triangular shape shown in Figure 1 below. They are to be moved into the six-sided shape as shown in Figure 2.

To move a penny, you must slide it so that it does not disturb any other penny and so that it ends up touching two other pennies. The pennies must stay flat on the surface at all times.

Can you rearrange the pennies as required, using only four moves?

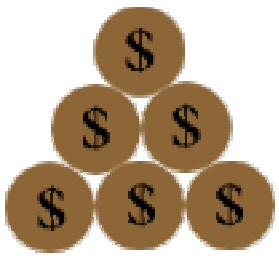


Figure 1

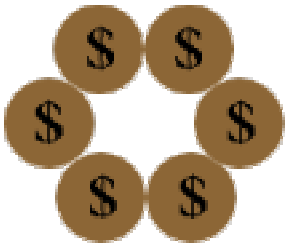


Figure 2

2. Invert the Triangle

A triangle of pennies is made as in a) below. What is the smallest number of pennies that have to be moved to turn the triangle pattern upside down as in b)?

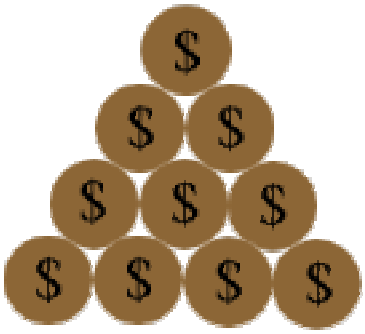


Figure a)

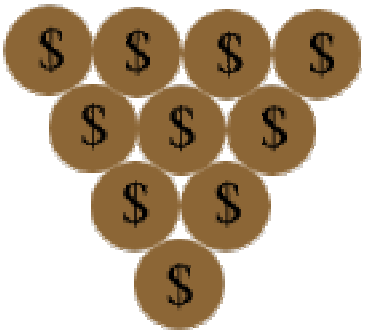
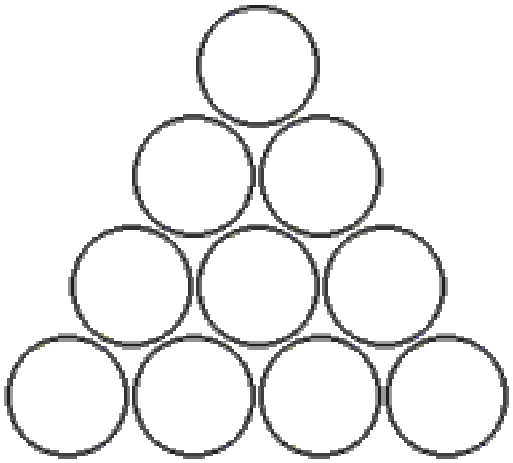


Figure b)

3. Jumping Pennies

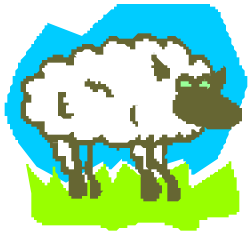
Use nine pennies to cover nine of the circles below, leaving one circle uncovered. Jump one penny over another, making sure there is an empty circle behind it on which to place the jumping penny. Take the penny that was jumped over off the board. Continue jumping one penny over another onto empty circles until there are no more jumps left to make. (NOTE: Pennies may only jump over one penny at a time, and there may not be any empty circles between pennies during jumps.)

Continue practicing until you have only one penny left at the end of a minute.



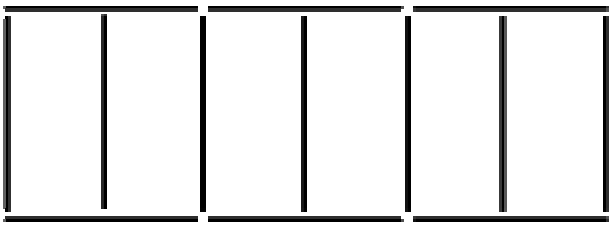
TOOTHPICK PROBLEMS
Problem Solving

Skill: Problem solving using manipulatives
Number of people: One or small group
Directions:



