

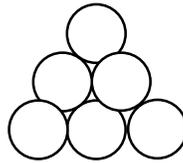
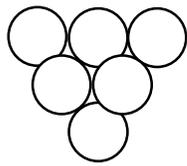
## Central Florida Math Circle

University of Central Florida  
Department of Mathematics

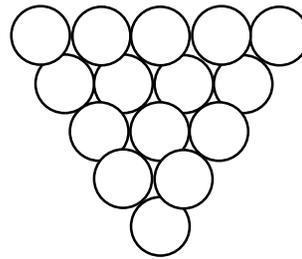
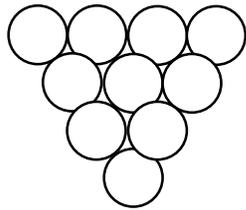


*Each student first works on these problems individually, then forms into groups and conducts group discussion.*

**Problem 1 (Reverse the Triangle)** Six pennies are placed on the table to form a triangle as shown. By sliding one penny at a time, reverse the triangle so that it points in the opposite direction. How many pennies do you have to move?

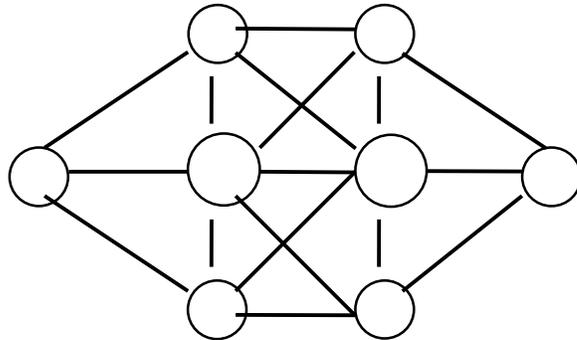


Now put ten pennies on the table to form a triangle. Reverse the triangle by sliding one penny at a time. How many pennies do you have to move?



How about 15 pennies? How about 21 pennies? Can you say something in general?

**Problem 2 (Digit Placing Puzzle)** Write the numbers 1 through 8 in the circles so that no two numbers inside circles joined by a line differ by 1. For example, if you put a 4 in one circle, you cannot put a 3 or a 5 in any of the circle joined by a line.



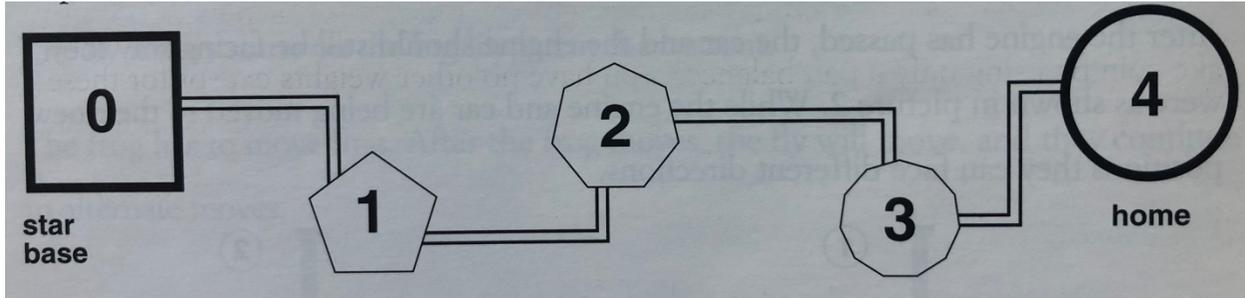
Can you design a similar digit placing puzzle using numbers 1 through 4 with 4 circles? How about numbers 1 through 6 with 6 circles? How about numbers 1 through 10 with 10 circles? Can you explain why you could do this or not?

