Escape the House

You are trapped in a house on the top of a hill.

There are two identical doors

- one door is a real door and safe

- the other is a trap and deadly

Outside there are two demons who trapped you in the house.

You cannot see the demons and their voices are identical.

The only clues you have are:

- one demon always lies

- one demon always tells the truth

You are allowed one question to one demon.

After your question, you must decide what to do.

Logic

This puzzle is an exercise in logic and reasoning.

The solution relies on working out what question will give the same answer from both demons.

It requires that you understand what to ask and what to do with the answer.

This factors into programming and problem solving.

It can use truth tables to work out the effects of always telling the truth and always lying.

This can be expressed using Boolean Algebra for the logical expressions.

The solution relies on the understanding of the operators NOT and AND.

These Boolean operators are core to how we design computer hardware and software.

Crossing the River

You are a farmer attempting to cross a river on your land.

You have to transport across the river:
- A fox
- A sack of grain
- A chicken

You have a boat but can only take one of the three things in it at a time.

You know the following will happen:
- if you leave the chicken and the fox together, the fox will eat the chicken
- If you leave the chicken and the sack of grain together, the chicken will eat the grain

How does you cross the river and get all three things to the other side intact?

Logic and Combinations

This problem mainly relies on realising what things can be left together.

The other element it relies on is which way you transport items.

This factors into programming and problem solving.

The problem can be broken down into steps and at each step if a certain combination is present you will fail.

You need to work out which pair of items is safe to leave together.

This can be expressed using Boolean Algebra for the logical expressions.

Combinations of conditions (item pairs in this case) are how we can build up complex circuitry and approach difficult reasoning programs.

Escaping the Zombies

Four people are running away from a zombie horde. If they are caught they will be eaten.

It is nearly midnight and very dark. The four people have a single flaming torch to light their way.

They reach the bridge to cross the deep fast moving river near their village.

The bridge is old and unstable - only two people can cross at a time and they need the torch to light their way safely.

The people will all take different time to cross the bridge:

- 1 minute
- 2 minutes
- 5 minutes
- 10 minutes

When moving as a pair, they always move at the speed of the slower person.

The zombies are 17 minutes behind them, how do they all get across without the zombies catching them or getting onto the bridge?

Meeting a Target

This problem is about meeting a target which on the surface seems very difficult.

This is related to a set of problems known as river crossing problems. This introduces the constraints on what you can do with both time limits (17minutes) and equipment limits(torch/bridge).

This can be approached in different ways including:

- Blind Brute Force Attack – just try every combination

- Constraint Structured Search – recognise the constraints and use them to eliminate poor options and concentrate on better options

One of the key things in this problem is to recognise how the immediate thought made not be the best thought.

This problem can be expanded into other areas:

- route planning – a classic example being the Travelling Salesman Problem

- job scheduling – maximising use of computer resources