1. The Farmer's Sheep Pens

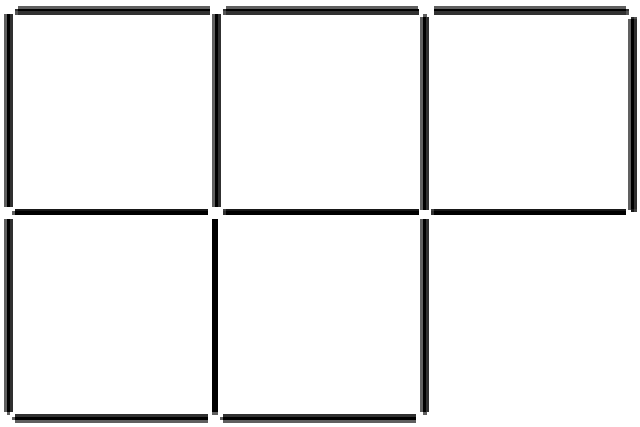
The drawing below shows how a farmer used thirteen toothpicks to make six identical sheep pens. Unfortunately one of the toothpicks was damaged. Use twelve toothpicks to show how the farmer can still make six identical pens.



2. Toothpick squares

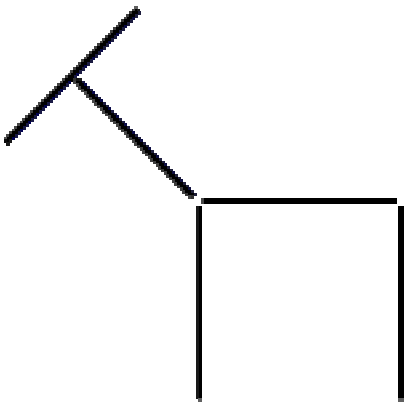
Remove three toothpicks from the fifteen in the arrangement shown so that only three squares are left.

Now try removing two matches for the arrangement shown to leave three squares. This time the squares need not all be the same size.



3. Toothpick Animal

Show how by moving exactly one toothpick to another position you can obtain a second animal that is the same size and shape as the first.



3

A BAG OF MARBLES
Problem Solving

Skill: Problem solving using logical reasoning
Number of people: One or more
Directions:

Figure out the following problem:

A bag of marbles contains cats-eyes, blue, green, and white marbles. How many of each are there if:

The number of green is half the cats-eyes
There are more white than green
There is three times as many green as blue
There are twelve cats-eyes.

Check the bag to see if you were right!

4

THE KOALA BEAR
Problem Solving

Skill: Problem solving using pictures
Number of people: One or small group
Directions:

<u>Koala Bear Problem</u>

A sleepy koala bear wants to climb to the top of a fruit tree that is 10 meters tall. Each day the bear climbs up 5 meters but at night, while asleep, slides back 4 meters. At this rate how many days will it take the bear to reach the top of the tree.

Draw a picture to help you solve the problem. Use scrap paper or graph paper.

******Questions for understanding:*

How tall is the tree?
How far did the bear climb during the day?
How far did the bear slip back at night?
What does reach the top mean?

******Hints for solving*

The answer is not ten days. Use your picture to see why.

5

MAGAZINE PROBLEM SOLVING
Problem Solving

Skill: Solving “real life” problems from magazines
Number of People: One or two

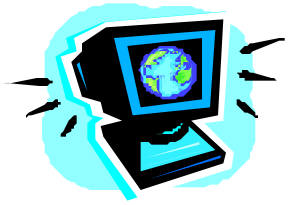
Directions: Use this magazine to solve the problems listed below. Then, make up some new problems from this magazine or another magazine and have a friend solve them.

Example Problems:

1. Page 13
   Note all the “measurements” in this ad. What does 60/40 mean? How many miles per year does the owner drive if he/she drives the maximum amount in the maximum time for the comprehensive warranty? For the major component warranty?
2. Page 19
   If the tax is 14% and I order one E244K and one N103K, how much is my total?
3. Page 34
   If you made all the recipes on this page, how much of the following ingredients would you need:
   Sugar; butter; white chocolate; dark chocolate
4. Page 65-68
   What is the most inexpensive gift you can purchase from these pages? If you wanted to spend over $20.00 and under $25.00 (not counting tax) and buy TWO items, what choices would you have?