Name: \_\_\_\_\_

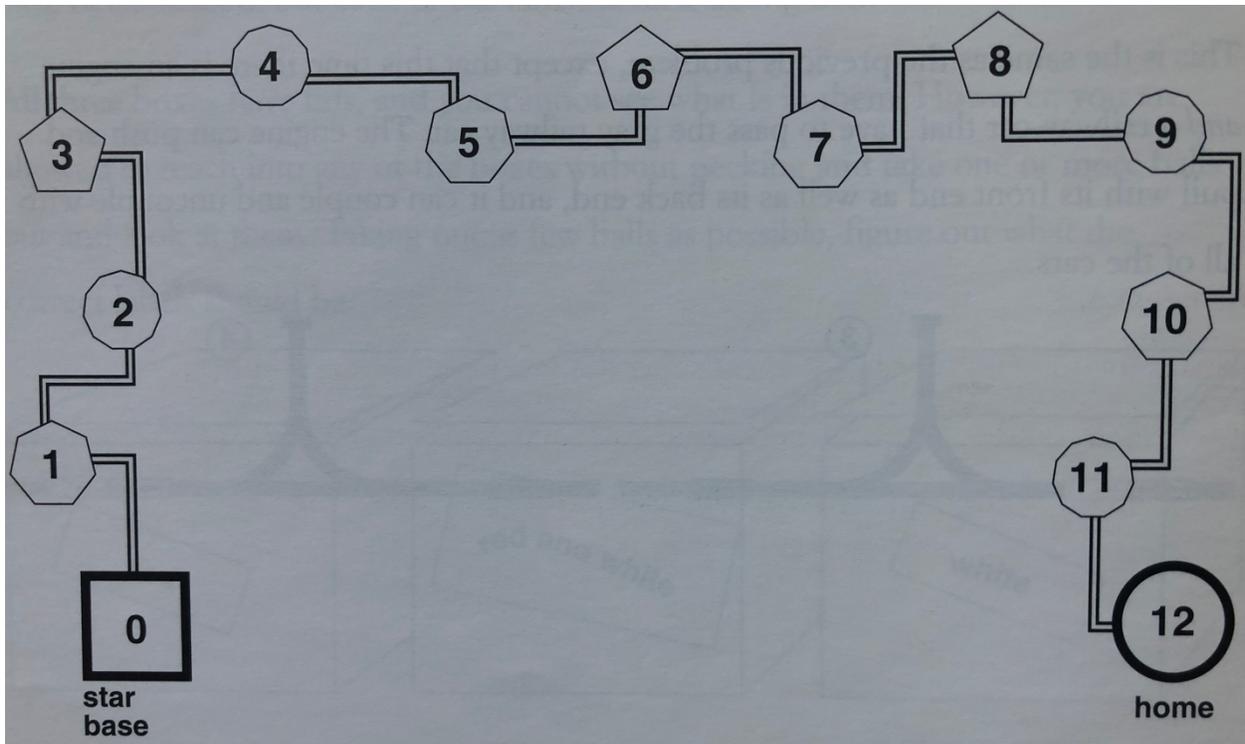
School Grade: \_\_\_\_\_

**Problem 3 (Space Travel)**

You are the pilot of a spaceship, and must travel home from a star base as shown. The only way is to take the space tunnels that connect through three space stations. However, it takes a lot of fuel to travel through a space tunnel. For each space tunnel, it takes one energy capsule. You have 6 energy capsules at the star base, but can carry only 3 at a time. You will have to pass through 4 space tunnels. You can store energy capsules at the space stations. How will you travel home from the star base?



This is like the previous problem. To get home, you will have to pass through 11 space stations and 12 space tunnels. For each space tunnel, it takes one energy capsule. You have 24 energy capsules at the star base, and you can carry up to 8 at a time. How will you travel home from the star base?



If you can carry up to 6 energy capsules at a time, how many energy capsules do you need to pass through 11 space stations and 12 space tunnels?

**Problem 4 (Cup Game)**

Please participate the cup game and figure out how to successfully play it. Can you write down a guidance (secret recipe?) to explain how to win the game with a student of 4<sup>th</sup> grade?

You are welcome to submit your solutions to all or part of problems to [ucfmathcircle@gmail.com](mailto:ucfmathcircle@gmail.com) or bring a hard copy to our next meeting. Thanks and have fun!