**Fox, Chicken and Corn**

You need to get a fox, a chicken and a sack of corn across a river. You can only take 1 item across at a time. You cannot leave the fox and the chicken together because the fox will eat the chicken, if the you are not there. You cannot leave the chicken and the sack of corn together otherwise the chicken will eat the corn, if you are not there. How do you do it?

**Sequencing**

The instructions are exactly the same but in a different order and the shape drawn will be different. Can you draw the two shapes?

1. forward 50 steps
2. forward 50 steps
3. turn left 90 degrees
4. turn left 90 degrees
5. turn left 90 degrees
6. turn left 90 degrees
7. forward 50 steps
8. forward 50 steps
9. forward 50 steps
10. turn left 90 degrees
11. forward 50 steps
12. forward 50 steps
13. turn left 90 degrees
14. turn left 90 degrees
15. turn left 90 degrees
16. forward 50 steps

**Die Hard**

In the movie "Die Hard with a Vengeance" there is a riddle that requires algorithmic sequencing. Bruce Willis and Samuel L. Jackson are given a 3 litre vessel and a 5 litre vessel neither of which have any markings.  They need to measure out *exactly* 4 litres of water to prevent a bomb going off in 30 seconds. How do they achieve this?

A group of monkeys on a branch

Description automatically generated with low confidence**The Rat Problem**

* A rat can move into an empty space.
* A rat can jump over one rat.

1. Can you get the rats to swap places?
2. What is the minimum number of moves?
3. Can you explain how you did it?
4. Extend your method to other numbers of rats

Abstraction - Use coins/pens/cards to help you

**Logical Reasoning 1**

Statements: Barney is older than Chloe

Doris is older that Barney

Conclusion: Doris is older than Chloe

Is the conclusion true or false?

**Logical Reasoning 2**

Statements: All teachers eat cake

Mr Green is a teacher

Conclusion: Mr Green does not eat cake

Is the conclusion true or false?

**Mexican Standoff**

You find yourself in a three-way Mexican standoff. You have a 1 in three chance of shooting an opponent. The second opponent, Peter has a 2 in three chance and Homer the third opponent has a 100 percent hit rate. Because you are the worst shot you get to go first. Peter gets to go second and Homer third. Everyone can think perfectly logically and each is aware of the others’ shooting capabilities. Explain what your best strategy is to be the last one standing.

**The Towers of Hanoi**

* **Chart

  Description automatically generated**All disks must be moved from peg A to one of the other pegs.
* Disks must be moved one at a time.
* A disk can only be placed on top of a larger disk.

**Counter Hopping**

* Swap around the red and blue counters.
* You can only move into an empty space or jump a counter of an opposite colour.
* You cannot move counters backwards
* Use coins to help you
* Break the problem down and try with fewer counters to start

Table

Description automatically generated

**Towers of Hanoi**

* Move the disks from one peg to either of the ither two pegs.
* A lager disk cannot be placed on top of a smaller disk
* How many moves does it take?

Icon

Description automatically generated

**Card Turning 1**

* You are shown the four cards below.
* Every card has a number on one side and a letter on the other.
* Every card that has a vowel on one side has an even number on its opposite side.
* Explain which card(s) you need to turn over prove that the vowels even rule is true?

Icon

Description automatically generated

**Card Turning 2**

* You are shown the four cards below.
* Every card has the age of a customer and what they are purchasing.
* To purchase fireworks the customer needs to be 18 or over.
* Explain which card(s) you need to turn over verify that customer purchases are legal?

Whiteboard

Description automatically generated with low confidence

**Konigsberg bridge problem**

Is it possible to cross all bridges but only crossing each bridge once?

**Icon

Description automatically generated with medium confidence**

**Bebras**

[**https://www.bebras.uk/**](https://www.bebras.uk/)

**Knights Tour**

Get the knight to visit all squares on the board once.

A knight can move two squares horizontally and 1 square vertically or two squares vertically and one square horizontally.

Chart, box and whisker chart

Description automatically generated

**Balance Scales**

You have 8 balls and a set of balance scales. Seven of them weigh the same. One of them is heavier. How do you find the odd ball with 2 weighings?

**Extension: Balance Scales**

You have 12 balls and a set of scales. 11 of them weigh the same. 1 of them has a different weight, (you don't know if it's heavier or lighter). How do you find the odd ball with 3 weighs?

**Sudoku**

Each row, column and 3 by 3 box must contain the numbers 1-9 without repeats.

**Table

Description automatically generated**