



Elf on the Shelf



Part 1: Elf on the Shelf Challenge

Your task is to design and build a shelf that can support the weight of an elf and keep it 6 inches off of the ground. You will be given pipe cleaners, note cards, and tape to build your shelf. You will also be given a ruler so that you can measure how high up your elf is. Remember that the elf has to be 6 inches off of the ground so think about how you can use your materials to make that happen.

When you place an elf on your shelf, the force of the elf will push downwards on your shelf. How can you design your shelf to support the weight of the elf in order to prevent your shelf from breaking?



PART 2: ELF ON THE BRIDGE CHALLENGE

If you were able to successfully build a shelf for your elf, your new task is to design and build a bridge made out of popsicle sticks and tape that can do two things:

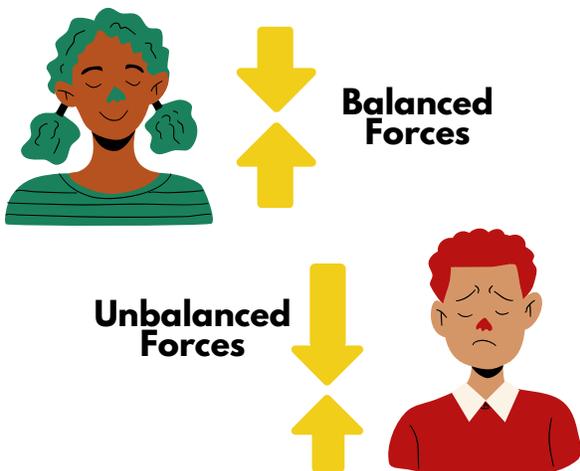
- (1) span a large gap and
- (2) hold as many elves as possible.

How many elves can your bridge hold without it breaking?

When you place more elves on your bridge, there will be more force pushing downwards on your bridge. How can you design your bridge to distribute that force in a way that doesn't break your bridge? Think about the different shapes of bridges that you may have seen and come up with an idea that can support all of that weight.



SCIENTIFIC CONCEPT:



The weight of your elves will push downwards on your bridge due to the force of gravity. The shelf and bridge that you build must counteract that weight by pushing upwards on the elves. In science, we call this a balanced force because the force of the weight pushing downwards and the force of the shelf/bridge pushing upwards equal and cancel each other out. However, if your bridge can't push upwards as hard as the elves push downwards, then the elves will break your bridge and move downwards. Since the force of the elves pushing downwards exceeds the force of the bridge pushing upwards, we call that an unbalanced force.

