

Gopher Holes

William the Weasel's favourite meal is gopher, so when William spies Gordon the Gopher he starts salivating as he takes off in hot pursuit. "That gopher is going to be my supper tonight" thought William. But Gordon the Gopher didn't wait around and, without William seeing, jumped into one of his four holes. William the Weasel was used to this. He had spent his whole life chasing gophers.

Gordon's holes were connected in a straight line by a skinny tunnel that William couldn't fit through



Gordon the Gopher during happier days... posing in the entrance to hole #1.

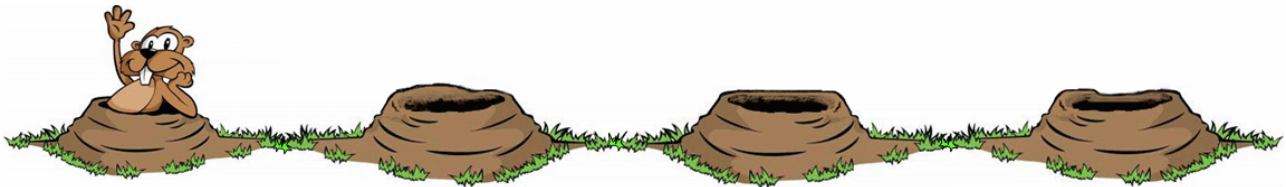
Every minute Gordon tunnels to a nearby hole to hide. He never stays in the same hole on two successive minutes and he never moves more than one hole away. William can search any tunnel he wants each minute even one that he had just searched. Unfortunately for William the Weasel, Gordon the Gopher was no ordinary Gopher. Gordon predicts the future. Gordon knows exactly which holes William will search and in what order.

How can William catch Gordon in just two minutes?

An example that leaves William hungry: William tries to catch Gordon first in the Right hole and then in the Middle hole. Gordon, knowing this, might first hide in the Middle hole and then hide in the Right hole.

Another example that leaves William hungry: William tries to catch Gordon first in the Left hole and then in the Left hole again. Gordon, knowing this, might first hide in the Right hole and then hide in the Middle hole.

Extensions:

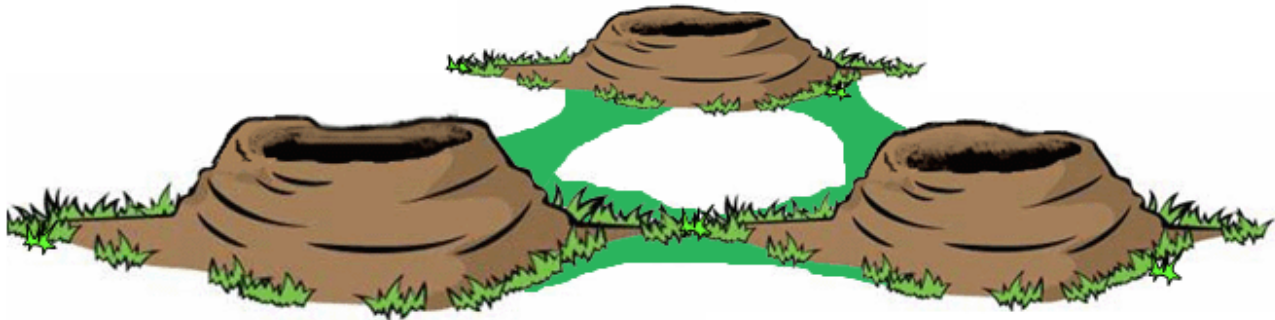


- Unfortunately, Gordon actually lived in four holes - not three. Find a way to capture Gordon in just 4 minutes.
- Find a way for William to catch Gordon if there are 5 holes. Is it always possible that William will catch Gordon if the holes are in a line?

- William the Weasel and his cousin Wesley, together search for a future-seeing Gordon the Gopher in the following 3x3 home in which connections are horizontal and vertical between holes. If Gordon the Gopher is trying to last as long as possible, how long does it take William and Wesley to capture him?



- Create a home where 3 weasels are needed to catch Gordon and they can do it less than 10 minutes.
- Create a home where 3 weasels are needed to catch Gordon, but it takes them more than 10 minutes to do it.
- How many friends would Wesley have to bring in order to catch Gordon in if he hid in this home?



- If Gordon the Gopher does not have to move each turn, but can choose to stay in the same place, how does it complicate matters for the weasels?
- If Gordon the Gopher can move through any number of tunnels, how does it complicate matters for the weasels?
- Design a home in which some tunnels are one way. How does this change the strategy?
- If Gordon the Gopher could not tell the future, how should William the Weasel search in order to maximize his chances of catching Gordon in the 4-holes-in-a-row home with 2 searches? 3 searches?

The Math in This Problem:

This investigation involves analytical reasoning in order to predict future occurrences. In this puzzle, students will develop and apply various strategies to develop a fitting solution.