6

VIDEO ARCADE
Problem Solving



Skill: Problem solving using a table
Number of people: One or two

Directions: Solve the following problem using the tables provided. Use the dry-erase marker and clean the sheets when you are finished.

There are four different video games at Lulu's Arcade. Dennis, Olivia, Joey, and Grace each played one video game. Then they each moved to another video game, one that they hadn't played yet, until each person had played all four games.

During the second round, Dennis played Game 1, and Olivia played Game 3. During the third round, Joey played Game 2 and Grace played Game 4. During the fourth round, Olivia played Game 2 and Grace played Game 3. Figure out which game was played by each child for each of the four rounds.

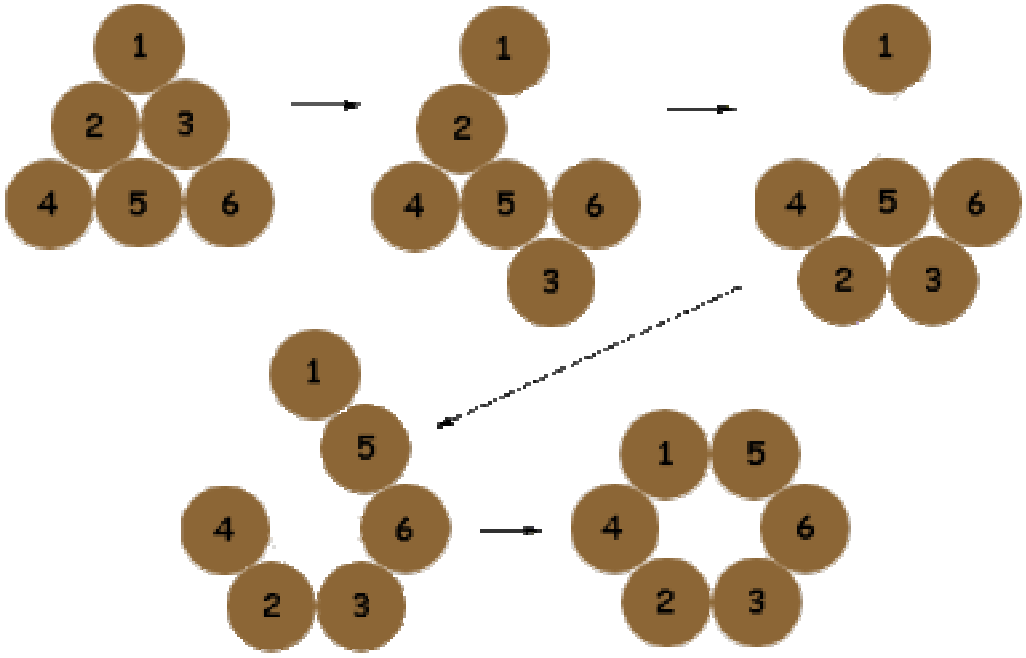
Name	Round 1	Round 2	Round 3	Round 4
Dennis				
Olivia				
Joey				
Grace				

Name	Round 1	Round 2	Round 3	Round 4
Dennis				
Olivia				
Joey				
Grace				

Problem Solving - Answers to Problems

1 Penny Problems

1. Penny Moves



2. Inverted Triangle

Here's one solution:

