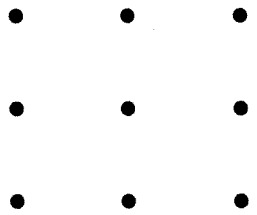
Cognition Lab

Lab 0: Problem Solving

Problem 1. Draw four straights lines that pass through each of the nine dots without removing your pencil from the paper.

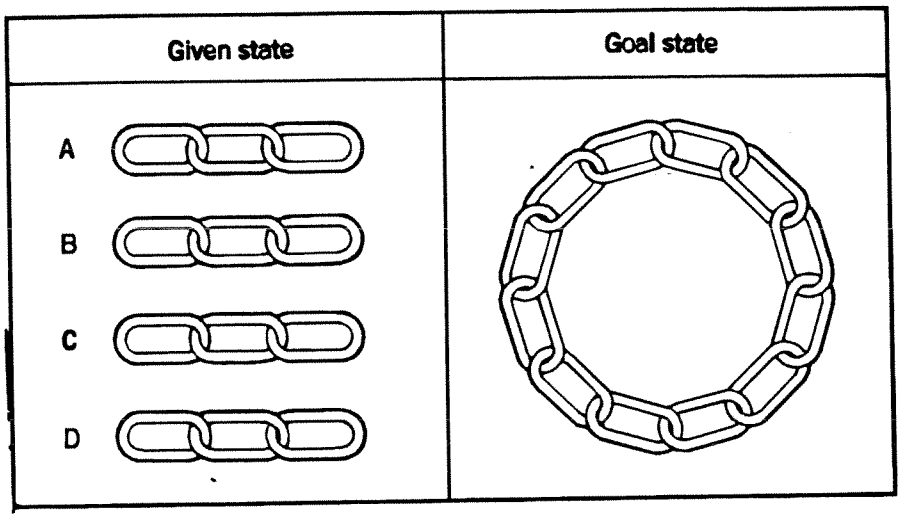


Problem 2. Arrange six matches so that they form four triangles with all sides equal to the length of one match.

Problem 3. In each of the problems below you have 3 empty jars (A, B, & C) with the capacities listed. Your job is to measure out a volume of water (listed as "desired amount") by using the three jars.

Problem	Capacity of jar A	Capacity of jar B	Capacity of jar C	Desired amount
a.	21	127	3	100
b.	14	163	25	99
c.	18	43	10	5
d.	9	42	6	21
e.	20	59	4	31
f.	23	49	3	20
g.	18	48	4	22
h.	14	36	8	6

Problem 7. You are given 4 separate pieces of chain that are each 3 links in length (see left diagram). It costs $100 to open a link and $150 to close a link. All links are closed at the beginning of the problem. Your goal is to join all 12 links of chain into a single circle (see right diagram). Your total budget for forming the circle is $750.



Problem 8. A hobo can make 1 whole cigar from every 5 butts he finds. How many cigars can he make if he finds 25 cigar butts?

Problem 9. Ten male senators are on their way to the Inaugural Ball. A crowd of disgruntled taxpayers attacks them with a volley of snowballs, knocking each senator's top hat to the ground. A helpful page retrieves the hats and hands one to each senator— but without checking to see who owns which one. What is the exact probability that exactly 9 senators will receive their own hats?

Problem 10. A conversation took place between two friends, a philosopher and a mathematician, who had not seen or heard from each other in years. The mathematician, who had an exceedingly good memory, asked the philosopher how many children he had. The philosopher replied that he had three. The mathematician then asked how old the children were. Her friend, who knew how much most mathematicians enjoy puzzles, said that he would give her a number of clues to the children's ages.

The philosopher's first clue: "the product of the children's ages is 36." The mathematician immediately replied that this was insufficient information.

The philosopher's second clue: "All of the children's ages are integers; none are fractional ages such as 1½ years old." Still, the mathematician could not deduce the correct answer.

The philosopher's third clue: "The sum of the three children's ages is identical to the address of the house where we played chess together often, years ago." The mathematician still required more information.

The philosopher then gave his fourth clue: "the oldest child looks like me." At this point, the mathematician was able to determine the ages of the three children. Here is your problem: What were the ages of the three children?