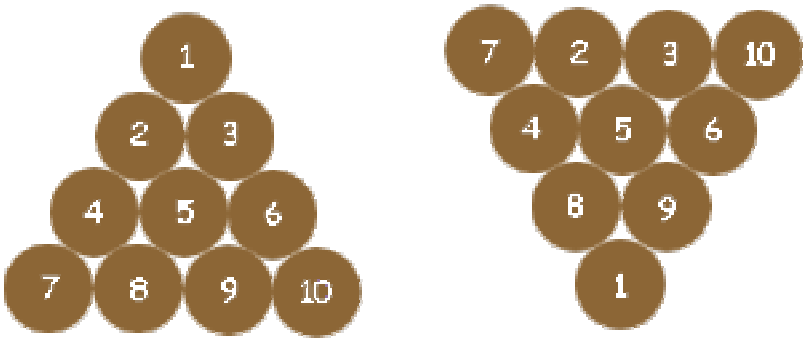
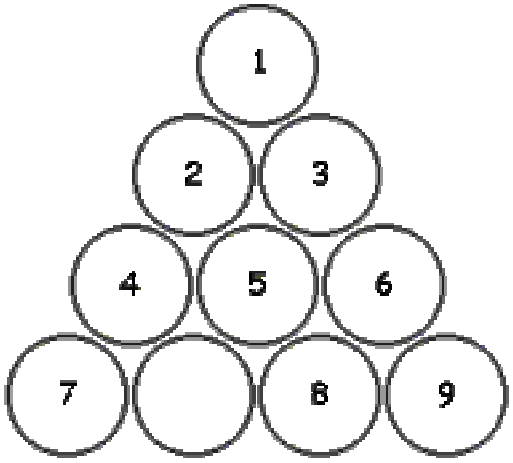


Figure a) Figure b)

3. Jumping Pennies

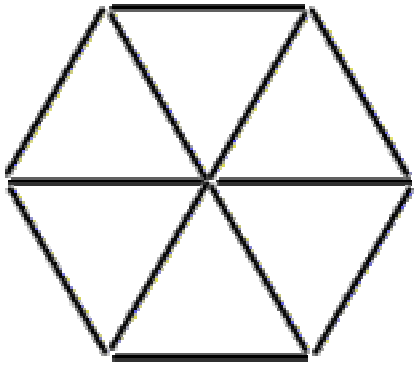
Here is one solution:



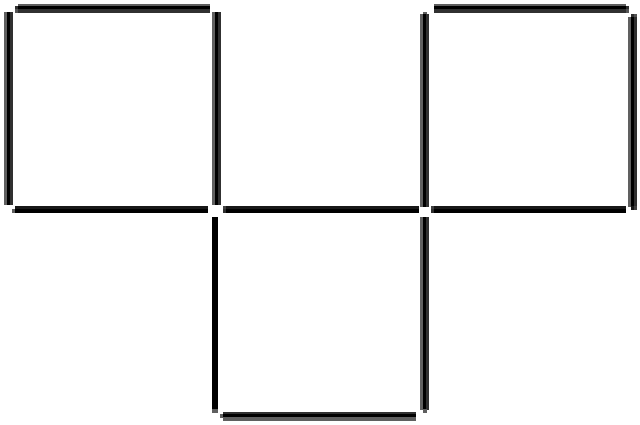
- 9 jumps 8, remove 8
- 2 jumps 5, remove 5
- 7 jumps 4, remove 4
- 2 jumps 9, remove 9
- 6 jumps 3, remove 3
- 2 jumps 1, remove 1
- 6 jumps 2, remove 2

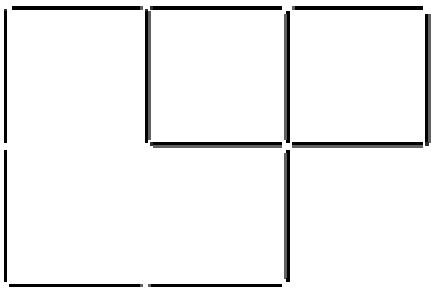
2 - Toothpick Problems

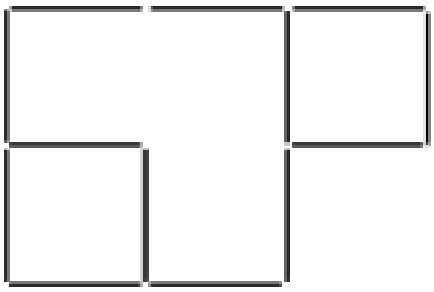
1. The Farmer's Sheep Pens



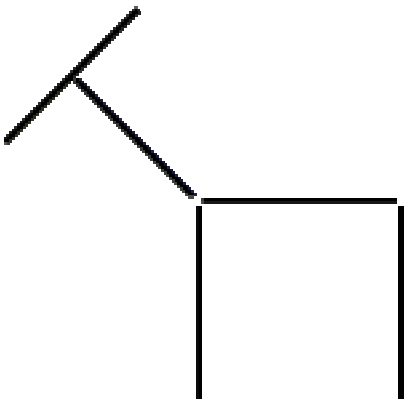
2. Toothpick Squares

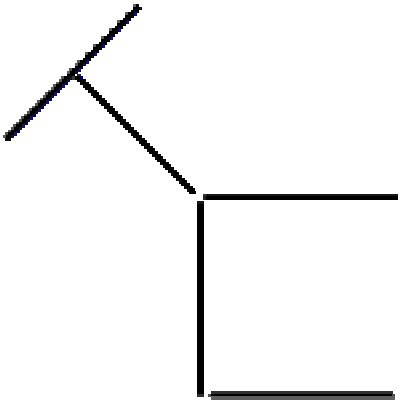






3. Toothpick Animal





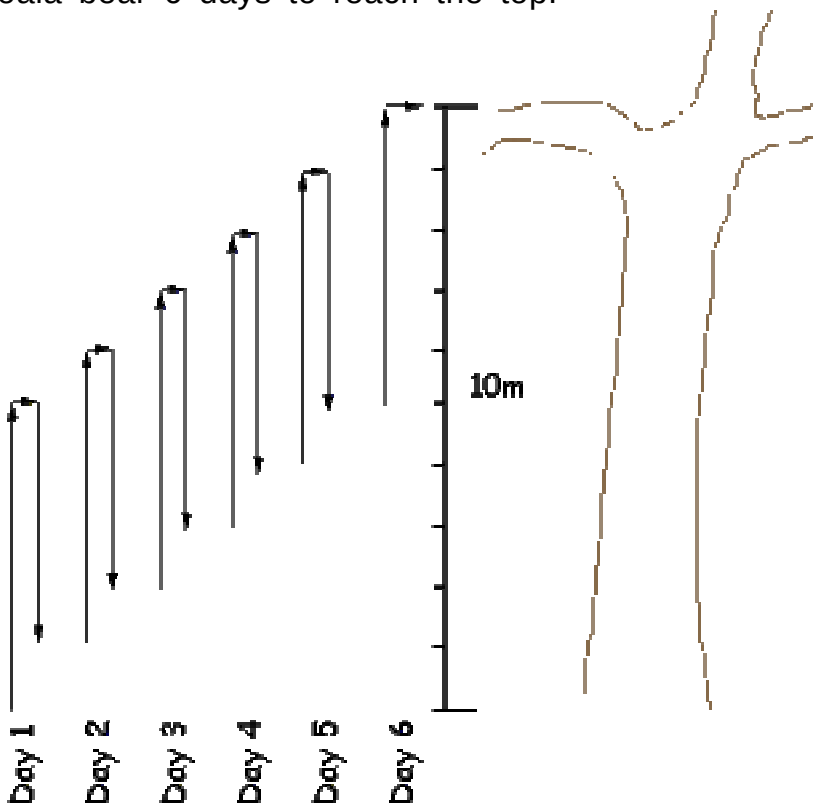
3 - A Bag of Marbles

There are:

- 12 cats-eyes
- 6 green
- 2 blue
- 10 white

4 - The Koala Bear

It takes the koala bear 6 days to reach the top.



5 - Magazine Problem Solving

Find some problems of your own in magazines that you have available to you.

6 - Video Arcade

	Round 1	**Round 2**	**Round 3**	**Round 4**
Denns	Game 1	Game 2	Game 3	Game 4
Oliva	Game 3	Game 4	Game 1	Game 2
Joey	Game 4	Game 3	Game 2	Game 1
Grace	Game 2	Game 1	Game 4	Game 3